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HISTORY OF GEOLOGICAL SCIENCES**

INHIGEO

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

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

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

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**The Great Fold of Nant d'Arpenaz, made geologically famous by H.B. de
Saussure**

Sketch by Beryl Hamilton



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The INHIGEO Board for 1996–2000, as Confirmed by the IUGS Council in Beijing, August, 1996

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REPORTS

President's Message

We should first thank David Oldroyd for the wonderful job he has done in supporting INHIGEO and in encouraging the study of the History of Geology, especially through his recent book *Thinking about the Earth*, Athlone Press, London 1996 which, after some fine reviews, is already available in German, and Turkish and Chinese translations are pending.

The death of our friend Peter Schmidt in Freiberg on 6 February 1999 will remind us how suddenly the scythe of the 'grim reaper' can fall—and on those, like Peter, who had so very much to give us. We send Anka, his wife, and their children, our thanks for all that Peter did, both for the study of the history of geology and the maintenance of the 'cultural heritage' in our libraries and museums.

Talking of scythes and 'cultural heritage', however, only reminds me that the scythe was, until recently, the official emblem of the university I have worked at for over thirty years. The scythe was used disgracefully in the past year, with the sudden and secret sale to a London book dealer (for an unsatisfactory sum) of our wonderful book collection, the Turner Collection, owned since 1968, when it was gifted to Keele University. This sale went through without *any* proper discussion amongst faculty members and *no* consultation whatever with those, like me, who were known to use it. We were merely told by the 'managers'—who now proliferate in British Universities—that such material was no longer part of the 'University's portfolio' (whatever that means) . . . *

It was wrongly claimed that the Collection concerned only the study of the History of Mathematics—even if this field was so easily and neatly separable from the history of other areas of science. The geologist John Farey (1766–1826), on whom I had been busy working, and after whom 'Farey numbers' in mathematics are named, was also a scholar in music theory and performance. Our Turner Collection contained some unique material relating to Farey's work in mathematics, which, since its sale to the bookseller, is no longer available to scholars. Such tri-mathy as Farey could indulge in is now virtually impossible, and apparently undesirable. We must all, instead, become experts in 'tunnel vision', for which—we are told—the narrower the tunnel the better the vision.

Problems in selling unique resources, or 'cultural heritage', have also directly affected historians of geology in Britain this year with the sale at auction of the library of the Royal Geological Society of Cornwall (in the very month of Peter's Schmidt's death). This Society was founded early in 1814 and may well be the second oldest surviving geological society in the world. I was present at the library sale in Bath, when the unbelievably high prices realised demonstrated the extraordinary interest there now is in buying old geology books right round the world. I have written some thoughts on this sale, and other 'Reflections on the Sale of Learned and Academic Libraries', for the next book catalogue of the major London book dealers, Maggs Bros, who purchased much at the Bath sale. My remarks give my thoughts on how such sales might be better moderated in future. We should in particular try to see that any such future sales are conducted with more openness and less secrecy, if only

* University practices, and the behaviour of (male) administrators, are parodied in a *hilarious* pseudonymous book: Charles Cutting, *The Surleighwick Effect*, Zoilus Press, London, 1993. Write for a copy to Zoilus Press, PO Box 9315, London E17 4UU, sending £7.99 (or even £8.00 if you like). The novel's 'hero' is an historian of science; and the reader is also told how to turn oneself into a distinguished scholar in this field. (As a useful exercise, the reader may also wish to try to distinguish between Surleighwick University and some other present-day institutions. The main theme of the book has to do with the sale of a university's more precious library holdings.) (Ed.)

to honour Peter's memory. We must also ensure that the next INHIGEO meeting at Freiberg in September (that Peter had so well organised for us) is an outstanding success.

In June there will be an international meeting at Lyme Regis in England to honour a woman in geology, one of the first to achieve an international reputation among geologists, Mary Anning (1799-1847). This promises to be a memorable occasion in which INHIGEO will have played its part. But we need to do more to persuade people that the history of geology is important. This seems to be a battle we may be losing. Any ideas from readers on how we can improve this situation will be much appreciated. The History of Geology needs all the encouragement it can get in these 'marginalising' times.

As for me, at this present unhappy time, I am reminded of my sojourn in Skopje, then in Yugoslavia, in 1963, when for a short time I became an ambulance driver during the dreadful earthquake which then hit that city. The terrible times being suffered there again prove, if only to me, that history, when properly carried out and not based on either myopia or nationalism, does have a vital explanatory role.

Hugh Torrens, Keele University, United Kingdom

Secretary-General's Report

When I was asked to let my name go forward to serve as INHIGEO Secretary-General my predecessor Ursula Marvin said that the work-load was seasonal and busy at times, but overall not terribly time-consuming. She emphasised that she had found the work exceedingly rewarding, taking one into contact with people all over the world, who, she said, were remarkable for their helpfulness and spirit of friendly co-operation. I entirely agree with Ursula about the pleasure that is to be gained by friendly communication with people all over the globe. But I cannot say that the work has not been time-consuming. One suspects that this may be a function of the world's email system. Perhaps I write more letters than is really necessary. Or perhaps (as one may suspect) it is simply that Ursula is more efficient than I am. Be this as it may, it has certainly been a busy year for me.

First, I must thank all those colleagues who have kindly supplied information or reviews to go into this *Newsletter*. (I should also thank my wife, who has been looking after the 'data base' and has organised the mailings, along with quite a number of incidental jobs.)

Second, I must add my words of thanks to those who have, elsewhere in the *Newsletter*, hailed our Swiss colleagues, who organised such a magnificent conference for us last September. Readers will find several tributes to our generous hosts for their splendid efforts, producing a joyous sequence of events that will long be remembered by those who were lucky enough to participate in them. Switzerland is indeed a fortunate country, with its beautiful scenery, villages, towns, and cities, and its efficient organisation, not to mention its being a Mecca for both geologists and historians of geology. My colleague, Hugh Torrens, has particularly requested that he be associated with these remarks.

But I should perhaps offer a word of apology here to our second field-leader, Professor Henri Masson of Lausanne. Regrettably, I do not have a synoptic view of the geology of the localities we visited under Henri's leadership, such is provided by Nazario Pavoni for the first excursion under Professor Rudolf Trümpy. But this should in no way be construed as any sort of suggestion that the second trip was any less successful, instructive, or enjoyable than the first. We all had a splendid time.

I was pleased to have the opportunity to say a few words of thanks to Henri at the end of the field trip on behalf of those participating. Among my comments I referred to the excellence and quantity of the materials he distributed; and the excellence of both his English and French! I think Henri is the only person I have met whose French is largely intelligible to me, because—for whatever reason—he speaks at a proper speed. Greatly appreciated! For their part, Professors Schaefer and Trümpy both speak perfect English (and as said Henri's is excellent too), and so there were no communication problems at all. Their several contributions are referred to elsewhere in the *Newsletter*.

We should also like to thank Dr Endre Dudich for organising a one-day session at the Conference of the Carpathian-Balkan Geologists' Association in Vienna, shortly before the Swiss meeting. Unfortunately, several of the persons who intended to be at the Vienna meeting were unable to be there at the last moment, so Endre cheerfully stepped into the several breaches and read their papers for them. I think he spoke four times altogether (including presenting his own paper of course), most ably on each occasion. We are exceedingly grateful to him for his effort and admire his ability to wear so many hats so gracefully. Incidentally, the Vienna meeting seems to have provided a great stimulus to our Austrian colleagues (who have been a bit silent for a while). This can be seen by their Annual Report, which reveals the large amount of work currently being done in the history of geology in Austria.

The ballot for new Members of INHIGEO took place last year, and twenty-seven historians of the geosciences were elected. However, a number of Members failed to vote at two consecutive elections. Hence, as determined at the Business Meeting in Neuchâtel, and in accordance with the rules governing the Commission's activities, I wrote to those persons and informed them that their membership would lapse unless I specifically heard from them that they wished to remain Members. Several people did respond, and their names were restored to the membership list. Even so, we have lost several former Members—though numbers have increased overall. Please note that the 'exclusion rule' will be applied at future elections, so that even if you wish to abstain from voting for all candidates it is necessary to send in your ballot paper. In future, incidentally, ballots will be conducted entirely by post: we are dispensing with the clumsy use of proxy votes.

My annual report was submitted to the IUGS as in the two previous years. We were pleased to receive the following response: "The [IUGS has] accepted the INHIGEO report and commended the leadership of the Commission. The Executive Committee reiterated its request that the Commission prepare articles on benchmarks of geology, with comments, to be occasionally published in *Episodes*." From this, it is evident that INHIGEO contributions to *Episodes* are regarded as important by the IUGS. I should be grateful if persons who may have ideas as to how we may best meet the IUGS's suggestion would contact me or Professor Torrens. There needs to be a round-table discussion of this issue, with concrete proposals put forward for consideration, at our next business meeting in Freiberg.

Regarding conferences and related matters, many people will have heard of the tragic and sudden death of our colleague Dr Peter Schmidt, whose obituary appears in this *Newsletter*. Peter was working extremely hard on what was evidently for him a great labour of love, into which he was throwing himself wholeheartedly. Already by the end of last year he had organised an impressive list of speakers. The meeting is, of course, going ahead (see p. 15), but it will surely not be the same without Peter. It is intended that the meeting be dedicated to his memory as well as that of Abraham Gottlob Werner, and I hope and trust that many Members, and others will want to travel to Freiberg to take the opportunity to visit one of the most important localities in the world so far as the history of geology is concerned. We are most grateful to Dr Ladwig for stepping into Peter's shoes to take over the organisation, and to Professor Helmuth Albrecht for undertaking to ensure that the meeting proceeds as planned, even without its principal motive force.

The next International Geological Congress will be held in 2000, in Rio de Janeiro, Brazil, for which a significant INHIGEO presence and degree of activity are planned. For details, see p. 16.

The situation regarding 2001 is somewhat 'fluid' at the time of writing. Two proposals have been under consideration by the Board. The issues are explained on p. 16. The Board's preference is to go to Turkey rather than Mexico, but if we proceed with that plan (*i.e.* Turkey in collaboration with the Geological Society of America), and if the GSA accepts the proposal for a 'Field Forum' in Turkey, it should be understood that it may be the case that there will be insufficient 'space' to accommodate all those who may wish to attend. It will, therefore, have to be a case of 'first come, first serve'. Other meetings are mentioned in the appropriate place in this *Newsletter*.

Regarding the Commission's publications, several matters should be mentioned. First the bad news. As Members may be aware, it was for long intended that the *Proceedings* of the XVIth INHIGEO Symposium, held in Dresden in 1991, should be published in Germany. But the project was delayed, first by the political upheavals and difficulties in that country in the early 1990s, and then by the death of one of the co-editors, Gerhard Mathé. Then the other co-editor, Peter Schmidt, was taken ill, and the project dragged on, with some persons withdrawing their papers. The Board had felt for a while that it was time to abandon the project, but Peter regarded it as a matter of honour that the work should be completed and so the Board did not press the matter. Editorial work was continuing in Berlin, and the publication might, I suppose, have been completed eventually—but not this year, we believe, with all the activity in Freiberg for the Werner Symposium. Following Peter Schmidt's untimely death, it was decided (after consultation with Frau Schmidt) that the project should be dropped; and so in April this year I and Professor Martin Guntau wrote to the people whose papers had been kept in waiting so long, explained the situation, and said that the papers were now to be returned to the authors. We deeply regret this unhappy conclusion, but hope and trust that the persons particularly concerned, and all Members of the Commission, will understand the situation and agree that we made the correct decision.

On a much happier note, we can record the appearance of the splendid 'Volcanoes Volume', edited by Italian Member Professor Nicoletta Morello and handsomely produced by Brigati publishing house in Genoa. This massive, profusely illustrated, tome of 755 pages, which is the printed outcome of the splendid conference held in Italy in 1995, is, in my view, the outstanding publication of the Commission to date, and I am sure that we would all want to thank Nicoletta for the tremendous amount of work she put into its production. The book is reviewed on p. 32. All Members are strongly recommended—nay commanded!—to obtain a copy.* Incidentally, for those interested in the history of volcanology, I would also draw attention to the books recently published by Antonio Nazzaro (see p. 33) and Emile den Tex (see p. 46). The latter is in Dutch, which is not a language read by a great number of people, but consideration is currently being given to the publication of an English translation.

Regarding the papers at the Liège conference in 1997, it was the original intention that these should appear as a special issue in *Annals of Science*, but this hope was not fulfilled, partly because not everyone got their papers in in good time and also because some referees were slow in writing their reports. However, several of the papers are scheduled for publication in the journal and will begin appearing this year. We should express our gratitude to Professor Kenneth Taylor for the large amount of work he put into the refereeing and editorial processes. I can testify to his efforts personally, as he had a great deal of helpful advice to offer so far as my own paper was concerned.

I understand that about a dozen papers arising from the Swiss conference were submitted for possible publication in the journal *Eclogae Geologicae Helvetiae*, and Professor Schaer is seeing to the matter of refereeing. I have no recent information as to how this process is getting on, but INHIGEO will endeavour to assist with publication costs if called upon to do so.

For other publications, we were pleased to be able to produce and distribute Professor Paul Mohr's bibliography on the history of geology in East Africa in 1998. If Members have other similar projects in mind, they are invited to contact me.

Members will surely be pleased to see the appearance of the first issue of an English-language *Newsletter* concerned with the history of geology work going on in Japan and describing the activities of our colleagues in JAHIGEO, which publication is distributed along with this *Newsletter*. It is good for the veil of the language barrier to be lifted thus. The idea of the publication was suggested by Professor Masae Omori and it was largely written by Professor Isao Imai. The new Member, Dr Michiko Yajima, has been the intermediary for the production of the publication. Thank you for the assistance, Michiko. Also, I should say that I *do* like Professor Yasumoto Suzuki's cherry blossom! I hope we may encourage our Chinese colleagues to consider a similar production some time in the future.

The question of the INHIGEO archives has been discussed at several recent Business Meetings. In Neuchâtel, it was decided to locate the papers as far as possible; leave them where they are where they are in safe keeping and available to the public; and otherwise transfer them to the IUGS Headquarters in Norway. My Report on this matter appears below.

The question of the numbering of INHIGEO meetings has begun to cause some difficulty, as there are now sometimes more than one meeting each year which INHIGEO organizes or with which it is associated. The matter has been canvassed amongst the Members of the Board, and the decision was reached that a number will only be allocated to a conference at which a Business Meeting of the Commission is held. Thus we have:

Italy (1995)	No. 20
Beijing (1996)	No. 21
Liège (1997)	No. 22
London/Edinburgh (1997)	—
Vienna (1998)	—
Neuchâtel (1998)	No. 23
Freiberg (1999)	No. 24
<i>etc.</i>	

There is one significant innovation in this *Newsletter*, and one reactivation of a former feature. To explain the origin of the innovation: I was fortunate enough to be able to visit Turkish Member Professor Celâl Sengör in Istanbul last October, admire his great history of geology library, talk about many matters of mutual interest, and have him as a guide to the wonders of his city, with all its fascinating and complex architecture and history. While there, we developed the idea (along with two lady American geologists who were also staying *chez* Sengör) of running a field-trip in Turkey in conjunction with the Geological

* Copies may be obtained from the publisher: Brigati Glauco, Via Isocorte 15, 16164 Genova-Pontedecimo, Italy. The price is 115,000 lire or 85,000 lire for INHIGEO Members.

Society of America, with some archaeologists joining the party. (The stage reached in this scheme is described on p. 16.) Also while in Istanbul, I took the opportunity to tape an interview with Professor Sengör, and a transcription of this most interesting conversation appears on p. 23. We hope to be able to publish such interviews with interesting and eminent members of INHIGEO each year. (Here, by the way, I should like to take the opportunity to congratulate Professor Sengör on his receipt of the Bigsby Medal of the Geological Society of London this year.) Readers of the transcription of the interview will be interested to see that Sengör was worrying about what happened to the Tethys when he was ten! I believe he has recently published a large monograph on this topic in German (which we shall try to have reviewed next year). How extraordinary to carry that grand question around with one since the age of ten—and treat it as both an historical and a geological problem!

The aforementioned 'reactivation' is simply the 'Notes and Queries' section of this *Newsletter* (which is open to both Members and non-Members of the Commission). It has attracted some interesting enquiries, and it is hoped that useful exchanges of information will emerge as a result of N&Q. Letters to the Editor are also welcome.

I repeat my wearisome annual requests. **1. Please keep me informed of changes of address, etc. And if you acquire an email address, please let me know. 2. When sending information about publications next year, please follow exactly the 'house-style' given on the inside of the back cover. (You cannot perhaps appreciate how difficult it is to sort out references written in—say—Albanian or Indonesian. That is why I make this request so emphatically. And for like reason, please do NOT NOT make abbreviations.)**

It should also be noted that I shall be overseas from August through to November, and largely out of contact.

Finally, I should like to express my warm thanks to the Members of the Board for all their helpful and timely advice. Hugh Torrens and Ursula Marvin in particular have been wise and prompt in their counsel. Here is perhaps the place to mention that Hugh was promoted last year to a chair in the History of Science and Technology at Keele University—and we warmly congratulate him for this well-deserved achievement. Ursula Marvin has now retired, but seems to be as active as ever. We wish her many good years ahead, and hope that she will always be associated with INHIGEO, to which organization she has devoted so much time, effort, and skill. Outside the Members of the present Board, I have particularly received valued help from Martin Guntau and the sadly departed Peter Schmidt. But thank you all.

David Oldroyd, Sydney

Minutes of the INHIGEO Business Meeting, Neuchâtel, September 9, 1998

1. The President opened the meeting at 5.45 p.m., with the following persons present:

Members

David Branagan, Robert Dott, Bernhardt Fritscher, Joseph Haubelt, Beryl Hamilton, Victor Khain, Ursula Marvin, Efgenyi Milanovsky, David Oldroyd (Secretary-General), Celal Sengör, Martin Rudwick, Hugh Torrens (President), Rudolf Trümpy, and Wolf von Engelhardt

In attendance

Joe Burchfield, Kathleen Vaccari, Martina Kölbl-Ebert, Thomas Marvin, Michael Roberts, Jean-Paul Schaer, Ilse Seibold, Robert Silliman, Philip Wilson

2. Apologies had been received from Albert Carozzi, Endre Dudich, François Ellenberger, Martin Guntau, Kotapelli Murty, Peter Schmidt, William Sarjeant, Ezio Vaccari, Wang Hong-Zhen, and Yang Jing-Yi.

3. The Minutes of the previous Meeting were taken as read.

4. The President reported that it was the intention of the Executive Committee to implement the statute that stated that those Members who had failed to vote at two consecutive elections. This policy would be applied only after the Secretary-General had written to every Member specifically concerned, enquiring whether there might be some reason why the rule should not be applied—such as a failure in the postal system, illness, etc. Also, proxy voting was to be abolished, and all future elections were to be by postal vote only.

Professor Torrens further reported that the Executive had thought desirable to create a new position, namely that of Vice President European countries [including Russia]. Such a position would be filled at the next round of elections in 2000.

He drew attention to an advance copy of the *Proceedings* of the 1996 Conference in Italy, recently published under the editorship of Professor Nicoletta Morello, which volume (of over 700 pages), he believed represented a very substantial achievement on the part of the Commission. It was hoped that further copies would be made available during the course of the Neuchâtel Conference [which regrettably did not occur]. Copies would be made available to Members at a concessional rate of about US \$50.00. [Subsequent to the Meeting, it was heard from Peter Schmidt in Freiberg that production of the *Proceedings* of the Dresden Conference was to begin in October, 1998.]

All the aforementioned proposals were agreed to by the Meeting without objection.

5. The Secretary-General distributed voting papers to those Members who had not yet voted in the 1998 round of elections. At the end of the Meeting, it was announced that all 29 Members in the 1998 ballot had been duly elected.

In response to a question from Professor Dott concerning the Commission's financial situation, the S-G reported that the grant from the IUGS was now only \$2000 p.a., but this year a further grant of \$1000 had been received from the IUHPS to help defray the costs of the Neuchâtel meeting. However, since it appeared that the Swiss organizing committee had been able to raise sufficient money for the running of this year's conference, it was suggested that a sum be transferred to Professor Morello to put towards the cost of the publication of the *Volcanoes* volume, the expenses for which were not yet fully covered. The S-G would, however, approach the Treasurer of the IUHPS before such action was taken.

The S-G made an *urgent* appeal to all Members present to keep him informed of any future conferences pertaining to the history of geology so that clashes, such as the one that had occurred this year, might be avoided.

[Subsequent to the Meeting, Professor Schaer informed the S-G that if papers from the Neuchâtel conference were to be published in *Eclogae* it might be necessary for INHIGEO to provide a subvention. However this would not be necessary for papers up to 12 pages in length. Participants wishing to publish in *Eclogae* should submit their papers to Professor Schaer before the end of 1998.]

6. Concerning the IUGS's 'report' on the Commission's work, the S-G stated that the Commission had endeavoured to encourage the election of some younger Members and this was reflected in this year's slate of candidates. There had been a dissenting voice (in correspondence), which took the view that the Commission was not the place for neophytes. However, the consensus of the Meeting was that the policy of encouraging the work of younger scholars should be pursued.

In the ensuing discussion, Professor Sengör asked whether there were any Greek Members, and was informed that there were not. He undertook to provide information about Greek scholars who might be interested in joining the Commission. The President asked the Russian Members present to nominate Members from the countries of the former USSR, and they said that they would endeavour to do so.

7. The President drew attention to the willingness of *Episodes* to publish articles of an historical nature, including book reviews. It was suggested that occasional 'country reports' would be appropriate, as also a report on the field excursions of the present conference, but no authors volunteered their services for this task. A further suggestion that an historical article or articles on the work of early women geologists was, however, to be pursued, bearing in mind the several 'poster papers' on this topic that had been exhibited at Neuchâtel this year.
8. Members were reminded that the INHIGEO Meeting for 1999 would be in Freiberg, and the President distributed pamphlets advertising the event. He also referred to the meeting that would be held commemorating the work of Mary Anning.
9. The INHIGEO meeting in 2000 would be in Rio de Janeiro, in connection with the 31st Congress of the IUGS. Dr Silvia Figueirôa would be acting on behalf of the Commission, and sessions on 'Millenarianism', 'Geology in the Tropics', and 'Major Developments in Geology in the 20th Century' were planned. There was to be a field excursion into the Brazilian jungle!
10. No plans had been laid thus far for a meeting in relation to the IUHPS in Mexico City in 2001. A meeting on 'Geological Travellers' was foreshadowed in Ireland in 2002 [and Professor Hestmark had tentatively suggested a meeting in Norway on some future occasion].
11. After discussion, the S-G undertook to contact all Members or persons known to have archival material pertaining to the Commission. Where archives from an individual were already established, they would not be 'disturbed'. Otherwise were to be transferred to Trondheim for permanent storage, at the Commission's expense. A list of the locations of the relevant papers would be published in the next *Newsletter*.
12. There being no business without notice, a formal vote of thanks to the Conference's Swiss hosts was carried with warm acclamation, at the proposal of the President, and the Meeting closed at 6.30 p.m.

David Oldroyd, Sydney

The INHIGEO Archives

The question of the permanent location of the INHIGEO papers of office bearers of the Commission was discussed at the Commission's business meetings held in Beijing and in Neuchâtel. The initial decision was that they should all be transferred to the Headquarters of the IUGS in Trondheim, Norway, but subsequent correspondence revealed that there was limited space there available for this purpose. At Neuchâtel, it was decided that where papers were already safely deposited in archives they would be left where they are and the Secretary-General was charged with determining locations, or facilitating safe transfer of papers to Trondheim. Information was then to be provided in the next *Newsletter*.

Accordingly, with the help of my predecessor Dr Ursula Marvin, and Professor Martin Guntau, I am able to report as follows:

President	Secretary-General	Dates
V.V. Tikhomirov (USSR)	K. Maslankiewicz (Poland)	1967-1976
R. Hooykaas (Netherlands)	M. Guntau (DDR)	1976-1984
G.Y. Craig (UK)	E. Dudich (Hungary)	1984-1989
M. Guntau (DDR)	Ursula Marvin (USA)	1989-1992
D.F. Branagan (Australia)	Ursula Marvin (USA)	1992-1996
H.S. Torrens (UK)	D.R. Oldroyd (Australia)	1996-2000

The INHIGEO papers of Professor Tikhomirov are presently in the possession of his widow, Mrs Galina Tikhomirova, who, according to Professor Guntau, has agreed to their transfer to Norway. No information about Dr Maslankiewicz's INHIGEO material is available, but it is understood that in the early days of the Commission the business was conducted almost entirely by Professor Tikhomirov. The papers of Professor Hooykaas are held in the State Archival Collections, Haarlem, North Holland, The Netherlands. Professor Craig has no INHIGEO papers in his possession, and none have been deposited anywhere. The papers of Professor Guntau are held in the archives of Rostock University, Universitätsplatz 1, D-18055 Rostock, Germany. Shelf-mark: R III-DIB-INHIGEO. The papers of Dr Dudich were passed on to Dr Marvin. The papers of Associate Professor Branagan are presently with him in Sydney and will be sent to Trondheim. The papers of Dr Marvin and Dr Dudich will be transferred to Trondheim later this year, when Dr Marvin has had time to sort them out. The papers of Professors Torrens and Oldroyd will be passed to their successors for their terms of office, and then transferred to Trondheim.

I have been unable to get any response from Russia as to Mrs Tikhomirova's address, or any volunteer to dispatch her late husband's INHIGEO papers to Norway. Assistance on this matter would be appreciated.

The address of the IUGS in Norway is: IUGS Secretariat, Geological Survey of Norway, PO Box 3006 Lade, N-7002 Trondheim, Norway. Tel. 47 73 921 500; Fax. 47 73 502 230. David Oldroyd, Secretary-General

PROVISIONAL AGENDA FOR THE BUSINESS MEETING OF THE COMMISSION, TO BE HELD IN FREIBERG, SEPTEMBER, 1999

1. Apologies
2. Minutes of the previous meeting
3. Matters arising
4. President's Report and matters arising
5. Secretary-General's Report and matters arising

6. Arrangements for future meetings of the Commission: Brazil, Mexico, Turkey, France, Ireland, Israel, Italy, Portugal, Estonia, Norway, . . . ?
7. Publications of the Commission, and contributions to *Episodes*
8. Conservation matters/Archives. (See pp. 18 and 21.)
9. Business without notice
10. Votes of thanks to our German hosts

Notes.

1. Immediately following the Business Meeting, there will be a meeting chaired by Dr Jean Gaudant (France) to discuss the 'state of play' with regard to the establishment of a European Journal for the History of Geology.
2. Persons wishing to place additional items on the foregoing agenda are requested to contact the Secretary-General as soon as possible.

INHIGEO BOARD MEMBERS

For the information of INHIGEO Members, and for the sake of the record, the following information has been compiled concerning the past membership of the INHIGEO Board. (It was found that the 'collective memory' of Members was not always in agreement on this matter! It is hoped that the information below is indeed correct. *Fd.*)

1967-1976

President: Professor Vladimir V. Tikhomirov, Geological Institute, USSR Academy of Science, Moscow, USSR
 Secretary-General: Dr Kazimierz Malankiewick, The Mineralogical Institute, Wroclaw/Breslau, Poland/DDR

1976-1984

President: Professor Reijer Hooykaas, The Free University, The Netherlands
 Secretary-General: Professor Martin Guntau, The University of Rostock, Rostock, DDR
 Past President: Professor Vladimir V. Tikhomirov, Geological Institute, USSR Academy of Science, Moscow, USSR

1984-1989

President: Professor Gordon Y. Craig, The University of Edinburgh, UK
 Secretary-General: Associate Professor Endre Dudich, Hungarian Geological Survey/The University of Budapest, Hungary
 Past-President: Professor Martin Guntau, The University of Rostock, Rostock, DDR

1989-1992

President: Professor Martin Guntau, The University of Rostock, Rostock, Germany
 Secretary-General: Dr Ursula B. Marvin, Harvard University, Cambridge, USA
 Vice-President: Professor Vladimir V. Tikhomirov, Vernadsky Institute, St Petersburg, Russia
 Past President: Professor Gordon Y. Craig, The University of Edinburgh, UK

1992-1996

President: Associate Professor David F.X. Branagan, The University of Sydney, Sydney, Australia
 Secretary General: Dr Ursula B. Marvin, Harvard University, Cambridge, USA
 Vice-Presidents: Professor Wang Hongzhen, China University of Geosciences, Beijing, China
 Professor Franco Urbani, Escuela de Geology, Caracas, Venezuela
 Dr Hugh S. Torrens, Keele University, Keele, UK
 Professor Martin Guntau, The University of Rostock, Rostock, Germany

Past President

1996-2000

President: Professor Hugh S. Torrens, Keele University, Keele, UK
 Secretary General: Professor David R. Oldroyd, The University of New South Wales, Australia
 Vice-Presidents: Dr Ursula B. Marvin, Harvard University
 Professor Wang Hongzhen, China University of Geosciences, Beijing, China
 Professor Franco Urbani, Universidad Central de Venezuela, Caracas, Venezuela
 Associate Professor David F.X. Branagan, The University of Sydney, Sydney, Australia

Past President:

CONFERENCE REPORTS

The 23rd Meeting of INHIGEO—Neuchâtel, Switzerland, September, 1998*

How does one give an impression of a rather small international conference? List all the papers, describe the field locations, praise the organisers, or what? That is the problem facing anyone writing an account of the twenty first meeting of INHIGEO.

INHIGEO, the IUGS Commission for the study of the Geological Sciences, was founded in 1967 through the efforts of Professor V.V. Tikhomirov, and has grown in strength in the intervening years, bringing together geologists and historians and stimulating scholarly research across the globe. In the periods between the International Geological Congresses, at which the Commission organises sessions, national groups and individuals are encouraged to have self-funded conferences on special themes, or in regions of particular interest.

The twenty-third** such meeting was held in Switzerland in September, 1998, organised by Swiss Commission Members Professors Jean-Paul Schaer, Rudolf Trümpy, and Henri Masson. The main meeting was held at the University of Neuchâtel, famous for distinguished professors such as Louis Agassiz and Arnold Guyot, the conference themes being the history of tectonic theory ('From Folds to Nappes to Plates') and the history of glacial theory. Some fifty scholars, divided about equally of geologists and historians from eleven countries, attended, the former predominating on papers concerned with tectonism, historians leading the latter section.

* Reproduced from *Episodes*, 1998, 21, 265.

** The Board has taken the decision to allocate a number to an INHIGEO conference or symposium only if a Business Meeting is held at that meeting (see p. 3).

It was a pleasure to be seated in the historic Aula of the University, equipped with dual slide projectors and overhead projector, perhaps the best facilities yet provided at INHIGEO meetings for some time past. Many of the tectonic papers concentrated on the significant figures Emile Argand, Albert Heim, and Maurice Lugeon and their work in unravelling the structure of the Alps, the understanding of which was particularly enhanced by several field trips, as were the observations of De Saussure, Agassiz, J. de Charpentier, and others concerning glaciation. Most papers were presented in English, with a few in French, but the audience faced the usual conference problem that papers were almost always just a little too long, and left little or no time for formal discussion, although arguments, in the true Socratic manner, on matters of history and geology, did manage to take place into and beyond mealtimes.

For myself, I particularly enjoyed the papers by Beryl Hamilton on Charles Lapworth, Wolf von Engelhardt on Goethe and the Ice Age, Martin Rudwick on Diluvial and pre-history of the glacial theory, Sandra Herbert on Darwin in Patagonia, and a fine poster display by Maria von Salis on Swiss women geologists.

The conference proper was preceded by a field excursion in the Glarus Canton and in the region of Lake Lucerne organised by Professor Rudolf Trümpy. Reared in this Canton, where he did his early mapping in the 1940s, and knowing its geology and the history of geological research in the region in extraordinary detail, we were led to a number of classic sites to see the story of the Glarus Nappes. The whole expedition was placed within the cultural and religious history of this region of Switzerland (the advent of Calvin coincided with the Little Ice Age!) in a manner that would be the envy of many professional tour guides. Professor Trümpy's unflinching good humour (which was occasionally tested!), and his selection of interesting and delightful local venues for rest and rehabilitation added an extra dimension to a memorable introduction to Swiss geology. The arguments in the field, renewal of old friendships, and meetings with new colleagues prepared the excursionists well for the formal meeting in Neuchâtel.

After the sessions at Neuchâtel there was a further excursion led by Professor Masson into western Switzerland, the Chamonix area, and Zermatt. The excursion highlights were the exposures that allowed de Saussure to deduce (from graded bedding) that highly inclined strata were not formed thus *in situ*; the salt mines at Bex (where we were regaled with a meal in the depths of the mines and learned about the history of the salt extraction industry there); the giant erratic blocks at Monthey; and the exposures of ophiolites high in the Alpine range at Gornergrat. Professor Masson provided a vast amount of printed historical material to accompany this superbly organised and enjoyable excursion, with just a touch of snow and ice to keep us on our toes.

An excellent display of materials relating to the history of geology (and particularly Swiss geology) was organised by Professor Schaefer in Neuchâtel's natural history museum, and although it had to compete with a widely advertised exhibition on 'Rats' (including live specimens and dead ones with curiously interlocked tails!) it attracted much attention in the local press and deserves to remain a permanent exhibition for the edification of geologists and non-geologists alike. Professor Schaefer prepared for the occasion a substantial booklet on the history of geology at the University of Neuchâtel (*Les Géologues et le Développement de la Géologie en Pays de Neuchâtel*, Muséum d'Histoire Naturelle de Neuchâtel, Neuchâtel, 1998*). Professor A.M.C. Sengör from Istanbul presented an invited address on the work of Emile Argand, and Argand's original hand-drawn map showing the tectonics of Asia, prepared for his famous address at the International Geological Congress in Brussels in 1922, was moved from Belgium to Neuchâtel to form part of Professor Schaefer's exhibition. It will now remain permanently in Neuchâtel. Another important exhibit was a recently discovered model of the structure of the Alps in the Glarus region, according to Albert Heim's double-fold theory. The model was constructed from a series of vertical paper strips, fixed across a geological map of the area, each strip representing a supposed horizontal section along a particular line. Thus Albert Heim's model offered a kind of hypothetical 'tomography' of the Glarus Canton. It was apparently constructed when he was only twenty-three.

My only regret about a memorable meeting was that we had no time to rehearse and perform two notable geological songs, one by the Heim brothers and another by Lugeon. Perhaps next meeting?

Although the Swiss meeting was the highlight of the year for INHIGEO members, a section devoted to the history of geology was also organised at the Congress of the Carpathian-Balkan Geological Association in Vienna in August/September by Hungarian Member, Endre Dudich, and some interesting papers were given, especially one by Teresa Poka on the history of the concept of 'prophyllites', a somewhat neglected field of historical research. Some visiting members were also able to take advantage of the occasion to see something of the historical treasures held by the Geological Survey of Austria.

David Branagan, Sydney

* For Professor Michel Durand-Delga's review of this book, see p. 26.



В торговом центре г. Невшатель. 11.9.98.

The INHIGEO Excursion A, 1998
Zürich-Glarus-Elm-Klausen Pass-Aldorf-Urnersee-Lake Lucerne-Lucerne (-Neuchâtel)
September 7 and 8, 1998.

Guide: Professor Dr Rudolf Trümpy

Geological and Personal Notes by Nazario Pavoni, Adliswil, Switzerland

Introductory Remark: This is a short report about the itinerary and general geology of Excursion A to classical sites in the history of Alpine geology, organized before the INHIGEO 98 Meeting in Neuchâtel. For further details, figures, profiles, maps, and papers regarding the local geology, reference is made to the excellent publication by R. Trümpy *et al.*, *Geology of Switzerland, A Guide-book. Part A: An Outline of the Geology of Switzerland; Part B: Geological Excursions*, Schweizerische Geologische Kommission, Wepf & Co., Basel, 1980, 334 pp. In the following, references to this publication will be made under the acronym *GS*.

* * *

Flat-lying Upper Freshwater Molasse (OSM), 1–3 km thick, forms the upper part of the rock series underlying the region of Zürich and Lake Zürich (Zürichsee). The present morphology of the region is strongly influenced by the action of the ice of the last glaciation (Würm Glaciation, Linth-Rhein Glacier). Important glacial erosion, moraines and fluvio-glacial deposits.

Geographic position of Zürich, named Turicum in Roman times: the town is located at the northern end of the lake (ship traffic); bridge over the River Limmat, the outflow of the lake (toll); isolated glacial hills (Lindenhof, a.o., fortifications by Romans) in the valley flat; erosional relicts of the terminal moraines of the Zürich retreat stage.

Rapid retreat of the ice about 10,000 years b.p. from Zürich towards the Alps. Some large parts of the glacier were then detached from the main glacial body due to the rapid retreat of the ice and became isolated ice bodies (*Toteis*). Covered by some fluvio-glacial fill, these ice bodies were melting slowly, thus originating the trough of the present lake.

We leave Zürich towards south, and then along Highway A3 towards Chur, in direction southeast. The highway follows the belt of lateral moraines of the Linth-Rhine glacier (Zürich stage) onto the top of Zimmerberg (700 m). Beautiful view over the lake. Towards south the landscape is bordered by the impressive scenery of the Helvetic Alps. Having crossed the moraines the A3 descends down to the Linthebene, a valley flat at 410 m above sea level, extending between the Lake Zürich (406 m) and the Walensee (419 m). It represents the site of a post-glacial lake, which has been filled up by fluvio-glacial and river deposits. Until the construction of the Linthkanal in 1811 (short stop at Ziegelbrücke) it was a swampy area. Tectonically, the valley section of the Linthebene is located in the zone of the Subalpine Molasse, extending along the northern border of the Northern Alps. Thick slices (*Schuppen*) of SSE-dipping Oligocene/Lower Miocene Lower Freshwater Molasse (USM) pile up the valley flanks on both sides of the plain.

Stop at Ziegelbrücke, railway station: Subalpine Molasse. Impressive outcrop of lower fresh water molasse (*Speernagelfluh*, USM, Oligo-Miocene). Well cemented, thick conglomerate (*Nagelfluh*) layers, dipping to the SSE. River deposits. Well rounded pebbles up to 30 cm in diameter. The *Speernagelfluh* belongs to the most southern, thrust Molasse series (*Speerschuppe*) of the Subalpine Molasse bordering the Alpine series (South-Helvetian Flysch, Helvetic nappes). For a long time the common occurrence of crystalline pebbles, red and green granites, ophiolites, and sedimentary rocks, such as dolomites, radiolarites, which rock types are not found in the nearby Helvetic series, remained an enigma.

Linth-Korrektion at the beginning of the nineteenth century: formerly, the River Linth flowed directly into Lake Zürich, and its alluvions caused a rise of the level of Walensee; the whole area was swampland. Under the direction of Johann Conrad Escher, the Linth was deviated into Walensee by 1811, where it has built up a small delta; subsequently the course of the river has been straightened between Walensee and Lake Zürich.

Having left Ziegelbrücke the Highway A3 enters the zone of Alpine nappes in a long tunnel on the south side of Walensee. At Mühlehorn we leave the Highway and take the road to the Kerenzenberg. Brief stop in the Meerenbach Gorge, south of Mühlehorn (*GS*, Exc. IV, stop 19): outcrop of 'kakirites' (intensively broken, brecciated rock) in Quinten Limestones. The kakirization is ascribed to a late advance of the Mürtchen Nappe, under little overburden. The zone trends north-south.

The road continues westwards through Öhrl Limestone of the Mürtchen Nappe. Stop at Obstalden (*GS*, Exc. IV, stop 18: view to the northeast over the Walensee). From west to east: Amden synform-Chapf-Leisthamm, and Churfürsten. Helvetic nappe structures, Mürtchen Nappe emerging near Betlis (waterfall, karst source) above the lake level, overlain by Cretaceous limestones and shales series of the Säntis Nappe (Uppermost Helvetic Nappe).

The road continues west to the Kerenzenberg pass (743 m) near Filzbach, and then descends regularly WSW and SW towards Beglingen, following the thrust of the Säntis Nappe over the Mürtchen Nappe (see stop below).

Stop near Beglingen (*GS*, Exc. IV, stop 16): view over the northern part of the south-north trending Glarus Main valley, river Linth. The valley has been deeply excavated by the Linth Glacier. The steep flanks (1500–2000 m high) of the Glarus valley reveal a spectacular N-S cross-section through the pile of the Helvetic nappes (from top to the base): Säntis-Drusberg Nappe (Cretaceous rocks), Axen Nappe (east of the Linth valley mainly Jurassic, Malm Dogger, Lias), Mürtchen Nappe, Glarus Nappe, Verrucano thrust mass).

The whole pile of nappes has been thrust from South to North over a distance of 50 km, the uppermost nappe (Säntis) the most northerly. East of the Linth River the main thrust-plane (MTP) of the Helvetic nappes corresponds to the thrust-plane at the base of the Verrucano mass. The root zone is located to the south of the Aar massif in the Vorderrhein Valley (Chur-Ilanz). A late uplift of the Aar massif deformed the thrust-plane into a broad antiform culminating, in our cross section, in the Tödi (3620 m) region.

At Beglingen, on the opposite valley flank, from SSW to NNW, Vorder-Glärnisch (Axen, Mürtchen Nappes), Wiggis/Rautispitz (Säntis/Axen Nappe), to the NNE, border zone of the Helvetic nappes thrust onto the subalpine molasse zone (Hirzli). From Beglingen, descent to Mollis and Näfels. The road proceeds southward in the central part of the Glarus main valley. Mighty masses of landslides fill the valley ground near Glarus (capital city)–Miflödi–Schwanden. At Schwanden (600 m) we leave the main valley. The road enters the side valley of the Sernft river (Kleintal), and climbs up the gorge, which is cut into the reddish/greenish rock mass of the Verrucano (Permian greywacke, Sernft). The Verrucano represents the competent base of the Helvetic nappes, thrust over Tertiary Flysch (Eocene/Oligocene). In fact, at the entrance of the Sernft valley (Löchsiten, east of Schwanden, see stop in the afternoon) the river has cut through the Verrucano into the underlying Flysch.

After the gorge, the valley broadens (Engi, Matt) and opens toward the south (Elm 980 m). Since the MTP (600 m near Schwanden) ascends more rapidly (Kärpf 2200 m) than the Sernft river, the Sernft valley is fully embedded in less competent Flysch (mainly shales, slates, sandstones). The erosional relicts of the Verrucano mass forming the impressive castellated

highest peaks (Tschingelhörner with Martinsloch, MTP) surrounding the valley. Near Elm and Engi, the dark grey Flysch series have been intensively exploited for several hundred years in order to produce slates. Careless mining caused the tragic Elm landslide in 1881, killing 116 people (GS, Exc. IV, stop 13). At Engi the exploitation of slates provided a large number of very well preserved vertebrate fossils, mainly fishes, very few birds and turtles, and sole markings. Johann Jakob Scheuchzer, 1708. Later, these fossils proved the young, Oligocene age of the Flysch, underlying the Permian and Mesozoic rocks of the higher mountains. Proof of inverted rock sequence, thrust (J.C. Escher von der Linth, A. Escher von der Linth, first half of nineteenth century). Lunch in Elm.

In the afternoon, visit of an old quarry in Oligocene Matt Sandstone, east of Matt (GS, Exc. IV, stop 12): typical graded bedding, overturned series, interrelation of schistosity and bedding. From Matt we follow the road back by the gorge to Schwanden. Near Schwanden we leave the car for a small hike on slippery Flysch—slope to the world-famous outcrop of the main thrust-plane (MTP) of the Helvetic nappes at the base of the Verrucano at the locality called 'Lochsiten' ('site of the lynx') (GS, Exc. IV, stop 11, No hammers! Some rain setting in.

From Schwanden the journey continues southward to Linthal. Large debris-cones of the creeks originating in the Flysch series to the east (e.g. Dürrenbach) deflect the youthful Linth River to the west side of the valley (GS, Exc. IV, stop 10). A few kilometres further south the autochthonous sedimentary cover with the dominant Malm Limestone (*Hochgebirgskalk*) and finally, in the valley bottom (Limmern Lake, hydroelectric power plant), the crystalline rocks of the eastern Aar massif, forming the direct equivalent of the basement rocks of the Schwarzwald in southern Germany, would be reached. From Linthal (660 m) our vehicle climbs up the steep slope through autochthonous and parautochthonous Flysch and Mesozoic slices to the hanging valley of Urnerboden (1350 m). From curve on the road, high up (GS, Exc. IV, stop 9), we have a last view to the NNE down the Glarus main valley, before clouds and rain block out the scenery. Urnerboden is a typical U-shaped, hanging valley, trending NE-SW parallel to the general strike of the Helvetic nappes. On the northern side Jurassic rocks of the Axen Nappe; on the southern side autochthonous and parautochthonous series of the sedimentary cover of the Aar massif, dipping to the NNW.

Rudi Trümpy tells the legend of how it came about that the Urnerboden belongs to the Canton of Uri and not to the Canton of Glarus. Stay overnight at Hotel Urnerboden (country festival with rustic folk music; rain and snow fall). Tuesday, Sept. 8, 1998.

We drive up towards the west on the Klausen Pass road. Stop in the glacial cirque of *Chius*, cut in a parautochthonous slice of Malm Limestone, thrust over Flysch (GS, Exc. IV, stop 8). Many sources (clouds, rain). The vehicle ascends to the Klausen Passhöhe (1948 m): to the north the Helvetic nappes (Axen Nappe), to the south the Helvetic autochthonous and parautochthonous sedimentary cover of the Aar massif (GS, Exc. IV, stop 7). The very planar, NW dipping MTP forms the surface of the southern slope. Unfortunately, clouds and rain hinder the view to the east and to the west. From the Klausen pass to the west the road follows the very steep flank of the uppermost Schächental (glacial cirque and deep U-shaped valley, many rich waterfalls) in Mesozoic and Cainozoic slices lying below the MTP. The road descends then in many sharp, keen curves down to Unterschächen (1000 m) and Spirigen, situated in the mighty Flysch zone which separates the Helvetic nappes to the north from the parautochthonous Helvetic cover to the south. The Brunnital, south of Unterschächen provides an interesting insight into the autochthonous Mesozoic cover of the northern Aar massif at the base of the Windgällen (Rudi Trümpy as geological artist). We follow the road further west to Bürglen (500 m): outcrop in folded Oligocene Flysch (GS, Exc. IV, stop 4) and Altorf (450 m, capital city of the Canton of Uri) in the Reuss valley. From Altorf northward to Flüelen, on the southern end of the Urnersee (eastern part of Lake Lucerne, Lake level 434 m).

The Reuss river originates in the Gotthard massif. The Gotthard represents the main European water divide. From there the Reuss flows northward, cutting deeply into the Aar massif (crystalline rocks, Hercynian and older basement, discordantly overlain by Mesozoic and Tertiary sediments, the whole overprinted by the Alpine orogeny), and the Northern Calcareous Alps.

At Flüelen we enter a small steam boat, reserved for the participants of the excursion. The weather clears up, sunshine! The boat trip on the Urnersee offers another spectacular N-S cross-section through the Helvetic nappes (similar to the Linth Valley). Classical region for both, the history of Alpine geology and the history of Switzerland (*Rütti*)! Steaming northward, we cross from one side to the other of the Urnersee to observe close up the impressive folding, partly due to gravity sliding, and the details of local tectonic complications, exposed in the cliffs of the Axen Nappe. The first geological section in the Alps, drawn by Johann Scheuchzer in 1708, is from this locality (see Fig. 1).

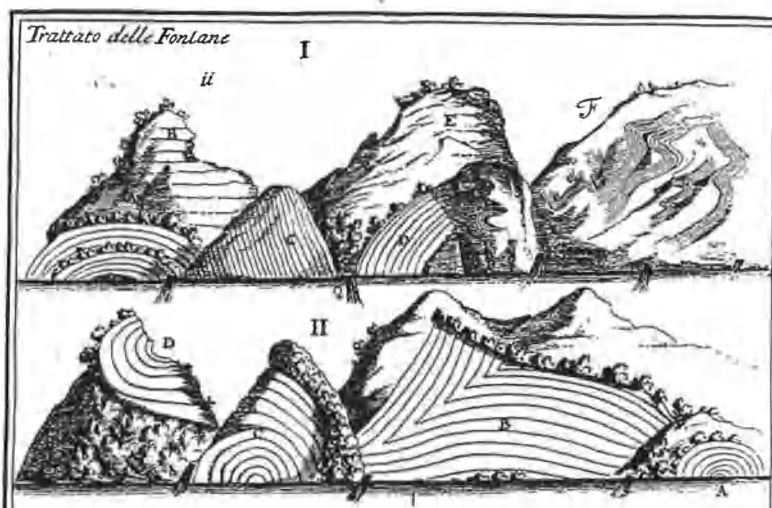


Fig. 1: Geological sections presenting folded strata of the mountains on the eastern and western side of Lake Uri (Urnersee), seen from the lake. After Johann Scheuchzer (1708), in: Vallisneri (1726) [from: N. Pavoni, 'Tectonophysics', in: J.C. Thams (ed.), *The Development of Geodesy and Geophysics in Switzerland*, Zürich 1967, 42–51]

- I. Section on the eastern side: South is on the right, north on the left.
A. Geissberg, south of Brunnen; B. Frohnalp; C. Schieferenegg near Sisikon; D. Buggisgrat; E. Grossaxenberg; F. Kleinaxenberg near Flüelen.
- II. Section of the western side: South is on the left, north on the right.
A. Seelisberg; B. Teufelsmünster; C. Bärchi; D. Kulm in the Isen Valley.

At Treib we leave the boat to ascend by funicular up to Seelisberg (800 m), situated on a broad anticlinal form of a digitation of the Axen Nappe. In full sunshine, standing on a big erratic block of Gotthard Granite brought by the Reuss Glacier, Rudi Trümpy explains the wonderful scenery of the Helvetic Alps. As a highlight of the day, looking to the east the clouds are just lifting, giving a grand view of the two peaks of the Mithen (*Klippen*)! Back at the boat, an afternoon picnic is offered to the participants. The pleasant journey continues westwards. We pass the tectonic border between the Alps s. str. and the Subalpine Molasse. Helvetic Cretaceous and Flysch thrust onto the Rigi-Schuppe (slice of Oligo-Miocene USM, 2–3 km thick, SSE dipping series of predominantly Nagelfluh layers; see Speer-Schuppe, first day stop near Ziegelbrücke).

Warmest thanks are expressed by all participants to Rudi Trümpy and his co-workers for the organization and excellent guidance of this fascinating excursion. Rather relaxed, we arrive at Lucerne, from where we take the train to Neuchâtel. At the railway station of Neuchâtel the group is welcomed by Professor Jean-Paul Schaer, and invited for a dinner in the Hotel de la Gare. The participants are then taken to their hotels.

Inspecting a Celebrated Glacial Erratic in the Woods near Neuchâtel: Sketch by Eugeni Milanovsky



Geological Society of America, Toronto Meeting, October, 1998*

Hutton, Lyell, Logan—and their Influence in North America

The History of Geology Division (HDG) organized a symposium on this topic for the Geological Society of America (GSA) Meeting in Toronto, October, 1998. James Hutton died in 1797 and Charles Lyell was born in the same year. That dual anniversary was celebrated by several symposia in 1997—one part of the Geological Society of London's celebration, Special Publication 143 *Lyell: The Present is the Key to the Past*, has already been published. ** HDG decided nevertheless to organize a Symposium for the Toronto GSA meeting and to couple Hutton and Lyell with William Logan, who was born a year later than Lyell in 1798 (they both died in the same year, 1875). The event, attended by a full house (an audience of more than 200) was made possible by a generous grant from the Canadian Geological Foundation to pay part of the expenses of speakers who were primarily historians, and could not otherwise be expected to attend the meeting.

Besides the symposium itself, a one-day field trip to Niagara Falls visited a geological site studied by many famous geologists, particularly Lyell. Copies of the field guide, *History of Geology Field Trip to Niagara Falls*, by Keith Tinkler (*Field Trip Guide, Number 9*, 20 pp.) are still available from GSA. Other papers on Lyell and Logan were read at a Theme Session, and will be discussed below along with the Symposium Papers.

After a brief introduction, presented by Keith Tinkler, the symposium began with two papers about Hutton. The first by Hugh Torrens (Keele University, a past President of the British Society for the History of Science, and current President of the

* This report was previously published (with three figures, not included here) in *Geoscience Canada*, 1998, 25, pp. 185–187. Permission is gratefully acknowledged. The meeting was jointly organized by Professor G. Middleton and Dr K. Tinkler. For further information, see: Tinkler, K.J., *History of Geology Field Trip to Niagara Falls (Field Trip Guide #9)* Geological Society of America, Boulder, Colorado, 1998.

** So too has the volume *James Hutton: Present and Future*. See p. 41 (Ed.).

International Committee on the History of Geological Sciences: INHIGEO) examined the contradictory view of Hutton held by recent historians: the conventional view is, as inscribed near Hutton's grave, that he was the 'Founder of Modern Geology'. This view was, perhaps first persuasively argued by Geikie (in *The Founders of Geology*, 1897). Though we now know much more about Hutton's life than the idealized portrait given by Playfair (1805)—including the fact that he had an illegitimate child, was known to take a dram or two of intoxicating spirits, and wrote a few coarse remarks in letters to his friends (Jones *et al.*, 1995)—we still have very few of his personal archives, because Hutton's executors (as others of his Edinburgh circle) destroyed them as a matter of principle. Even his extensive rock collection went after Hutton's death to Robert Jameson (ironically the leading, and antagonistic, British Wernerian) and has not survived.

In understanding Hutton's influence, Torrens argued that we should bear in mind how difficult scientific communication had become in the late eighteenth century, because of the French Revolution and the Napoleonic Wars—continental scientists generally had no chance to read Hutton in the original during his lifetime and for years after, and were equally wary of any 'revolutionary' theory of the earth. Hutton did travel extensively through Britain and had formulated the basics of his theory by the 1760s. He did make detailed field observations as shown by the drawings of his field companion, Clerk of Eldin, and by his published plan views and sections (for examples, see Dean, 1992). His ideas about unconformities, the intrusive nature of granite, and the pervasive role of subterranean heat were original, in advance of his times, and support the claim for his great historical significance.

Dennis Dean (author of *James Hutton and the Theory of Geology*, Cornell University Press, 1992) then took up the question of Hutton's early influence in North America. There is no question that the main influence in the eighteenth century was that of Werner, and Hutton's ideas did not become known, even at second hand. In 1798 and 1803 Hutton's views were discussed in print, and misquoted, based on secondary sources. Hutton never visited America, and the only aspect of American geology that he discussed directly in his publications was the Natural Bridge in Virginia, described earlier by Thomas Jefferson. In 1795, Hutton rejected Jefferson's catastrophist interpretation and proposed an erosional alternative. In 1818, Gilmer gave a Huttonian account of the Bridge. In 1825, the writings of Jeremiah Van Rensselaer give the first clear indication that Hutton was being read in the original (Van Rensselaer rejected both Hutton and Werner). The 1828 analysis of the geology of Nova Scotia, by C.T. Jackson and Francis Alger (cf. von Bitter, 1978) is a clear example of Hutton's influence. In the next two years, Hutton's views and the Neptunist-Plutonist debate became well known here from the 1829 American edition of Robert Bakewell's *Introduction to Geology* and from Lyell's *Principles*.

Robert H. Dott, Jr. then asked: 'How significant were Lyell's contributions to North American geology?'. Lyell paid two visits to North America, and travelled widely under the guidance of local experts. In Dott's view his agenda was: to protect his books (an important source of income for his field expenses), which had begun to appear in pirated American editions; to obtain an expertise that he could display before his home audience (the Geological Society of London); to publish popular, and therefore lucrative and influential, accounts of his travels; and to seek new examples to incorporate in future editions of his *Principles and Elements*. As a bonus, Lyell also discovered new fossil evidence for his opposition to organic progression, and new field evidence to support the efficacy of floating ice (cf., Dionne, 1972, 1974).

Though Lyell was undoubtedly an effective propagandist for his views and books, he learned much from local geologists on his tours. He ultimately published more than thirty communications, based on local authorities and personal observations. By acknowledgment and personal diplomacy, he was able to overcome the suspicions of most American geologists about exploitation, and to make at least one major disciple (J.W. Dawson). With Dawson, he discovered Carboniferous reptiles and non-marine molluscs in Nova Scotia; with Hall he investigated the history of Niagara Falls (cf. Tinkler, 1987), and with Roy (cf. Legget, 1976, 1988), he saw evidence of higher lake levels in the Ontario basin (supporting his views on the importance, albeit limited, of fluvial erosion, and slow elevation of the land). He pointed out the Arctic affinities of marine molluscs interstratified with the drift. In his second travel journal (1849) Lyell made a bold attempt to relate the drift of New England and maritime Canada to southern US river terraces, elevated shorelines, and the extinction of large mammals by alternate vertical uplift, subsidence and marine submergence, and uplift.

The next paper was delivered by Leonard G. Wilson, author of *Charles Lyell—The Years to 1841: The Revolution in Geology* (Yale, 1972). The second volume of his life of Lyell has just appeared, entitled *Lyell in America: The Transatlantic Years, 1841–1853* (Johns Hopkins, 1998) but instead of dwelling on this topic, Wilson described 'The influence of the geology of Madeira on Sir Charles Lyell'. Lyell was in Madeira and the Canary Islands in the winter of 1853–1854. Besides his general interest in volcanoes, Lyell made this visit because von Buch had described these islands as illustrating his 'craters of elevation' theory. Elie de Beaumont believed that lavas were originally horizontal, so that cones with lavas dipping away from the crater must have been uplifted. Darwin's observations in South America had supported von Buch, although Darwin rejected a catastrophic theory of uplift. Lyell found that the island of Madeira had been formed by a long succession of volcanic eruptions on land, from centres in lines running through the middle of the island and along the north and south coasts. Deep valleys cut by streams produced spectacular scenery (illustrated by Wilson, using drawings and sections prepared, perhaps, by Lyell's travelling companion Hastings) and revealed the source of the flows. Few of the volcanoes displayed craters, and vertical dykes showed that the lavas were deposited on slopes as high as ten degrees, and had not been tilted as von Buch's theory required. Though Lyell was not yet prepared to deny de Beaumont's theory that steeper slopes must be tectonic, what his observations did convince him of was the long history of eruptions required to produce volcanoes, and the efficacy of flood waters in steep streams to erode them.

Suzanne Zeller, author of *Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation* (University of Toronto, 1987), then shifted attention to William Logan. Though Logan was educated in Edinburgh at a time when the predominant influence was Wernerian, by the time he became interested in geology in 1831 the climate of opinion had changed. Logan's early work in South Wales was on coal, and he became convinced that coal resulted from forests that accumulated plant materials in place, as revealed by the underlying 'seat earths', with their included tree-roots (stigmata). In what is now Canada, developing coal resources was a matter of practical importance, and a survey of New Brunswick was begun by Gessner in 1838, and of Newfoundland by Jukes in 1839. Logan returned to Canada in 1840 and toured extensively, visiting the coalfields of Pennsylvania and meeting Lyell in New York in 1841. Later that same year, the legislature funded a one year geological survey of 'Canada' (Ontario and Quebec), and in 1842 Logan began work in the Gaspésie (after first preparing a detailed section of the coal measures at Joggins, Nova Scotia). By 1845, it was clear that there was no coal in 'Canada', and Logan was forced to devise other strategies to continue the Survey: these included the search for other useful minerals (e.g., iron, copper), and exploiting the scientific reputation that he had by then established. His public reputation was further consolidated by the meeting in Montreal of the American Association for the Advancement of Science, and by the success of

Canada's contributions to the 1851 Exhibition in London. By 1856 he had succeeded in obtaining permanent status for the Survey. In 1855 Logan exhibited his geological map in Paris, in 1863 the *Geology of Canada* was published, followed the next year by the *Atlas*. Logan's vision, shown by these maps and reports, included much more than just the present Ontario and Quebec, and Robert Bell observed that Logan's maps (including those showing a large hypothesized coal basin in the foothills of the Rockies) helped to establish the vision of a much expanded Canada, a vision realised by Confederation in 1867.

The last paper delivered at the symposium, by Peter von Bitter, displayed the instrumentation that Logan used in the field (he had, of course, to prepare topographic as well as geological maps), and the five geological maps of Canada that resulted from his labours (von Bitter, 1994a, 1994b). Most of his long-distance traverses involved 'dialling' along coasts or rivers using pacing and a prismatic compass, with elevations established by mercury barometer. A Rochon's micrometer telescope was used to measure long distances. More rarely, Logan also used a theodolite for triangulation. The speaker showed us the five maps that Logan compiled. The best known is the 1865 map on a scale of one inch to 125 miles. Less well known is the large wall map of 1869, described in the *Transactions of the American Institute of Mining Engineering* as 'the finest of all our American maps.'

As originally planned the last paper of the symposium was to have been entitled 'Shaping a career in geology: William Logan, Charles Lyell, and John William Dawson'. Unfortunately, the author, Susan Sheets-Pyenson died before she could present it. Her intentions can be surmised by a reading of her abstract, her article in *GSA Today* (1998), and her book *John William Dawson: Faith, Hope, and Science* (McGill-Queen's University, 1996). Instead of her paper, a brief summary of her career was read from the symposium chair, by way of a memorial.

On the next day, several shorter papers were read that supplemented the symposium. William Brice described a meeting between Dawson and Charles Frederic Hart, a native of New Brunswick who was later to become director of the first geological survey of Brazil. In 1860 Hart discovered a major source of insect fossils, west of St John, NB. Originally thought to be Devonian (later determined to be Pennsylvanian), these were examined by Dawson, and Hart's description was incorporated, with his consent, in Dawson's celebrated *Acadian Geology*. Laing Ferguson described Lyell's work at Joggins, in two visits, the second (in 1852) accompanied by Dawson. The main discovery, still significant for vertebrate taphonomy today, was of vertebrate remains trapped in hollow, vertical buried tree stumps. Robert Silliman further discussed the importance of Lyell's work and association with Dawson in Nova Scotia. There Lyell made a disciple, and gained valuable evidence for his uniformitarian ideas, both from studies of the coal measures and from observations of recent sedimentation. He also observed the action of floating ice, which Lyell preferred to continental glaciation as an explanation for erratics and glacial striae.

Finally, a significant paper by Hugh Torrens threw important light on a long-standing question about Logan. After working in London for several years as an accountant (and showing no interest in geology) Logan was sent to South Wales in 1831 to become manager of his uncle's Forest Copper Works. Within just a few years he had presented papers on coal to the Geological Society of London, and prepared maps and sections of such high quality that they were used as models by De la Beche for the newly formed Geological Survey of Great Britain. How did he learn his geology and surveying techniques? By examining previously unpublished sources in Swansea (the Royal Institution of South Wales and Library) and Keyworth (British Geological Survey Archives), Torrens has made a persuasive case that the main influence on Logan was the community of 'papyrophobic' (publication-shy) land and mine surveyors ('colliery viewers') operating in that region. An important study of Logan's main business partner in Swansea has also been published (Bayliffe and Harding, 1996) and it demonstrates their myriad business links in both coal and copper, in what was then a world centre for copper production.

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Gerard Middleton, Hamilton, Canada; Keith Tinkler, St Catherines, Canada

Three Congresses on History of Polar Research and Related Matters

1. 1898-1998: *The 'Belgica' Antarctic Expedition Centennial Symposium, Brussels, 14-16 May, 1998*
The ship *Belgica*, of the Belgian Antarctic expedition, was beset by ice in the Bellingshausen Sea on March 10th, 1898. The expedition, led by Adrien de Gerlache de Gomery (1866-1934), was the first to overwinter on the Antarctic coast. The ship drifted along the coast until it was able to sail home on March 14th, 1899.

A meeting celebrating the centennial of the event was arranged in 1998 by the Belgian National Committee for Antarctic Research in Brussels. 140 members from eleven countries participated. Thirty-two papers were presented, describing the historical background of the expedition and giving biographies of some of the expedition members. The scientific achievements of the Belgian expedition and its input to further polar research were presented on the second day. The third day offered insights into Belgian polar research at the end of the 20th century. In this section, professor Andrew Clarke from the British Antarctic Survey received the 'Belgica Medal, 1998'. The official reception of the symposium was associated with a visit to the exhibition

'Antarctica: The Last Continent', (*Antarctique: Le dernier continent*). This meeting was a very friendly one, as so many relatives of expedition members were able to be present. It was highlighted when Baron Gaston de Gerlache, son of the expedition leader, invited all speakers for an agreeable cocktail evening in his garden and home at Château de l'Ast, close to Brussels.

2. *International Congress on the History of the Arctic and Sub-Arctic Region, 18–21 June, 1998, Reykjavik, Iceland*
The International Congress on the History of the Arctic and Sub-Arctic Region was organized by the Institute of History, University of Iceland, and the Icelandic Ministry of Foreign Affairs and External Trade, in co-operation with the Stefansson Arctic Institute in Akureiri. Nearly a hundred participants came from 14 countries. Sixty-eight lectures were given in three parallel sessions. For the first time, scholars such as historians and ethnologists met with historians of science to discuss matters related to Iceland and the Arctic regions.

The meeting handled three main themes: 'Centre and periphery'; 'Indigenous culture and external influences'; and 'Farming'. Three round-table sessions followed: 'Historical sites and heritage management'; 'Pre-industrial navigation in the north'; and 'The position of the Karelian Autonomous Socialist Republic within the Soviet Union in the 1920s and 30s'.

Time was given for single lectures on various subjects from the history of science concerning arctic and subarctic regions, which did not fit into the other sessions.

Unfortunately, it was rather difficult to make contact with other scholars from different disciplines, because the papers were presented in three parallel sessions. Nevertheless, meeting colleagues from east and west was most interesting, as everybody contributed his or her individual point of view.

3. *Polar Sea of Discord and Collaboration: Science and Politics in Oceanography and Arctic Exploration, St Petersburg 27–30 January, 1999*

The conference was organized by the St Petersburg Branch of the Institute of the History of Science and Technology, Russian Academy of Sciences. The meeting format was that of a workshop with a series of sessions and round-table discussions and brief presentations on the results and perspectives of research in different national and disciplinary perspectives. Some materials for discussions were pre-distributed via email, including recent information on various associations and networks in the area of maritime history, history of oceanography, polar research, etc. It was most helpful to receive also 'News and Views from the participants, outlining their personal visions of trends, problems, and perspectives in their different field.

The aim of the conference was not to present focused academic papers but to talk more about recent achievements and to identify new trends and important, but yet understudied, historical issues and problems. This was admirably achieved during the meeting, with the participants coming from Alaska and other states of the US, from Scandinavia, Germany, and Russia.

The sessions covered 'Research efforts in the history of polar science and in oceanography'; reflections on 'Social and cultural history'; and 'History of oceanography and fisheries'. Another leading theme was 'Studies of international collaboration in polar research'. A session on 'Navies, oceanography, and polar research' was held in the famous Russian Geographical Society. Extended discussions on 'Perspectives of oral history' and 'Science and the navy' followed. A summing-up on an agenda for future collaboration, requested by the participants, completed the conference.

In addition to the meeting and associated receptions, there was a tour of the wonderful Arctic and Antarctic Museum. On the last day, we had time to visit the wonderful State Hermitage Museum at the Winter Palace. St. Petersburg in winter gave a very clear sense of what polar history was all about!

Meeting on the History of Meteorology of the German Meteorological Society, held in Leipzig, 15 September, 1998

During the Conference of the German Meteorological Society, held in Leipzig, a session on 'Reconnaissance of the Third Dimension' was organized by the History of Meteorology Specialist Group, on September 15th, 1998. An introduction was given during a keynote speech describing the development from high mountain stations to remote sensing by satellites. Five papers were held during the following session. The first asked: 'Why does water form clouds?' and outlined the status of thermodynamics before the end of the eighteenth century. The next paper dealt with studies in scientific aeronautics at Berlin (1888–99), in connection with the studies of the physics of the atmospheric boundary layer. Aerological measurements at Spitsbergen (1906–1914) were presented as Hugo Hergesell's initiative. Another paper showed the development of climatological models from radiation balance to three-dimensional, linked global circulation models. A biographical dictionary of German-speaking meteorologists was introduced also.

In addition, four poster papers were displayed on aeronautics and meteorology at Leipzig, on a historical review on the determination of the height of stratospheric clouds, on material sources from three centuries on female meteorologists, and on the work of the new specialist group of History of meteorology, founded in 1997.

Cornelia Lüdecke, Munich

FUTURE MEETINGS, AND ACTIVITIES RELATED TO THE HISTORY OF GEOLOGY

Barrande Bicentenary

The 200th year of Joachim Barrande's birth falls on 11 August, 1999, which is a holiday period. The meeting celebrating Barrande's work will therefore be held at the National Museum, in association with the International Symposium of the Ordovician Subcommittee in Prague, from 20–31 June, 1999, the precise date being 26 June, when also an exhibition relating to Barrande's work will be opened. For further information, contact Dr Vojtech Turek, Head, Department of Palaeontology, Národní Muzeum, Václavské nám. 68, 115 79 Prague, Czech Republic (Fax 24 22 64 88).

Abraham Gottlob Werner (1749–1817) and his Times: International Symposium, September 19–24,

1999: Freiberg University of Mining and Technology*

Abraham Gottlob Werner was one of the most important persons in the history of geological sciences. He taught at the Freiberg Mining Academy for over forty years. Numerous students from many parts of the world attended his lectures on Oryctognosy,

* Supported by: The German Geological Association (DGG); The German Mineralogical Association (DMG); The German Meteorological Society, History of Meteorology Specialist Group; The Association for Geological Sciences (GGW); The Polish Academy of Science; The Polish Geological Association; The Polish Geological Institute Wrocław; The Polytechnical University of Wrocław; The Saxon National Foundation/The Saxon Academy for Nature and Environment; The Saxon State Department of the Environment and Geology, Section for Land and Geology Freiberg; The State Museum for Mineralogy and Geology Dresden; The Head Mining Authority for the State of Saxony; Freiberg Municipal Council; The University of Wrocław.

Geognosy, Mining Science and Iron Metallurgy. Werner had an enormous impact on the scientific life of his time, both in Germany and abroad. When he died, he left a rich cultural heritage: one need only think of his natural history collections, his library, and his coin collection. Right up to our own time, the life and work of Werner has never ceased to attract attention. September 25, 1999, is the 250th anniversary of Werner's birth. To celebrate this occasion, an international History of Science Symposium is to be held at the Freiberg University of Mining and Technology from September 19 to 24.

After the tragic death of Dr Peter Schmidt, who initiated the Werner Symposium, we feel obliged to finish his ideas and make the Symposium an outstanding success.

Professor Dr Ernst Schlegel, Rector, The Freiberg University of Mining and Technology	Professor Hugh Torrens, President, INHIGEO, Keele University
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Excursions, stage performance, and reading of Novalis:

Erzgebirge Mountains (September 19, 8.30 a.m. to 6.00 p.m.)	~25 DM
Novalis reading: <i>Lehrlinge zu Sais</i> (September 19, 8 p.m.)	
Performance of <i>Die Zauberflöte</i> (September 21, 7.30 p.m.)	25, 21, or 16 DM
Dresden (September 23, 9.00 a.m. to 4.30 p.m.)	~20 DM
Osiecznica/Poland (September 24, 6.00 a.m. to 7.00 p.m.)	~40 DM
Opening of the Werner Memorial	

Conference fee:

100 DM (concessional rate 50 DM)

Accommodation:

A (hotel)	90–130 DM per day single/140–180 double
B (pension/bed and breakfast)	60–80 DM per day single/80–110 double
C (Private home)	30–45 DM per day single/50–70 double

Programme summary:

Monday September 20. Morning: Opening of the conference; Afternoon: Plenary session; Evening: Opening of the Werner Exhibition, honouring ceremony, and welcome by the Rector of the Freiberg University and the Mayor of Freiberg

Tuesday September 21. Scientific sessions: 9.00 a.m. to 5.30 p.m.

Wednesday September 22. Scientific sessions: 9.00 a.m. to 5.30 p.m.

Thursday September 23. Visit to Dresden. Special meetings (as the need arises) in the evening. (These will include the INHIGEO Business Meeting, and a meeting to discuss the establishment of a European journal for the history of geology. See p. 17.)

Friday September 24. Visit to Osiecznica/Poland.

The main topics of the sections will be:

'Earth Sciences around 1800'; 'Theoretical Concepts and Academic Controverses at the time of Werner'; 'The Spirit of the Times at the Turn of the 18th/19th Centuries'; 'Interactions between Geology and Mining Technology'; 'Students and Disciples of Werner'; 'The Influence and the Reception of Werner's Work'; 'Collecting and Collections at Werner's Time'; 'Geology, Literature, and Arts'; 'Meteorology in the Time of Werner'.

The Symposium *Proceedings* will probably be published in *Zentralblatt für Geologie und Paläontologie*.

Contact persons at the Freiberg University of Mining and Technology, TU Bergakademie Freiberg are:

Chairman of the Organizing and Programme Committee, Prof. Dr Helmuth Albrecht. Tel.: 49-3731-39-3406, Fax: 49-3731 39-2832, Email: <halbrech@iwtg.tu-freiberg.de>.

Dr Roland Ladwig, Assistent des Organisations-Komitees, Technische Universität Freiberg, Institut für Wissenschafts- und Technikgeschichte, Nonnengasse 22, D-09596 Freiberg, Germany. Tel.: 49-3731-39-2825; Fax: 49-3731-39-2832, Email: <ladwig@iwtg.tu-freiberg.de>.

For further information, contact Dr Ladwig as soon as possible.*

[NB: It MAY be possible for INHIGEO to provide small grants to help Members attend this conference. If you would like to receive such assistance, please contact David Oldroyd, to get your name on the list.]

On the History and Philosophy of Geophysics and Related Disciplines, 2000

A half-day session devoted to the discussion of problems in the history and philosophy of geophysics and related disciplines (geology, astronomy, meteorology) will be held as part of the conference of the German Geophysical Society at Munich in March, 2000. Oral presentation of fifteen minutes and posters are invited. For details, contact Dr Wilfried Schröder, Geophysical Institute, Hechelstrasse 8, D-28777 Bremen, Germany.

* At the time of compiling this *Newsletter*, we have been informed that about eighty papers are scheduled for presentation. Additional offers must be sent to Dr Ladwig immediately.

William Smith Millennium Meeting, 2000

'Celebrating the Age of the Earth'

The Geological Society of London, Burlington House, Piccadilly, London, 28–29 June, 2000

Call for Papers:

With attention focused on the close of one Millennium and the dawn of another, what better time to celebrate the Age of the Earth? Sponsored by the Geological Society, the History of Geology Group in Britain is organising a special meeting designed to be of interest to all geoscientists. We intend to review the historical development of our science, with particular emphasis placed on geochronology and methods used to establish the Age of the Earth. Topics to be covered will range from the constraints on geological time imposed by seventeenth-century theologians and the date of Creation; through changing perceptions about geological time in the eighteenth and nineteenth centuries, to the eventual discovery of radioactivity and the very latest methods now used to date our planet and the universe.

The proceedings will be opened by a keynote speaker and contributors of international repute are being invited. A subsequent thematic publication is being considered. Talks will be of thirty minutes duration and anyone interested in presenting a paper should send a title and abstract to the convenor as soon as possible. As the number of talks is inevitably limited, persons offering papers that are not accepted for presentation will be invited to contribute a poster display.

A reception and Celebration Dinner will be held on the evening of the first day. For those interested a 'Time-related' field excursion to the Wealden will be led by Professor Hugh Torrens on 30 June.

Convenor: Dr Cherry Lewis, History of Geology Group, Wells Cottage, 21 Fowler Street, Macclesfield, Cheshire, SK10 2AN, UK. Email: <celewis@aol.com>.

Cultural Heritage in Geosciences, Mining, and Metallurgy—5th International Symposium, July, 2001

The 5th International Symposium—"Cultural Heritage in Geosciences, Mining and Metallurgy:

Libraries—Archives—Museums"—will be held at the Colorado School of Mines, Golden, Colorado, USA, from 24–28 July, 2000.

History of Geological Sciences at the 31st International Geological Congress, Rio de Janeiro, August, 2000

One of the world's most important and well-established scientific conferences, the 31st International Geological Congress, cannot be left out of your agenda for the year 2000. The conference will take place from August 6 to 17, at Riocentro, Rio de Janeiro, during the celebration of the 500th anniversary of the Portuguese arrival in Brazil.

The general scientific program includes pre- and post-congress field-trips, workshops and short courses, colloquia, special and general symposia, GeoExpo 2000 (scientific exhibits), and meetings of affiliated organisations and societies.

INHIGEO proposed, and is organizing, one post-congress field-trip and three General Symposia, namely:

27-1: 'Different Perceptions of the Geological Sciences in the Tropics';

27-2: 'Geological Sciences and End-Millenniumism';

27-3: 'Some Major Developments in Geology in the 20th Century'.

The General Symposia are designed to cover the entire spectrum of present geological sciences, and will take place on August 7, 8, 9, 10, 14, 15, 16 and 17. Each General Symposium will consist of a Poster Session accommodating all accepted contributions (afternoon), followed by an oral session (the following day), with: the convenor's address, about five keynote speakers, and open discussion.

According to the IUGS's decision, all papers must be presented in English and authors must be registered at the Congress. The length limit for abstracts is 250 words and the deadline for their submission is September 1, 1999. Abstracts will be printed using the author-prepared camera-ready copy, and in accordance with the Congress format. A sample of the form will be included in the Second Circular (scheduled for distribution in April, 1999).

Those wishing to take part in the INHIGEO program should contact one or both of the INHIGEO colleagues who will be convenors of the symposia: Associate Professor José de Santana (Brazil) (27-1); Professor Manuel Serrano Pinto (Portugal) (27-1); Dr Maria Margaret Lopes (Brazil) (27-2); Professor Hugh Torrens (UK) (27-2); Dr Silvia Figueirôa (Brazil) (27-3); Professor David Oldroyd (Australia) (27-3). It is anticipated that there will be five papers presented orally for each General Symposium and numerous poster papers/displays. These can range beyond the themes of the main symposia if desired, but preference will probably be given to topics falling within those broad themes.

Registration fees for the whole meeting are: participating members US\$ 350; accompanying members; US\$ 150; enrolled students US\$ 100.

Persons interested in receiving the circulars and participating in the meeting should contact the 31st IGC Secretariat Bureau: Casa Brazil 2000, Av. Pasteur, 404 Urca, Rio de Janeiro-RJ, 22290-240 Brazil. Fax: (55) (21) 295-8094. E-mail: <31igc@31igc.org>.

Additional information is available at the website: <<http://www.31igc.org>>.

Geology of History/History of Geology: Ionian Regions of Western Turkey, 2001

[The International Union for the History of Science will be holding its next Congress in Mexico City in 2001, and the INHIGEO Board has considered holding a meeting there as part of the Congress—as for the meeting at Liège in 1997. However, our Commission has no Members in Mexico to organize such a meeting; and the Mexican Congress will be in the year following the large IGC in Rio de Janeiro—by which time our South American colleagues may well be in a state of exhaustion! An alternative suggestion is therefore under active consideration, and has the support of the Board Members. The idea is to hold a meeting in Turkey under the aegis of a 'Field Forum' of the Geological Society of America, it being a gathering of geologists, historians of geology, and archaeologists. It would involve field studies in the day, followed by round-table interdisciplinary discussions in the evenings. There would not be the usual presentation of papers as at a 'standard' INHIGEO meeting. The meeting would be more in the nature of a 'research dialogue' than one devoted to the presentation of known facts and accepted ideas.

Such a meeting would enable Members to visit an interesting and historically very important part of the world, where INHIGEO has had no previous activities. We are assured that the proposed area of study is not one that will be dangerous because of political problems in the region.

The proposal still has to be put to and accepted by the GSA, and the meeting has to be self-funding (though INHIGEO will presumably make some financial input). Numbers attending will be limited and participation will therefore have to be on a 'first come first serve' basis. Members' prompt expression of views on the proposal are invited. (Please contact David Oldroyd.) (If we proceed with the Turkish meeting, the envisaged Irish meeting will [with Patrick Wyse-Jackson's agreement] be deferred until 2002.)

The principal leaders would be INHIGEO Member Professor Celâl Sengör, GSA Board Member Dr Dorothy Stout, and a Turkish archaeologist. (American historian of geology Dr Sally Newcomb has been assisting with the liaison with GSA, for which we are grateful.) (Ed.)

* * *

The following is a draft of the proposal for a 'field-forum' in Turkey:

The aim of this proposal is to bring to the attention of the GSA the possibility of a 'Field Forum' held in Western Turkey in 2001, to combine a study of tectonics, history of geology, and archaeology. The purpose of such a combination would be to familiarise the participants with a well-exposed and magnificently developed collisional orogen that has some pre-collisional features, such as a fully-developed marginal basin (Black Sea), still preserved; localities of importance for the history of the development of tectonic concepts such as double-sided orogens (Kober), Zwischengebirge (Kober) sutures (Synaphie: Solomon-Calvi), and active strike-slip faults (Ketin). Western Turkey has been studied geologically since the beginning of the nineteenth century and publications that came out of here relating to the region had considerable influence on the development of geology, particularly the geology of the Alpine-Himalayan belt.

In addition, the area to be examined is the home of the Ionian Civilization, of the first natural philosophers, and in a way of the first 'geologists'. Anaximander's theory of regression and organic evolution was conceived here. Xenophanes, Herodotus, Hecataeus, Heraclitus, Galen . . . , who all wrote on matters pertaining to the earth, came from the area. The city-states these people lived in were all located in sites that are geologically extremely interesting. One can thus study the geological controls that shaped the rise of the Ionian civilization (the first civilization to give rise to science!), the siting of the cities, and their influence on the phenomena, their histories of discovery, and the ways in which the geological/geographical circumstances of the region shaped the development of the novel ideas. Thus, we think, Western Turkey offers a unique opportunity to study the relationship between the geology of a region and its influence on the origins and development of science: arguably a more feasible enterprise in the intended study area than anywhere else in the world.

A number of geological and archaeological institutions in and outside Turkey will be solicited as co-organisers. Preliminary contacts are most encouraging. For example, the Board Members of the International Commission on the History of Geological Sciences have expressed a strong interest in the proposal and the Commission would be actively involved in the forum. The necessary leaders for the conference are available in Turkey.

A.M. Celâl Sengör, Istanbul; Dorothy Stout, Geological Society of America

Bicentennial of the Birth of Alcide d'Orbigny (1802–1857), 2002

Professor Philippe Taquet has written providing preliminary information about a proposed meeting organised by Le Muséum National d'Histoire Naturelle, Paris, Le Muséum d'Histoire Naturelle de la Rochelle, La Ville de La Rochelle, and L'Association Alcide d'Orbigny. It is intended that there will be exhibitions at La Rochelle and Paris, an itinerant exhibition in South America, a republication of *Voyage en Amérique Méridionale*, an edition of his unpublished plates, the production of a documentary film, and—last but not least—an international congress held in Paris, La Rochelle, and Bolivia on 'Alcide d'Orbigny—l'Homme—le Voyageur Naturaliste—Le Paléontologie et le Fondateur de la Micropaléontologie et le Géologie avec sa Notion des Étages Géologiques ainsi que le Partisan de Multiples Catastrophes'. For further information, please contact Professor Taquet at Laboratoire de Paléontologie, Muséum National d'Histoire Naturelle, 8 Rue Buffon, 75005–Paris, France; or <taquet@mnhn.fr>.

NEW JOURNALS

An Initiative to Establish a European Journal for the History of Geology

Introduction

The European Union, whose vitality has been demonstrated by its recent creation of a new currency, possesses a unique character in being an economic and political entity formed by an association of countries, all of which have their own history, culture, and language. This is why it now appears opportune to create a truly European, multilingual, journal, designed for historical articles devoted to geological researches carried out on our continent, which, as is well known, has been the cradle of this science, as well as of work carried out abroad by European geologists. National Committees for Geology already exist in several such countries: in France, the UK, Germany, Spain, The Netherlands, and Hungary. The first two each have a significant number of members (more than a hundred each). Such groups, however, are still too small to support the financial costs that publication of a printed journal would entail. Nonetheless, the French *Comité* annually issues a volume of *Travaux* reflecting the activities of the three public meetings they organise each year. Similarly, British History of Geology *Newsletters* are issued by the British Committee, and the Spanish Commission publishes its *Boletín*.

Some Proposals/Questions:

1. *Should it be an independent journal or the publication of a European Society?*

The first, and fundamental, choice concerns the status of any future journal:

Either—This journal could emanate from an aggregate of the national European committees, which would each be represented on the Editorial Board. This is very probably the best solution, since national committees are in the best positions to serve the cultural interests of the countries they represent.

OR—This journal could be totally independent, its editor being, in such a case, under the control of an Editorial Board made up of co-opted members, who would be directly concerned both with editorial work and responsible for the scientific and historical quality of the articles it would publish.

A *third* possibility would be to make any such journal the organ of a new European Society for the History of Geology. The major inconvenience of this solution would be to add the load of management to that of the editorial work, with an extra secretariat entrusted to administer this new Society. An advantage of this solution would be, on the other hand, that the Chief Editor and the Editorial Board could be elected by the members and be responsible to them. Each National Committee could have a right to be represented on the Council of any such new Society.

2. *The Constitution of any Provisional Committee.*

To assure a harmonious start to this project, and before taking any decision which would affect its future, it seems vital to consult those members of INHIGEO who represent countries that make up the European Union (or who have already been put forward as candidates), as well as Swiss members of INHIGEO. National Committees ought equally to be consulted, each of them having the chance, if they wish, to be represented on the provisional committee charged with deciding major options. To give the project the best chance of success, it is desirable that the leading European historians of geology, make up this provisional committee, possibly with representatives of other continents. In addition, a privileged position should be negotiated with HESS (USA), which publishes *Earth Sciences History*.

3. *Timetable Proposals.*

Taking account of the importance of the problems we still have to resolve, it seems reasonable not to expect the effective launch of any new journal (i.e. the appearance of the first volume) before 2001. For this, it is preferable that its future status be determined before the (northern) summer of 1999. We must therefore rapidly consult the European members of INHIGEO and European national committees. If such initial consultations prove positive, we must then equally rapidly organise (at the latest by the beginning of 2000) a second consultation to appoint members of the first Editorial Board to administer the journal (or a new European Society). The announcement of a printer would also become urgent by then.

Epilogue

The preceding lines only give a selection of the proposals, which need to be discussed and improved. I hope to receive your ideas and suggestions as quickly as possible to allow diffusion of our initial conclusions this coming (northern) summer.

A Questionnaire:

1. Are you in favour of the creation of a *European Journal for the History of Geology*?
2. Are you likely to subscribe (on the basis of an annual subscription of about £30 to £40 or 45–60 Euros)?
3. Do you think this journal should emanate:
 - a) from European national committees
 - b) be totally independent (and managed by an Editorial Board)
 - c) be the publication of a "European Society for the History of Geology" still to be formed?
4. In the second case (3b), do you think that members from the national Committees for the History of Geology should be statutory members of the journal's Editorial Board?
5. Do you think it will be possible to come to some conclusions on this initiative during the INHIGEO meeting in Freiberg, Germany, over 20–22 September 1999?

Please reply as soon as possible, and by July 1, 1999, at the latest, to:

Jean Gaudant, 17, rue du Docteur Magnan, F-75013 PARIS, France.

Fax: [33] 1 44 27 81 48. E-mail: <gaudant@ipgp.jussieu.fr>

Jean Gaudant, Paris

Geohistorische Blätter

In May, 1998, a new society was established in Berlin, named 'Berlin-Brandenburgische Geologie-Historiker "Leopold von Buch"'. Its focus is the study of the history of Prussian and Brandenburgian geologists and geological institutions and their influence on German, European, and international geology. The Chairman is INHIGEO Member Dr Peter Kühn, and Members Martin Guntau and Rudolf Daber are also actively involved. A meeting celebrating the 225th anniversary of von Buch was held at Angermünde near Berlin on April 25, 1999. The new society has immediately established a new journal, *Geohistorische Blätter*, three numbers of which have already been published. For further information, contact Peter Kühn, Bahnhofstraße 27, D-13127 Berlin, Germany.

ARCHIVES

We have received a request from Professor R.W. Home (Melbourne University), Chairman of the IUHS's Commission on Scientific Archives. He wishes INHIGEO to be involved in the major problem of preservation of geological archives, and is particularly concerned about the question of electronically stored information. His wish is that INHIGEO should nominate someone who may be deputed to be involved in the work of the Archive Commission. The nominee's role would be that of bringing the problem to the attention of geoscientists, and trying to get them to 'do something about it', both in the matter of preserving personal papers, and in maintaining electronic records. Notices could be placed in appropriate journals such as *Eos*, *Episodes*, etc.

It is suggested that the matter be discussed at the Business Meeting of INHIGEO in Freiberg and a person be nominated to undertake the task as an INHIGEO representative. The matter should then be actively canvassed at the gathering of geologists in Rio de Janeiro in 2000, and a report submitted to the IUHS at its meeting in Mexico City in 2001. Some kind of action plan could and should be developed in Freiberg. Any person with ideas or suggestions in relation to this topic—which is very much within INHIGEO's remit—is invited to contact me, or Professor Torrens, before the Freiberg meeting. (As many readers will know, there is in fact a journal specially devoted to the field: *Geological Curator*. It is edited by the Irish INHIGEO Member, Dr Patrick Wyse-Jackson. There may well be other such journals that I am not aware of.)

David Oldroyd, Sydney

AWARDS

Citation to, and Reply by, Professor Kenneth Taylor, on the Occasion of his Receipt of the Sue Tyler Friedman Medal of the Geological Society, Keele University, 16 April, 1998*

Citation by the President of the Geological Society, Mr R.F.P. Hardman, C.B.E.

Historical study of earth sciences has concentrated mainly on two periods: the early Nineteenth Century (the time of Smith and Lyell), and the mid-Twentieth Century (the era of the plate tectonics 'revolution'). Far less well explored is the Eighteenth Century; this is the field that Kenneth Taylor has researched with outstanding thoroughness and insight.

* Reproduced, with permission, from *Geoscientist*, 1998, 8(4), 8–9.

In the Eighteenth Century, France was the centre of world science, and French its international language. Kenneth's command of French has enabled him to convey an understanding of its geoscientific culture unsurpassed in the English-speaking world. His research has focused particularly on Nicholas Desmarest, who first analysed the famous extinct volcanoes of central France in explicitly geohistorical terms. Kenneth has rightly set Desmarest's research into the context of many other geologists across Europe, reconstructing for modern readers a lively scientific community.

Kenneth gained his doctorate from Harvard University in 1968, and for the past twelve years has held the post of Full Professor of the History of Science at the University of Oklahoma. He is a real teacher, and generations of students have benefited from his stimulating courses. He perfectly balances the sometimes conflicting approaches of the scientist and the historian, and he is well respected by both professions.

Kenneth's contributions to the advancement of historical studies of the Earth sciences are as distinguished as his own original researches in that field. From 1985 to 1993 he served first as Secretary, and then Chairman, of the US National Committee on the History of Geology. He is a member of the equivalent French organisation, is highly active in the International Commission on the History of Geological Sciences, and is currently President of the History of Earth Sciences Society.

Kenneth Taylor, for your research into the history of Earth sciences, and your contributions to the advancement of such studies, it is my pleasure to present you with the Sue Tyler Friedman Medal.

Reply

News that this medal would be given to me this year truly came as a surprise. And I remain astonished. I know the work of those who have received this award before; it is a great honour for my name to be listed with theirs. I also know the work of a great many who have not yet received the Sue Tyler Friedman Medal, who deserve this recognition much more than I do. So I realise that my surprise will be shared by others. This does not in the least diminish the pleasure I take in accepting the medal, or the pride I feel in being so recognised by the Geological Society. I am deeply grateful to the Society for this sign of regard for my humble contributions to the history of geology. I wish to say also that it is a special privilege for me to come to this great nation to receive the medal—a country where, just fifty years ago, I was fortunate to experience my first year in school.

I may never get a better chance than this to express my thanks, also, to all of you who represent so marvellous a science, the conceptions and practices and traditions of which make for so much fascinating historical study. In retrospect, it seems to me that I got into the history of science in large part because it affords opportunities for learning about the scientific enterprise in ways that disregard conventional disciplinary boundaries. The history of science is an integrative field, in which as it turns out one is not merely able to situate scientific thinking and activity within their larger cultural settings, one is virtually compelled to do so. No doubt there are varying tastes as regards integrative thinking, but for me this feature of the history of science—that it almost necessarily takes into account various dimensions of human thought and experience—has always been central to its appeal.

The geological sciences seem to me to have a parallel integrative quality, a comparable multi-dimensionality, perhaps more so than any other cluster of natural sciences. I am not alone, I believe, in finding this attractively challenging. For example, those of us who try to make sense of how geology was taking shape during the 18th century find ourselves obliged to try to reckon with a remarkable diversity of factors whose roles cannot be ignored. These include, of course, the cultivation of technical expertise and conceptual vision on the part of geological pioneers. Not least significant was the unprecedented achievement, a work in progress during the eighteenth century, of melding novel historical or developmental views on nature together with already-established modes of framing a permanent natural order descriptively and theoretically. On historical inspection, the efforts leading to these accomplishments are found to involve a complex of motives, methods, and ideas whose sources must be linked with philosophy, religion, and aesthetics, as well as social, economic, and political considerations. The establishment and development of geological science has been a great cultural adventure. Although I am more familiar with the geology of times long past than of today, my associations with living geologists have shown me that your present geoscientific adventures are as rich and exciting as ever. I take the liberty here of speaking for historians of science on this point: Thanks to all you geological scientists and to the earth sciences you cultivate. You, your work and the traditions you carry on present us with wonderful stuff for historical study and interpretation.

Although it might be wise to end on that note of thanks, I close instead with a wish and an exhortation. Historical scholarship and historical awareness in the geological sciences have come a long way during my lifetime, but still have a long way to go. History of the earth sciences now constitutes a comparatively minor presence, although a growing one, within the broader discipline of the history of science. Perhaps more telling, tangible commitment of the institutions and industrial enterprises of the geological sciences at large to their historical heritage is weaker than in most areas of science. In my own country, for example, there are large and extremely well funded centres for the history of physics and the history of chemistry; support for these centres comes not mainly from academic history of science, which in any case has only meagre resources, but from the physics and chemistry establishments, notably including their industrial cousins. It is not my present purpose to call for creation of a comparable centre for the history of geological sciences—although that is not actually a bad idea. I do mean to say that those who cultivate the history of geological sciences deserve and need your support, both moral and material. I realise that this may amount to preaching to the choir. The Geological Society does after all have its History of Geology Group; the Society sponsors historical conferences and publications; and for a decade it has conferred the medal I am so proud to receive here. Few if any geological institutions do more to promote the history of geology. In these signs of recognition that historical examination and interpretation of geology has a rightful place at the table, and is an asset to science and to culture at large, the Geological Society is a leader. I hope that this leadership will be exercised in years to come with even greater vigour and effect, with consequences spreading to other agencies, both public and private, where enlightened awareness of the good history of geology can do might make an even greater difference in its practice.

Geological Society of America: Award to Hatten Yoder

At the business meeting, the Division presented its History of Geology Award to Hatten S. Yoder, Jr. The citationist, Robert Hazen, recounted highlights of Hat Yoder's distinguished career as an experimental petrologist and historian of science. Hat was the youngest geologist ever elected to the National Academy of Sciences. He served fifteen years as Director of the Carnegie Institution's Geophysical Laboratory in Washington, and is the recipient of numerous prestigious medals and honours for performing and directing scientific research. On this occasion, he was receiving the History of Geology Award for his more than thirty books, articles, and biographical memoirs on the history of experimental petrology and of the Geophysical Laboratory and its staff members.

In his response, Yoder described himself as a strong believer in teaching every science from a historical viewpoint. He said that the development of an idea—the sequence of perceptions, observations, intuitions that lead to a discovery—is critical to the understanding of a science. Yoder believed that students would be better served if the steps in geological reasoning were spelled out for major concepts, with due regard for controversial detours, instead of mere presentation of the current consensus. He advocated the return of historical introductions to every new data paper. He applauded the role of the Division in bringing together geologists and historians so they may share their respective expertise and illuminate the science for public appreciation. Hat said his own contribution to the promotion of this union has been persuading the American Geological Institute to establish the History of Geology as a recognized specialty not buried under 'Not elsewhere classified'. He thanked the Division, and said in closing that he felt that he still had to earn this Award. Others do not share this opinion, but we all are happy to know that he is still pursuing his researches on the history of geology.

Ursula B. Marvin, abstracted from *GSA Today*, March, 1999

BRIEF ARTICLES

Notes on Geosciences in Bohemian Countries in the Era of Werner

Josef Haubelt, Prague

1. Joseph Stepling (1716–1778), Director of the Clementine Observatory at Prague and of the *Consensus Philosophorum* (Philosophical Assembly) at the University of Prague from 1752 to 1761, engaged in some geophysical and meteorological researches. His colleague Jan Krtitel Bohác (1724–1768) was active as a Linnaean-style naturalist. Jan Antonin Peithner (1727–1792) studied mining from the Natural Philosophy Department at Prague and started geological researches in Bohemia. The neglect of natural history during the Counter Reformation had to be overcome before geological research could be initiated.
2. Ignaz von Born (1742/1791) lived in Prague and Staré Sedlice from 1762 to 1776. It was with him that modern geological research into mineralogy, volcanology and palaeontology began in Bohemia. Included in his circle were Johann Jacob Ferber (1743–1790) from Sweden and Franz Josef von Kinsky (1739–1805). Von Born published *Prager gelehrte Nachrichten* from 1771 to 1772 and convened the *Privatgesellschaft zur Aufnahme der Mathematik, der vaterländischen Geschichte und der Naturgeschichte* between 1775 and 1784. His treatise, *Über einen ausgebrannten Vulkan bei der Stadt Eger*, started a controversy about volcanoes that lasted almost fifty years. Von Born also criticized palaeontological works, which, through Frantisek Zeno (1734–1786), were being published in the *Neuen physikalischen Belustigungen*.
3. The *Böhmische Gesellschaft der Wissenschaften* was active during the years 1784 to 1791 and was renamed *Königliche Böhmische Gesellschaft der Wissenschaften* in 1791. Abraham Gottlob Werner's ideas on the external characteristics of 'fossils' were published in the Society's *Abhandlungen* in 1786. During the presidency of Jan Mayer (1754–1807) a scientific expedition to the *Riesengebirge* was organized in 1786, with Frantisek Josef Gerstner (1756–1832), Tobias Gruber (1744–1806), Jan Jirásek, and Thaddäus Haenke (1761–1816) as participants. In 1784, Count Jan Nepomuk Mitrowski (1759–1799) visited Naples and subsequently published his *Physikalische Briefe über den Vesuv*. Six years later, Alexander von Humboldt (1769–1859) and Johann Karl Freiesleben (1774–1836) made a 'Neptunist' expedition through the Bohemian uplands.
4. The life and work of Franz Ambros Reuss (1761–1830) of Bad Bilina is called 'Freiberg Neptunism' in Bohemia. Johann Anton Schönbauer (1757–1807), who worked as a physician at the *Berkammer* in Joachimstal until 1788, published his *Neue analytische Methode die Mineralien und ihre Bestandteile richtig zu bestimmen* (2 vols., 1805–1809) and also *Determination und Werners Mineraliensysteme* (1809). In this period, Johann Wolfgang von Goethe paid his first visits to Bohemia.
5. Carl Christian André's *Patriotisches Tagblatt* and *Hesperus* were published in Brünn in 1800–1805 and 1811–1820 respectively, the latter subsequently appearing in Stuttgart. He also published *Übersicht der Gebirgsformen und besonders der Übergangsformen in Mähren* (1804). The National Museum of Moravia was founded in 1817.
6. A second peak of development involved the work of Kaspar Maria, Count of Sternberg (1761–1838)—in Regensburg and Freising until 1810, and thereafter in Bohemia. He published one of the founding works in palaeobotany: *Versuch einer geognostisch-botanischen Darstellung der Flora der Vorwelt* (1820–1838), and was responsible for the establishment of the *Vaterländischen Museum des Königreichs Böhmen* in 1818.

History Section of the German Geophysical Society

Wilfried Schröder, Geophysical Institute, Bremen Roennebeck

The German Geophysical Society (founded 1922) has had a very active History Commission since this was founded in 1982. Since then, the Society published a journal (*Mitteilungen des Arbeitskreises/Communications of the Commission*), Volume 18 of which will appear in 1999. The last issue, with contributors from round the world, was a *Festschrift* for Professor Hans-Jürgen Treder on the occasion of his seventieth birthday. It was entitled *From Newton to Einstein*, Treder is one of the leading researchers on Einstein's work.

In the last few years, papers from the history sessions of the Interdivisional Commission of the International Association of Geomagnetism and Aeronomy have been published in the *Mitteilungen* (Proceedings for Vancouver, 1987; Exeter, 1989; Vienna, 1991; Buenos Aires, 1993; Boulder, 1995; Upsala, 1997). In addition, special issues have been published that have collected the historical studies of Herbert Hörz (philosophy and history of science), Karl Heinz Bernhardt (history of meteorology), Hubert Laitko (history and philosophy of science), Thomas Schalk (theoretical physics and history), Hans-Jürgen Treder (history), Karl-Heinrich Wiederkehr (history), Holger Filling (history), and Wilfried Schröder (history and philosophy of science). Overseas contributors include Sir Granville Beynon, FRS (UK), Stephen Brush (USA), Theodore Landescheidt (Canada), Luiz M. Baretto (Brazil), George Hamilton (UK), Susanne Deberhat (France), Alv Egeland (Norway), Kotopalli S. Murty (India), Vaclav Bucha (Czech Republic), Jozef Verö (Hungary), Antal Adam (Hungary), Ferencz Öczep (Turkey), and many others. The *Mitteilungen* provide a forum for discussion of all aspects of the history and philosophy of science, but especially the geosciences and related disciplines. The editor is Wilfried Schröder, from whom copies may be ordered (price US\$ 30.00).

Another aspect of the Commission's work is the collection of old scientific instruments, biographical notes, scientific correspondence, and other items of historical interest. One of the main concerns is the lives of leading German geoscientists such as Emil Wiechert (geophysics/seismology), Luder Mintrop (seismology/exploration), Hans Ertel (theoretical geophysics),

Julius Bartels (geophysics/geomagnetism), Johann von Lamont (geomagnetism), Hermann von Helmholtz (geo/astrophysics), Helmut Landsberg (seismology), Beno Gutenberg (seismology), etc. We also consider institutional history, scientific research programmes, and international relations. Many papers have been published on such topics in the *Mitteilungen* or in geophysical journals (e.g., *Acta Geodetica* and *Geophysica*, Hungary; *Mitteilungen Deutsche Geophysikalische Gesellschaft*, Germany; *Gesnerus* Switzerland; *Planetary Space Science*, UK; *Meteorologische Zeitschrift*, Germany; *EOS*, USA).

From time to time, the History Commission organizes meetings during the Annual Sessions of the German Geophysical Society. These are open to the general public, but also there are specialist sessions on historical topics. The last conference was held in Potsdam in 1998, and the next one will be in Munich in the Spring of 2000. The general theme for this will be 'History and Philosophy of Geosciences and Related Disciplines', the convenors being Wilfried Schröder and Martin Boblo.

The History Commission is open to all interested scientists who are members of the German Geophysical Society (annual membership fee: 80 DM; 30 DM for retired scientists). The present President is Professor Dr Dr h.c. Hans-Jürgen Treder, who has for long been a leader of the 'Cosmic Physics' Commission of the German Academy of Sciences in Berlin and Director of the Einstein Laboratory for Theoretical Physics. The Secretary is Dr Wilfried Schröder, Hechelstrasse 8, D-28777 Bremen Roennebeck, Germany, to whom enquiries may be addressed.

NOTES AND QUERIES; LETTERS TO THE EDITOR

Non-Member Bill Wimbledon has written on the important question of the IUGS GEOSITES Working Group:

I am writing after a short conversation with Hugh Torrens. Can I introduce myself? I am the chairman of the Global Geosites WG, a newish undertaking by IUGS. Its purpose is the promotion and compilation of a global inventory of key geological sites and terrains. To support those busy protecting sites and help those who are embattled in their own country and geoconservation may be weak. This is a scientific compilation to support any conservation effort. (It arose initially from a need to put some facts into World Heritage considerations) We work from the obvious: no sites, no science. (See *Episodes*, September, 1996.)

I am very aware of the connection between sites and the development of science. Places where first finds were made or theories propounded (tested or refuted). There are also the simple associations with major historical figures, and linkages to collections and buildings. I suggested to Hugh that INHIGEO might be interested in inputting to our work on compiling national and regional listings (documentation to follow). Some sites are just as much or of more value because of past activity as for present or on-going. And for many places the interest and study is a continuum from the very early days to the present. Therefore I am convinced there is an important part for INHIGEO in the Geosites process.

Questions:

- 1) I have asked the organisers to book a slot for a Geosites workshop at the Rio IGC. Is there any scope for some joint activity? At the very least, I would welcome the chance to speak at an appropriate INHIGEO session if that is possible, to spread the word and perhaps bring in a different group in the geological community.
- 2) Is there any possibility of a note in your newsletter enlisting help from your membership? Better still, is there a possibility that INHIGEO would formally contribute its own list to Geosites, a list that could be worked up and documented in the countries?

William A.P. Wimbledon, Postgraduate Research Institute for Sedimentology, University of Reading, Whiteknights, Reading, RG6 6AB, UK. e-mail: <joy&bill@aberdon.demon.co.uk>. Tel: 44 1222 772400 (W), 44 1635 41930(H); Fax: 44 1635 44133 or 1222 772412

The Freiberg Archive for the History of Geology

This archive, which has close links with the *Geologische Vereinigung*, is a treasure trove for those interested in the history of geology. After the first *Geologenarchiv* was destroyed in Berlin during the War, the present one was established in 1958 under the guidance of the *GV*. Max Pfannenstiel of Freiberg, who was both a geologist and an experienced librarian, was invited to establish it, the *GV* giving moral support as well as some small financial assistance.

When in 1972 Pfannenstiel handed the collections over to the university library for storage and future cataloguing they already consisted of more than 30,000 documents, among them complete sets of scientific correspondence, mainly of geologists, palaeontologists, and to a lesser extent, mineralogists. After Pfannenstiel's death in 1976, his work was continued by colleagues nominated by the *GV*. Today, the archive has about 70,000 documents. In addition to the letters there are some movies as well as tapes, maps, sketches, field notebooks, portraits, medals, obituaries, and other items of historical interest.

The bulk of the material is catalogued and is thus easily accessible. The development of the archive depends almost entirely on gifts from interested and generous colleagues. Examples from the last two decades include the bequests of André Cailleux, Eugene Wegmann, Hans, Stille, Hans Cloos, and major donations from Curt Teichert and Georg Knetsch. Archive news is published annually in *Geologische Rundschau*.

Address: Prof. Dr Eugen/Dr Ilse Seibold, Universitätsbibliothek, Werthmannplatz 2, D-79098, Freiberg, Germany. Fax: 0761-203-3987.

Historia Naturalis is an annual series devoted to the logical and philosophical foundations, methodology, and history of geological and biological sciences. Extensive essays, articles, and short communications (in Portuguese, Spanish, Italian, French, and English), translations of classical works as well as book reviews, will be considered for publication. Contributors are invited to contact Dr José Roberto Pujol-Luz, Instituto de Biologia, Universidade Federal Rural do Rio de Janeiro, Seropédica, Rio de Janeiro 23890-000, Brazil.

Some Web Sites

'Geoclio' (general site for information on the history of geology): <<http://geoclio.st.usm.edu/>>

Leo Laporte (USA): <<http://www2.ucsc.edu/people/laporte/>>

Kenneth Taylor (USA): <<http://www.ou.edu/cas/hsci/>>

Comisión de Historia de la Geología de España: <<http://www.uam.es/SGE>>

Lydie Touret (France): <<http://cri.ensmp.fr/mineral/>>

UK Mining-history list: <<http://www.mailbase.ac.uk/lists/mining-history>>

Ezio Vaccari (Italy): <<http://www.ge.cnr.it/CST/welcome.html>>; <http://www.ge.cnr.it/CST/Geol/index.html>

David Oldroyd (Australia):

<http://www.arts.unsw.edu.au/sts/sts_core_links/sts_staff_homepages/d_oldroyd_site/david_oldroyd_cv.htm>

A new web-page listing books for sale on mining history, geology, and palaeontology is:

<<http://home.earthlink.net/~msbooks>>

Please note that the historical-geology web-site, formerly operating from the University of Wyoming, is no longer functioning.

* * *

Professor William Sarjeant (Canada) writes:

I have sought in vain for any portrait of Joseph Barclay Pentland (1797–1873), concerning whose life and researches I am continuing my investigations. I would also appreciate any information concerning his ancestry, since all my investigations in England and Ireland have come to a dead end.

* * *

The Oxford Dictionary of Scientific Quotations. Oxford University Press is resuscitating a project that started off some time ago under the general editorship of Professors Roy Porter and Bill Bynum at the Wellcome Institute, London, but which fell into abeyance for several years. If any Members know of any good 'quotable quotes' by geologists (e.g., "The present is the key to the past"), please write them on an index card and post, along with the precise reference, to David Oldroyd at 28 Cassandra Avenue, St Ives, NSW 2075, Australia. Or send by email to: <D.Oldroyd@unsw.edu.au>. If supplying quotations in languages other than English, please give approximate—or exact!—translations. References (which should be about 100 words or less) should be given according to the conventions used in the *INHIGEO Newsletter*. No abbreviations please!

* * *

The following enquiry has been received from a non-Member, Antony Berger (528 Paradise Street, Victoria, BC V9A 5E2, Canada. <aberger@uvic.ca>):

Researching Ancient Perceptions of Rapid Environmental Change

In searching for a new, less harmful and more sustainable environmental ethic and for ways to reduce human-induced harm on nature and the environment, many contemporary writers and thinkers look to Asian philosophies for insight. They are attracted especially by Daoist and Buddhist views, which do not place a radical break between the human and the non-human world. But what of the other side of the human–nature relationship, the harm that rapid (i.e., obvious in the course of an average human lifespan) abiotic natural processes (e.g., weather extremes, earthquakes, eruptions, collapsing slopes . . .) cause humans and other organisms?

Various scholars expert in ancient Chinese and Indian philosophy, with whom I have discussed this matter, confirm that there is little in the Daoist or Buddhist canon on natural landscape change that harmed peoples of those times, say in the first millennium BCE. This seems rather strange, given that the founders and early practitioners of both systems lived in regions where landslides, floods, switches in river channels, and other rapid landscape changes were not infrequent. Travellers to distant regions are likely to have told them about other 'strange' events, such as coastal changes and lake-level fluctuations that affected people's lives. To what extent were these phenomena acknowledged in their philosophy, and can the West learn anything from their perspectives on dark nature?

I am attempting to identify writings on ancient Asian thought that bear on these questions and in the larger issues they raise. How do world religions—as well as contemporary environmental philosophy and policy—acknowledge rapid natural landscape and ecosystem changes? To what extent do different world religions reflect the character and dynamics of the landscape from which they came?

I should be grateful for any insights, references to relevant literature, or expressions of interest that others may have in following this or some similar track.

* * *

New Canadian Member, David Spalding, writes:

William Edmund Cutler (1878?–1925), Dinosaur Hunter

Cutler was born in the UK, but came to Canada when relatively young. His citizenship was presumably British, and his tastes, if not his training, were scientific. Supplements to the standard work, William Sarjeant's *Geologists and the History of Geology* give only three brief obituary notices. During World War I Cutler was homesteading in Alberta, Canada, when Barnum Brown (1873–1963) of the American Museum began collecting dinosaurs in the vicinity. Cutler exchanged an uncollected dinosaur (eventually named *Monoclonius cutleri*) for some training in field techniques. He then became the first freelance dinosaur collector in western Canada, supplying material to a Calgary collection (documented in the Archives of the Glenbow–Alberta Institute) and later to the British Museum (Natural History), from which Baron Nopsca described *Scolosaurus cutleri*. Cutler also held a non-academic position at the University of Manitoba.

After service in World War I, Cutler continued collecting in Canada and then led the British Museum's Tendagaru expedition in 1924 until his death the following year. There his assistant was Louis Leakey (1923–1972), then a Cambridge student, and Cutler is mentioned in a number of works by and about Leakey. He is also mentioned in Loris Russell's and Edwin Colbert's discussions of dinosaur hunting, and I have written briefly of him in my *Dinosaur Hunters* (Key Porter 1993). During research for an upcoming book *Into the Dinosaur's Graveyard* (Doubleday Canada, 1999) I have gathered more archival information but there are many gaps in his story. I should be interested to know of any sources of published or archival information about Cutler other than the institutions and sources named. I have no information about his birth place and parentage, his education, or of the truth of rumours that he spent some time in the United States. Although his interests in natural history were broad (he collected butterflies, birds, and invertebrate fossils as well as dinosaurs) I know of no publications by him.

* * *

Non-Member Stephen Pober (Pober Publishing, 35 Stratford Road, Staten Island, NY 10301, USA. Ph./Fax: 718-816-9779. E-mail: <pobe@worldnet.att.net>) writes:

We are currently preparing a revised edition of the Hazen and Hazen bibliography, *American Geological Literature, 1669–1850*. When this was published approximately twenty years ago, the authors stated in their preface:

The bibliography is incomplete for several types of published sources. Perhaps the least complete portion is the listing of mining and railroad company reports. This literature (including annual stockholders' reports, share advertisements, geological reports, articles of incorporation, and bylaws) must have been published for many

thousands of operating mines in nineteenth-century America; however, only about three hundred such reports were found in our search.

The card catalogue of the Baker Library at Harvard was one of the sources checked by the Hazens. Can anyone direct us to other possible sources? Thank you, in anticipation, for any suggestions.

* * *

Non-Member Dr Cherry Lewis writes:

I am working on the life and works of Arthur Holmes, and as I have had difficulty in tracking down much correspondence to or from him, I should be most grateful if people who either knew him or Doris Reynolds (his wife), who corresponded with them, or who perhaps know of any archives that contain letters to or from him would contact me. The address is: Dr. Cherry Lewis, Wells Cottage, 21 Fowler Street, Macclesfield, Cheshire, SK10 2AN, UK. Email: <clewis@aol.com>.

* * *

American Member Kennard Bork writes:

I should be interested to know if anyone has specific information concerning Alexandre Brongniart's interactions with American mineralogists, geologists, and stratigraphers. Current work has yielded significant correspondence between Brongniart, author of the important French textbook on mineralogy (1807), and Parker Cleaveland, author of America's first text on the subject (1816). It is also evident that Brongniart and Yale's Benjamin Silliman, Sr. conducted a valuable exchange. Other clues would be most welcome.

* * *

À vendre!

French Member Jean Gaudant writes:

The daughter of the late Léon Aufrère still has some copies of the book *Soulavie et son secret*, published by her father in 1952. The book recounts the geological activities of Jean-Louis Giraud-Soulavie (1752-1813), an enlightened abbot who in 1772 started the field observations described in his seven-volume *Histoire naturelle de la France méridionale* (1780-1784). As early as 1780, he established a stratigraphy which was partly based on fossils—at least concerning the three types of limestone formations, which he divided into *fondamental*, *secondaire*, and "white and soft" (our Miocene *molasse*). The book also describes Soulavie's dispute with the fanatic conservative abbot, Augustin de Barruel, who severely criticized him in *Les Helvétiques ou lettres provinciales philosophiques* (1781) and persecuted him for several years, to the point that Soulavie eventually gave up his geological activities in 1784.

People interested in purchasing this valuable item may send their order, together with a money order of FF 250 (or 38.1 Euros), directly to: Marie-Françoise Aufrère, 7 rue Saint-Hyacinthe, F-75001, Paris, France. (The price includes the cost of postage or shipping.)

* * *

Non-Member Sally Newcomb writes:

I should like to know if anyone is familiar with the early history of specific gravity determinations in mineralogy. The concept was known since Archimedes, and applied in coin assaying by the seventeenth century. My interest is in the application of specific gravity determinations to solid minerals. Thank you. <newcomb@earthlink.net>

INTERVIEW

Interview with Professor A.M. Celâl [Jalal] Sengor, Istanbul, October, 1998

David Oldroyd*

Celâl, let me thank you first for inviting me to pay a visit to your hospitable Istanbul, and second for allowing me to record this interview. So could you—just in a few words—tell us: a) how you got into geology; and b) how it came about that you're so interested in the history and philosophy of geology. That's not so uncommon in English-speaking countries, or in Germany or France, but I suspect it's pretty rare in this part of the world.

Celâl Sengor

It is indeed. I got into geology largely because of Jules Verne. When I was in primary school I read his *Voyage au centre de la terre* in Turkish translation, and I fell in love with the character of Professor Lidenbrock. What really impressed me was: number one that he loved books. He was a book-worm and he was an antique book collector; and the other thing that impressed me was that he *knew* so much about all sorts of things, not just geology. He was a true intellectual such as I was imagining in those days that I ought to be like myself. So I got into geology through Jules Verne. When I got into the fourth grade of elementary school an encyclopedia began to be published in Turkey, called *Gökkusagi*, which was a translation from an Italian encyclopedia. It was published initially by the Istituto Geografico de Agostino in Novara and had in it a beautifully illustrated introduction to historical geology, and it showed paleogeographical maps. I now know that they were largely Schuchert's paleogeographical maps, though I didn't know that at the time of course. But when I looked at those I said to myself: "My God! *This* is something I am interested in." And I remember one day at 2 o'clock in the morning I was sitting in my bed looking at that encyclopedia and my mother came in and she said: "What are doing at this time of the night? You should be in bed. You're at school tomorrow." I said: "I'm looking at the Tethys, and I'm wondering how it disappeared." My mother said: "Stop talking nonsense! Go to bed!" Anyway, I got interested in that. And I read.

At junior high school I had a tremendous teacher in natural science and she greatly encouraged me to get into this. Her name was Miss Nuriye Güneyi. She herself was a zoologist, and published. She was a lady who taught us in the morning, and in the afternoon went to the university and did research. But in high school I had a shock. It came in the form of a *National Geographic* article. A great geography teacher I had, whose name was Captain Tarik İnözü, retired from the Turkish navy, handed it to me and said: "There's an interesting article here. Would you like to translate this for me?" Social science classes in Robert College, where I studied, were taught in Turkish and many of our teachers in these subjects didn't speak English. Geography was considered a social science and therefore this man, who was a very good geomorphologist, taught us in Turkish. So he handed

* This interview was taped while I was enjoying Professor Sengor's hospitality during a visit to Istanbul in October 1998. It is hoped that we may be able to publish a similar interview with an interesting/distinguished member of INHIGEO in each future issue of the Commission's *Newsletter*.

me this article—it was by Samuel Matthews, I still remember, January, 1973 of the *National Geographic* ** — in the last year of my high school. I looked and said "It's all continental drift. It's all nonsense. Why do you want to read it?" "Well never mind", he said, "I do want to read it. Would you kindly do a translation for me?" I said: "Of course. With pleasure! But continental drift's all nonsense, isn't it?" Anyway, I translated the article and during process of translation I realised, first, how intellectually isolated I'd been; and second that everything Eduard Suess said about overall tectonic behaviour was wrong. *How did you know about Eduard Suess at that stage?*

A very interesting question! Well, I knew about Suess because of the great father of Turkish geology, Professor Hamit Nafiz Pamir—who'd been a friend of my grandfather, and by that time I'd met him. In his textbook published in 1959 there were references to Suess. And everything he said always started with Suess. I asked: "Who is this man Suess?" So he gave me (he always had Volume One and Volume Two of *Das Antlitz der Erde* by him) . . . ; he handed it to me. I could barely read it. I spoke German at the time, but my German was only spoken German and I'd never read anything in German before except children's books. Well, I fell in love with Suess. I said: "My God! That's the way to do tectonics! You do it on a large scale; include the whole earth, etc." But now I suddenly realised that Suess was wrong; and I shall never forget: from January to about May I had a serious depression. Because, I thought, if Suess was wrong with his geology, nobody can be right. I'll get out of it. I'll do something else. But I had never imagined that I could become anything else than a geologist, ever since I was in primary school. So I didn't know what to do. It was like having lost your beloved and couldn't find another one! Finally, my geography teacher helped me and said: "Look, this is science, and this is how it goes. Theories come and go."

Were you then eventually put back on the rails by doing the translation?

Yes. But let me recapitulate: I did the translation. The translation led me to other articles. I read those, and I realised that this new picture of the earth was better than Suess's; and then I got into a depression, and I thought that Suess, with all that tremendous work, couldn't get it right. But don't forget I was only a little kid. My geography teacher helped me and he said: "Look: this is science. This is how it goes. This is a new theory. This is what I'm interested in now. I was not trained on this theory. This is something completely new." And he impressed upon me that this newness was because our knowledge of the ocean floors was new—previously nobody knew about the ocean floors, really; all the seismology was new; and we could now locate earthquakes with tremendous precision. That was not possible before. So I started realising that science was a developing affair—that science was not what I had imagined it to be, in which you find out something, and that's it. You get the golden keys. It's very peculiar you see. I thought Suess had got the right answer, but I knew that before him there had been failures. For example, I knew about Leopold von Buch when I was in high school. I remember drawing his theory of mountain uplift on the blackboard. And I had Elie de Beaumont's theory. Of course, I hadn't read Elie de Beaumont himself, but I knew about his theory and somehow I must have thought that the great really Suess really had the answer. And it wasn't the case.

So I got interested in tectonics as a large-scale thing, and I was interested in what people thought about it, how to go about it. That's why I was interested in its history. Then I went to Germany and that really made a difference in my life. My mother, who speaks fluent German, said it would be a good idea if I patched up my German. I mean my German was the German that I'd learned from a nanny. My mother said I needed proper German and suggested that I should go to Goethe Institute before going to the United States. "You speak English," she said. "You come from an American high school, but you really need to get proper spoken and written German." So I said "OK. I want to go to Goethe Institute."

At that time I had met Professor Ketin, who was the man who eventually hired me in Istanbul and became my colleague later. But he said: "A lot of the books that you know about—von Humboldt, von Buch, and all these interesting people—you can't find them in the ordinary book shops. You have to go to second-hand book shops." And the concept of a second-hand book shop I knew about, because in Istanbul there used to be a district (there still is, but deteriorated terribly) of second-hand book shops, and even when I was in primary school I used to go there and buy books. My grandfather had a friend who was a historian and he taught me how to buy books. So Professor Ketin said: "In Germany these things are called *Antiquariat*. You go to the *Antiquariat*. You'll find them there." So I went to Germany and to the *Antiquariats* in Munich. I got some catalogues and I quickly realised how it worked. Then I went to the *Deutsches Museum*. There was a man there called Dr Öpik, if my memory serves me right, who was a very fine historian—a nice man. I went to his office and I said: "In the card catalogue I notice that there are some letters of Humboldt." He said "Yes." "I'd like to copy them", said I. I was thinking at the time that this Europe was a pretty unstable place. Libraries get bombed. I thought I will save whatever I can and get them to Turkey! So I said: "I will copy them all" (and later, David, I'll show you the Humboldt letters that I copied there).

Anyway, I went to Dr Öpik and I said I'd like to copy these things, and he said "Yes, I'll help you." And we got to talking, and so he gave me a lot of good advice. But as I was copying the letters I said: "My God! I can't read them. Terrible handwriting this Humboldt has." And I went back to Dr Öpik and said: "How do you read this stuff?—this is terrible." He said: "It is pretty bad handwriting. But that's not your problem." "What is the problem, then?" I asked. He said: "That's not the alphabet that you're used to. I said: "Really?" I'd never heard of the *Fraktur*.

Then while I was in Goethe Institute, 30 kilometres from Munich, it happened that a week or so later I was asked whether I'd like to teach a *Fraulein* English. I said: "With pleasure. Why not?" And I immediately went to the address given. An elderly lady opened the door and introduced herself as *Fräulein Zinke*. I won't go into the disappointment I felt at the time! But she motioned me in, and there, in the living room, in a corner—a man was sitting covered with blankets, obviously an invalid; and she said: "Mein Vater, Dr Zinke."

I had a chat with Dr Zinke. He was one of the most interesting men I've ever met in my life, an incredible intellectual—and we got to talking and I told him about these letters of Humboldt, etc. He said: "Bring me those letters and I'll teach you how to read them." And then *Fräulein Zinke* said: "Well let's make an arrangement for this course I will take from you. How much will you charge?" I suggested that for every hour of English I would teach her I might have an hour of chat with her father. And Dr Zinke said: "Oh! I'll say yes to that!" And he said I should bring him a three-lined notebook, and with a beautiful hand he wrote the entire *Fraktur* alphabet; and he taught me the old German hand; and I read the Humboldt letters.

And you know, the more I did that in Germany the more I met people. I went to the libraries, and I realised that geology—like any intellectual activity—can only be done properly if you know its entire evolution. So, in my mind, I'm not interested in history of geology 'in brackets': I'm interested in geology. *That's it!* And for me geology includes absolutely everything. You go right to the beginning—you know, to Anaximander, to the cave man who picked up the first stone and looked at it, you know, that sort of thing; or who got curious about the mountains. That's where everything starts for me. And

** Volume 143, No. 1, pp. 1-37; article entitled 'This Changing Earth'.

one of the reasons why you don't see people in countries like mine getting interested in the history of geology is, I think, because they think Western science is something they can take as they have taken technology—that it can be taken like a pill; you swallow it and it's there. They don't realise that it's something that you have to grow yourself, that it's an activity that grows on you. And that's why they are sent abroad. They study geology. But then they just learn a, b, c, d; and they live the rest of their lives just with a, b, c, and d. That's it.

Of course, that's also true of 95% of Western geologists, isn't it? Only a tiny fraction are seriously interested in the history and philosophy of geology. Very few would be writing the history of the Tethys in Western universities or in Western geological departments, as you've been doing.

If we include all geologists in the Western world—of course when we say the Western world we include Australia and the various European extensions—I would probably have said you're right. I mean, most people learn geology as a profession and go out and practise it. Western academics, however, are much better than they are in this country, or any similar country, because in the West academics at least view their professions as an intellectual activity, and there are various degrees in which they are interested in history. I mean: when you start a course in any Western university, the professor will tell you just a few things about the history of the subject—who did what, etc., etc. In the worst case, that'll be something he's read in his lecture notes, umpteen years ago, and he just regurgitates that. But at least he feels that need to regurgitate, because somebody else has done it before him. Then, as you go up the scale there will be people who get interested in curious incidents that they happen to come across; and they develop an interest for that, not quite realising, or not quite wishing to realise, that it is a part of the whole. And then they get interested; they know curious facts about the past. At the next stage up, people get interested if they themselves happen to solve a problem, and then, because it's *their* problem and *their* discovery, they like to get into its history. There was a lot of that in plate tectonics. When plate tectonics came, among all those people who were involved some at least turned into historians also, as you know.

Menard, for example?

Indeed. Even Tuzo Wilson. I mean Tuzo had never really been interested in history. He was too interested in solving problems now. But he started talking about scientific revolutions. He had heard of Kuhn. If Tuzo had stopped to think for a second about what had happened about the history of geology he would have never mentioned Kuhn; because even his own work in the fifties had elements of plate tectonics that he had used in the context of the contraction theory. Others had been mobilists. In those days, only the oceans and precise earthquake information were missing. Tuzo invented plate tectonics by using his own older knowledge on world geology and the new oceanic and seismological data. Parts of the new theory were totally incompatible with the old ideas, but considerable parts were compatible. Older theories kept on living within plate tectonics as 'limiting cases'. Anyway, Tuzo got interested in both Kuhn and the history of geology. So that's the next stage. And finally you get people like me who view geology and its history, as Goethe once said, as one. As I said earlier, I don't separate the two. You know, for me it's a spectrum: it's a continuous spectrum from the first cave man to plate tectonics today, and beyond.

And so you're now writing or publishing mammoth books dealing with geology from the Stone Age through to the present.

Yes, my Asian book came about because I was asked by Mark Harrison and An Yin to present a paper on our present views on the evolution of Asia—for a Conference in UCLA; and I had a mind to add a few pages of history. Because it was, and still is, my conviction that people in the West know too little about how Asia was explored—like the importance of the Trans-Siberian Railway and the tremendous amount of geological work done for that; or the work of the Indian Survey. You know, that Tethys concept, all the palaeontology, the Gondwana-Land concept: they all came out of Asian work. So I said I'd like to write a few pages. But Harrison said: "No! I won't allow you to put a few pages in; but I would ask you to write a separate chapter on that." I said: "Mark, it's a topic I know, but I don't know it sufficiently to be able to write a chapter. However, I could write a book. To write a chapter on a topic like that you *really* have to know it cold, and I don't. But I could write a book, and I'll investigate the topic and will learn enough to be able to write a book." And he said: "Fine!" So it's going to be a Companion. The first volume's already out—the geology is out. The companion history volume is also going to be published by Cambridge.

Which has given you the tougher time: the geology or the history?

The history! The history has given me the tougher time because there are so many problems that not only need to be solved in themselves but that project into the present day. I mean, how many people know that the main notions of tectonics that developed in Europe had at their roots Asiatic biases? All those people—Elie de Beaumont, Leopold von Buch, and beyond that Werner, Linné . . . ; all those who made pronouncements on various aspects of European tectonics—all had Asiatic biases. Why? It's still like that. North America and Europe are by far the better known continents, but where does the tremendous debate of continental deformation rate? Asia! Why? Because structures in Asia are so much larger. They are so much clearer to be seen; so much easier to deal with in many ways; and if you go just 50 years back, or let's say 70 years, back to *La tectonique de l'Asie* of Emile Argand—everyone thought that was the best thing ever published in the twenties or thirties—and it was about Asia. Why, why would this Alpine geologist, the man who revolutionised thinking in the Alps, who knew the Alps like the back of his hand, why would he not take Europe, which was the obvious thing to do, but jump to Asia? Why would Eduard Suess, sitting in Vienna, make Asia the corner-stone of his tectonics of the world? In that regard, the biases which we today inherit in plate tectonics come straight from Asia. And we are now strangling each other over Asia, yet many of us are not aware of the fact that we are also dealing with a lot of biases that have come from that continent. We think we all have European biases and we're carrying these discoveries into Asia. But we're not.

When you say Asian biases you mean actually biases generated by Western European travellers or visitors into Asia?

Entirely.

Not by Chinese geologists, say?

No, not at all. In fact, the first chapter of my book is called 'Asian versus Asiatic Traditions', and I introduce a distinction: I say 'Asian' is the thoughts of Asians, the people who live in Asia; but 'Asiatic' biases are made by Europeans who started thinking about Asia, who saw Asia. And therefore I introduce this Asiatic *versus* European traditions in geology, and I think one of the reasons why it's originated was because of the tradition of expeditions. Imagine Pallas; and imagine Pallas's counterparts in Europe. Pallas's counterpart in Europe was Cuvier. Right? How much of the terrain did Cuvier ever see, to worry about in geology? De Luc: Pallas's counterpart. What did de Luc know? A little corner of the Alps; France; Italy; England; *finito!* Charpentier. What did he know? A little bit of Saxony! Of course, these people *thought* they'd travelled a lot. They went to Denmark, Spain. But if you take the area covered by the Pallas expeditions, it covers a ground equivalent to the whole of Europe and beyond—all done by one man! Pallas had to deal with *all* sorts of structures, and he had companions who argued

about these things. And that is why the 'Asiatic' workers had different biases; and they were much less provincial. They were much less bogged down by their own hang-ups. In Europe, there were little fiefdoms. Everyone owned a mountain! So really what you're trying to do in this book is tell Western historians something that is almost unrecognized—how these workers in Asia in the 18th and 19th centuries brought ideas back to Europe, which then, as it were, produced a set of 'rails' that was to direct the subsequent history of tectonic thinking?

Indeed! But you said the 18th or 19th centuries. Let us start with Hippocrates!
With Hippocrates!?

You know *Airs, Waters and Places*. What does he take to show as an example of how a terrain affects the health. He's talking about Scythia. He's talking about the geography of Scythia, right? And ever since Hippocrates Asia has been an example. You take the Middle Ages. Friar Giovanni di Plano Carpini goes to the Great Khan. What do they talk about? How high Asia is! How they climbed up! What a magnificent continent! How different it is! How little provincial Europe is! You could imagine the affect of this on their minds. Think of Marco Polo—talking about where he found people, knew about the Ark; going above the Bolor Mountains; going down the Tchichiklik Pass into the Tarim Basin. All of these things accumulated in the consciousness of Europe. You would not know the geography of where you lived in the same detail that you would know Asia at that time, because Asia was immediately idealised. The Catalan Atlas had an idealised map of Asia, showing pilgrims going over there. Every generation had its view, its vision, of Asia. Eratosthenes had the Taurus in Asia. Linné had the High Tartary. Leibniz called Russia—he was really meaning Tartary—*vagina populorum*, from where all people came out. De Guignes wrote his book about how Asia became the centre—the great mountain from which people were dispersed. And in the twentieth-century Mustafa Kemal, when he founded the new Turkey, he wanted to create a new history for the Turks, and he said all civilisations are carried by Turks. This story is told in the *Appendix of the Thirteenth Tribe*—how he kicked out some of the academics from Turkey who didn't believe him.

You also get this 'Asiatic idea' in William Dillon Matthew in the present century in the United States; or even with Griffith Taylor in Australia. Not to mention the 'Aryan Myth' that beguiled the Nazis!

Indeed, Germans had it. All of this comes straight from a geological theory of what Asia was, and how it affected the history of the Earth.

You've told me, however, that you think that the European is the only true civilisation.

It is. It's the only civilisation.

The only civilisation! ? OK.

Not just Western Europe—Europe as a whole.

That is, Europe, plus its offshoots in places like New Zealand or Australia?

Yes. But I want to include Russia. I'm very anxious to include Russia as a civilised nation.

We'll certainly allow you Russia! Even America! But isn't there a sort of paradox here—that this 'central' thinking about the world comes from Asia, but isn't itself Asian?

Yes indeed, because as I said Asia is, or was, like the moon. People know a lot more about the moon than they know about their own geological surroundings. Everybody knows about the craters of the moon. But ask anybody about what rocks they have in their surroundings and they won't be able to tell you.

That's interesting. Kant developed his theory of the earth on the basis of thinking about the moon.

Yes, there are all sorts of examples like that. The exotic is always more interesting. There are historians who've written marvellous articles about imagined cities of Asia. So it's not a paradox, because Asia was the first fertile terrain of colonisation, that was easier to study. And it was easier to study because, you see, the proper colonisation of Asia by civilisation started in 1581 when Yermak crossed the Urals in the name of the Stroganov family and defeated Kuchum Khan and invaded Siberia; and within seventy years the eastern boundary of Russia was pushed seven thousand kilometres—bang—to the Pacific Ocean, and the Russians who went there—people would like to view them as rogues and plunderers—it is amazing how much information they brought back—how much curiosity was there. In my estimation, those people were heroes. They went out there to open a completely new terrain, and I find it very interesting that much later, when North America was invaded by much more 'civilised' whites, i.e. Western Europeans, the Indians were exterminated, but those Russian 'rogues' didn't exterminate anybody. They still have the same populations living there, and they're running into trouble now because of it. Americans have no trouble. Nobody's claiming territory in the western United States, not seriously anyway, whereas in Russia, in the Altai republic, in Yakutia, everybody is claiming territory. Because the Russians just considered those people one of them. They were also Russian. And when I looked at the exploration and development of the territories of Russia, I'm amazed how much we have learned, how much that influenced people. Even the absence of the northeast passage, or rather the impracticability of the northeast passage: you know, I think it gave a shot in the arm to the colonisation of South Asia. The East India Company of the British, and the Dutch, etc., would not have flourished, I'm sure, had the Russians not shown that that northern route for trade with south-east Asia was not practicable.

Well, we'll probably have to draw this to a close for reasons of space in the Newsletter, *Celâl*, but I wonder if you could finish by telling us how would you like to see the study of the history of geology develop in Turkey. Or do you not see any future for it?

I see little future for it for two reasons: i), subjects like this are underfunded—grossly underfunded; ii), if I were a young historian of science, would I worry about the history of science in a country where there was no science? You would get mere 'dribbles'. You would have to address things like: why didn't it come? It becomes an interesting sociological study, and in order to create a framework for the sociologist who will answer these questions you'll have to do a lot of groundwork essentially to come to a negative result; and that's discouraging.

Yes, if you're going to tackle a problem, take one that's interesting and soluble. And rewarding.

Yes indeed. And one of the reasons why I prepared that little bibliography [on the history of geology in the area of the Ottoman Empire], upon your encouragement, was that I'm trying to make the study of the history of geology in Turkey as painless as possible.

Or to facilitate?

Or 'to facilitate'. Thank you. Yes, that's the reason why I did it. But I'm not very sanguine. And it's not because I think the subject's uninteresting, but because I'm not very sanguine about the intellectual development of Turkey as a whole in the near future.

Well, I fear that's too big a question to discuss here. However, at least we can say that INHIGEO members will be able to obtain your bibliography at a very advantageous price; and perhaps what you've done will encourage some of them to pursue the vast topic that you've been pioneering.

Geology in a Favoured Place

Jean-Paul Schaer, *Le Géologues et le Développement de la Géologie en Pays de Neuchâtel: Catalogue Publié à l'Occasion de la Réunion de la Commission Internationale de l'Histoire de la Géologie (INHIGEO) (Neuchâtel, 9-11 Septembre 1998)*, Neuchâtel, 1998. 81 pp., 30 figs., 19 photo-portraits.

All the participants in the splendid INHIGEO meeting at Neuchâtel—where the welcome of our Swiss hosts was greatly appreciated—received a copy of this short book, written by Professor Jean-Paul Schaer, who was the lynch-pin of the whole event. The volume appears under the joint imprimatur of the University's Geological Institute and the Neuchâtel Museum of Natural History.

The work provides a summary of Schaer's numerous previous publications on the history of geology in the Neuchâtel region, and particularly on Agassiz, Guyot, Argand, Wegmann, We find that two themes, often kept apart, are here successfully linked: on the one hand an account of the progress of geology in the Neuchâtel area with respect to theoretical notions, which have followed on one from another since the eighteenth century; and on the other descriptions of the personalities of the geologists themselves. Thereby one comes to appreciate the extent to which the origin and temperament of those who do science count in its onward march—whether they be leaders of men such as Agassiz, or highly original sources of inspiration to others, like Argand, both with their enthusiastic entourage of auditors. But both also had their faults: a domineering personality in the case of Agassiz and egotism in the case of Argand, which generated violent antagonism amongst some of their respective contemporaries.

Thanks to Switzerland's geographical location in the middle of the Alps, the thoroughness and perseverance of its peoples, and the diversity of its cultures, it occupies a most favoured place in the history of geology. Yet the Canton of Neuchâtel forms only a small part of the Swiss Confederation, with an area of 800 sq. km., and a population of a little more than 150,000, of whom less than a third live in the capital. The region breathes a provincial tranquillity. It is all the more surprising, then, that so many outstanding geologists should have been born or lived there, at the border region between the Jura chain and the *molasse* plateau of central Switzerland.

With Schaer, one can try to find explanatory causes. First, there is the geographical position—the region shows excellent examples of folded strata in the Jura, and, for glacial theory, there are the celebrated erratic blocks. A sociological cause would be the 'double culture' of the region's intellectuals in the nineteenth century. A significant number of the Neuchâtel geologists were descended from the Huguenots, who fled their country after the revoking of the Edict of Nantes in 1685. The French Revolution and the Napoleonic interregnum over, these Huguenots renewed their contacts with France, having maintained their French culture. Some returned to Paris, just at the time when so many distinguished scholars, such as Haüy in mineralogy and Cuvier in palaeontology, were there. At the same time, naturalists from Neuchâtel, which was a principality dependent on the King of Prussia, commonly studied in Germany, particularly Berlin. Thus one can partly explain the intense intellectual activity of the Neuchâtel region by the attempted emulation of both German and French cultures. The rigorous Protestant education system favoured this tendency among the well-to-do bourgeois or aristocratic milieu. Thus during the period 1830–1840, on either side of the celebrated meeting in 1838 of the Geological Society of France in the Jura of Porrentruy, the Museum of Natural History, the Natural Sciences Society, and the first Neuchâtel Academy were founded, at the initiative of Agassiz particularly.

The history of geology in the Neuchâtel region can be divided into four periods:

1. *The precursors.* During the 'Theory of the Earth' period, Louis Bourguet (1678–1742), teacher of philosophy and mathematics, enunciated his ideas, including those on the organic origin of fossils, which were then still controversial. During his travels at the end of the eighteenth century, the Genevan Jean-André Deluc (1727–1817) concerned himself with the origin of erratic blocks and the folding of the Jura. But it was to Werner's Prussian student, Leopold von Buch (1774–1853), that we owe the first real decipherment of Neuchâtel geology: in 1802 he drew the first known profile (section) through Switzerland, which is reproduced on the cover of Schaer's volume. Less happily, von Buch was also the author of the theory of craters of elevation, with anticlinals resulting from the rise of magma; and, thanks to his celebrated disciple Élie de Beaumont, this theory held up the progress of structural geology in Europe for half a century, particularly in the Jura.
2. *The 'golden age' of Neuchâtel geology between 1830 and 1848.* The powerful personality of Louis Agassiz dominated this period. Brought up in Germany, he went to Paris as an admiring student of Cuvier, himself of Huguenot descent. The death of his mentor in 1832 took Agassiz to Neuchâtel, where he became well known for his teaching, his studies of fossil fish, and the dissemination of the new glacial theory, which replaced de Saussure's notion of a *grande débâcle*. Agassiz surrounded himself with an enthusiastic entourage, among which there stand out the lively personalities of Amanz Gressly (1814–1865), a key figure in establishing the concept of 'facies', and Arnold Guyot (1807–1884), a founder of limnology, whose name is immortalized in oceanic 'guyots'. Thus Neuchâtel gained considerable renown before Agassiz—succumbing to the call of America—departed for Harvard, where he attracted several of his followers, including Guyot, Desor, and the Frenchman Marcou. In the States, Agassiz played a leading role through his various travels and conferences, and the establishment of the Museum of Comparative Zoology at Harvard.
3. *The development of geology from 1848 to 1909.* There followed the proclamation of a republic after the anti-Prussian revolution of 1848 and the closure of the Academy, which was not re-established until 1866. But after 1852, geological research was taken up again thanks to the intellectual and political influence of Edouard Desor (1811–1882). This German, another person of Huguenot descent, had been secretary to Agassiz before having a violent falling out with him. During this second half of the nineteenth century there were a number of notable geologists, particularly teachers and surveyors of the Neuchâtel area. The best known would be the last professor of the Second Academy, Hans Schardt (1858–1931), his sojourn in Neuchâtel coinciding with his remarkable discovery in 1893 of the thrusts of the *Préalpes romandes*, shortly after Marcel Bertrand's wonderfully insightful hypothesis of the great tectonic overthrusts of the Canton of Glarus in central Switzerland.
4. *Subsequent to the establishment of the University of Neuchâtel (1909).* Following Schardt, the Genevan Émile Argand (1879–1940) took up the new chair in geology. Far from being an insignificant event, this "once again placed Neuchâtel on the highest peaks of geology" (Schaer). A pupil of Maurice Lugeon of Lausanne, and like him moulded by

French culture, Argand became an outstanding alpine geologist, through his sense of 'volumes' and of the kinematics of the *zone pennine*—even if he somewhat neglected the geology of the Canton of Neuchâtel.

In 1922, this lone genius Argand, inspired by Wegener's ideas, prepared his celebrated structural map of Eurasia for the Brussels International Congress (published 1924). His mobilist ideas led towards many new propositions that were prophetic of plate-tectonic concepts: the thrusting of the Indian peninsula under Tibet at the end of a long journey; the Tertiary opening of the Mediterranean with the rotation of the Corsica/Sardinia micro-continent; and following Pierre Termier, the northward push of the Adriatic block producing the folding and piling up of the Alpine nappes, etc. With the death of Argand, Eugene Wegmann (1896–1982), from the German-speaking part of Switzerland, brought his knowledge of the ancient Scandinavian shields to Neuchâtel, along with his ideas on tectonics, and particularly on 'structural stages'. Though his easily-offended personality did not 'give wings' to geology at Neuchâtel, Wegmann nevertheless gained a high reputation, particularly in Germany and France. With the help of the influence of his friend François Ellenberger, he made a generous benefaction to the Geological Society of France, which is the source of the endowment of the history of geology prize that bears his name.

Finally, the book recounts the work done at Neuchâtel since the Second World War—the period in which Jean-Paul Schaer himself played an important role, about which, with undue modesty, he is silent.

From all this, one will remember that from within the flood of contributions at the 'base', with diligent researchers teaching in and mapping the region, there burst forth to international recognition, a century apart, the powerful personalities of Louis Agassiz and then Emile Argand. Thanks to them, the small town of Neuchâtel has gained a world-wide reputation in geology.

We must thank our friend Jean-Paul Schaer most warmly for this copiously illustrated work. He shows most admirably how the evolution and progress of geology have depended on the varied characters of the geologists who, for three centuries, have followed on one another at Neuchâtel.

Michel Durand-Delga, Toulouse

Ways of Folding

Albert V. Carozzi, Bernard Crettaz, David Ripoll (eds), *Les Plis du Temps: Mythe, Science et H.-B. de Saussure*, Musée d'Ethnographie, Geneva, 1998. 367 pp. 29 Swiss francs.

A colloquium was held at the 'Annexe' of the Geneva Museum of Ethnography in Conches (the part of Geneva where de Saussure was born) from 14 to 17 October, 1998. The theme was 'Science and Mountain', and the meeting brought together researchers from all over Switzerland (Geneva, Berne, Lausanne, etc.), France (Paris, Grenoble), as well as Lübeck and Verona, and, of course, Albert and Marguerite Carozzi from Illinois. It coincided with the opening of an exhibition at the Museum on 'Folds of Time'. The present work, which was published to accompany the exhibition, contains the digest of the colloquium's deliberations (helpful for those aspects that most of the participants didn't have time to get to know before the meeting . . . nor during, for the time was so fully occupied).

It rapidly became evident at the meeting that there were communication problems between the two groups of participants: the historians of science and the ethnographers. Several months later, I'm not sure that I understood some of the points at issue in the arguments, which were, however, always courteous even when lively. Reading the contributions of Bernard Crettaz and Jean-Claude Pont consecutively will perhaps enable the reader to get an idea of the two sides of the argument.

Bernard Crettaz addresses his general problematic under ten headings: the 'Alpine myth'; 'Science, myth, and theology'; 'The grand unfolding [dépli] of the world'; 'New priests, new temples, new pilgrims'; 'From myth to science'; 'The myth of science, H.-B. de Saussure: from the endlessly repeated folkloric cliché of the forefather to unknown young scholar'; 'Science colonized by myth'; 'Achievement of Alpine Disneyland'; and 'Nomadic thoughts, nomadic objects, nomadic mountains'. A vast and ambitious project, but one that is not always intelligible: can someone explain to me what the metaphor of folding (and unfolding) of time actually means?

Jean-Claude Pont, who teaches history of science at the University of Geneva, discusses 'Myth and science', concluding his account provocatively by asking: 'Is science a myth?'—ignoring the claim of Crettaz, who slides from 'Myth of the Alps' to 'Mountain myth'.

Next David Ripoll examines the images of mountain and natural sciences from the eighteenth century, that is from the time when mountains were elevated to the rank of objects of contemplation and became part of art history. I was most pleased to hear this said at the colloquium as I have long felt that art reveals many things about mountains that are not presented to the reader in scholars' writings of that era.

Christian Deléclaz focuses on the relief maps of the same century: which lie somewhere between science and myth. Yves de Saussure, Eric Golay, and François Walter recall something of the personality and work of de Saussure. Danièle Decrouez and Edouard Lantero analyze his geological collections.

Finally, we have a very long essay by Albert Carozzi: one hundred and forty pages—more than a third of the book. Entitled 'Discovery of a great discovery: Horace-Bénédict de Saussure and antagonistic horizontal thrusts [refoulements horizontaux en sens contraires] in the formation of the Alps', his paper begins with a comprehensive account of the Genevan scholar's oeuvre, with an essay on his personality, which was what he presented at the conference. Carozzi also presents a long autobiography which, besides explaining the reasons that led him to study the author of *Voyages dans les Alpes*, gives an account of university customs such as are not often revealed these days. And are perhaps not peculiar to Geneva!

Needless to say, it is the last part of the essay that will be of greatest interest to historians of geology. It is concerned with tracing the "scientific advance towards the discovery of the concept of horizontal antagonistic thrusts, according to unpublished manuscripts of Horace-Bénédict de Saussure". The argument will come as a surprise to many who thought they knew de Saussure's ideas by a simple reading of *Voyages dans les Alpes*, notwithstanding the obscurity of certain passages, particularly those concerned specifically with horizontal thrusts. For sceptics, however, the only thing will be to go and read the manuscripts to which Albert has devoted so many hours, and see with their own eyes the notebooks with their drawings in wax crayon, and then in ink, often extremely difficult to decipher.

The first section examines the development of de Saussure's ideas between 1758 and 1772. From his observations of Alpine granitic and metamorphic massifs, de Saussure is led to the idea that granite can be stratified vertically. And as he observes some microfolding in the gneisses he ascribes the whole to subaqueous crystallization, similar to that which occurs in travertine or alabaster, which can crystallize on the side of a container. But for such precipitation to occur on a large scale there

had to be a container for the primitive ocean. As de Saussure could not find the necessary surfaces, he suggested, as a second idea, that the strata had been forced to stand upright by some subterranean disturbance of unknown origin.

However, study of the limestones of Mount Salève near Geneva and the famous S-fold of Arpenaz (which participants on the excursion with Henri Masson after the INHIGEO meeting at Neuchâtel were able to touch with their own hands) made him return—for them—to the hypothesis of 'confused crystallization'. But here there was an insuperable difficulty, for the shales associated with the limestones, which were microfolded, were true sediments. How could components of a same series have different origins?

It was de Saussure's journey to Italy in 1772–73 that clarified the situation. There he observed 'Pleistocene' limestones and convinced himself that they were genuine sediments, like the conglomerates, sandstones, and shales. In 1774, he adopted the idea that a subterranean force, acting vertically, had elevated the whole mountain chain. Then he attributed this force to "an extraordinary seismic shock", similar to the earthquakes of Lisbon (1755) and Calabria (1783). This was the "*grande débâcle*", to which several references were made in the *Voyages*.

But de Saussure still wasn't satisfied. In part because this force could not be demonstrated. And also because it did not explain the disharmonic relationship between the limestones and the shales. Returning to Nant d'Arpenaz, he questioned whether a vertical force could produce an S-shaped fold.

Eventually, de Saussure arrived at his final hypothesis: the seismic force was horizontal, but with a vertical component. The great folding of the molasse at Alby-sur-Chéran (Haute-Savoie) provided him with an example. Henceforth (we are now in the 1780s) he had his definitive solution to the problem. And there it was, thirty years before the publication of the famous experiments of James Hall (1815)—making a thick cloth slide down a steeply inclined surface. One point remained: in the molasse of Alby the folding is one-sided, requiring an obstacle against which the beds are stacked up. In the Alpine case, on the scale of mountain chains, an obstacle is unnecessary if one imagines two compressions, acting from the periphery and directed towards the centre, which finds itself forced upwards by the two movements combined. And Albert Carozzi gives a final diagram showing a crust of granite, broken into two converging parts by deep horizontal thrusts from opposite directions, which stand up and buttress against each other in a structure as high as Mont Blanc, whilst the lower levels, by faulting, develop superficial thrusts.

I am necessarily reminded of a text by Dolomieu (1750–1801), which shows how the compressed earth surface, displaced and elevated, causes the masses of Mont Blanc to fold and be propped up (*Journal des Mines*, 1797–98, 2, p. 425). A prophetic vision: in spite of the anachronism, it is worth mentioning. Dolomieu appealed to an "oblique impact on the earth's crust", resurrecting the secular theory of Whiston's comet (1696). Did Dolomieu know of de Saussure's recent conclusions, or did he arrive at his idea independently? Carozzi does not say. On the other hand, he expresses his regret that Hutton died too soon to utilise the last two volumes of the *Voyages*, which appeared in 1796.

One should add that the article is generously illustrated with photographs, engravings, and diagrams. Speaking more generally, the book is enhanced by its first-rate illustrations. And the presentation is most attractive.

Gabriel Gohau, St Cloud, France.

The Hard Road to the Top

Ellis L. Yochelson, *Charles Doolittle Walcott, Paleontologist*. Kent (Ohio) and London: Kent State University Press, 1998.

pp. xvi + 510. US\$ 49.00 HB.*

Ellis Yochelson began his study of the life and career of Charles D. Walcott more than thirty years ago with the publication of a seventy-nine page biographical memoir for the National Academy of Sciences. He has since lectured, discussed and published extensively on Walcott. As a palaeontologist and a lineal successor to Walcott's Survey position in the old castle building of the Smithsonian Institution, Yochelson immersed himself in the details of his subject's life and work and he developed an empathy with Walcott that comes through clearly in his writings. Walcott was the third head of the United States Geological Survey Bureau (USGS) and he is known among geologists everywhere as the discoverer of the Burgess shale, "the single most important find of fossils", Yochelson wrote (in the *Dictionary of Scientific Biography*). Walcott, who never went to college, also became one of the most influential and powerful scientific executives in America's history. He founded and/or presided over the U.S. Reclamation Service and the Bureau of Mines, the Geological Society of America, the Smithsonian Institution (and the U.S. National Museum). He also founded the National Advisory Committee for Aeronautics and was one of the principals in the establishment of the Carnegie Institution of Washington, the Cottrell Research Corporation, the National Research Council, and the National Park Service.

Walcott's tenure as head of the USGS coincided with the first successes of the conservation movement. In an era of virtual worship of the tycoons of finance and industry, the barons of coal and steel, the giants of the arts and sciences, Walcott too was a very big deal. And—what counted most for geologists—he had begun as a field man. Even after he became a Washington insider, Walcott, who took his wife on a fossil collecting trip for their honeymoon, somehow managed to get into the field each year at least for a part of the time. One of the first Survey appointees, he belonged to a heroic group including W.H. Holmes, Clarence Dutton, Arnold Hague, G.K. Gilbert, S.F. Emmons *et al.* that gave us the first topographic and geological maps of the immense Western Territories. Walcott had spent season after season with such men, surveying and collecting in the field and working under the most arduous conditions; and he published continuously throughout his lifetime. Yochelson (in the *DSB*) calls him "the second or third most prolific American paleontologist" and in my own opinion he was the single most important factor in the designation and definition of the Cambrian System, not excepting even Adam Sedgwick who coined the name before Walcott was born. Yet in an age of a flamboyance that earned it the title of 'Gilded', this powerful executive, as Yochelson points out (p. ix), "wrote plainly and to the point, eschew[ing] superlatives . . . [I]n his view one should start at the beginning of a subject and proceed in logical order." That is also a fair description of the style of this volume.

At an early age Walcott began a diary, which he continued faithfully until his death. It serves as the framework for this biography ("The text more or less follows a chronology," Yochelson writes) organised primarily on Walcott's day-by-day record of his activities, much of it quoted verbatim, as in the entry for April 13, 1870 (p. 13): "Weather pleasant. Last day of my first year in business. Have liked it very well. Have had no trouble with my employers & all seems satisfactory." On this unvarnished chronological structure, Yochelson has hung the fruits of his years of study. He has diligently searched out Walcott's voluminous correspondence with everyone from James Hall to Theodore Roosevelt—everything that might be even

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remotely connected to Walcott's life and his careers, both as working palaeontologist and as Washington bureaucrat. In instances of esoteric palaeontological or administrative/political subjects such as the distinction between stratigraphic palaeontology and palaeobiology, or the founding of the George Washington Memorial Association, Yochelson provides clear and informative explanations. As Walcott developed into a geologist, his diary entries, largely personal from his youth onwards, came to include professional concerns as in this entry for March 2, 1882: "Owing to a change in the nomenclature of the Pogonip limestone reviewed matters pertaining to it." This is followed by Yochelson's clear explanation of the significance of the "matters" involved. Once established as Director of the Survey, the entries reflected Walcott's enhanced responsibilities as well as his august social position, e.g.: "At Survey 9-10: 15 A.M. 2-5 P.M. Meeting of N.[ational] A.[cademy] Sci. 10:30 1:45. Presided at lecture of Prof. Alpheus Hyatt 8:15-9:15. With Helena [wife] to reception at Hearst's 10-12:30" (April 17, 1900)" [p. 378].

As a chronological account of Walcott's life through the period covered in this volume (it concludes with Walcott's 1907 resignation from the Directorship of the Survey to become the Secretary of the Smithsonian Institution) Walcott's biography is a significant commentary, as much for the geology that failed to interest him sufficiently to make it into his diary as for the topics that did. For much of this time Walcott was preoccupied with the Taconic controversy, a problem that predated his first geological position as assistant to James Hall. Nearly all American geologists from the 1840s on were similarly fixated and they drew into their conflict European geologists including Charles Lyell, Élie de Beaumont, Joachim Barrande, M.G. Dewalque, Archibald Geikie, Waldemar Brøgger, Karl von Zittel, and Canadian geologists such as William Logan, Elkanah Billings, A.C. Selwyn, and many others. In Britain, the parallel Cambrian-Silurian dialectic led to Charles Lapworth's establishment of the Ordovician. In America, it led Walcott into a lifetime of detailed palaeontological studies (particularly of trilobites) that framed the Cambrian System pretty much as we know it today.

Ellis and I disagree on our analyses of the Taconic episode in the history of geology but not on the importance of Walcott's role in the affair—a role that Ellis recounts in sympathetic but uncritical detail. The editor of this review, perhaps hoping to put us together by the ears, so to speak, asked me to explain our disagreement. We differ in that Ellis regards the Taconic controversy as a scientific conflict while I consider it as a behavioural problem. Ellis takes a Platonic view of the geology of the terrain and accepts Walcott's biostratigraphy of 1888 as 'right' or at least better than the protagonists of Ebenezer Emmons' Taconic System. I take a behavioural view of the conflict and a nominalist view of the geology. In 1839, Emmons had proposed to create a new Taconic System from the structurally disordered rocks of the Taconic Range. It would be the true primordial system—the first strata above the Primary and the base of the Transition series of Werner (terms that were still current at that time). The current protocols for nomenclature did not exist. James Hall and Henry D. Rogers insisted that Emmons' Taconic strata were equivalent to strata of the conformable sequence that began with the Potsdam Sandstone and continued into strata equivalent to Murchison's Silurian. Thus the great Taconic Controversy began as a conflict over contradictory interpretations and developed into a bitter dispute over the designation of the earliest and lowest strata and the honour of discovery.

Since this particular stretch of the Appalachians continues to this day as a major resource for the PhD industry, I retreat to my nominalist views, but I cannot resist pointing out that the Swiss geologist Hans Schardt introduced the concept of *nappe* in 1883, five years before the last of Walcott's burials of the Taconic System. Only the complexity of such new and previously inconceivable structures could match the complexity of the distribution of the Lower Paleozoic strata of the northern Appalachians, a complexity that accounts for the rabbit-like proliferation of PhD theses even today. Yet surely the ferocity of the Taconic Controversy explains why it took more than a quarter of a century after Schardt's work before the northern Taconics were described as a *klippe* by Rudolf Ruedemann in 1909 and Arthur Keith in 1912. Apparently in the twenty-four years of Walcott's diary notes between Schardt's 1883 paper and the cut-off point for this volume, two decades before Walcott's death, there was no mention of the new Alpine tectonics. As the early International Geological Congresses attempted to standardise the international correlation, Walcott representing J.W. Powell and the USGS, was principally responsible for defeating the proposal that would have divided the Lower Paleozoic into the Taconic, the Cambrian and the Silurian Systems. It is this more-than-quarter-century response-time that makes me consider the Taconic Controversy as behavioural rather than scientific. The Taconic System today thrives as a lost cause with the controversy shifting once again, this time from geologists *per se* to historians of geology. As J.D. Dana reburied the Taconic coffin with fifteen articles in his *American Journal of Science*, each more persuasive than the last, so a new stream of articles are appearing on the merits of the victors in the conflict, even extending to Lapworth's introduction of the Ordovician. The late V.V. Tikhomirov once pointed out that the first formal vote of any international body ratifying the present Cambrian-Ordovician-Silurian was taken at the 1960 IGC! *Eppur se muove!*

The cumulative effect of the book is a new appreciation of the pervasive influence of the USGS on the course of American geology for good and for ill. An example of the latter is the early insularity of the Survey set by Walcott's predecessor, J.W. Powell, whose suspicion of efforts at international standardisation suggests a 'Barrandian colony' of modern American isolationists in the Gilded Age. Walcott's predecessors as Directors of the Survey, Clarence King and John Wesley Powell, were a lot more colourful but it was Walcott in his thirteen-year tenure as Director who moulded the Survey as we knew it through the 20th century. The book closes with Walcott resigning the Directorship of the Survey to become Secretary of the Smithsonian Institution in 1907, the most important government position in American science. He lived another twenty years (to 1927 according to the jacket blurb). Since the discovery and exploitation of the Burgess shale was in 1909, we shall have to wait to learn of it, or for that matter of anything else about the last two decades of Walcott's life. The last sentence of the text hints at another volume.

In the meantime, those interested in Yochelson's views on Walcott's Burgess Shale work will have to fall back on his Academy Memorial or his *DSB* article; or, for a somewhat less flattering portrait, on Stephen Jay Gould's *Wonderful Life: The Burgess Shale and the Nature of History* (1989). Yochelson mentions Gould's account in an aside in the Preface, but he does not refer to his own important essay in the *Transactions of the American Philosophical Society*, which differs greatly from Gould's account. But not to cavil. For insight into the life of this powerful man at the centre of intersection of government, industry and natural science throughout the Gilded Age, scholars of the profession of geology in America will find this work an indispensable resource, not least for the extensive bibliography with which it concludes.

Cecil J. Schneer, Newfields, New Hampshire.

Interactions of Earth Sciences: A Russian Historical Approach, Unspoilt by Western Philosophy of Science—A Possible Challenge

I.A. Rezanov, *History of Interrelations of the Sciences of the Earth*, Nauka, Moscow, 1998. 223 pp.

It is indeed a fascinating intellectual adventure to trace the interactions—rather than merely the interrelations—of the earth sciences through their successive stages of historical development, from Antiquity to the near future. (Note that the author uses the Russian term *vzaimodeistvie* or 'interaction'; not *vzaimosviaz* or 'interrelation'.)

Professor Rezanov distinguishes five types of interactions/interrelations, which are due to: (1) the common object (the Earth); (2) the exchange of methods; (3) the use of knowledge borrowed from other sciences; (4) the mutual transfer of concepts and interpretations; and (5) the common tasks or aims of science.

Within any given science, the following elements are distinguished: fundamentals, methods, empirical generalisations, laws, basic concepts, hypotheses, theories, and ideas. (Data are not mentioned, though 'data banks' are.)

The earth sciences are subdivided according to their specific objects, namely the solid earth, the ocean, the atmosphere, and the 'geographic shell' or 'biogenosphere' (not 'biogeosphere!').

After many centuries of 'prehistory' the earth sciences started to develop and differentiate, towards the middle of the eighteenth century.

The core of the book (pp. 46–127) discusses the interactions of several branches (or disciplines) of the earth sciences: mineralogy, biostratigraphy, physical geography, geophysics, geochemistry, petroleum geology, as well as the interactions of earth sciences and the so-called 'fundamental sciences' (physics, chemistry, biology). After a long period of differentiation, there is now a recent tendency of integration, which will lead to the creation of a comprehensive earth science. But it is premature to speak of 'geonomy'.

Subsequently, the development and interaction of scientific methods is discussed, from ancient times to the present. The stages of creation and evolution of specific methods and their increasing interpenetration is changing now to the integration of methods. This is a major breakthrough of the second (twentieth-century) scientific and technical revolution, which is still ongoing.

A particularly interesting chapter deals with the interactions of scientific ideas and the formulation of scientific 'laws'. (It is acknowledged that these are approximations—that is, laws expressing our knowledge, rather than Laws of Nature *per se*.)

Recapitulating the historical progress, differentiation and interaction of the earth sciences, Rezanov emphasises that the present process of integration is controlled not by speculative ideas of 'geonomy', but by timely new tasks set by human society. Among those mentioned are 'sociology of nature', comparative planetology, meteorological forecasting, prediction of geohazards and disasters, geotechnology, and geodynamics. The general idea is captured by the book's last sentence:

The first scientific revolution (in the early nineteenth century) was brought about by the appearance of the biostratigraphic method and led to the establishment of the historical approach in geology; the second scientific revolution is connected with the large penetration of physical and chemical methods into the geological sciences.

The Bibliography comprises 254 items. The eighteen non-Soviet authors are Aristotle, Baulig, Bowie, Cuvier, Darwin, Dietz, Guntau, Haug, Hawkins and White, Hess, Joly, Lyell, Neumayr, Penck, Roll, Staub, Stille, and Willis (in each case Russian translations of their works being cited). The only title by a non-Russian historian of science referred to is a paper of Professor Martin Guntau of Rostock University (a former Secretary-General and President of INHIGEO): 'The Birth of Geology as a Science', published in Russian in Moscow in 1986. One may also observe that the reader may have the uneasy impression that the author's manuscript has spent some ten years in the drawer, for the most recent references are dated 1987.

The philosophical basis of Professor Rezanov's approach is that of conventional dialectical materialism. Thus epistemology presents no problem to him. Neither is he worried about the concepts of 'paradigm' and 'paradigm change'. So far as the classification and methodology of the sciences are concerned, his starting point is that classic of the relevant Soviet literature, B.M. Kedrov's *Object and Interrelation of Natural Science* (Moscow, 1967).

The concept of 'geonomy', as proposed by V.V. Belousov (*Ways of the Earth Sciences: Interactions of the Earth Sciences*, Moscow, 1964) and by I.V. Krut (*Introduction to the General Theory of the Earth: Levels of Organisation of Geosystems*, Moscow, 1978) is rejected as a premature and too speculative approach. It is not surprising, but nonetheless regrettable, that Professor Rezanov is not familiar with the 'geonomy' of Professor E. Szádeczky-Kardoss, which has only been published in Hungarian (Budapest, 1974). This is our fault—by which I mean that the members of the Hungarian Academy of Sciences Commission on geonomy have not yet publicised the work in English.

The notion of 'systems approach' is mentioned (p. 17), as complemented by the historical approach, but the idea is not elaborated in detail. This is, as a matter of fact, not surprising. It is strange, however, that the same holds true for 'organisation levels', though these are considered as more and more complex ('qualitatively higher') systems, each being the specific object of one (or more) scientific disciplines. Rezanov considers them to be fairly arbitrary.

We note that 'mobilism' in general and 'plate tectonics' in particular are considered to be no more than working hypotheses—not even a theory—'fixism' being deemed of equal value for the time being.

It is remarkable (but difficult to understand) that mathematics, both pure and applied, are almost totally ignored. Geomathematics, mathematical geology, and computerisation are not mentioned. The single reference that I could find runs as follows: "Up-to-date (including cosmic) tools for the recording of physical phenomena in the atmosphere, hydrosphere, and the soil are applied, and the achievements of mathematics and computers are widely used" (p. 209).

Engineering and environmental geology, as well as several other branches of applied geology, are neglected if not completely disregarded, although, in the spirit of V.I. Vernadsky, the role of the biosphere is stressed repeatedly.

Nevertheless, the book testifies to the undoubted erudition of the author. (According to my pleasant personal experience, he *does* read and speak English!) He has made an enormous intellectual effort to arrange his vast historical and geoscientific knowledge in a logical and plausible manner. There are, however, some repetitions, which the reader may find somewhat tedious.

Be this as it may, Professor Rezanov's work offers a kind of challenge. If it were translated into English (which I warmly recommend, though this would not be an easy task) the book could serve as a basis for responses or comments by non-Russian historians of the earth sciences, which could lead to an exceptionally fruitful exchange of ideas.

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Seismology in the Plate Tectonics Revolution

Jack Oliver, *Shocks and Rocks: Seismology in the Plate Tectonics Revolution*, American Geophysical Union, Washington DC, 1996.

In addition to its introduction and appendix, the book is divided into eleven sections, a bibliography, and an index. The first parts deal with the pre-1960s problems (observations of earth movements, learning about the earth by means of earthquakes, and artificial disturbances). Section II contains a selection of papers from the 1960s, including ideas about continental drift and sea-floor spreading, and some scientific recollections or reminiscences. A short section deals with the origin and history of the Lamont Geological Observatory. Section III discusses the period after the 1960s, including fully-fledged plate-tectonic theory, research strategies and philosophies, etc., and an epilogue. The appendix has a paper entitled 'Seismology and the New Global Tectonics' by B. Isaacs, J. Oliver, and L. Sykes, reprinted from the *Journal of Geophysical Research* (1968). In general, the small book gives an insider's view of some of the problems concerning seismological questions. It should be of interest to readers and it will be useful to have the original paper from 1968.

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The Great Volcano Volume

Nicoletta Morello (ed.), *Volcanoes and History—Proceedings of the 20th INHIGEO Symposium Napoli–Eolie-Catania (Italy), 19th–25th September, 1995*, Brigati, Genoa, 755 pp. Price: 115,000 Italian Lire (85,000 Italian Lire for INHIGEO Members).

This massive volume contains most of the papers read at the XXth Symposium of the International Commission on the History of Geological Sciences (INHIGEO) during its three scientific sessions in Naples, Vulcano and Catania. These sessions were interspersed with field excursions in one of the world's most spectacular, best-known, and historically most significant volcanic districts in southern Italy, where majestic volcanic scenery embracing emerald seas blends into the reflections of venerable ruins stammering an eternal ode to human grandeur and evanescence. In fact, this book is the second publication that resulted from this meeting, the first being a nicely-produced and most useful soft-bound *Guidebook* by A. Nazzaro, G. Frazzetta, and M. Neri (92 pp., no date [1995], no publisher, no place of publication).

The book under review is also soft-bound (despite its bulk). The cover is adorned with the beautiful picture of Stromboli from Sir William Hamilton's *Campi Phlegraei* (supplied by Professor Dennis Dean). Following a one-page preface by the editor, the book includes forty-seven contributions authored by fifty participants (the natural to social scientist ratio being roughly seven to five). Of these forty-seven contributions, only thirty-eight are full papers, the rest being abstracts. The contributions fall into three main groups, namely: 1) history of volcanology and related earth-science disciplines; 2) histories of volcanoes; and 3) biographies. In the first group there are twenty-two essays, thirteen in the second, and eight in the third. In addition, there is one paper by Ursula Marvin on meteorites, relating the story of the 1794 shower of stones in Siena and how they were initially confused with Vesuvius fallout; two papers on archaeology outlining the prehistoric settlements of the Etna region; and one inexplicable short paper (5 pp.) from Albania about the 'Institute of Geological Research and its Library's Service,' which has neither volcanoes nor much history in it, except a brief account of the evolution of the Institute and its library! What relevance this paper may have had to the topic of the meeting "devoted solely to volcanology" remains a mystery to me.

Geographically, the papers cover the following volcanoes and volcanic regions. As expected, the volcanic districts of the Mediterranean have the highest number of papers devoted to them: twenty-one. Of these, general papers on Italian volcanic districts claim five, Vesuvius alone five, Etna four, Eolian volcanoes three, Aegean Sea two, and the Bay of Naples region and the Carpathians each claim one paper. In the Atlantic region, Iceland has two, the Azores one, and the Hebridean Province one. The circum-Pacific region has two contributions: one from Japan (a nice summary of the history of volcanic petrology in that country) and one from the Australasian region. Extra-Alpine Europe and the Americas are each represented by one paper and one paper has a global coverage. In many of the remaining eighteen contributions there is also regional information, though their main thrust is thematic.

Overall I found the book very informative. The biographical papers are nicely done and concentrate on scientists who have previously received little attention from the historians of geology (with the exception of the great Abbe Lazzaro Spallanzani). I was particularly pleased to see Papp's paper on von Fichtel bringing into the limelight not only this great pioneer, but also the important contribution that the Carpathian/Pannonian region has made to early geology. Papers such as Papp's and Hjartarson's (on Hekla in Iceland) make statements such as "Werner's . . . position on the relative importance of fire and water was very much in line with the current discussion of these matters" (Güntau and Ospovat, p. 234) appear wide from the mark. I find it a pity that Langer left his contribution on Gerhard vom Rath as an abstract only, in view of the critical importance of vom Rath's 1871 trip to Italy, in the company of Eduard Suess, on the latter's tectonic views. Histories of volcanoes will no doubt be useful not only to volcanologists interested in the long-term behaviour of volcanoes, but also to archaeologists and even to social historians. Among the general history of science papers there is a nice balance between case histories and general issues. Some papers have biographical, regional, and general implications at once: Oldroyd's meticulous account of the Judd–Geikie controversy is a particularly fine example.

The book is useful as a guide to people who are interested in the history of volcanology in the areas discussed, though its coverage of that history as a whole is very unbalanced, as the geographical distribution of areas dealt with has already hinted at. Temporally and thematically its coverage is also patchy. For instance, there is nothing on ancient accounts and ideas on volcanicity, nor is there a treatment of the great figures of volcanology such as Alexander von Humboldt, Leopold von Buch, George Poulett Scrope, and Elie de Beaumont, about whose work on volcanism and its implications there are not many satisfactory accounts. Another area not at all touched is the Dutch SE Asia, in which there is so much history of volcanology with immense influence on tectonic thinking that needs to be better known (van Bemmelen being the most extreme case). The grand volcanoes of the East African Rift Valley with their peculiar rocks do not even get a mention; neither do those of Hawaii with Dana and Dutton, nor the inner Asian volcanoes in Iran and in Tibet, the "two grand fellows" of St George Littledate and Bonvalot, nor indeed the pseudovolcanoes of the Tien Shan that were 'created' by the great orientalist Abel Remusat and Klaproth in the nineteenth century on the basis of Chinese accounts of 'burning mountains' and that so seriously misled von Humboldt. A much-needed systematic treatment of the history of ideas on relations among volcanicity/subvolcanic activity, fracturing of the crust, uplifts of diverse types and geomorphology would have been a most welcome contribution in such a volume, in which some treatment—perhaps in lieu of an introduction—of the general development of volcanology in parallel

with its most closely allied disciplines of tectonics and petrology is sorely missed. Finally, is any history of volcanology ever complete without the majestic chimneys of the Andes?

But a conference proceedings can only bring forth what has been submitted to it. It should not be thought of as replacement for comprehensive treatises or manuals. Perhaps the most important effect of this "first ensemble of writings by historians and scientists devoted solely to volcanology" (from the preface) will be to draw attention to those areas that need future focus.

Though the volume is beautifully produced with its eye-friendly pale yellow paper, reflecting that refined aesthetic taste that characterises everything that is Italian, its editing is not the best that I have seen. First, the quality of the English is very variable, descending from the summit of Dennis Dean's unequalled eloquence to outright incomprehensibility in one or two places, although the book remains comfortably (if not pleasingly) understandable within that spectrum. The quality of figures is generally good, but it is clear that some contributors chose to submit xerox reproductions of some figures, with unpleasing results.

Another concern is about the manifest laxity of at least some of the reviewers as reflected in a few of the minor, but disconcerting, historical errors that have crept into the pages of even the most experienced contributors and that could have been avoided easily by the help of a careful reviewer. For instance, Branagan's credit to Juan Sebastian d'Elcano (*not* del Cano as on p. 24!) and to Álvaro Mendaña de Neira for the discovery of the *Ria de los Volcanos* (Bay of Volcanoes; present Astrolabe Bay with the active Karkar, Long, and Sakar volcano islands at its mouth along the northern shore of New Guinea) in Ortelius's 1570 map (*not* 1510 as on p. 24, which must be a printing error; Ortelius was born only in 1527) is obviously a slip of memory, for neither of these navigators ever went close to it; it was Juan de Saavedra who first left us a detailed account of these coasts returning from his 1527 cross-Pacific voyage. Similarly an unintentional slip must have been Dott's credit to Gutenberg and Richter (1938) for the discovery of the inclined seismic zones, for Berlage and Smit Sibinga had already in 1937 published detailed isobaths to the inclined seismic planes under SE Asian island arcs in well-circulated international journals and they were much discussed subsequently; and these planes had been known to the Dutch even before that. In fact, Gutenberg and Richter used Dutch data for their analysis. The paper by Christy and Lowman contains a number of statements that would have never passed the reviewers of a serious geological journal (such as "the [unpredicted] wide occurrence of volcanos on upper blocks of continent-continent convergence zones" being a problem for plate tectonic theory in 1981! In 1977 a whole Penrose conference on Tibet gathered in Woodstock, Vermont—which Paul Lowman did attend, if my memory serves me right—to discuss precisely that prediction made in 1973 by John Dewey and Kevin Burke—with a little circulated prelude in 1972)! Professor Leonard Wilson's lucid and detailed account of how Lyell killed the theory of elevation craters has Cuvier's *Ossements fossiles* dated as 1811 (should have been 1812) and Jameson as the translator of the *Discours préliminaire* (should have been Kerr) in its Footnote 8. The translation was first published in 1813, so it is unclear why Wilson chose to refer to the third edition of 1817 without specifying that the 1817 book was the third edition; it certainly was not the most recent edition when Lyell wrote to Murchison from Naples in 1829. An alert referee could have drawn attention to all these matters. This review is not the place to exhaust such instances, but competent and careful refereeing is a blessing both for the author and the readers of a paper and must be the first priority of any editor.

For its price, the book is not a bargain—not even for INHIGEO members at US\$ 50.00 per copy. But I think it is worth buying. I do not think any serious student of the history of volcanology would want to be without it. Although dependent on considerable history, volcanology is not a topic blessed with many historical treatments. I hope this volume will usher in a new phase of increased activity, in which there will be many eruptions of historical accounts of volcanology!

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More on Volcanoes and History

Antonio Nazzaro, *Il Vesuvio: Storia Eruttiva e Teorie Vulcanologiche*. Biblioteca scientifica, Collana 'Geofisica dell'ambiente e del territorio', Liguori Editore, Naples, 1997, vii + 374 pp. Lire 55,000.

This book is based on the author's personal and extended observations of Vesuvius over many years, combined with the analysis of the numerous relatively little-known accounts from local observers from the seventeenth and eighteenth centuries and extending until the first half of the nineteenth century. Indeed, Vesuvius is a violent geological 'machine', close to one of the major European cities, and its dangerous behaviour is a scientific, historical, political, and environmental challenge of major magnitude, about which this book is deeply concerned.

The volume is divided into two parts. The first (Chapters 1 to 4) includes a general overview of the types and cyclicity of eruptions and the volcanologic theories that have attempted to explain them. It analyses also the volcanic risk, the behaviour of humankind versus catastrophic eruptions, and the development of monitoring and predicting techniques.

Vesuvius is 1281 m high, and has a double conical structure formed by two stratovolcanoes, one inside the other, which has developed through repeated phases of decreasing magnitude of cone building and destruction to calderas since Late Pleistocene. The older stratovolcano called 'Somma' underwent at least three eruptive cycles, may have reached an elevation of 3000 m, and ended its activity as a huge caldera with the famous Plinian eruption of 79 AD. Only its high, arcuate northwest wall, 'Monte Somma' (1132 m), is prominent today. Inside the Somma caldera is the younger Vesuvius stratovolcano called 'Gran Cono', and between the two is the circular depression of the 'Atrio del Somma', its northern half being called 'Valle del Gigante'. The Gran Cono developed after 79 AD and was destroyed and changed into an ephemeral caldera, the 'Atrio del Vesuvio', during the 1631 eruption. A new cone grew inside, reducing the *atrio* to a circular suture line, and expanding into the present 'Gran Cono'.

The above summarised history of Somma-Vesuvius, as presented in this book (Chapters 1 and 2), relies largely on its inferred geomorphologic evolution, which expressed the succession of constructive phases forming conical craters, and of destructive phases, changing them into calderas.

The author seems to be impressed only by successive morphologies and wants to use them as a guide for his narrative, but little is said about the petrologic nature of the lavas generated by various eruptions, a fundamental character indeed, which controlled the entire volcanic process and whose temporary morphological expression is only one aspect. The author's approach is similar to that of many nineteenth-century European geographers who described and classified landscapes *per se* without paying any attention to the various types of rocks that were carved by streams, glaciers, and other surficial agents. Spectacular changes of morphology could well have been the only impressive feature recorded by local observers of Vesuvius in the seventeenth and eighteenth centuries. However, further reading of this book (see for instance the glossary) shows among

these observers an unusual and keen awareness of the characteristics of lava flows, pyroclastic materials from bombs to ashes, and other volcanic products.

In my opinion, the history of a volcano cannot be adequately told, and even understood, without taking into account the petrologic nature of its products, which controls not only the various types of eruptions but also the final geomorphologic aspect of the succession of events. This is particularly true of Vesuvius, which during its history has had very different types of eruptions, including not only its own Vesuvian type but also Plinian (violent Vesuvian), Strombolian, and Hawaiian.

The striking petrologic evolution of Vesuvius during its long eruptive history has been well analysed by Pichler (1970, pp. 125–219) among others. It results from the peculiar character of the magmatic reservoir of Vesuvius, now thought to be located at a depth of 5 km in Triassic limestones and dolomites. Over time, this reservoir has—by assimilation of these carbonate rocks and by complex magmatic differentiation—produced a series of unusual lavas, and related tuffs and ignimbrites.

In Chapter 3, the author discusses Vesuvius and the birth of volcanology. Indeed, Vesuvius entered the history of science in the modern sense by the eruption of 1631 which followed a long period of inactivity and generated a number of publications by local naturalists. These documents written in Italian were rapidly translated into Latin, French, or German and spread all over Europe. Among these naturalists were: Gregorio Carafa and Giulio Cesare Recupito for the eruption of 1631; Ignazio Sorrentino with his chronicle of Vesuvius; Francesco Serao on the 1737 eruption; and Giovanni Maria della Torre (1768) with his unusual studies on Vesuvius between 1755 and 1768. These featured the use of microscopes, which he improved or had built according to his specifications. Gaetano de Bottis (1786) is also worth mentioning for his book that was extremely rich in observations. He was the first professor of natural history at the University of Naples and collaborated in his experiments on electricity with another naturalist who also left important writings on Vesuvius, namely the Duke della Torre Ascanio Filomarino—a scientist and politician known to be a skilled clockmaker, who even constructed a seismograph. Finally, Teodoro Monticelli studied the eruption of 1822 and ushered in the transition toward modern volcanology.

I pointed out above that the local observers of Vesuvius in the seventeenth and eighteenth centuries were unusually keen, and since their works are relatively little-known and rare, a more detailed analysis of their contributions should have been given before discussing their relationship with the theories of their time. It is only in the glossary (pp. 311–321) that the reader gets a glimpse of their amazing observations and related early definitions of the various volcanic products of Vesuvius, such as bombs, fumaroles, lapilli, Pelé's hair, lava fountains, lava tunnels, ropy lava flows, and so on.

Chapter 3 reviews the successive theories on the origin of the fire of volcanoes, which was the general context of the studies of these pioneer naturalists. It is unfortunately short and superficial, and furthermore fails to provide a synthesis. Nevertheless, the reader will find well-known theories such as the fermentation of pyrite concentrations, subterranean air and water (sea water or rain) interaction, the combustion of bituminous materials and coal seams, and assorted vitrification processes. Eventually, epidermic sources of heat, such as fermentation of pyrite masses and combustion of bituminous materials were replaced by the more general hypothesis of the internal heat of the earth, introduced by James Hutton and applied to volcanoes by Scipione Breislak. The theory of the 'craters of elevation' of Leopold Von Buch was the first attempt to link volcanoes to deep crustal orogenic events, thus opening the path to modern thinking.

The relationship between humankind and the volcano is the subject of Chapter 4. Apparently, Vesuvius is no exception to the rule of attracting people's attention as a source of heat, and of thermal springs used for medicinal purposes. Furthermore, it offers the advantages of a healthy climate, rich soil, bountiful crops and outstanding vineyards, as compared to the unhealthy surrounding swampy areas with their yearly pestilence and famine. These repeated events appeared far worse than the occasional catastrophic volcanic eruption, which, though sometimes responsible for thousands of fatalities, was quickly forgotten.

Scientific understanding of the dangers of volcanoes began with the search for events that were precursors of violent eruptions, earthquakes, variations of sea level, or of water levels in wells. These attempts at prediction are discussed by the author in terms of their social, political, and financial problems. Such crude methods of prediction gradually evolved into modern evaluations of volcanic risk, with increasingly sophisticated techniques, but still with mixed results. Instrumental in these studies were the contributions of Karl Gottfried Immanuel Freidlaender (1871–1948) and of Alfred Rittmann (1893–1980), leading to the establishment of the present Osservatorio Vesuviano.

The second part of the volume consists of Chapter 5, entitled 'Natural History of the Eruptions of Vesuvius', which is eighty-six pages long. In the introduction to this chapter, the author insists that the historical study of volcanic activity is indispensable for the understanding of a volcano, with the implicit assumption that its future behaviour will be similar to that of the past. Consequently, such a history is of critical importance for developing models of volcanic behaviour. In the author's estimation, this historical approach, which includes events precursor to eruptions and the determination of the various types of eruptions, increases the knowledge of volcanoes, whereas geophysical and geochemical monitoring, which does not take into account the history of eruptions and the geology of volcanoes, is so to speak 'blind' and does not provide the best guarantee of success.

In the rather confusing introduction to Chapter 5, the author attempts to demonstrate the superiority of history over science in volcanology. His assumption that the future behaviour of a volcano is similar to its past is, however, entirely unsupported. The book does not discuss the various types of eruptions of Vesuvius in a scientific way. Furthermore, geophysical and geochemical monitoring are part of the geology of volcanoes, not 'blind' unrelated techniques.

At any rate, this long chapter is valuable as a detailed narrative of the succession of eruptions of Vesuvius from 79 AD to 1944, with more emphasis after the eruption of 1631, when documents became readily available. For the first time, many original observations and little-known references become associated in a single history. The author systematically describes each historically-documented eruption by means of various features such as dates, types of activity and of paroxysms, types and pattern of vents, geographic distribution of products (but given simply as lavas, lapilli or ashes), estimated volume of ejecta, degree of destruction of habitats, and finally contemporaneous narratives.

Unfortunately, no geological considerations, either petrographic, lithologic, geophysical or geochemical are to be found in this chapter. Actually, modern volcanology relies mainly on geophysical monitoring as the only technique that has achieved a moderate amount of success in the prediction of volcanic eruptions. In my opinion, the natural history of eruptions, where available and even if proven partially reliable, is only of historical and folkloric character, and of minor predictive value.

However, the reader will find the various appendices to be of documentary interest. They provide a thematic anthology dealing with volcanic phenomena, eruptive mechanisms and products, observations and experiments, risk and civil defence, the 'sociology and anthropology' of the volcano, monitoring and instruments, and the 'advantages' of the volcano, including the use of lavas as building materials, the fertility of the soil and the related high quality wines, and finally tourism. The anthology

is followed by a glossary, mentioned above, which provides some very early descriptions and definitions of volcanic products by local observers. The bibliography is mostly of regional character and hence brings to light many little-known regional contributors. In contrast, the author index is insufficient and there is no subject index.

In summary, this handsome volume may please historians and sociologists interested in the evolution of a particularly violent volcano, but geologists interested in the history of volcanology will be disappointed by this missed opportunity to provide a much-needed synthesis between history and science.

Reference

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Homage to François Ellenberger

Gabriel Gohau (ed.), *Hommage à François Ellenberger: Fondateur du Comité Français d'Histoire de la Géologie (COFRHIGEO)*. Paris: Société Géologique de France, 1997. 70 pp. PB

Gabriel Gohau (ed.), *De la Géologie à son Histoire: Ouvrage édité en Hommage à François Ellenberger*. Paris: Ministère de l'Éducation Nationale de la Recherche et de la Technologie: Comité des Travaux Historiques et Scientifiques (Section des Sciences), 1997. 224 pp. FF 300. PB*

The study of the history of geology is actively pursued in France, with a learned society (COFRHIGEO) specifically devoted to the field. This 'Comité' was founded in 1976 by the geologist-turned-historian, François Ellenberger, and the two books here under review are the published outcome of a meeting held in his honour on May 17, 1995, on the occasion of his eightieth birthday. Ellenberger is a man widely admired by his colleagues, indeed (as I understand) held in awe for the breadth and depth of his knowledge of the history of geology.

The first volume named above is a collection of short papers, saying something about Ellenberger and his career, and providing a bibliography of his publications to 1996. These amount to the massive total of 257 items, the first having been published in 1937. The earlier ones were, of course, geological, but covered an extraordinary range, from tectonics to palaeontology. I also notice a book: *Le Mystère de la Mémoire: l'Intemporel Psychologie* (1947), which (I imagine) gives us some of the ideas that developed in Ellenberger's mind during his period as a prisoner of war in Austria, when he was deprived of books and had to rely to a considerable extent on memory for mental sustenance, though in fact he managed to undertake some geological work in the confines of the prison camp, and a sort of do-it-yourself university was, it seems, improvised there amongst the prisoners.

After the war, a distinguished geological career followed, which took Ellenberger to the presidency of the Geological Society of France and the award of the prestigious Wegmann Prize. From the early 1970s, we begin to see the first papers on the history of geology appearing, and for the last quarter-century or so he has largely devoted himself to the study of the history of geology. Readers may be familiar with his *magnum opus*, the two-volume *Histoire de la Géologie*, also available in English, which has attracted extensive critical acclaim.

Geology is, of course, the historical science *par excellence*, and perhaps for this reason an exceptionally large number of geologists have been drawn into the study of the history of their science. In the concluding essay of the second volume under notice, entitled 'Histoire d'un cheminement', Ellenberger explains how he 'progressed' from geology to the history of geology. It was his practice to read *everything* that he could find that had been written on a topic when he was engaged in a piece of geological research. Only in that way, he discovered, could he understand the problems that had to be solved, and how, in some cases, good ideas or observations had been pushed aside in the name of prevailing theory.

As he grew older, and less active in the field, Ellenberger began to apply this principle to the study of the history of geology too, and this led him to read the work of interesting, little-known precursors of Hutton such as Louis Bourguet and Henri Gautier. Later, when it came to writing his grand history of geology to the beginning of the nineteenth century, he undertook to read *everything* that had been written relating to the science, both primary and secondary sources. He went right back to Greek and Roman times, and learned languages as required, in order to read the primary sources. Many were the errors he uncovered, both in translations and interpretations! Mind you, such 'total history' does not make for easy comprehension. Indeed, one may get into a 'Tristram Shandy'/'Ulysses'-style predicament if one tries to include *everything* in one's history. Perhaps both Ellenberger and his readers are fortunate in that the sources for ancient ideas about the earth are limited—or not unlimited.

Anyway, the world of learning, and more particularly geologists, has been greatly impressed; and the fine collection of papers in the second volume under notice, by eighteen distinguished historians of geology (together with a short essay by Ellenberger *lui-même*) make a fitting testimonial to the doyen of French history of geology. I shall now list the papers and their authors, and then make some remarks about the items that I found particularly interesting. Space precludes detailed consideration of all the contributions.

We have:

Jean-Claude Plaziat on the fossils of the Paris region and their influence on the thinking of the celebrated 16th-century potter, Bernard Palissy;

Nicoletta Morello on the work of Borelli on Aetna;

Jean Gaudant and Geneviève Bouillet on early studies of fossil fish, especially by J.J. Scheuchzer;

Kenneth Taylor on Nicholas Desmarest and how he became a naturalist;

Albert Carozzi on the unpublished methods employed by H.-B. de Saussure for recording geological information symbolically

Wolfhart Langer on the early geological work in the Eifel region (*i.e.*, on the western side of the Rhine, near Koblenz);

Hugh Torrens on *unsuccessful* coal prospecting in Somerset;

Martin Rudwick on Smith, Cuvier, and Brongniart, and the origins of geology;

Kennard Bork on the relationship between the work of Brongniart and the American geologist Cleaveland;

Gabriel Gohau on the origins of actualist/uniformitarian method in geology;

Philippe Grandchamp on the 'Petit-Coeur' affair (referring to the discovery in the Alps of Carboniferous plants sandwiched into Jurassic strata), and the associated work of Élie de Beaumont and its 'ideological context';

Henri Tintant on the work of Alcide d'Orbigny;

* This review is scheduled to appear this year in *Metascience*, where there will also be a response by Gabriel Gohau.

Goulven Laurent on the relationship between palaeontology and evolution, with particular reference to the work of H.G. Bronn; Cecil Schneer on the last 'theory of the earth', namely James Hall's notion of 'geosynclinal'; Michel Durand-Delga on the first geological maps of the world, by Ami Boué and Jules Marcou; Bernard Gèze (now sadly deceased) on the phosphate caverns of central France; and the (autobiographical) essay by Ellenberger himself.

Some of the papers (as those of Morello, Taylor, Rudwick, Torrens, Gohau, or Schneer, for example) tend to examine ground that has been trodden previously by the authors themselves or by other historians (such as Robert Dott on geosynclines); and there may well be overlaps in other papers about which I am unaware. But all have important contributions to make; and Taylor, Rudwick and Torrens broach the 'question of questions'—namely what it was that led to the emergence of geology as a new science as and when it did. I shall now discuss those papers that happen particularly to interest me, with no disrespect intended, of course, to the other authors.

First I just say of Langer's informative paper that I have long heard of the famous volcanic rocks of the Eifel region, which attracted much attention in the eighteenth and nineteenth centuries, almost to rival those of the Auvergne or the volcanoes of Italy. Yet I have never seen a geohistorical paper on the region. I want to go there!

Durand-Delga's paper interested me because it cleared up an old mystery. There is a reference in the New Zealand literature to a geological map of the world by Alcide d'Orbigny, dated 1843, which gives 'geological colours' to New Zealand. I searched unsuccessfully for this map when I was writing my master's thesis on the history of geology in New Zealand in the nineteenth century. Now Durand-Delga's paper reveals that the reference should have been to a manuscript geological map of the world prepared by Ami Boué in 1843 (and there is also a printed version, dated 1845). Boué did not, of course, visit Australasia, but he did what he could to colour in our distant part of the globe, on the basis of travellers' information, and what 'might be expected' for areas that were then unvisited. Professor Durand-Delga has kindly sent me coloured copies of the Australasian parts of the two Boué maps, for which I am most grateful. His paper reveals how Boué and Marcou went about their grand inductions, and what they were able to accomplish. He points out that such attempted syntheses were forerunners of the work of the International Geological Congresses (initiated in 1878), which sought to bring order to the mass (or morass) of conflicting stratigraphic classifications that were being developed around the world.

These personal interests aside, I shall now concentrate on those papers that seem to me to throw light on the 'question of questions'. (Thus I regretfully pass by such early investigators as Palissy, Borelli, and Scheuchzer.)

First the inspector of manufactures, Desmarest. He is remembered for his work in the Auvergne, in which, during the 1760s and '70s he demonstrated the volcanic origin of basalt, and showed, in a famous memoir presented to the *Académie* in 1775, how one could elucidate the *history* of successive formation and erosion of lava-flows. By my book, this is 'doing geology'. Taylor shows how Desmarest was, until the 1750s, when he was in his thirties, a man whose knowledge chiefly came from books of history and antiquities, even to solve such questions as whether there had once been a land-connection between France and England (on which topic he wrote a prize-winning essay). But he imbibed from the works he consulted the skill to evaluate sources critically; and, one might mention, he also studied physics. Thus Desmarest was, Taylor argues, already committed to empiricism, before he turned to natural history. And his subsequent employment required him to travel, and to evaluate technical processes and the way things were made. So we have a good understanding of how and why Desmarest turned to the study of the earth from an historical and empirical perspective. Taylor (as he has informed me in an e-mail) sees this turn as 'symptomatic' of the beginnings of geology as a science, though he would not want to say that Desmarest, single-handed, began the new science.

Torrens also is interested in the relationship between technology, manufacturing and geology, and he has given much attention to the role of the surveyor/engineer William Smith (and people of his 'class') in the beginnings of the science. Unlike Desmarest, Smith, of course, was not a scholar but quintessentially a 'practical' man. He arrived at the famous principle that different strata of different ages could be recognised by the different fossils contained within them. He sorted out the correct order of the strata for the rocks of southern Britain, and published a geological map for the whole of England and Wales in 1815. But while he recognised a temporal order in the strata according to their placement in a geometrical sequence, Smith was not specially interested in their *history* as such. He wanted to know which rocks might be found where, and their properties and economic potentials. Thus if a bed was found that looked somewhat promising for coal, Smith could, by his stratigraphic knowledge and examination of the fossils in or close to the bed, advise as to whether it was really part of the Coal Measures and might be mined with prospect of profit.

Thus we have Torrens' story of the attempt by those who ignored Smith's principle and dug for coal near Bruton, Somerset, from 1803 to 1810, and lost a lot of money in the process. Smith visited Bruton in 1805 and found fossils that told him that the pit was being dug in rocks that were far too high in the stratigraphic column to yield profitable coals. He advised accordingly, but his advice was ignored—with disastrous financial results. Much the same happened a few years later in Sussex, when the advice of John Farey, another surveyor and disciple of Smith, was likewise ignored.

So for Torrens, the beginnings of geology were related to technical/economic factors, and involved the establishment of the correct order of strata, using fossils to establish this order. However, I would add, the work of the likes of Smith and Farey was not much concerned with the *history* of the earth. Their '*problématique*', as our French friends would say, was geometrical and economic in character.

Next we come to Rudwick's important paper, which, however, he has adumbrated in earlier publications, and will develop more fully in a promised book on the origins of geology. Rudwick identifies four approaches to the study of the earth that were followed about 1800. First, there was the tradition of collecting specimens, classifying them, and storing/displaying them in 'cabinets'. Fossils were detached from their matrices, and no significant connection was remarked between the fossils and the strata in which they were found.

Second, there was Wernerian '*Geognostie*', which sought to establish the order of strata, chiefly on lithological grounds. It was, says Rudwick, a structural, not geohistorical, science. It had a practical/economic rationale and fossils were of relatively minor significance.

The third tradition involved 'theories of the earth' such as Buffon's: models or 'systems'. These proposed a series of changes which, given a set of laws and assumed starting conditions, allowed one to know or understand the subsequent sequence of events. By embryological analogy, these models can be called 'epigenetic' theories. But whether they envisaged relatively brief unidirectional sequences (as did Buffon's theory), or long cycles of events (as did Hutton's theory) they lacked the element of contingency.

Fourth, there was the tradition of looking for the 'archives', 'documents' or 'monuments' of the earth's past, analogous to items sought by the historian who seeks to learn about human history. Desmarest was doing something like this in the Auvergne.

Now, suggests Rudwick, what Smith did was to bring together the tradition of the cabinet fossil collector and the geognost, for the specimens of Smith's collection could be and were arranged in a coherent temporal and spatial order. Of course, it improved geognosy significantly (as Torrens' study of the Bruton fiasco well shows). But in itself it did not produce a geohistorical approach to the earth.

Such an approach was, Rudwick contends, brought about by Georges Cuvier. His early work on elephants and their fossilised relatives was in the 'cabinet' tradition. But he also used the language of the 'antiquarian', and sought to reconstruct the past, discovering what the animals were like, which were presented to him in his museum as a jumble of bones. He also came to realise, after reassembling their parts, that different types of vertebrates were associated with particular formations in the Paris region.

As is well known, Cuvier collaborated with Alexandre Brongniart on a study of the rocks of the Paris Basin, and prepared a map thereof. Brongniart visited London in 1802, and probably learnt what Smith was up to, so that on returning to Paris he and Cuvier could begin a correlation of the Parisian strata with the help of their contained fossils. Perhaps they could have achieved their ends without Smith's help. (We cannot be sure.) But Cuvier's work was now (for Rudwick) geohistorical in character. Fossils were equivalent to 'documents'—which could indicate the *contingent* conditions of existence (e.g., marine or fresh-water) when the strata were deposited. And that history was radically contingent, not pre-ordained as it would have been in one of the earlier theories of the earth. So, for Rudwick, Cuvier is the key figure in the establishment of modern geology, and the process of this establishment involved geohistorical thinking. Hutton worked differently: he had a theory of the earth, thought out *a priori*, which required 'proofs and illustrations', as the subtitle of his *Theory of the Earth* indicated.

If we accept Rudwick's argument, then Hutton was no more the 'father of modern geology' than was Buffon, Smith, or the geognost Abraham Werner. Indeed, in a sense Hutton's geology was quite archaic. So if you accept the emergence of geohistoric thinking as the litmus test to recognise modern geology, then the colour turns, so to speak, when we get to the work of Brongniart and Cuvier. Personally, however, I doubt that there was a sharp colour change in this 'grand titration'. The colour was changing continuously from the time of (say) Lavoisier or Lomonosov. And Torrens would be right to maintain that Smith and his peers were important components of the change.

Anyway, by 1828, when Élie de Beaumont encountered the anomalous order of strata at a site near the village of Petit-Coeur in the French Alps—as discussed in Grandchamp's paper—we can say, no doubt, that geology had been established and that the geohistorian's task was understood. Wernerian *Geognosie*, at least, was on the decline, and less money was being wasted on fruitless coal-hunts in Britain or elsewhere. Élie de Beaumont, it may be mentioned, was developing the theory that as the earth cooled and contracted it formed mountain ranges as wrinkles in the crust, and ranges that had the same alignment were supposedly of the same era. One might call this a 'theory of the earth', but it was also one that was contingent: one had to go and look at the mountains and determine their alignments and see which rocks were upheaved, and where they were situated in the stratigraphic order. (Later his theory lost much of its contingency: it was imagined that the ranges formed a 'quasi-crystalline' pattern, that of a pentagonal network.)

Regrettably for me, however, Grandchamp's paper is a little too specialised to be useful. In 1828, Élie de Beaumont reported the discovery of coal plants (Carboniferous) where they had no business to be, sandwiched between beds containing belemnites (later allocated to the Jurassic). It suggested that Carboniferous plants had persisted in the Alps long after they had died out elsewhere. (I hate to think what William Smith might have made of this had he encountered such a state of affairs in Somerset!) I gathered from Grandchamp that the observations led to much subsequent disputation, and that the area was one that Ellenberger himself studied intensively.

Unfortunately for me, Grandchamp does not tell us, even briefly, the direction that the later debates took, or anything about the modern interpretation. I *imagine* it must have something to do with thrust faulting, such that strata of different ages have become tangled with one another by the action of lateral forces. But I should have liked information on this. It shows, incidentally, that with the best will in the world one cannot make sense of isolated texts if one is innocent of certain items of knowledge—which makes me believe that the popular crusade against whiggery may be somewhat misplaced.

Grandchamp's concern is to ascertain how and why Élie de Beaumont made the observations and gave the interpretations that he did. There is close textual and historical argument, which arrives at the conclusion that Élie de Beaumont was under the influence of his teacher Brochant de Villiers. But we are not told about how, if at all, *'l'affaire'* related to Élie de Beaumont's tectonic theories.

The next paper, by Henri Tintant, about the palaeontologist Alcide d'Orbigny, assumes less knowledge on the part of the reader and thus, for me, had more to offer. It describes how d'Orbigny set about the establishment of subdivisions of the stratigraphic column into finer subdivisions than the main units, such as Jurassic or whatever. With infinite palaeontological labour, he established twenty-seven 'stages', each characterised by a particular suite of fossils; and he suggested specific sites where such assemblages might be found. (Such sites later came to be called 'stratotypes'.) The idea was to establish an empirical basis—on essentially Smithian principles—for world-wide stratigraphy. It was a success, and its influence remains to this day, in that a good number of the stages first proposed by d'Orbigny are still used (e.g., Toarcian, Bajocian, and Oxfordian, in the Jurassic).

D'Orbigny's work appeared in the 1850s. It was successful practically, but had all sorts of theoretical problems, especially when it had to contend with Darwinian (or Lamarckian) evolutionism. D'Orbigny was not an 'environmental determinist' like Lyell, such that changing conditions gave rise (somehow!) to new forms. If anything, d'Orbigny's stratigraphy meshed with that of Cuvier, in that it envisaged successive catastrophes and subsequent creations of new faunas. Were that the case (and perhaps it is, if you believe that major faunal changes are the product of extra-terrestrial impacts, reversals of the geomagnetic field, or whatever), stratigraphy would be a relatively tidy business. Evolutionary theory, however, demands a blurring of faunal boundaries, or perhaps some kind of punctuational evolutionary change, so that things are not too fuzzy for the stratigrapher.

There is also the problem that one can hardly expect the same fossils to be deposited simultaneously all over the world, or even at neighbouring localities, where waters may be tranquil or turbulent, and sediments pebbly, sandy, muddy, or whatever. It is these kinds of considerations that give comfort to Creationists even to this day! Yet the system of stages that d'Orbigny devised was remarkably successful, and, as said, is still used in essence to this day, though admittedly with numerous objectors. As Derek Ager has facetiously put it: '[T]he Bacchanalian and the Machiavellian Stages, though [they may be] theoretically

adjacent in time, will inevitably be defined at their two different [and separate] type localities. It is extremely unlikely that the top of the Bacchanalian at its type locality will exactly correspond with the base of the Machiavellian in its home ground'. Indeed!

So classical, palaeontologically-based stratigraphy certainly has its problems (and its disputes) and is now supplemented by all sorts of radiometric and geomagnetic dating methods. Nevertheless, the work of d'Orbigny lives on, and has done sterling service over the years. Tintant exposes the metaphysical roots of the system, which (*à l'Ellenberger*) should be known if one would understand modern controversies on these issues.

It might have been helpful if a paper on the work of Friedrich Quenstedt and his pupil Albert Oppel—who devised the notion of subdividing stratigraphic stages into (bio)zones by means of suitable defining fossils—had followed, for then we might have had a pair of papers that would have clarified the whole basis of subsequent biostratigraphy, with its tangled metaphysical roots, conflated with acrimonious debates about rules of nomenclature. To be sure, this story is perhaps sufficiently known (at least to German readers) by the work of Helmut Hölder—though Anglophones like yours truly could do with more on the topic.

In fact what is offered next is a valuable paper by the historian of palaeontology, Goulven Laurent, who discusses a prize-winning essay by the German palaeontologist Heinrich-Georg Bronn (1856) in answer to the question posed in 1850 by the *Académie des Sciences* as to whether, when a species becomes extinct, its successor is a new creation (as Lyell and d'Orbigny imagined) or the product of transformation (transmutation/evolution) of the old form. Bronn's answer was eventually given in a massive volume of 542 pages. Clearly the academicians had asked a difficult question!

Bronn concluded against catastrophism and in favour of progressionism, but decided that the stratigraphic/palaeontological evidence was insufficient to demonstrate smooth transformism. In the end, whether one opted for evolution or creationism depended, Laurent argues, on one's beliefs. To an extent this is still true today, so far as observations of macro-invertebrate fossils reveal, but a few years after Bronn's essay Darwin's *Origin* appeared on the scene and Bronn reviewed the work, edited the first German translation, and added a historical introduction (giving prominence to Lamarck). The wand of the incompleteness of the stratigraphic record could be waved to scare off all Doubting Thomases; and as we know Darwin waved it vigorously. Bronn might, then, have become a Darwinian, but he died in 1862.

Yet Laurent shows that much of Bronn's pre-Darwin essay was strongly Lamarckian in character (an observation congenial to Laurent, a strong advocate of Lamarck and his ideas), in that the pre-Darwin Bronn propounded laws of change that were essentially those of Lamarck. However, the fossil evidence did *not* show gradual transitions with intermediate forms in intermediate beds, so, ironically, the empiricist Bronn could not allow himself to be a Lamarckian transformist (or a Darwinian one, for that matter). Of course, if such transitions been found everywhere one could not have had the useful stratigraphic advances of d'Orbigny, Quenstedt, and Oppel—a nice ingenious paradox!

I skip by Cecil Schneer's paper on James Hall, the idea of the 'geosynclinal', and the last 'theory of the earth', noting only that if Rudwick is right about the origin of geology as an historical enterprise there should, perhaps, have been no theories of the earth at large in the second half of the nineteenth century! But of course there were, and have continued to be so. So geology, when founded—let's say by Cuvier—did not forsake theories of the earth for ever. For dynamic and historical geology are two sides of the same coin, a point made at the outset of Gohau's essay on 'actualism'.

Turning to Gohau's paper, then, I may mention that he and I have corresponded for many years, though we had never had the pleasure of meeting until the Neuchâtel conference. Before his retirement, he taught at a *lycée* in Paris, but has moved in academic circles to a large degree. He wrote a doctoral thesis under Ellenberger's supervision on early theories of mountain building, and since his retirement has been producing important papers at a furious rate. He is now President of COFRHIGEO, so Ellenberger's mantle has in a sense passed to Gohau, who, like his master, is a devotee of primary sources.

Of all the topics discussed by writers on the history and philosophy of geology, that of 'actualism'/'uniformitarianism'/'catastrophism' is perhaps the muddiest, and Gohau points out that Ellenberger discovered that part of the trouble arose over confusions of the shades of difference of meaning between 'actual' in English and '*actuel*' in French; and that the term slipped into the English literature through William Fitton, whose mother was a Francophone; and then it was thought for a time by French geologists that the geological use of the term originated in England! *Actually(!)* the word 'actual' is so loose in English that I prefer not to use it, and would stick to 'uniformitarianism' in its several brands, each specified as required; or use the terms 'real' or 'true' if needed.

But the issue is not just linguistic. Gohau's approach is to classify explanations according to the type of findings or observations to be explained, which he usefully calls the 'earth's archives'—a concept that goes back a long way in his work, as I recall from our correspondence. In the present paper, he considers three examples: the ideas of the seventeenth-century diluvialist John Woodward; the eighteenth-century Swiss geologist Jean-André de Luc; and a less well-known French author Marcel de Serres who published a volume comparing the cosmogony of Moses with the observations of geology (1838).

For Woodward, the 'archives' were shells found in sedimentary strata in elevated positions. His explanation was that they got there when gravity was suspended during the Noachian deluge. Thus for Woodward not even the laws of nature were constant; but a shell was a shell and a sediment was a sediment, in the past as at present.

For de Luc, the 'archives' included granites, which could not be produced artificially in his day, and are not seen being formed in nature 'before our eyes'. So different causes (precipitation from a universal ocean), not different intensities of action, were held responsible for their formation.

For Serres, the 'archives' were organisms found in the rocks, with new ones appearing in the upper layers and replacing the older ones found in the lower layers. The explanation proffered was the activity of '*l'Être infini*'.

Thus, in the three cases considered the 'archival' observations were incompatible with any causes known to be acting in the present: so some kind of 'magical' explanations had to be invoked. Lyell (with Hutton's help!) side-stepped the difficulties by invoking a dynamic geology and drawing on unlimited drafts of time (G.P. Scrope's banking metaphor). Lyell was, however, left with the problem of the source of new species—and as is well-known, he simply put it in the too-hard basket. Moreover, as Gohau shows, there were several 'uniformitarians' before Lyell.

But, following Hooymaas, Gohau suggests that one must see an extremely complex web of ideas involved in the eighteenth and nineteenth centuries, in which catastrophists, so-called, played an essential part (as Rudwick writing on Cuvier, and Tintant on d'Orbigny, would undoubtedly agree). There were uniformitarians before Lyell, and catastrophists after him. And insofar as the latter integrated their catastrophism with Genesis they had to extend the time-scale of the world radically, offending Biblical literalists in the process, just as much as did the 'uniformitarians'.

This fine collection of essays, brought together to honour a man who has inspired all the contributors, but perhaps none so more than the editor, Gabriel Gohau, concludes with a brief essay by Ellenberger outlining his own intellectual progress from geologist to historian of geology. He mentions how, when working in the area described in Grandchamp's essay he worked assiduously reading the writings of the early workers in the district, and all the many things that had been written on ideas about metamorphism. Later teaching structural geology at Orsay, he did so from an historical perspective, explaining how earlier geologists had tackled the problems facing those that followed.

Eventually, he became seriously interested in Hutton and published several papers on him and his precursors. Let me conclude with Ellenberger's own words:

Je lus; j'assistai à des colloques; je me pris à amasser sans relâche des notes, de pleines liasses de photocopies, j'accumulai les fiches d'auteurs et thématiques, avec toute l'ardeur fiévreuse d'un collectionneur. Je fis connaissance d'une foule d'auteurs, de grand mérite, parfois totalement méconnus, ou très souvent mal lus par les historiens classiques. Je découvris à quel point l'éradication des erreurs historiographiques invétérées était un rude combat: l'inertie des consensus est décourageante. On est mal écouté lorsqu'on affirme, par exemple, que ni Hutton, ni Lyell n'ont été les initiateurs de la doctrine uniformitariste. Pour être à l' hauteur de ma tâche, je vis qu'il me fallait, coûte que coûte, lire intégralement les textes dans leur langue originelle. Je me remis au latin, je m'acharnai à améliorer mon allemand: ascèse récompensée par des joies profondes.

Yes, I am sure Ellenberger has had much joy in his life, which has brought him many achievements and rewards. I should not be surprised, however, if he thought that his foundation of COFRHIGEO was one of his major achievements; and he must surely have been delighted to receive this fine testimonial to his ceaseless endeavours. He has been an inspiration to his French colleagues, and to many others round the world interested in the history of geology, who might wish to emulate his zeal but have not his abilities.

David Oldroyd, Sydney

Georges Cuvier: Comparative Anatomist, Palaeontologist, and Geologist

Martin J.S. Rudwick, *Georges Cuvier, Fossil Bones, and Geological Catastrophes: New Translations & Interpretations of the*

Primary Texts. Chicago and London: Chicago University Press, 1997. xvi + 301 pp. US\$ 34.95; £27.95 hard cover *
In *Metascience* (March, 1998) there was a published transcription of an interesting conversation I had with Martin Rudwick (MR) when he was in Sydney in April 1997. In that interview, Professor Rudwick spoke of how he had come to be interested in Cuvier, years ago, when he was teaching palaeontology at Cambridge; and how his study of Cuvier's original texts revealed much about the methods of reasoning in palaeontology; and this became so absorbingly interesting that MR eventually devoted himself to a lifetime of study of the history of geology. I'm sure readers will agree that this career shift has been of great value to historians of science, particularly of course those interested in the history of geology.

Also in his interview, MR told us that he was working on a book on Cuvier and his texts, and that this was to be a foretaste of a synthetic study that would examine the historical roots of geology, involving (I assume) its emergence from cosmogony, mineralogy, fossil collecting, archaeology, mining, etc., in the late eighteenth/early nineteenth century. Now, with this well-produced and relatively inexpensive volume, the first of these two promissory statements is fulfilled. Cuvier was/is, for MR, the key figure in the emergence of geological science—as for Michel Foucault Cuvier was the key figure 'making possible' the emergence of Darwinian evolutionism ('La situation de Cuvier dans l'histoire de la biologie', *Revue d'Histoire des Sciences*, 1970).

I have been told by some French colleagues that Foucault did not read Cuvier too closely or extensively(!). Whatever the truth about Foucault, the same can *not* be said of MR: he has spent a life-time, on and off, working on Cuvier, and knows his published and manuscript texts intimately. And now we are provided with some of the outcome of those years of extended research and cogitation—in an absorbing, and to some extent novel-in-form, literary package. *Georges Cuvier* is like a nutritious, multi-layered sandwich, consisting of alternations of plain but substantial historical exegesis and analysis and fresh English translations of some of Cuvier's principal texts. The result is a volume that will prove invaluable, both to the Anglophone whose French is weak and to students of the history of science who have not the opportunity or depth-of-purse to gather together the necessary documents for a detailed study of Cuvier. MR's judicious choice of texts and his authoritative accompanying commentary provide the reader with an excellent way of getting to know Cuvier and his work in a gratifyingly painless way. We also get to know many points of detail about Cuvier's life and times, and some sense of his character too, not to mention the geological thought of his period, through the exegetic parts of the book and numerous explanatory footnotes, which are not (thank you Chicago) hived off to some remote part of the book.

So what do we learn for sure about Cuvier's thinking? A lot of contradictory things have been said about him, from the encomiums of Creation Scientists whose ideas in some cases draw directly from Cuvier, to the work of Reijer Hooykaas who made a scholarly historical analysis of catastrophism, to those who see Cuvier's talk of nature's "thread of operations" being broken as an indication that he did not believe in the constancy of the laws of nature, and was therefore 'unscientific' in his thinking. Charles Lyell, on the other hand, simply omitted mention of Cuvier in the historical introduction to his *Principles of Geology*. (Doubtless, the ever-diplomatic young Lyell thought it prudent not to tangle with the most powerful French naturalist of the day. But would it not have been interesting if Cuvier had lived to provide a riposte to Lyell's *Principles*?)

Leaving that speculation aside, we learn how Cuvier developed his ideas through his work comparing the anatomies of African and Indian elephants, mammoths, and mastodons. We learn of his studies of fossil vertebrates from the Paris region, and his reconstruction of their skeletons, and how he thought they functioned as unified anatomical wholes. We learn how Cuvier compared fossils from France with living opossums in the Americas or Australia, and *predicted* the existence of certain marsupial-characteristic bones in the French fossils; and then proceeded to display them by dissection. We learn from this how he wanted to make comparative anatomy as far as possible an exact, predictive science: comparable in some respects to astronomy, with determinable laws. We learn how the details of the anatomies of fossil mammals from Parisian quarries were worked out, and the stratigraphy of the region too (this work being aided by Alexandre Brongniart). We learn that Cuvier thought of himself as an *historian* of nature and gradually adopted Jean Deluc's neologistic term 'geology' as his (Cuvier's) career

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developed. We learn that Cuvier *did* believe in something like a Wernerian universal ocean, and that there were great catastrophes, either of a deluge type ('mega-tsunamis', in modern parlance), or sudden changes in temperature, as evidenced by frozen mammoths, or perhaps sudden changes in the levels of land surfaces at different places—perhaps with abrupt interchanges of regions of land and sea. We learn that Cuvier believed his catastrophism was empirically warranted. We learn also that he used observations of present processes to understand the past; so, his catastrophism notwithstanding, he would willingly have subscribed to the 'uniformitarian' maxim, 'the present is the key to the past', had it been coined in Cuvier's day. (In fact, Cuvier once wrote: "Le premier pas à faire pour deviner le passé, c'étoit de bien constater le présent".) We learn that Cuvier was quite interested in mines and mineral deposits, as well as fossils. We learn that he did not go out of his way to link geology to the Biblical narrative, though he wanted it to be consistent with what was known of human history; and that he did think that the world was very old. We find out why he was so interested in the Egyptian ibis. We learn that he was an unswerving opponent of transformism, for the stratigraphic record did not seem to offer up transitional forms. We learn that Cuvier thought that there were no fossilised humans, but that there was evidence for a relatively recent inundation (as indicated by what were later construed as the products of glacial action); and evidence for a whole series of earlier catastrophes. We learn that the famous phrase "bursting the limits of time" meant finding out about the earth's past for the period prior to the beginning of written records. Most importantly, we learn that Cuvier was apparently agnostic about the causes of catastrophes or the origins of new types of organisms; but he had a general idea of the stratigraphic column, knowing, for example, that reptiles preceded mammals in the record (which Lyell hoped was not the case). We do *not* learn, as Gillispie once put it, that "Samuel Smiles might have found him [Cuvier] too willing an example of self-help" (*Edge of Objectivity*, 1960, p. 280); though he was obviously a skilled political-scientist. Of course, all this is not new to historians of science, but it is agreeable to have it all deftly presented in one volume.

But there is one difficulty about Cuvier that seems to me to persist and defy understanding. In his famous *Preliminary Discourse* (PD), he discussed the question of whether there were new creations of forms after each catastrophe (as several later geologists supposed). But Cuvier imagined (MR trans., pp. 229–32) that Australia was swamped by some inundation and then repopulated by migrations from Asia; so that *what might appear to a stratigrapher afterwards as a new creation was in fact nothing of the kind*. There might even be mutual exchanges of organisms, if the Asiatic types were later destroyed in Asia, and then that continent was subsequently repopulated by a migration from Australia.

I do not wish to discuss here whether or not such a scheme might yield anything like the stratigraphic record as we know it. The question that interests me is whether Cuvier supposed the "irruptions" or catastrophic floods were *universal*. Basing my views on the text of PD, I ventured the view in my book *Thinking About the Earth* (1996) that Cuvier did *not* believe they were; so, with the help of his theory of migrations, he was relieved of the problem of inexplicable uncaused productions of new forms after each catastrophe. But I was taken to task (in a review in *Archives*) by the French historian of palaeontology, Professor Goulven Laurent, for misrepresenting Cuvier's views on this point, and for not having read the original literature on the topic sufficiently. In correspondence with Professor Laurent, I willingly conceded that I had not read the whole *oeuvre* of Cuvier, but thought that the PD text provided a sufficient warrant for my statement. I therefore asked Professor Laurent to refer me to texts that displayed the idea of the *universality* of Cuvierian floods/catastrophes.

The response was that there are some passages in the PD where the possibility of universality *and* non-universality was canvassed. This is surely true, though they seem to be remarks made *en passant*. Also, there is a passage in a part of a later addition to PD (5th English edition, 1827, p. 278, not translated by MR) where Cuvier speaks of the "last universal inundation". From this reference, Professor Laurent inferred that Cuvier had supposed that there *had* been earlier universal inundations. I then raised the question with him as to how Cuvier supposed the planet was restocked with terrestrial organisms *if* there had been universal inundations. In response, I was referred to two passages that *are* translated by MR. The first (p. 57) says something to the effect that the production of new organisms was "more inconceivable" than any of the other phenomena; and the second (p. 126) conceded that the first origin of organisms were an unsolved problem.

MR's discussion of these 'problems' suggests that they were more or less shrugged off by Cuvier. And very likely Cuvier was right to do so, for the development of science at that time. They were of the kind that Andrew Lugg has called 'overdetermined' problems; and they seem to turn up rather frequently in geology ('Overdetermined Problems in Science', *Studies in History and Philosophy of Science*, 1978). For example, Lugg considered the case of Agassiz and glaciation. There was incontrovertible evidence in favour of the former extension of glaciers, but no theory on offer to account for *why* there might have been major climatic changes. It was not the case, beloved by some philosophers of science, that the scientist was overwhelmed by an excess of possible explanatory theories that would cope with the evidence. Rather, there was a drought of explanations—none at all in fact. The Cuvier case was, I think, somewhat similar. The empirical evidence suggested the occurrence of catastrophes (perhaps universal) and new creations; but there was no explanation to hand as to the way in which the creations might have come about. The 'migration hypothesis' was, I suggest, a desperate one, that was scientifically incoherent. But Cuvier, it seems, largely laid the problem in the 'too hard' basket and got on with his work. Now it may be that I have got this wrong; but I do want to hear more from MR on this topic. I hope it will be accorded extended discussion in his promised general book on the origins of geology as an historical science.

Returning to the book that actually lies before us, I opine that the selection of texts is admirable (though I should have liked the pagination of the original texts to have been indicated, to assist the reader who might want to chase up some of them, as I have had to do for this review). Admirable also is the discussion that precedes each text. All historians of geology—yes, even Francophones!—will, I venture, put the book down knowing more about Cuvier than when they took it up.

The translations have been done with great care, and with attention to the exact meanings of the original. Admittedly, this leads to a somewhat 'wooden' prose style, but this has been MR's policy decision, and it is a correct one in my view. I beg to differ a little from the judgement that Robert Kerr's original English translation of PD (1813) was poor. It was freer, and in some ways more elegant than MR's, but as is the way with old translations one can not always tell what was original and what was editorial emendation or addition, and this can cause problems. Anyway, let us compare the three versions of a passage from p. 1 of PD:

Antiquaire d'une espèce nouvelle, il m'a fallu apprendre à déchiffrer et à restaurer ces monumens, à reconnoître et à rapprocher dans leur ordre primitif les fragmens épars et mutilés dont ils se composent; à reconstruire les êtres antiques auxquels ces fragmens appartenoient; à les reproduire avec leurs proportions et leurs caractères; à les comparer enfin à ceux qui vivent aujourd'hui à la surface du globe; art presque inconnu, et qui supposoit une science à peine effleurée auparavant, celle des lois qui président aux coexistences des formes des diverses parties dans les êtres organisés.
(Cuvier)

As an antiquary of a new order, I was obliged at once to learn the art of restoring these monuments of the past revolutions to their original forms, and to discover their nature and relations; I had to collect and bring together in their original order, the fragments of which they consisted; to reconstruct, as it were, the ancient beings to which these fragments belonged; to reproduce them with all their proportions and characters; and, lastly, to compare them with those which now live at the surface of the globe: — an art almost unknown, and which presupposed a science whose first developments had scarcely yet been traced, that of the laws which regulate the co-existence of the forms of the different parts in organised beings. (Kerr)

As a new species of antiquarian, I have had to learn to decipher and restore these monuments, and to recognize and reassemble in their original order the scattered and mutilated fragments of which they are composed; to reconstruct the ancient beings to which these fragments belonged; to reproduce them in their proportions and characters; and finally to compare them to those that live today at the earth's surface. This is an almost unknown art; and it presupposes a science hardly touched on [*effleurée*] hitherto, namely that of the laws that govern the coexistence of the forms of the different parts of organisms. (MR)

MR's version is certainly closer to the original than is Kerr's; but I don't think that, judging by this brief example, we can say that Kerr did a bad job. Rather the reverse, in fact.

But this is perhaps beside the point. MR gives us access to a good many hitherto rather inaccessible texts; and Cuvier's original meaning is properly retained. These are two big pluses. The third one is the fact that MR explains in detail just *how* Cuvier went about his self-appointed task, as set forth in the foregoing passage. I now await with keen anticipation MR's next book (which will surely be an epic), explaining how Cuvier's work dovetailed with other early geology, and recounting the story of how geology emerged as a new science at the beginning of the nineteenth century. And perhaps the enigma of the universality or otherwise of Cuvier's catastrophes will be settled.

David Oldroyd, Sydney

Celebrating Hutton

G.Y. Craig and J.H. Hull (eds), *James Hutton—Present and Future*, The Geological Society, London, 1999, Special Publication No. 150. £59.00/US\$ 98.00 (£29.00/\$48.00 for Society Members).

Readers of *Newsletter* No. 30 may recall my enthusiastic report on the events associated with the meeting in Edinburgh in 1997 commemorating the bicentenary of the death of James Hutton. The published versions of some of the papers presented at the well-funded and excellently organized meeting appear now in book form.

In many ways it is surely an admirable collection, but from the perspective of the historian of geology it does not at all come up to expectations, given that the original intention was that the Symposium should be of academic significance for those interested in the history of geology—as indeed the meeting itself most certainly was. The book's contributors, who as it happens are virtually all Americans or work in the United States, have mostly used James Hutton as a 'peg' on which to hang some of their ideas about modern geology, rather than provide historical exegesis or analysis of the history of some aspect of geology. However, it is fair to say that they all the papers connect their contributions, albeit sometimes tenuously, to the great Hutton. Yet the Symposium's two main historical contributions (other than those of McIntyre and Marvin, of which more anon) by Gordon Herries Davies and Celâl Sengör are regrettably missing. So too is what was to me in many ways the most interesting scientific contribution—by Maureen Raymo—on changes in climate during the course of the Earth's history, with special reference to Milankovich cycles. The omissions are to be regretted, given that the Symposium was originally intended to be a meeting of historians and geologists: for whatever reason the historians may feel short-changed in the published product.

The book opens with a 'précis' by Donald McIntyre of James Hutton's Edinburgh, which gives a synoptic account of what was going on scientifically, politically, and socially in Edinburgh, Scotland, and beyond, during and around Hutton's lifetime. It certainly provides the background information needed to understand Hutton's work, though such knowledge is not required for understanding any of the papers that follow in the collection. In any case, persons concerned with Hutton's Edinburgh will want to consult the full version of Professor McIntyre's admirable paper, published in *Earth Science History* (1997). Given the length of the book (184 pp. for £59.00), I think the publishers should have accommodated the full paper, or omitted this 'précis', to make way for other material. (In fact, I don't really see why the paper appeared in *Earth Sciences History*! The full version properly belonged in the Symposium's proceedings, providing greater leavening for the technical/scientific contents of the volume.) But leaving these thoughts aside, I should like to know how McIntyre would square the very favourable estimate we have of 'Enlightenment' Edinburgh with what we know of the *horrific* conditions in the Scottish coal mines at that time, 'just down the road' (see R. Bald, *A General View of the Coal Trade of Scotland*, 1812). What did the likes of the well-to-do Hutton, with his manufacturing interests, and a leader of Edinburgh's chattering classes—a wonderful conversationalist, we are told—think about the conditions in the mines? Were they all part of the great system, "designed in wisdom"?

Most of the other papers focus on the specific research interests of the presenters, which, of course, is natural, right and proper. It is interesting how they all draw attention to what might be called problematic areas of current geological theory. Don Anderson maintains that there is something radically wrong with 'mantle plume theory' and proposes his own alternative. It is interesting that he chooses to approach his radical critique through a jokey description of the logic of mantle plume theorists and invocation of Humpty Dumpty and Holmes (Sherlock/Arthur) logic. Connoisseurs of scientific etiquette will be justified, I suggest, in thinking that this is what a scientist may do when s/he challenges an entrenched paradigm. Anderson's criticism, which is real and serious, but which I would not have the temerity to attempt to evaluate, is shaded by a cloak of attempted humour.

Peter Wyllie provides an important prolegomenon to any future history of the studies of rock melts in the twentieth century and a discussion of the old migmatist/magmatist controversy. It is well done, and deals with a topic of fundamental historical importance, which is desperately calling for full monographic treatment. It would be a fine thing if Wyllie would oblige one day.

Werner Schreyer describes recent work done on rocks or minerals that preserve traces of their metamorphic history at the time when they were buried at great depth/pressure (e.g., relics of coesite, normally unstable and unknown at surface pressures, found within garnets). The point is that such finds show the great depths to which subducted material may be carried into the earth's interior—perhaps 150 km; but they raise the question of just *how* coesite-bearing metamorphosed rocks may be returned to the surface as components of the slices of orogenic belts, developed at collision sites,

Andrew Watson develops an aspect of Hutton's thought—that the earth is a kind of self-sustaining entity in which both organic and inorganic processes are involved—which some have seen as precursorial to modern Gaia theory. Watson wonders, however, whether it may have been a matter of chance that the linked organic and inorganic feedback processes were necessarily stabilizing, and he points out that one cannot assess the *a priori* probability of the processes being stabilizing in the long run since we only have knowledge of what has happened on *one* life-bearing planet. It is suggested that a spectroscopic search for evidence of life on planets outside the solar system might throw light on the question. I personally would rather doubt it, unless one could actually travel to and have a close look at such planets. Could the possible feedback mechanisms of immensely distant planets ever be analyzed on the basis of spectroscopic evidence? It sounds far-fetched to me.

Ursula Marvin gives the only essentially historical survey amongst the scientific papers, with a valuable summary of ideas about the impacts of extra-terrestrial objects from the seventeenth century through to the present. She does not really attempt to address the complaints of some palaeontologists that fossil evidence does not mesh with the idea of a great K-T impact, but, broadly speaking she sides with the impact theorists. Speaking as an outsider to the field, I am inclined to agree that the evidence for such catastrophic causes of major extinctions is compelling. But this is to speak of a scientific revolution still in progress, and as such it lies outside the competence of this historian.

Ian Dalziel takes readers on a journey as far back as geological investigation currently allows, considering particularly the efforts being made to reconstruct the arrangements of plates before their coming together to form Pangaea. But he takes a less jaundiced view of plume theory than Anderson, and thinks, as have/do many other geologists, that plumes may be causally related to the formation and break-up of super-continents.

Stuart Monro and A.J. Crosbie describe with enthusiasm their grand millennium project for the establishment of a science-centre—the 'Dynamic Earth Project'—which promises to be something like the 'Dome of Discovery' that was built as a temporary construction in London for the 1951 Exhibition, but which in Edinburgh's case will be wholly devoted to earth science and is presumably intended to be permanent. The project is surely admirable, but to judge from the picture of the proposed building that has been designed to house the project it will produce an architectural monstrosity in Edinburgh. It is to be (and now is being) constructed in the land between Old Edinburgh and Salisbury Crags, not far from the site of Hutton's former residence. This general area is one of highest historical importance and aesthetic value, where buildings should be constructed only with the greatest sensitivity towards their milieu and Edinburgh's architectural heritage. Yet what we are to have, it seems, is something akin to the buildings currently going up in Sydney for the Olympic Games. That such a building should be constructed to house a project that all earth scientists and students of the history of geology would wish to embrace is, I submit, a great embarrassment—indeed little short of a tragedy.

Robert Dott's closing remarks, which were published in last year's *INHIGEO Newsletter*, form part of the volume but need not be discussed here. The book concludes with an essay by Hutton's intellectual biographer, Dennis Dean, entitled 'Hutton Scholarship, 1992–1997', 1992 being the year of publication of Dean's life of Hutton. His present essay refers to the two recently published editions of Volume 3 of Hutton's *Theory of the Earth* (one of which he himself edited), to McIntyre and McKirdy's booklet *James Hutton . . .*, issued at the time of the Symposium, a paper by Charles Withers on Hutton's unpublished agriculture MS, Douglas Allchin's paper on Hutton's ideas about phlogiston, David Leveson's admirable paper on Hutton's methodological views and practices, some important new Hutton correspondence published by Jones, Torrens, and Robinson, and a few other items. For some reason, Dean also chooses to make derogatory comments about my introductory general study, *Thinking About the Earth* (1996), the short 'Hutton section' of which I would not dream of representing as a contribution to fresh 'Hutton Scholarship'. Dean rightly upbraids me for a stupid mistake, namely a statement that Hutton visited the Jura in 1794. I have no idea now how this absurdity came about, and willingly acknowledge and would like to apologise for, and expunge, the error. However, why, in other respects Dean should regard my summary of Hutton's views as 'eccentric' I cannot imagine; and where he gets the idea that I have been "denegrating [*sic*] biographical scholarship" I cannot imagine either. All I say in the book—after naming a few biographical works (including Dean's, which I reviewed favourably a while back in the *British Journal for the History of Science*) in a concluding 'Suggestions for Further Reading'—is that there is "ample scope for further biographical, or perhaps autobiographical, studies". Denigration?

David Oldroyd, Sydney

Celebrating Lyell

Blundell, Derek J. and Andrew C. Scott (eds), *Lyell: The Past is the Key to the Present*, Geological Society Special Publication No. 143, London, 1998. vii + 376 pp.

"For geology, Lyell proved to be the right man at the right time in the right place". With this testimonial, the editors open Part I of this volume of invited papers presented at the 1997 Bicentenary Lyell Meeting in London. It is a rich and diverse work replete with new insights by writers on a wide range of subjects, made all the more interesting by the authors' sometimes contrasting views of Lyell and his contributions. Historians of geology who are familiar with Lyell and his times will find in this volume an abundance of newly uncovered facts and fresh interpretations. Other readers, including students with little or no prior knowledge of Lyell, will find here most of the basic information on his life and work along with lively discussions of his role in the establishment of geology as a science, his influence in Europe and America, and his continuing relevance today.

The book includes twenty-three chapters grouped into three parts with an editor's introduction summarizing the content of each one. Part 1 contains seven chapters on the life and influence of Lyell. Part 2, eight chapters on Lyell and the development of geological science; and Part 3, eight chapters on Lyell's legacy to geology.

A volume like this one deserves to be discussed chapter by chapter, but that would be too gargantuan an effort for a short review. However, much of the interest in such a book lies in the opportunity it provides to compare the views of different authors on the same subject. Many topics offer themselves—climate change, tectonic processes, revisions of stratigraphic systems—but herein we will sample the range of opinions on Lyell's uniformitarianism as it is perceived today.

A philosophical view is presented by Victor A. Baker in a chapter titled 'Catastrophism and Uniformitarianism: Logical Roots and Current Relevance in Geology'. Baker (p. 175) quotes from a letter Lyell wrote in 1829 declaring that his purpose is to establish a method of reasoning in geology according to the principles that: "no causes whatever have ever acted, but those now acting; and that they never acted with different degrees of energy from that which they now exert". Lyell was convinced that to be truly scientific geology must have strict logical foundations analogous to those of Newton's physics. In achieving his aims Lyell was astonishingly successful. His *Principles of Geology*, in which he included uniformities of natural law and process, and also uniformities of rates and intensities, sold 15,000 copies, ran into 12 revised editions, and was translated into several languages. It wielded enormous influence in Britain, Europe, and America. From the first, however, as

explained by Ezio Vaccari in a chapter on the reception of Lyell's *Principles* in Europe, those legions of readers who believed in a cooling Earth with an irreversible history rather than in Lyell's steady-state recycling Earth, tacitly dropped Lyell's uniformities of rate and intensity quite out of the picture.

Nevertheless, Lyell's insistence that the Earth's surface is modified only gradually by processes currently in operation, still colours much of geological thought today. Baker points out that not until the 1960s and 1970s did the 'outrageous' hypothesis formulated in the 1920s by J. Harlan Bretz that cataclysmic floodwaters had formed the Channeled Scablands of eastern Washington achieve general acceptance. Meanwhile, in 1971, the Mariner 9 spacecraft sent back images of immense ancient channelways on Mars displaying many of the same landforms. Since then, most geologists finally have accepted the reality of cataclysmic processes with highly variable rates and intensities. Baker (p. 180) concludes (after having defined his terms): "Geology is a realistic science, not an actualistic one. A science that would limit itself to using the present as the arbitrator of what counts as natural evidence condemns itself to being actualistically unrealistic".

On one issue, Lyell's uniformitarianism extracted a steep price from Lyell himself. Patrick J. Boylan in his chapter, 'Lyell and the Dilemma of Quaternary Glaciation', describes Lyell's excitement when William Buckland, his former teacher and mentor, fresh from field excursions with Louis Agassiz, visited Lyell in Scotland in 1840 and showed him a wealth of glacial features on his own estate at Kinnordy. Lyell was elated by the totally new insight that many puzzling features, such as moraines, hummocky drift, polished and striated outcrops, and the distribution of erratics, could best be explained by the former presence of land ice. Within days Lyell converted wholeheartedly to Agassiz's glacial theory. Shortly thereafter, Lyell joined with Buckland and Agassiz in presenting papers to the Geological Society in London at three successive meetings.

The response was devastating. Boylan (p. 156) remarks that Lyell appears to have been very shaken by the vehemence of criticisms from virtually every one of his closest allies. Perhaps the telling blow was dealt by William Whewell who challenged his methodology in framing his arguments. In any case, Lyell soon came to realise that the hypothesis of ice sheets covering vast stretches of low-lying land violated his own uniformitarian principles. So, Lyell recanted, withdrew his paper (which the Geological Society probably was not going to publish anyway), and returned to the prevailing hypothesis that the surficial features in question had been formed during a recent epoch when ocean waters, crowded with debris-laden icebergs, had rushed down from the polar region over the recently submerged lands. To us, this may not sound like a particularly uniformitarian proposition, but Lyell clung to it for the remaining thirty-five years of his life while geologists in Europe and America fully accepted the evidence for Pleistocene ice sheets. Despite this anomaly, Lyell's towering reputation as one of the world's greatest geologists remained fully secure.

In his chapter, 'Lyell's *Principles of Geology: Foundations of Sedimentology*', M.R. Leeder sees Lyell as not at all a strict anti-catastrophist. Leeder (p. 97) cites Lyell's willingness in successive editions of his *Principles* to abandon firmly held views whenever field evidence supported new ones. Lyell had dismissed reports of the uplift of Fenno-Scandia on grounds that it would be impossible in the absence of volcanoes and earthquakes, until he visited the area and examined the evidence. Lyell also adopted a radical redistribution of lands and seas due to vertical uplift and submergence of land areas as the immediate cause of climate changes. (Lyell did not believe in eustatic changes of sea level.) Leeder calls attention to a pair of world maps Lyell used in all twelve editions of the *Principles*, in which our familiar continents are shown girdling the equator during times of extreme heat and massed over the poles at times of extreme cold. (These maps appear in the current volume as Figure 1, page 165, in a very informative chapter on climatic change by J.R. Fleming.) The maps show an eerie resemblance to archaic illustrations of continental drift, which, however, was the farthest thing from Lyell's mind. One wonders if Lyell would suppose that North and South America, for instance, would submerge in place while similarly-shaped landmasses would emerge in a horizontal line at the equator or grouped at the poles; but perhaps their shapes were simply meant to be illustrative. In any case Leeder credits Lyell with many perceptive new insights that provided a firm foundation for sedimentology. At his talk in London, he said he thought Lyell would enjoy a hearty laugh if he were to hear our current view of him as a strict uniformitarian.

Leonard Wilson, Lyell's biographer, argues that Lyell's uniformitarian views, including those that critics deem to be too extreme, have been fully vindicated. He points to the discovery of radioactivity, early in this century, as a justification of Lyell's steady-state hypothesis of Earth's internal heat production. And he joins those who view plate tectonics as confirming Lyell's confidence in the gradual nature of change. Wilson states (p. 35): "It is an unacknowledged tribute to uniformitarian geology that today those who would introduce sudden marvellous events into Earth history are usually obliged to summon meteorites from outer space. Although meteorite impacts have left their traces in the form of craters at various places on the Earth's surface, their possible effects on world climate and biological extinction remain obscure". [As one who frequently has spoken and written on the effects of impacting meteorites, I would respond that we do not summon them, they come unbidden; sometimes wreaking enormous havoc on Earth's surface, its atmosphere, and its waters. UBM]

In the book's final chapter, 'Humanity and the Modern Environment', Sir John Knill (p. 363) states that inasmuch as we live in a world that is changing on all scales from the submicroscopic to the global, it was Hutton's great contribution to identify the cyclical nature of geological change so that as geologists we accept change as the norm. Lyell, in his turn, appreciated the constancy of physical and chemical behaviour so that the processes occurring at present had their analogues in the past. Sir John dismisses uniformitarianism as a misnomer, "much beloved by university examiners, implying that the rates and nature of geological processes remain unchanged through time". He goes on to review the current human influence on climate and the environment which, he says, has all the hallmarks of a phase which, if found in the geological record, might be interpreted as cataclysmic. Sir John argues that Humankind has two alternatives: either to accept the inevitable, adapt to changes as best we can and face the possibility of extinction, as has happened to many species in the past, or to attempt to control man-made change so effectively as to manage Earth's natural processes and survive. He judges that political reality may render the latter option unfeasible. Either way, he believes that our understanding of the past will be central to our ability to survive in the future. From this comes the subtitle of this book: *The Past is the Key to the Present*.

Ursula Marvin, Cambridge (Mass)

Novel Geology

Roger Osborne, *The Floating Egg: Episodes in the Making of Geology*, Jonathan Cape, London, 1998. Pp. 344 + 4 chronology pages + 17 notes and sources pages + 2 copyright acknowledgment pages + 4 index pages. £10.00, paperback.*

This book is best described as an anthology of writing, with Osborne's commentaries, showing how geological science has developed in one, the eastern, part of the largest English county—Yorkshire. If I were reviewing this for the North East Yorkshire Naturalist (a mythical journal like too much of this book's content), I might be kinder to it. But geology is a global science, and its history equally so, and to be told that so much of it was invented, or discovered, here, like stratigraphy (pp. 30, 269) or biostratigraphy (p. 301), without any discussion of the historical situations of just these aspects of geology in other parts of England, let alone Europe, or South America, is to totally distort that history.

The 'Episodes' of the book's subtitle were inspired by a 1984 paper cataloguing the discovery of fossil marine reptiles in the Lower Jurassic Alum Shale of north-east Yorkshire, the deposit which inspired the first chapter—a rambling excursion into chemistry and the alum maker's art. This is where the 'Floating Egg' of the book's main title makes its only appearance. This alone appears on the spine, so what any future second-hand book hunters will make of such a title remains to be seen. This 1984 paper was by Michaels Benton and Taylor and calendared the finds of these fossil reptiles and their subsequent careers in the 'care' of museums around the world. This led Osborne to the more original parts of his book, with ten chapters on the First, Second, etc., to Tenth Reptiles found in (or reported from) this or the Jet Rock between 1758 to 1960. If this book's 'Egg' seems of a highly 'curatorial' variety, at least it gives some insights of real curatorial significance. The detailed recording of the fates of the Fourth, a lost pre-1828 plesiosaur, or the Seventh, 'the most magnificent', which went to Ireland or the 2,000 mile separation of head and body of the Ninth, which went to America, is welcome. But whether these really are THE First, Second, etc., reptiles, even from this part of Yorkshire, is quite another matter. Dino-inventing Richard Owen told the King of Saxony in 1844 that in the thirty years since the first ichthyosaur had come to scientific attention (but in Dorset), at least a thousand had been found in England alone.

The least successful parts of this book are fictionalised Chapters 4, 16 and part of 25. The first misleads with stories of how William Smith 'invented' stratigraphy on top of York Minister in 1794. Osborne asserts 'that everything in this book is true' (p. x) but here spells his narrator's Christian name incorrectly. It should be Samborne (not Samborn) Palmer. This same man is then found receiving letters from someone (a surgeon who was never Dr) who had been dead ten years! In final absurdity, the narrator tries to describe events that occurred seventeen years after he had died. Quite apart from such fictional facts, we are given much highly hindsightful 'history', with Smith observing rocks in Yorkshire in 1794 which he had not yet recognised. In a later Smith-inspired chapter (12), the poor man is committed to prison in the wrong year. Further errors can be endlessly uncovered. For a start, Smith was not averse to writing and did not find Lias in Derbyshire (or visit High Littlejohn). Mary Anning's mother never had a fish shop at Lyme Regis. John Parkinson (the correct one also diagnosed the disease named for him) and William Bird never wrote books on geology. The word '*palaeontologie*' was coined by the Frenchman, Henri Marie Ducrotay de Blainville (see E.G. Vartpatrikova, 'On the Origin of the Term "Paleontology"', *Soboscheniya Akademia Nauk Gruzinskoi SSR*, 1973, 70, 129–131) in 1822, and thus before Buckland's work on his Yorkshire cave was published (1823). Louis Hunton published more than one paper and the geological section still on display round the Scarborough Museum is not by John Phillips.

Many more proven Yorkshire episodes in the history of geology go unmentioned. Dr Peter Murray's involvement with the fossil plants of Gristhorpe Bay is one example (but whose appearance in the book goes unindexed). Reverend Frederick Kendall's work (who suffers the same fate) is another. Kendall, who was the first to describe the fossils of Scarborough, did so anonymously, having been sent down from Cambridge University for multiple arson attacks on his old College. (His father hired the best lawyers and got him off in the lawsuit that followed, but his College knew he was guilty.)

This book has, in my opinion, been inspired in general by the current vogue for historical novels concerned with the history of science and more specifically by the success of Richard Fortey's fine *The Hidden Landscape* from the same publishers in 1993. Sadly any comparison stops here. Photos in *The Floating Egg* are badly reproduced and the history recorded in it is parochial, myopic, and too often factually wrong. The history of geology is no more a field for enthusiastic amateurs than is brain surgery.

Hugh Torrens, Keele, UK

A Pilgrim's Progress

David Oldroyd, *Sciences of the Earth. Studies in the History of Mineralogy and Geology*. Ashgate, Aldershot, Brookfield, Singapore, and Sydney, 1998. XIV + 340 pp.*

L'ouvrage, publié dans la Variorum Collected Studies Series, où il porte le n° CS628, est un recueil d'articles de notre ami David Oldroyd, dévoué Secrétaire général de l'INHIGEO, et membre étranger de notre Comité. Ceux qui connaissent l'auteur savent que sous sa grande modestie, il cache une œuvre riche et variée. Plusieurs livres d'abord, notamment *The Arch of Knowledge* (1986), très belle introduction à l'histoire de la philosophie et la méthodologie des sciences, *The Highlands Controversy* (1990), et récemment, *Thinking About the Earth* (1996), une histoire des idées en Géologie. Mais aussi de très nombreux articles, dont une sélection, de 1972 à 1984, donc antérieure à ses ouvrages, est opportunément réunie dans le présent ouvrage.

Dans sa préface, il explique en toute simplicité comment il est devenu historien des sciences. Lors de ses études à Cambridge il s'était intéressé simultanément aux sciences naturelles et à la musique de chambre, situation inconfortable le mettant à cheval sur les fameuses 'deux cultures' de C.P. Snow. C'est après qu'il est devenu professeur de chimie qu'il découvre, à l'occasion de conférences, l'intérêt de la dimension historique de la science. Il fait alors le projet de se lancer dans cette étude quand il saisit l'occasion d'aller enseigner en Nouvelle-Zélande. La suite de sa carrière l'amène en Australie où il vient de prendre sa retraite à l'Université de Nouvelle-Galles du Sud.

Les articles réunis dans le présent livre sont classés en quatre thèmes. Le premier, sur un texte 'géologique' de l'antiquité, contient un seul article, rédigé en 1979 avec P.B. Paisley, est consacré au fameux poème *Aetna*.

Second thème: idées anciennes sur les minéraux et l'analyse minérale. Dix articles, classés dans l'ordre chronologique des sujets y figurent. Sans pouvoir les détailler tous, disons qu'on part des influences néo-Platonicienne et Stoïcienne sur la

* A shortened version of this review appeared earlier in *Nature*, 1998, 396, 131–132.

* Published here by courtesy of COFRHIGEO.

minéralogie aux XVIème et XVIIème siècles, pour arriver à Edward Daniel Clarke (1769-1822) et son rôle dans l'histoire du chalumeau, en passant par la chimie de Stahl et les thèmes phlogistiques en minéralogie, Cronstedt, la minéralogie et la révolution chimique.

Ce thème correspond en fait au sujet de son PhD, en 1974, *From Paracelsus to Haüy: The Development of Mineralogy in Relation to Chemistry*. Il le présente avec humour dans sa préface en disant qu'il voulait initialement étudier l'influence de la révolution chimique sur la minéralogie, et qu'il avait dû, pour y parvenir remonter au phlogistique, puis à la Renaissance, enfin aux néo-Platoniciens et Stoïciens. Ce qu'il nomme joliment le syndrome de Leibniz, lequel avait dû, pour écrire l'histoire de la famille de Hanovre . . . commencer par une histoire de la terre, sa célèbre *Protogée*.

Le troisième thème, qui contient des articles publiés entre 1972 et 1984, se rapporte à la Terre, méthode et histoire. S'y trouvent les articles les mieux connus (du moins de moi). Son étude sur Robert Hooke qui présente la méthodologie de l'auteur des *Discourse of Earthquakes*, méthodologie utilisant le modus tollens des scolastiques si cher à Karl Popper. Puis son travail, avec W.R. Albury, sur l'application des *Mots et les choses*, de Michel Foucault, aux sciences de la terre, de la minéralogie de la Renaissance à la géologie historique. On voit, dans cet article, l'influence des auteurs français sur David. C'est, dit-il dans sa préface, Randall Albury, qui connaissait Condillac, Lavoisier, Bichat, Vic d'Azyr et Haüy, qui l'orienta vers ce sujet. J'ai retrouvé les effets de cette influence récemment en lisant le preprint de l'exposé qu'il a fait à Liège en juillet 1997, au Congrès d'histoire des sciences, sur des 'Non-written Sources in the Study of the History of Geology' (et qui doit paraître bientôt dans *Annals of Science*) où il évoquait la 'phénoménotéchnique' bachelardienne (qui connaît, même en France, ce concept que, pour ma part, je crois important?).

Ensuite, son gros article en deux parties sur l'historicisme et l'essor de la géologie historique, fondamental à mes yeux. Ce papier paru dans *History of Science* en 1979 fut le point de départ de la correspondance qui n'a jamais cessé, depuis, entre nous. Ce qu'il nomme historicisme: "the view that the history of anything is a sufficient explanation of it", correspondant à ce que j'appelle la contingence historique. Il dit aujourd'hui, notamment après lecture du dernier livre de Rhoda Rappaport, *When Geologists were Historians: 1665-1750* (1997) qu'il ne le réécrirait pas de la même manière.

Suit une étude sur Buckland et la communauté géologique anglaise au début du XIXème siècle. Il s'agit en fait d'une double recension, de N.A. Rupke, *The Great Chain of History*, et de M.J.S. Rudwick, 'Cognitive Styles in Geology'. Occasion pour David de prendre position sur le 'programme fort' de l'école d'Edimbourg en sociologie des sciences. Et l'ouvrage se clôt par son travail sur Sir Archibald Geikie (1835-1924) qui pose le problème de la 'Whig Historiography of Science', c'est-à-dire de la tendance des géologues à décrire l'histoire de leur science comme une accumulation continue des connaissances, à la façon dont le parti Whig voyait le progrès de la société anglaise. Là encore, la préface nous avertit qu'il fut whiggiste dans ses premiers travaux, puisqu'il ignorait tout de l'épistémologie: il se rappelle qu'il ne connaissait pas même le nom de Kuhn quand il partit pour Sydney.

Pour ceux qui ont lu certains de ces articles, il est utile de les posséder sous la forme d'un seul volume, où la pagination est celle de la publication originale, ce qui permet de les citer dans leur version primitive. Pour ceux qui ne les connaissent pas, c'est une occasion de pénétrer dans une œuvre qui allie à sa bonne connaissance de la géologie un intérêt rare pour la philosophie . . . et notamment la philosophie française.

Gabriel Gohau, St Cloud, France

Geology in the Setting of a Dutch Colony

Th.E. Wong, D.R. de Vletter, L. Krook, J.I.S. Zonneveld, and A.J. Van Loon (eds), *The History of Earth Sciences in Suriname*, Edita, Amsterdam, 1998. 479 pp.

Early travellers were attracted to the jungles of Suriname by stories of El Dorado, the legendary city of gold. Even Shakespeare spoke of the region as "full of gold and bounty" and in 1598 Sir Walter Raleigh drew a picture of Guyana in which every rock was described as "argentiferous". In 1667, the Dutch Republic acquired Suriname from England under the Treaty of Breda in exchange for their North American colony, Nieuw Amsterdam. Dutch settlers started colonising the coastal fringe, where sugar became the major plantation crop. Robert Schomburgk was the first scientific explorer of Surinam's interior in 1843. The first professor of geology at Leyden University, K. Martin, took a twenty-day trip up the Surinam river in 1885, which resulted in a preliminary draft of a "geognostic outline map". His pupil, Gustaaf Molengraaff, studied the geology of the Dutch West-Indian islands in 1886. In 1892, he referred to the "incredible lack of the government interest in the exploitation of Suriname" and could only explain this "because the government does not know its geology. The government has never commissioned any geological investigation of Surinam, even though there are many indications of gold". He continued: "England realises that the economic importance of a colony can only be judged when its soil is properly known and neighbouring British Guyana was surveyed geologically as early as 1867".

Between 1901 and 1911 the Royal Dutch Geographical Society funded several expeditions to the interior of Surinam and both gold veins and alluvial gold were reported. (Gold is currently economically the second important mineral after bauxite.) Bauxite was discovered in 1903. But an official Geological and Mining Service was not established in Surinam until 1943! The present book is the first exhaustive compilation of both the history and the state-of-the-art of earth sciences in the country.

Beautifully produced and illustrated, *History of Earth Sciences in Suriname* is the result of an initiative taken back in 1974 by Professor Reijer Hooikaas, founder of the Commission for the History of the Geological Sciences (now Earth Sciences) of the Royal Netherlands Academy of Arts and Sciences (KNAW). Hooikaas envisaged a history of the development in geological thinking, which would revive the ideas of our predecessors and expose the motives of their actions.

The book starts with a fascinating account of a romantic journey by dug-out canoe in pre-outboard motor days to the Lawa goldfields in 1946, which will bring back cherished memories to many field geologists. This 'overture' is followed by eight articles by various specialists on topics, ranging from the Precambrian, geochronology, cartography, hydrogeology, geomorphology and soil surveys to archaeology. This section is followed by seven articles on the exploration and mining of gold, solid minerals, bauxite, diamonds, industrial minerals and hydrocarbons, preceded by an outline of the Surinam mining legislation. The third part of the book deals with the scientific infrastructure.

The reviews of the history of the Geological and Mining Service, the Bureau for Aerial Mapping and of the Soil Survey Department are all beautifully illustrated, with interesting pictures of field camps, jungle scenes, river crossings, means of transportation and several aerial photographs. The publication concludes with an up-to-date bibliography of thirty-two pages and an index. A full-colour geological map on a scale of 1:1,500,000, adapted from a map published in the Suriname Planatlas from 1988, accompanies the book. A minor disadvantage of the book—it being a collection of nineteen articles by sixteen

different authors—is occasional repetition of text, references and illustrations. I counted, for example, ten identical topographical maps of Suriname, scattered throughout the book. However, because so many of the earth scientists who have worked in Suriname in the recent past have contributed, the reader will find almost everything he or she wants to know about geosciences in Suriname from the early colonial days through to the country's independence.

Frederik van Veen, Delft

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ÉLOGES

Dr Peter Schmidt (1939–1999)

It is with great sadness that we say goodbye to Peter Schmidt. He was snatched by death completely unexpectedly in Freiberg on 6 February, 1999. We have lost a very special, committed, extremely helpful, and exceedingly kind colleague and friend, who found fulfilment in his scientific work and in his family's well being. His work was highly regarded by many members of INHIGEO, of which Commission he had been a Member since 1991. He met all those who had the good fortune to work with him, or attended scientific events with him, with spontaneous honesty and human warmth. Everybody who knew him will have pleasant memories of him.

Peter Schmidt was born in a little spot in Thuringia on 17 June 1939—in Gerstungen, a place with which he was closely linked right to his end. He lost both parents early and grew up with his grandparents. On leaving school he became a miner in the potash mine in Merkers (Thuringia), a fact about which he always took pride. In 1956, he went to the Mining Academy in Freiberg, attended the 'ABF' (a department responsible for preparing young factory and agricultural workers for university), and started studying geology in 1959. Subsequently, he turned to geophysics under his highly respected teacher, Otto Meisser, and received his doctorate (Dr re. nat.) on the base of a thesis on 'Makroseismik des Vogtlandes' (1969).

But already by 1968 Peter had become an employee in the Library of the Mining Academy Freiberg and soon was curator of its Rare Book Department. Right up to the last hours of his life he worked in this position enthusiastically, for the welfare of the Mining Academy Freiberg—and, more than that, for the community of librarians and geoscientists at home and abroad. For the last three decades Peter cared for the historically valuable and rare books in Freiberg and published papers about the collection. He made it known, and information about it available, far beyond Freiberg and Germany. His successful efforts to enlarge the stock by acquiring the collections of contemporary scholars were widely appreciated and supported. Along with Austrian colleagues, he was one of the initiators of the series of international symposia entitled 'Cultural Heritage Collected in Libraries of Geosciences, Mining, and Metallurgy', the first of which was held in Freiberg in 1993 and has been continuing productively with further conferences in different countries. In this way, Peter made a lasting international contribution to the continuation of the cultural heritage of geological sciences and mining.

Peter Schmidt also rendered outstanding services to the history of the geological sciences. In three extensive and comprehensive bibliographies he recorded all papers published in the fields of geology, geophysics, mineralogy, and palaeontology in the GDR in the period 1949–983. In 1976 he was involved in the foundation of the 'Working Group on the History and Philosophy of the Geological Sciences' in the 'DDR Geological Sciences Society' and was in charge of this Group from 1988 onwards.

Peter was also active in science policy matters on the history of geosciences. Along with Professor Ewald Kohler (Regensburg) he took the initiative for a meeting of geo-historians from the old and new German states to discuss in detail in an objective and critical atmosphere the 'state-of-the-art' and opportunities for further work in the field. Freiberg was selected as venue for the first major conference (1992) on 'The History of Geology in the German States' and the aforementioned Working Group was recognized as a new body for 'The History of Geosciences' for the Federal Republic of Germany as a whole, under Peter's chairmanship.

Already in 1991 Peter was co-convenor of the XVth International INHIGEO Symposium in Dresden and Freiberg on the history of geoscientific collections and museums, as well as the conference on the occasion of the 200th anniversary of the day when Alexander von Humboldt began his studies at the Mining Academy in Freiberg. Both meetings were very successful. The Working Group regularly organised further conferences at Peter's initiative and he reported on these activities and the results achieved in the *Nachrichtenblatt zur Geschichte der Geowissenschaften* (6 vols, 1991–1996), edited by him. All this involved a superhuman amount of work, willingly and enthusiastically undertaken. Those who were able to participate in these activities will want to express their thanks to Peter for all that he did. His last initiative was concerned with the preparation of the INHIGEO Symposium on the occasion of Abraham Gottlob Werner's 250th birthday, which will be held in Freiberg in September 1999. Tragically, Peter will not see the results of the efforts that he had already put into the arrangement of the programme, with all his characteristic enthusiasm.

We have lost a valuable colleague and friend. We enjoyed talking, arguing, and working with him. We shall miss him so much.

Martin Guntau, Rostock Peter Kühn, Berlin

Otakar Matousek (January 14, 1899–January 4, 1994)

The National Burial Ground in Vysehrad, Prague, is the last resting place of many of the outstanding personalities of the Czech nation. This year on January 14, 1999—for the fifth year running—relatives, friends, and students attended the grave of the geologist Otakar Matousek, the first and so far the only Professor of Methodology and History of Geological Sciences at Charles University, who many a time in jest promised to live to be a hundred. Unfortunately he did not to live to make good this promise—but he was only short by five years and ten days.

As it were symbolically, Matousek was born in the Podskalí quarter of Prague in a place under the Rock of Vysehrad. He graduated in natural and physical sciences (with a major in geology) from the Faculty of Natural Sciences of Charles University, and already in 1921 he took a degree as Doctor of Natural and Physical Sciences (RNDr).

Matousek acknowledged three outstanding natural scientist as his tutors. In Prague, there were Filip Pocta (1859–1924), Professor of Geology and Palaeontology, who elaborated Joachim Barrande's (1799–1883) *Système Silurien du centre de la Bohême, Part VIII: Bryozoaires, Hydrozoaires, Anthozoaires et Alcyonaires*; and Josef Velenovsky (1858–1949), Professor of Systematic Botany, phytopalaeontologist, and author of *Flora Cretacea Bohemiae*. The decisive influence, however, was the Sorbonne Professor Émile Gustave Haug (1861–1927), author of the notable *Traité de géologie* (Vols I–IV, 1907–11), with whom Matousek undertook postgraduate study. In 1925 Matousek 'habilitated' from general geology. In the period 1929–30 he was in the US, first as an Exchange Fellow at the International Institute of Teachers at Columbia University and then as Visiting Professor of Geology at Princeton. In 1935, he became Associate Professor of Methodology and History of Geology in Prague. He was affiliated to the Institute of Philosophy and History of Natural Sciences, where the director was Emanuel Rádl (1873–1942), the chief exponent of the philosophic realism of Tomas Masaryk (1850–1937), first President of Czechoslovakia. At that time, Matousek had already been director of 'Radiojournal', but he was dismissed from his post in 1938. During the German occupation, Matousek dwelt in the safer countryside, working in a factory in Chotebor.

The beginnings of Matousek's literary activity were connected with scouting, of which, together with the geologist Odolen Kodým (1898–1963), he was an enthusiastic proponent. In this, the initiators had also been the 'forest schools' for students of the Faculty of Natural and Physical Sciences, the first of which was established at Skryje in 1928—in the heart of the Barrandien. Matousek was an unconventional university educationalist, who expressed unorthodox opinions, e.g. in the works *Americká škola a naše reforma (American School and our Reform, 1930)* and *Dnesní studenti, výzkum jejich schopností (Today's Students, Research of their Abilities, 1935)*. He wrote numerous studies on the geology of the Barrandien and on the Dalmatian coast. For us it is of particular import that he wrote (together with his wife Božena) the study *Vznik a vývoj geologie (The Emergence and Development of Geology, 1927)*. Then he was the sole author of the monograph *Franciscus Zeno, počátky Učené společnosti a české geologie (Franciscus Zeno, Beginnings of the Learned Society and Czech Geology, 1927)*; the clearly arranged *Dejiny československé geologie (History of Czechoslovak Geology, 1934)*; and the synthetic study *Pojem, metody a historický vývoj geologie (Concepts, Methods and Historic Development of Geology, 1940)*. By these works, he became the pioneer Czech historian of the geosciences.

After the Liberation, Matousek was for a brief period, on the authority of the second Czechoslovak President Dr Eduard Benes, Director of the Czechoslovak Radio. However, he soon came over to Charles University as Professor of Philosophy and History of Natural Sciences. One of his first post-war journeys was to Australia, from where he brought—from Czechoslovak expatriates—many donations to his war-impooverished country. At the Prague Natural Sciences Faculty, Matousek was a distinguished successor to the philosopher, Emanuel Rádl, as testified by his works *Člověk kritizuje přírodu (Man Criticises Nature, 2nd edition 1946)*, *Deduce člověka (Deduction of Man, 1937)* and *Myslenkový vývoj přírodních věd (Development of Thought in Natural Sciences, 1939)*. It was an ill-conceived act that the Rádl and Matousek Institute for General Natural and Physical Sciences was abolished; and though it was subsequently re-established, it does not, even to-day, as the Institute for Philosophy, Methodology and History of Natural Sciences, measure up to its previous level.

Matousek was 'transferred' to the established Czechoslovak Academy of Sciences (1953), where he was occupied with the study of the history of natural and physical sciences of the last century, especially with the work of the physiologist Jan Evangelista Purkyně (1787–1869), who had already in 1837 indicated the main principles of the cell theory. Together with the biologist Bohumil Nemeč (1873–1966), Matousek issued a pioneering Festschrift: *Jan Evangelista Purkyně: badatel a národní buditel (Jan Evangelista Purkyně: Scholar and National Revivalist, 1955)*; and he was the sole author of the remarkable book *Přirodovědci a lékaři doby Purkyně (Natural Scientists and Physicians of the Purkyně Era, 1957)*. However, educational work with students was something that Matousek was sorely missing. Fortunately, he was able to return to it as late as the middle-sixties, when, in 1970–71, he was Professor at Berkeley, California.

In 1964 a scientific conference was convened in Liblice near Prague, which founded the Czechoslovak Society for History of Sciences and Technology. I was then acquainted with a number of Matousek's studies, and his paradigmatic monograph on Zeno was my guide in my study of the beginnings of the Czech geology—as can be seen by my subsequently published *Studie o Ignáci Bornovi (Studies on Ignaz von Born, 1971)*. Matousek had drawn in the general lines and the directions that should be followed in the study of history of natural sciences. I adopted a stance supportive of Matousek's position, expressing the view that it rested on a masterly understanding of the methods of historical work. A deeper relationship came about, witnessed by our mutual correspondence. I was trying, unsuccessfully, to assist in the publication of Matousek's biography of Purkyně. And when Matousek's ninetieth birthday was approaching in 1989, I proposed, as a member of the editorial board of the quarterly *Dejiny věd a techniky (History of Sciences and Technology)*, to publish his portrait, along with biographical data about him, as was then the custom for distinguished personalities. But I failed in my efforts. The era was not then favourable.

Otakar Matousek was a dynamic personality. He was an outstanding scholar and at the same time an unforgettable university educationalist, who enjoyed his students' and colleagues' respect. A creative natural scientist, he also became the pioneer of scholarship in the history of geosciences in Czechoslovakia. His life-history demonstrates the troubled circumstances in Central Europe during our century. Matousek, however, reached the forefront of intellectual life during the interwar years. At that time, Czechoslovakia was a unique but isolated island of freedom and democracy in the midst of Europe. Matousek belonged to the stream of cultural life that was shaped and directed by Masaryk, and with him Emanuel Rádl. Particularly after 1948 Matousek's destiny was troubled. But for us today—as scientist, citizen, and man—he is a reminder of those humanistic values that were embodied in Czechoslovakia.

Josef Haubelt, Prague

COUNTRY REPORTS

Australia

The Earth Sciences History Group (ESHG) of the Geological Society of Australia continues to provide links between Australian researchers. Usually two newsletters are distributed each year, with articles, conferences reports, lists of events, publications, and reviews. The Group is chaired by Carol Bacon.

In 1998 several members of the ESHG presented papers at the 14th Australian Geological Convention held in Townsville. The Mawson lecture entitled 'Tectonic Evolution of the Eastern Australian Fold Belts from a Granite Based Perspective' was given by Emeritus Professor Bruce Chappell.

Further to the item in *INHIGEO Newsletter* No. 30 (p. 37) it can be reported that the *Proceedings of the Strzelecki International Symposium* held in Melbourne in December 1997 are now published in the *Proceedings of the Royal Society of Victoria*, 110, 480 pp. The hard-cover book version entitled *The Permian System: Stratigraphy, Palaeogeography and Resources* or the soft-cover journal issue are available for purchase by contacting Neil Archbold. Both are priced at \$195.00 Australian, + \$20.00 Australian for airmail overseas postage. The volume includes two papers on historical themes: David Branagan's well-illustrated paper on Strzelecki's contributions to the knowledge of the eastern Australian Permian sequences and Neil Archbold's paper on the history of discovery and study of the Permian glacial sediments of Bacchus Marsh, Victoria. Other papers in the volume include snippets of historical interest, notably the paper by Gary Webster on the history of discovery and study of the Permian crinoids and blastoids of Timor.

Neil Archbold continues his search for early references to the Bacchus Marsh Permian glacial sediments and their impact on early debates on matters Gondwanan.

Carol Bacon continues an interest in the history of geology of Tasmania, and has recently completed a history of the exploration for oil in Tasmania. Plans have been made for the production of a timeline of events of significance in the history of geology and mining in Tasmania.

Early in February, 1998, Max Banks organised with Dr John Thorne and made the main contribution to a week-long course entitled 'In the Steps of Darwin' for The Australian College for Seniors, and held at and from Jane Franklin Hall, Hobart. The course dealt with Darwin's activities in and around Hobart in 1836 and set them in the background of his life story to that time and against understanding of earth and life sciences and the social issues of the time. Peter Stevenson, geologist, Hobart, contributed to the course with a discussion on the reasons for and design of the voyage of the *Beagle*. During the course Dr Phil Dowe, philosopher, led a discussion on Darwin and the argument from design.

With help from David Leaman, Max Banks has been using Charles Darwin's field notes on the geology of Hobart Town to trace, more closely than previously done, the routes he took while in Hobart in February, 1836. In so doing they have disinterred some geological facts observed by Darwin and then forgotten for a century or more. Some new light has been cast on the local geological history. Comparison of Darwin's field notes with a subsequent unpublished 'memo' and then the relevant parts of his *A Naturalist's Voyage Round the World* and his *Geological Observations on Volcanic Islands* reveals minor changes in identifications and interpretations and considerable changes in emphasis. On Monday, February 8, 1999, David Leaman led an excursion to retrace Darwin's route on the eastern shore of the Derwent River on that day and date 163 years before, and the party was able to see the rocks Darwin saw, to be 'exposed' to his observations and interpretations of them and to hear modern ideas about them.

David Branagan gave a keynote paper on 'The Pole and the Australian Permian' at the Strzelecki International Symposium on the Permian of the Eastern Tethys, held at Deakin University, Victoria, in December 1997. He presented an invited paper to the first Australian Symposium on Parks History at Mt Buffalo, Victoria, in April, 1998; and also in 1998 gave two historical papers at a conference on the environmental geology of the Botany Basin, Sydney. At the invitation of the Frederick May Foundation for Italian Studies at the University of Sydney, he lectured on 'Vesuvius: Volcanic Wonderland', discussing the history of geological studies of Vesuvius, with special reference to the work of Sir William Hamilton. He is currently working on a biography of the notable Australian geologist, T. Edgeworth David. Barry Cooper continues an interest in the history of geology of South Australia and in the historical use of building stones. He will be delivering a lecture on the latter subject to the History of Science and Ideas Group in Adelaide on 3 May, 1999.

David Corbett has continued with his researches into the geological work of Sir Douglas Mawson. A paper, the first of a proposed trilogy, was published by the South Australian Museum in 1998. The second, on the relationship between Mawson and Professor T.W. Edgeworth David, his mentor, Antarctic colleague and friend, and mainly based on the correspondence between them, has recently been completed. Corbett is also involved as a consultant to the future permanent exhibition which the Museum is planning on the life and work of Sir Douglas Mawson.

Tom Darragh's paper on the correspondence between Adam Sedgwick and Robert Brough Smyth has been accepted for publication in *Historical Records of Australian Science*. Five letters from Smyth and four from Sedgwick are reproduced. The paper includes an account of the foundation of the Museum of Natural History (later National Museum of Victoria) with which Smyth was involved early in his career. Darragh continues work on the translation and editing of Ferdinand Hochstetter's notes of his visit to Victoria in 1859. Both translation and notes will amount to more pages than would be acceptable for a journal article, so suggestions for a possible medium of publication will be gratefully accepted.

David Oldroyd also has an interest in Sedgwick, through his current study of the history of geological research in the Lake District, UK. In October, 1998, he revived an older interest, in presenting the James Wright Memorial Lecture at the Geological Society of Edinburgh. David spoke on the (very) private life of the young Archibald Geikie, utilizing youthful diaries donated to the Haslemere Educational Museum by Geikie's grandson, Derick Behrens.

David Branagan and Oldroyd attended the INHIGEO meetings in Austria and Switzerland. The former spoke on 'Australasia and Austria: Geologists and Geological Communication' in Vienna and on 'Antipodean Ice Ages' in Neuchâtel; and the latter spoke on 'Early Ideas About Glaciation in the English Lake District: The Problem of Making Sense of Glaciation in a Glaciated Region' in Neuchâtel.

Publications by ESHG Members

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- Branagan, D.F., 'Geological Periodization', in: G.A. Good (ed.), *Sciences of the Earth: An Encyclopedia of Events, People, and Phenomena*, Garland Publishing, Inc, New York and London, 1998, 1, 306-314.
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Carol Bacon, Hobart*

Austria

General Information

Owing to several circumstances there have been no Austrian reports in the *INHIGEO Newsletter* since No. 28. The system of reporting has been reorganized since the beginning of this year, and it is now one of the tasks of the *INHIGEO* members in the newly established 'Working Group on History of Earth Sciences in Austria' at the Austrian Geological Society to report about the annual activities for the Commission's *Newsletter*.

The following report is an attempt to give a short overview of the main activities and publications in the years 1996 to 1998.

In 1997, Dr Tilfried Cernajsek was awarded financial support for his project 'History of geological sciences in Austria' (Austrian Science Fund/Project P12535–SPR). The project has two employees, Chr. Bachli/Hofmann and M. Gestötnner. The study of some important materials of the Scientific Archives from the time of the beginning of the Imperial Geological Institute (*Geologische Reichsanstalt*) in 1849 to the 3rd International Geological Congress in Vienna is one of the major aims of this research project. Special attention is being given to the correspondence of the second Director of the Imperial Geological Institute, Franz von Hauer (1822–1899), and to selected extant field diaries, from 13 geologists of that period. The correspondence of Franz von Hauer is particularly important because he had contacts with most of the significant geologists and scientists of his time. More than 660 letters are preserved, which allow an interesting view of scientific discussions and the social and political milieu. The 266 field diaries of the Scientific Archive of the Geological Survey of Austria contain much valuable information about field activities and also unpublished scientific knowledge. In the first stage, the field diaries of Marco Vinzenz Lipold (1816–1883) and Emil Tietze (1845–1931) were transcribed and compared with the authors' published papers. Additionally, the field diaries of Alexander Bittner, Franz Foetterle, Georg Geyer, Franz Hauer, Carl Maria Paul, Heinrich Prinzinger, Guido Stache, Friedrich Teller, Emil Tietze and Heinrich Wolf have been partly transcribed.

The written reports to the Director of the Imperial Geological Institut, Wilhelm von Haidinger, were also checked and compared with the Administration and Registration Archives of the Geological Survey of Austria. By searching these archival materials and geologists' bequests it is possible to give a more accurate and complete description of the historical development of the geosciences in Austria. The development of theories and results in the geosciences is considered with this analytical method. The influence of the conditions of life and the historical/political circumstances in respect to the development of science have been documented and presented more accurately.

At the last general meeting on November 19, 1998, the Austrian Geological Society accepted a proposal for the foundation of a new working group on 'The History of Earth Sciences in Austria'. The foundation session took place on 21 January 1999 in Graz. (A more detailed report will be given in *Newsletter* No. 32.)

Meetings and Anniversaries

For the centennial of the death of the famous Austrian palaeobotanist Constantin Freiherr von Ettingshausen (1826–1897) a symposium was held in the Museum Joanneum in Graz, from 7–9 July 1997, being organized in collaboration with the Museum of Natural History in Vienna and the Institute of Geology and Palaeontology of the Karls-Franzens-University in Graz. The meeting was accompanied by a special exhibition with an catalogue book, entitled 'Faszination versunkener Pflanzenwelten—Constantin von Ettingshausen ein Forscherportrait'.

From 30 August–2 September, 1998, the XVth Congress of the Carpathian–Balkan Geological Association (CBGA) was held in Vienna. A special *INHIGEO* meeting in the framework of the Congress was concerned with the 'Advancing Geological Knowledge of the Carpathian–Balkan Region in the 19th and 20th Centuries'. A series of historical papers on the theme had been organized by the Hungarian *INHIGEO* Member, Dr Endre Dudich, and the local Organizing Committee of the Congress (Geological Survey of Austria). Nine varied papers were presented in a half-day session on 31 August:

'History of the Carpathian–Balkan Geological Association' (E. Dudich); 'The Contribution of Serbian Geologists to the Carpathian–Balkan Geological Association' (A. Grubic); 'Centenary of Victor Uhlig's Monograph on the Geology

* Carol Bacon also prepared the Australian report for *Newsletter* No. 30 (1998). My sincere apologies to her for failing to put her name to the report last year (Ed.).

of the Tatra Mountains' (Z. Wojcik and W. Narebski); 'The Role of the Moscow Geological School in the Study of the Structure and Development of Eastern (Ukrainian) Carpathians' (E.E. Milanovsky); 'Great Contribution of Foreign Scientists in Mineralogy to the Development of the Balkan Peninsula' (Z.M. Ilic); 'Propylites: History of their Systematization and Genetics—the Hungarian School of Petrography, 19th Century' (T. Poka); 'Changing Concepts: From Median Mass to Microplates' (E. Dudich), 'Australasia and Austria—Geologists and Geological Communication' (D.F. Branagan).

The abstracts were printed in the conference papers of the CBGA.

Lectures/Courses

In October, 1996, Harald Lobitzer presented a paper at a symposium dedicated to the memory of Aloys Sprenger in Islamabad, entitled 'The Contribution of Austrian Geoscientists to the Geological Exploration of Pakistan'.

Bernhard Hubmann gave a lecture on 'C.F. Peters (1825–1881) und der Beginn der erdwissenschaftlichen Institute an der Karl-Franzens-Universität Graz'. This lecture was organized by the Austrian Geological Society in collaboration with the *Naturwissenschaftliche Verein für Steiermark* at the Institute of Geology and Palaeontology /University of Graz on May 27, 1997.

Tilfried Cernajsek reported at the 4th Heritage Symposium 'Cultural Heritage in Mining, Geology and Metallurgy, Libraries—Archives—Museums' in Banská Stiaavnica, Slovak Republic (7 September, 1998) on 'Die Lehrtätigkeit des k.k. montanistischen Museums in Wien 1835–1849'.

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Albert Schedl and Tilfried Cernajsek, Vienna

Bolivia

Carlos Serrano contributed to the 10th International Congress of Mining and Metallurgy, held in Valencia, Spain, 1–5 June, 1998. For financial reasons, and given the impossibility of actually attending that congress the paper, 'Mining in the Cerro Rico: Some Technological Considerations', was read by another INHIGEO member, Spanish colleague Octavio Puche.

In July, I received two volumes of a special edition of the book *Studies of History of the Techniques, Industrial Archaeology and the Sciences* (ISBN: 84-7846-717-3, published by the Board of Castilla and Leon), containing the proceedings of the 6th Congress of the Spanish Society of History of the Science and Technology. This took place in the Spanish cities of Segovia and La Granja, and was attended by representatives from several countries. I presented one of the five lectures given at the meeting, my paper being entitled 'Examples of Transference of Science and Technique between America and Europe'. It discussed the topic of mining and metallurgy during the colonial period. I thank the kindness of the President of the Spanish Society of History of the Sciences and Technology, Dr Alberto Gomis Blanco, and that of the co-ordinators Manuel Castillo Martos, Juan Luis Hourcade, and Gloria Ruiz.

Also in July, the article: 'L'eau et l'argent à Potosi (ancien Haut-Pérou puis Bolivie)' was published in the French magazine *La Houille Blanche (Revue Internationale de l'Eau)*, pp. 65-75, written jointly with the French historian Alain Gioda. It deals with the storage, piping and use of water in the colonial metallurgical activities.

In September, *The Annals of the 2nd National Congress of Metallurgy and the Science of Materials* were published. This congress had been held in the Bolivian city of Oruro from 11–13 November, 1996. I presented a paper on 'An Example of a Restoration Project: The San Marcos Mill', which described a project in Potosí involving the reconstruction of an old amalgamation and gravity-settling plant. Bolivian and foreign visitors from different backgrounds can now visit the premises, which have been turned into a centre for both recreation and education (a museum-café-restaurant).

During the colonial period (1545–1825), the method of amalgamation of silver ores was applied at the San Marcos premises. Later—early this century and until the 1960s—a gravity concentration plant worked there. Now it is possible to see the 'technological superposition'—which is linked with the history of Bolivian mining—showing the Age of Silver and that of Tin. During the restoration work, many of the suggestions contained in the work mentioned above were taken into consideration.

An example of my work on industrial archaeology, and related to the aforementioned processing plant, was presented by my Spanish colleague Josep Mata-Perello of the Polytechnic University of Cataluña, at the 2nd European Congress of Latin American Scholars, which took place in Halle, Germany, from 8 September.

From the 4–7 November, the XIIIth Bolivian Congress was held in Potosí, with specialists from the United States, Canada, Germany, Italy, Argentina, and Bolivia attending. During the opening night, I gave a lecture on 'History of Mining in Potosí', a topic that dealt with the 454 years of mining activity of one of the greatest silver deposits in the world—the Cerro Rico. The meeting was held at the San Marcos Museum café-restaurant (mentioned above).

As usual, a meeting of the National Archive and Library of Bolivia was held in 1998 (in Sucre). Together with archivist, Ana Forenza, we presented a contribution, based wholly on primary sources, related to the Cerro Rico during the second half of the sixteenth century. The work described the 'Special Features of Mining in Potosí during the XVIIth Century'.

Likewise, the *Journal of the House of Culture*, 4th issue, was published in Sucre, being a summary of the work presented at the XXth International Congress of the History of Science, held in Liège in 1997. The work is about the mining technology of the Cerro Rico of Potosí.

Volume 18 (December, pp. 7-17) of the *Revista Metalúrgica* (issued by the Technical University of Oruro) contains my article 'Avant-garde' Technology in the Potosí S.A. Mining Company: Ing. Luis Soux'. This was one of the most renowned enterprises located in the Cerro Rico, and the work there was closely linked to the life of the French engineer Luis Soux (1855-1936).

Carlos Serrano, Potosí, Bolivia

Brazil

The 5th Latin American Congress on the History of Science and Technology was held in July 28–31, 1998 in Rio de Janeiro, Brazil. Dr Silvia F. de M. Figueiróa, President of the Latin American Society on the History of Science and Technology, and Dr Maria Margaret Lopes organized the meeting, with the help of other colleagues from Rio de Janeiro. The two other Brazilian INHIGEO members, recently elected, also presented their papers, as well as our Portuguese INHIGEO colleague Dr Manuel Serrano Pinto, and some postgraduate students. The Congress was very well attended, with some 250 papers and around 300 participants, mostly from Latin America but also from the USA, Portugal, Spain, France, Belgium, and India.

Also, the 40th Brazilian Geological Congress, held in Belo Horizonte (Minas Gerais), October, 11–16, 1998, hosted a scientific session on 'History and Philosophy of Geological Knowledge' where five papers were presented orally, and six were discussed in the poster session. The topics included history of mining, history of mineralogy, and debates on philosophical approaches to geology.

In the second semester, 1998, Margaret Lopes won a grant from Rockefeller Humanities Fellowships and Museo Etnográfico, Universidad de Buenos Aires, Argentina, to study the development of paleontological sciences in Latin America, especially in the Argentinian Museums: Buenos Aires National Natural Sciences Museum and La Plata Museum. In her studies she carried on investigation on paleontological work in Brazilian, Chilean, Uruguayan and Argentinian museums at the end of 19th century. Her book *O Brasil descobre a pesquisa científica: os Museus e as ciências naturais no século XIX* (1997) has been nominated for the 'Jabuti Award'—the major award of the Brazilian Publishers' Association—and is among the ten finalists in the category Natural Science and Medicine, out of a hundred titles.

The Brazilian publications for 1998 are listed below, quoted according to the language of publication.

Scientific Meetings (abstracts and proceedings)

Gonçalves, Pedro W., 'As explicações sobre a origem das rochas e da Terra: os vínculos das ciências da terra com a religião (Um estudo sobre James Hutton)', *Abstracts, 5th Latin American Congress on the History of Science and Technology, Campinas*, Gráfica UNICAMP, 1998, 111–113.

Gonçalves, Pedro W., 'A coleção Huttoniana de minerais, rochas e fósseis: possíveis papéis educativos para o ensino de ciências da Terra', *Anais, 10th Simp. sobre la Enseñanza de las Ciencias de la Tierra*, Palma de Mallorca, 1998, 97–100.

- Figueirôa, Silvia F. de M. and Lopes, M. Margaret, 'Understanding volcanism in Brazil: a preliminary survey on Portuguese and Brazilian geoscientists ideas (1797–1943)', in: Nicoletta Morello (ed.), *Volcanoes and History*, Brigati, Genoa, 1998, 157–170.
- Lopes, M. Margaret and Figueirôa, Silvia F. de M., 'Cartas trocadas: a comunicação científica no contexto do continente latino-americano na transição para o século XX', *Abstracts, 5th Latin American Congress on the History of Science and Technology*, Campinas, Gráfica UNICAMP, 1998, 148–149.
- Lopes, M. Margaret and Figueirôa, Silvia F. de M. (orgs), 'Gender, Science and Technology in Latin American History', *Abstracts Volume of the 5th Latin American Congress on the History of Science and Technology*, Campinas, Gráfica UNICAMP, 1998, 285 pp. (abstracts in Spanish, Portuguese, English, and French).
- Newerla, Vivian B., 'Expedições de exploração ao extremo sertão paulista (1905–1906): olhares e saberes', *Abstracts, 5th Latin American Congress on the History of Science and Technology*, Campinas, Gráfica UNICAMP, 1998, 180–181.
- Santana, José Carlos B. de, 'Euclides da Cunha e Amazônia: visão mediada pela ciência', *Abstracts, 5th Latin American Congress on the History of Science and Technology*, Campinas, Gráfica UNICAMP, 1998, 234–235.
- Silva, Clarete P., 'História e Memória: a prática científica colonial vista através das 'Memórias Mineralógicas e Geológicas' do cientista brasileiro José Vieira Couto (1750–1827)', *Abstracts, 5th Latin American Congress on the History of Science and Technology*, Campinas, Gráfica UNICAMP, 1998, 241–242.
- Tavares, Giovana G., 'O Instituto Histórico e Geográfico de Goiás: a história de uma instituição (1930–1970)', *Abstracts, 5th Latin American Congress on the History of Science and Technology*, Campinas, Gráfica UNICAMP, 1998, 255–257.
- Silva, Clarete P. and Figueirôa, Silvia F. de M., 'A contribution to the history of mineralogy: José Vieira Couto's mineralogical memoirs (Brazil, 1799–1805)', *Collected papers, International Symposium on the History of Mineralogy and Mineralogical Museums, Gemology, Crystal Chemistry, and the Classification of Minerals*, St Petersburg, Academy of Sciences, 1998, 160–162.

Journal articles

- Figueirôa, Silvia F. de M., 'Mundialização da ciência e respostas locais: sobre a institucionalização das ciências naturais no Brasil (de fins do século XVIII à transição ao século XX)', *Asclepio*, 1998, 50, 107–123.
- Lopes, M. Margaret, 'A construção de Museus Nacionais na América Latina Independente', *Anais Museu Histórico Nacional*, 1998, 32, 40–61.
- Santana, José Carlos B. de, 'Geologia e metáforas geológicas em "Os Sertões" (Geology and Geological metaphor in "Os Sertões")', *Manguinhos–História, Ciências, Saúde*, 1998, 5 (supl.), 117–131.
- Silva, Clarete P. da, 'Eh minas . . . Éh Minas . . . As atividades geocientíficas no Brasil colonial: um estudo da obra mineralógica de José Vieira Couto (transição dos séculos XVIII para o XIX)', *Manguinhos–História, Ciências, Saúde*, 1998, 5, 169–172.
- Gonçalves, Pedro W., 'James Hutton e a origem dos granitos', *Terra em Revista*, 1998, 4, 94–96.

Coordinated by Dr Silvia Figueirôa, the Brazilian INHIGEO members have started work on preparing the field trips and the INHIGEO General Symposia for the 31st International Geological Congress in Rio de Janeiro, August 6–17, 2000. We should like to remind you all that next meeting point is in **RIO DE JANEIRO** for the Rio 2000 IGC. You are all very welcome!

Maria Margaret Lopes and Silvia F. de M. Figueirôa, Campinas*

Canada

David Spalding writes from British Columbia:

During 1998 I contributed a number of entries to the *Encyclopedia of Paleontology* being prepared by Fitzroy Dearborn in the U.S.A., covering such notable Canadian palaeontologists as J.W. Dawson, W.A. Parks and Loris Russell; the Americans Roland Bird and Barnum Brown; and also a piece on Management of Fossil Resources. Latest news is that the publication is likely to be out in the spring of 1999. I have also written a number of reviews on Geological History titles for various periodicals.

My main work during the year has been writing a book entitled *Into the Dinosaur's Graveyard*. (The title comes from a poem by Canadian poet Al Purdy.) It is a substantial book about the discovery and interpretation of Canadian dinosaurs, and briefly about the activities of Canadian dinosaurologists in other countries. Its approach is broadly historical, and it also covers the scientific, cultural, and economic significance of dinosaurs in Canada. Although aimed for a popular audience it will be the most comprehensive history of dinosaur study in Canada produced to date, and will include enough documentation to provide access to the literature for those interested. It is now in the final stages of rewriting, and is to be published by Doubleday Canada in August 1999.

I have another book appearing in February, 1999. It is largely on the living whales of the west coast of North America, but also briefly discusses recent work on fossil whales in the region.

Other Canadian news that has come to my ears includes the sad news of the recent death (July 6th, 1998) of Loris Russell of the University of Toronto, Royal Ontario Museum and National Museum of Natural Sciences. Russell was an eminent palaeontologist who also contributed substantially to the history of palaeontology in Canada.

A volume of original pieces on the history of Canadian palaeontology is being planned by editors Tim Tokaryk of the Eastend Fossil Research Station and Debra Lindsay (University of New Brunswick).

Professor William Sarjeant has kindly sent us offprints of recent articles and reviews, as follows:

'The Earliest Discoveries', in: James O. Farlow and M.K. Brett-Surman (eds), *The Complete Dinosaur*, place, date and publisher not supplied, 3–11.

'Crystal Palace', in: Philip J. Currie and Kevin Padian (eds), *Encyclopedia of Dinosaurs*, Academic Press, San Diego, London, Boston, New York, Sydney, Tokyo, and Toronto, date not supplied, 161–164.

'History of Dinosaur Discoveries', in: Philip J. Currie and Kevin Padian (eds), *Encyclopedia of Dinosaurs*, Academic Press, San Diego, London, Boston, New York, Sydney, Tokyo, and Toronto, date not supplied, 340–347.

* For further information about the Rio Conference in 2000, see p. 16.

(with Geoffrey Tresise) *The Tracks of Triassic Vertebrates: Fossil Evidence from North-West England*, National Museums and Galleries on Merseyside, Liverpool, 1997, 216 pp.

'Michael Eric Smith (1941–1996): Reminiscences of a Friendship', *Mining History: The Bulletin of the Peak District Mining Historical Society*, 1997, 13, 33–36.

'The Dinosaur Demise: A Contrarian View', *The Ottawa Citizen*, October 14, 1997, A17.

Reviews

E.A. Vincent, *Geology and Mineralogy at Oxford 1860–1986*, The Department of Earth Sciences, Oxford, 1994, *Earth Sciences History*, 1996, 15, 77–79.

Steve McCarthy and Mick Gilbert, *The Crystal Palace Dinosaurs: The Story of the World's First Pre-Historic Sculptures*, The Crystal Palace Foundation, London, 1994, in: *Earth Sciences History*, 1997, 16, 56–57.

'John Wesley Powell: Four Publications Concerning his Travels and Attachments', *Earth Sciences History*, 1997, 16, 60–61.

Geology Talks: Commercial Cassettes Recording the History of Geology, in: *Earth Sciences History*, 1997, 16, 64–65.

Crispin Tickell, *Mary Anning of Lyme Regis*, Lyme Regis Philpot Museum, Lyme Regis, 1995, in: *Earth Sciences History*, 1997, 16, 159–160.

Richard V. Melville, *Towards Stability in the Names of Animals: A History of the International Commission on Zoological Nomenclature 1895–1995*, Natural History Museum, London, 1995, in: *Geoscience Canada*, 1997, 24, 209.

Paul C. Lyons, Elsie Darrah Morey, and Robert H. Wagner (eds), *Historical Perspectives of Early Twentieth-Century Carboniferous Palaeobotany in North America*, The Geological Society of America, Boulder, 1995, in: *Metascience*, 1997, No. 12 (new series), 136–139.

Daniel R. Bingham, *Public Culture in the early Republic: Peale's Museum and its Audience*, Smithsonian Institution Press, Washington D.C. and London, 1995, *Earth Sciences History*, 1997, 16, 54–55.

Tom Donnelly, *The Aberdeen Granite Industry*, Centre for Scottish Studies, Aberdeen, 1994, in *Earth Sciences History*, 1997, 16, 62–64.

Peter Marshall, *Nature's Web: Rethinking our Place on Earth*, Sharpe, New York and London, 1996; and Per Bak, *How Nature Works: The Science of Self-Organized Criticality*, Springer-Verlag, New York, 1996, in *The Structurist*, 1997/98, No. 37/38, 84–89.

Ian Keillar and John S. Smith (eds), *George Gordon: Man of Science*, Centre for Scottish Studies, Aberdeen, 1995, in: *Technos*, 1998, 5, 321–323.

Susan Sheets-Pyenson, *John William Dawson: Faith, Hope, and Science*, McGill–Queen's University Press, 1996, in *Metascience*, 1998, 7, 415–418.

Wang Hongzhen, David F. Branagan, Ouyang Ziyuan, and Wang Xulian (eds), *Comparative Planetology, Geological Education, History of Geology: Proceedings of the 30th International Geological Congress, Beijing, China, 4–14 August, 1996*, Volume 26, VSP, Utrecht and Tokyo, 1997, in: *INHIGEO Newsletter* No. 30, 1998 (for 1997), 29–32.

China

In October 27–29, 1998, the XIIth Annual Meeting of the Committee on History of Geology, Geological Society of China, was held in the China University of Geosciences, Beijing. The meeting was attended by more than forty scholars and specialists, including five members of the Chinese Academy of Sciences and the Chinese Academy of Engineering: Chen Mengxiong, Cheng Yuqi, Dong Shenbao, Han Dexin and Wang Hongzhen. At the opening session, President Wang Hongzhen gave a short review of the achievements of HGGSC since its establishment in 1980, and expressed his belief that it will continue to flourish and make more extension and innovation in the coming 21st Century. Professor Mo Xuanxue, Vice President of the University, made a brief address of welcome. After short speeches by Professor Cheng Yuqi and Dr Wang Mili, Secretary General of the GSC, Professor Yang Guangrong, Secretary General of HGGSC, gave a summary report of the activities of the Committee for the year 1997–1998.

Altogether twenty-four papers were read and discussed during the sessions, among which seven were concerned with personages, five with geological institutes and geological undertaking, eight with the development of geological disciplines, and two with the ancient geological thinking in China. Among them, the more interesting were the following:

Dong Shenbao, 'Progress of granite chemistry and granite research in China'; Zhai Yusheng, 'Retrospect and prospect of mineral deposit studies at the turn of the Century'; Du Letian, 'An innovation from a solid concept to a liquid concept of the Earth'; Ji Chuanmao, 'Promotion to Hydrogeology and Engineering Geology in the Thirtieth Geological Congress'; Chen Mengxiong, 'A big reform and readjustment of geological organizations in China in the beginning of the fifties'; Yu Guang, 'The general situation of the higher geological education in China from 1909 to 1949'; Peng Xinglin, 'Professor Chen Guoda and his Diwa Theory Yang Guangrong'; 'Treatment of relationships in geological research by some forerunners in Geology'.

During the meeting, nearly all the participants attended a centenary commemoration of the renowned geologist Professor Fong Jinglan. He specialized in mineral deposits and was professor of this University. The newly elected Committee of HGGSC held its first meeting and discussed the projects for the year 1998–99. A forum was also called for discussion of the planned book *Fifty Years of Geological Sciences in China*, which will be published in 1999. Seventeen people gave their opinions and made useful suggestions at the forum.

Publications and other activities

Since its foundation in 1980, the HGGSC has maintained the tradition of organizing at least one symposium and publishing at least one book related to the history of geology each year. In addition, the HGGSC has always encouraged its members to participate or help organize various activities such as memorial meetings for geoscience figures and the publication of serial books related to the history of geology. Among these activities the following may be mentioned.

1. Professor Cheng Yuqi, formerly President of GSC and presently adviser of HGGSC, Professor Chen Mengxiong, and Professor Pan Jiang jointly edited a very interesting book entitled *A Historical Retrospect of the former Geological Survey of China (1916–1950)*. The Geological Survey of China was one of the earliest established national geological surveys and built up a world reputation in the early half of this century. The volume was published by the Geological Publishing House, Beijing in 1996.
2. Publication of *Biography of Chinese Scientists and Technologists (Earth Science, Vol. 1)* (1996) was organized by the China Association of Science and Technology with Professor Liu Dongsheng, MCAS, as chief editor. The biographies of this volume include thirty-eight first-generation earth scientists born between 1877 and 1904.

Numerous articles were written by HGGSC members. The volume was published by the Hebei Science and Technology Press, China.

3. Professor Wu Fengming, member of HGGSC, participated in the compilation of the *History of Natural Science Book Series*, and edited a book entitled *A History of Geology in the World, Vol. 1: Foreign Countries*, which includes a good relation of the history of geology in the western countries. It was published in 1996 by Jilin Educational Press.
4. Professor Zhu Xun, formerly Minister of Geology and Mineral Resources, PRC, the most suitable person to do the work, edited a book entitled *Geological Science and Mineral Resources Industries*, under the Serial Publications of History of Natural Science". It was published by the Yunnan Science and Technology Press, China, in 1997.
5. A memorial book, *Eighty Years of the Geological Library of China*, was edited by the China Institute for Geological and Mineral Resources Information and published by the Geological Publication House, Beijing, in 1997. The Library was started in 1916. It was the Geological Survey Library until 1950 and was famous as the largest professional science library in East Asia. Both Professor Cheng and Professor Wang deliver speeches at the memorial meeting and wrote papers in the memorial volume.
6. In commemoration of the great contributions to the geology of China by the internationally-known Chinese geologist Professor Huang Jiqing (T.K. Huang 1904–1995), for many years Honorary President of the Chinese Academy of Geological Sciences, the latter institution compiled and published a book in praise of his manifold contributions to geology, including the history of geology. The editors include Professor Wang Yangzhi, member of HGGSC. Both Professors Cheng and Wang wrote contributions.
7. The Centenary commemoration meeting for the main founder of the first modern oil-field in China (the Yuman Oil Field), Professor Sun Jianzhu (1897–1952), was held in August, 1997. It was organized by the Petroleum Society of China and other institutions. Professor Tian Zaiyi, Adviser, and Professor Shi Baoheng, Vice President of HGGSC, were among the main organizers. The book was published by the Petroleum Industry Press, Beijing (1998).
8. Professor Yang Guangrong, Secretary-General of HGGSC, participated in the compilation of a book entitled *Biography of Members of Chinese Academy of Sciences Engaged in Higher Education*. Two hundred and forty-nine biographees, covering the six Scientific Sections of the Chinese Academy, are included.
9. Professor Li Erong, member of HGGSC, edited a monograph entitled *Geological and Seismological Hazards in China*, in the series *Research on Hazards in China*, sponsored by the China Committee on Ten Years' International Mitigation of Hazards. It contains rich historical material concerning ancient earthquake records as well as related concepts in ancient Chinese society. The volume was published by Hunan Peoples' Press, China (1998).
10. Professor Huo Youguang, member of HGGSC, wrote a book entitled *Explorations in the History of Science and Technology of Ancient China*, published by Shaaxi Science and Technology Press, China, 1998. The monograph deals with the scientific and technological thinking and methods in ancient Chinese writings and their comparison with those of the West.
11. Professor Li Zhongjun, member of HGGSC, recently completed his book *Earth Science Writings in Ancient China*, which includes two hundred and fifty-three books from the pre-Qin Dynasty down to the Qing Dynasty, covering geological knowledge, geological thoughts, and including a systematic introduction and comment. Altogether eighty-four ancient authors are mentioned.
12. Professor Zhai Yusheng, Vice President of HGGSC, has been busy preparing his monograph treating the geoscience disciplines comprising mineralogy, petrology, mineral deposits and geochemistry. The book was originally scheduled to appear this year, but its completion and publication have had to be postponed, perhaps to early 2000.
13. Professor Yang Jing-Yi attended INHIGEO's Neuchâtel Conference on the History of Geology, and presented a paper on 'Bailey Willis (1857–1949) and his Contributions to the Development of Structural Geology in China'. She also attended the 8th International Conference on History in China: 'China and the West', Berlin, September 7–14, 1998, and presented a paper on Willis there also. Her publications for 1998 (all in Chinese) were:
'On the Birth and Development of Fixism in Global Tectonics', *Journal of Dialectics of Nature* 1998, 20, 51–59.
'Brief Discussion on Chinese Texts Concerning Earth Sciences on Western Writings from 1840 to 1900', *China Historical Materials of Science and Technology*, 1998, 19, 89–96.
'The Spread of *Yu Gong** into the West', *Classic Texts and Culture of China*, 1998, 2, 118–120.
'Brief Biography of Arthur Holmes (1890–1965)', in: *Twenty Prominent Figures of the Twentieth Century*, Hundred Flowers Press, Tienjin, 1998, 19–20.
'In Memory of Professor Huang Ji-Qing', in: Chinese Academy of Geosciences (ed.), *Papers in Memory of Huang Ji-Qing*, Geological Press, Beijing, 1998, 151–152.

Yu Guang and Wang Hongzhen, Beijing

Colombia

We have been glad to receive the following letter (31 January) from Colombian Member, Professor Espinosa-Baquero:
Dear Members of INHIGEO,

As you will certainly know, the city where I live, Armenia, Colombia, was destroyed last Monday, 25 January, by an earthquake. I should like to inform all members of INHIGEO that, fortunately, my family (Monica and our children, Andres, 10, and Laura, 4) and I are safe and sound. Our house, located in the neighbourhood of Armenia, didn't suffer any damage. Yesterday, the electrical power was reestablished in our area, the water service was installed today, and the telephone is working more or less normally. Our situation is a privileged one, however. We are not short of food (though gastronomy is obviously not permitted!).

Monica and I are very busy. She is a physician and works in a local public hospital. I have been involved for many years with historical seismicity, intensity studies, and the study of active faulting. We have much work to do. Our university

* One of the earliest Chinese classical texts, which appeared about 3–5th century B.C. It described geography, mineral resources, etc., in nine districts.

has suffered great damage (5 million \$US, after estimations); so we shall have time to study the earthquake, since courses and other activities are delayed for now.

Best wishes to all, Armando Espinosa

Costa Rica

Costa Rican Member Dr Gerardo Soto is currently working and residing in Japan, which has interrupted his studies of the history of geology in Central America. However, in collaboration with Professor Percy Denyer, he has been working on a paper on pioneer geologists in Costa Rica, especially the American geologist and palaeontologist, William H. Gabb, who worked there in 1873–74. The study should be published in 1999 as a chapter of a book on the history of nineteenth-century Costa Rican science.

Dr Soto has proposed the annual celebration of 'Volcano Day'. See: G.J. Soto, 'A Roman Heritage: The Volcano Day. Proposal for the Creation of a Volcano and Volcanologists' Day', *IAVCEI News*, 1998, 3, 5.

Czech Republic (Brno)

In the Czech Republic, there are two centres of study for the history of geological sciences: in Prague and Brno. We present a report from Brno.

In autumn, 1998, a new working group, 'Geoarchaeology', was established at the Czech Geological Society. The aim of the group is to prepare a list of the stone raw materials used in prehistoric times in the territory of the Czech Republic, to search for the oldest traces of raw material exploitation (mining, quarrying) and distribution in Central Europe, and how to determine the rock composition of chipped or polished artefacts using petrographical, geochemical, or physical methods. The first annual conference of the group will be held on November 4, 1999, at the Faculty of Science, Masaryk University in Brno. For further information please contact Dr Antonín Prichystal (e-mail: <prichy@gap.muni.cz>).

In 1999 there will be the 200th anniversary of Joachim Barrande's birthday, the most celebrated geologist and palaeontologist in our republic. His research work was focused on the area of Lower Paleozoic sedimentary rocks in central Bohemia (between Prague and Plzeň) now named the Barrandien in his honour. In 1847, along with Roderick Impey Murchison, Philippe Edouard Poulletier de Verneuil and Alexander Keyserling, Barrande made an important field trip to the famous Moravian paleontological locality, Celechovice na Hane, where limestones were quarried at that time. Before the visit, the limestones were believed to be Silurian but during the field-trip their Devonian age was ascertained and thus Devonian rocks were found for the first time in Moravia. With our help the Moravian Museum is preparing an exhibition dedicated to the memory of Barrande and his field-trip to Moravia with those three outstanding European geologists of the last century.

The important anniversary of the German geologist Abraham Gottlob Werner (1749–1813) falls this year. As is well known, he was Professor of Mining and Mineralogy at the Mining Academy of Freiberg (Germany) and is considered the one of the chief founders of geology as well. The geology of the time was much influenced by the Neptunian school of Werner, and his influence on the progress of geology was extremely important not only for Germany but for our country too. On the basis of his visit to Brno, a new society was founded there (*Werner Verein* = Wernerian Society), with the aim of promoting Moravian geology. A large collection of petrographic and palaeontological material was created, which is now in the Moravian museum in Brno. The Moravian Museum is preparing its exhibition in 1999 to honour Werner's anniversary.

The Faculty of Science of Masaryk University is steadily publishing the history of the several branches of this Faculty under the editorship of Rudolf Musil. Work on the history of Quaternary period is slowly approaching completion. The eventual publication will provide a digest of the history of the whole field of Quaternary research from the territory of the former Czechoslovakia, from the beginning of twentieth century to the present. It will thus provide a complete view of researches (karst investigation, geomorphology, river terraces, glaciation, Quaternary sediments, soil erosion, weathering, landslides, Quaternary tectonics, pedology, travertines, Pleistocene mammals (including humans), birds, molluscs, vegetation, peats, volcanic activity, palaeolith and mesolith, petroarchaeology, Quaternary stratigraphy and associated problems), together with the fundamental papers, number counts, and consideration of their significance in several periods (before the First World War, between the two World Wars, and after the Second World War). The book will be published in Czech only.

In 1998, we initiated a series of papers concerned with the publications of geologists from earlier centuries who worked in Moravia (Czech Republic). Such papers will be published annually in the university periodical *Universitas* under the title *Moravská geologie (Moravian Geology)*. Last year, two geologists from the eighteenth century and nine from the nineteenth, whose names and work had long been forgotten by geological experts, were considered.

In September, 1998, there was a second workshop in Jihlava, entitled 'Silver Iglau', which was concerned with the history of mining in the Ceskomoravská Vrchovina Highland. On the first day, participants heard fifteen lectures, each from various perspectives—geology, mineralogy, speleology, history (e.g. 'The Kutná Hora' Ore District, 'Silver Minerals in the Czech Republic', 'The Ore District of Jihlava—lead in Mediaeval Water', 'History of Mining in the Ore District Havlíčkov Brod', etc.). The lectures are summarized in the journal of the Museum Vysociny, Jihlav (published in Czech only). The next day there was an excursion to the ore district, 'Havlíckov Brod' (the area in the central part of the Czech Massif, which has Pb–Zn–Ag veins produced by hydrothermal mineralization). The visitors could view old mine slag heaps and the ancient Pekelská mine near the village of Strbříčné Hory (13th and 14th century) and the gallery of Pribyslav (age unknown). The third workshop 'Silver Iglau'—on the history of mining in Ceskomoravská Vrchovina Highland region—will be held in the year 2000. Information can be obtained from Karel Maly of the Museum Vysociny, Masarykovo náměstí 55, 58601 Jihlava, Czech Republic.

Rudolf Musil and Antonín Prichystal, Brno

Czech Republic (Prague)

During 1998, we participated in four conferences and symposia concerned with, or having a bearing on, the history of geological sciences. The first was the international symposium, 'Beginnings of Electrical Research', which was held in Prague, Zámek and Znojmo, June 14–17, 1998. We also participated in the programme of the 38th Seminar on the History of Metallurgical Production, convened by the Prague National Technical Museum on November 4. After that, there was the traditional pre-Christmas seminar 'On the History of Mining' in the National Technical Museum (December 10–11), which was chaired by INHIGEO Member Miloš Zárybnický. Finally, there was the important conference 'Kaspar Maria hrabě Sternberg, přírodovědec a zakladatel Národního muzea' ('Caspar Maria, Count of Sternberg, Natural Scientist and Founder of the National Museum'), which was held on December 17, on the occasion of the 180th anniversary of the establishment of the National Museum. A respectful visit was made to the Count's grave in Horní Stupno, near Rokycany in Western Bohemia.

On the occasion of these conferences two exhibitions took place in the Prague National Technical Museum and the Prague National Museum, both of which were significant cultural events. First there was the exhibition on the 'Life and Work of the Czech Designer of the Lightning Rod, Václav Prokop Diviš (1698–1765)', which travelled from Prague to Zámek and Znojmo. And then there was the exhibition on the life and work of Caspar Maria, Count of Sternberg, co-founder of phytopalaeontology, with the support and interest of the Sternberg family, whose contributions to the development of the cultural of the Czech nation have been and are generally recognised. Both these exhibitions provided an opportunity for the appreciation of two of my books: *Zivot a dílo Václava Prokopa Divíse (Life and Work of Václav Prokop Divise, Vysoké Myto, 1982)* and *Kaspar Maria Sternberg, Přírodovědec a Geolog (Caspar Maria, Count of Sternberg, Natural Scientist and Geologist, Prague, 1988)*, which sought to provide an objective picture of the work of these two personalities, both of international significance.

The conference on the history of electrical research had an international character. Of particular interest were the lectures on geophysical problems. There was a paper by Ditmar Schneider (Magdeburg, Germany) on the electrical apparatuses of Otto von Guericke and one by Franz Pichler (Linz, Austria) on the development of the said apparatuses up to the end of the eighteenth century. For the Czech provenance, Jan Janko (Prague) spoke on 'The Beginnings of Electrophysiology'; Ivan Stoll (Prague) spoke on 'The Lightning Rod of Professor Richmann in St Petersburg'; and Josef Haubelt (Prague) gave a paper on 'Ein mährisches Zusammentreffen mit dem württembergischen Pietismus'. All lectures are being printed in a memorial volume that will be published by the Prague National Technical Museum. The contributions of Mrs Joelle Amagbegnon (born in Cotonou, Benin) to the discussions met with much interest. She is co-owner of the company 'Nuage a.s.', which has overhauled the lightning rods in Prague Castle.

The 18th seminar on the history of metallurgy naturally accepted contributions on the history of the mining of raw materials, in particular in the area of 'black metallurgy'. As usual, talks having a bearing on mining archaeology were heard from Slovakia as well as from Czech lands. I gave a lecture, 'Father Petr Janowka, SJ, and the Beginnings of Mining Universities in Central Europe', which I have completed in a seminar on mining history entitled 'Gerhard van Swieten and Mining'. During this seminar, lectures were presented on the history of mining archaeology. Jindra Biolková (Ostrava) spoke on 'Honourable Doctors of Mining Sciences at the Mining University, Ostrava'. Ivan Hercko (Banská Štiavnica, Slovakia) gave a fine lecture on 'The Scientific Activity of Frantisek Ulrich in Slovakia'. It should be known that Ulrich, the Mineralogy Professor of Charles University, was an active combatant in the fight against Nazism and died on October 21, 1941, due to injuries received as he was trying to avoid incarceration.

The conference in the National Museum included lectures by Charles University Professors Emeritus Oldřich Fejfar and Zlatko Kvacek. The former spoke on 'Caspar Maria, Count of Sternberg, Johann Wolfgang von Goethe, and Josef Sebastian Gruner'; the latter on 'Caspar Maria, Count of Sternberg: Co-founder of Scientific Palaeobotany'. To their contributions were added notable lectures by Jiri Kvacek (Prague) with his paper on 'Fossil Plants from the English Jurassic in the Collection of Caspar Maria, Count of Sternberg', and Rudolf Prokop (Prague) speaking on 'Caspar Maria, Count of Sternberg, and his Significance for Research on the Czech Lower Palaeozoics'. My contribution was also (I hope!) not without interest, namely 'Caspar Maria, Count of Sternberg, and Lorenz Oken'.

Milos Zárybnický (Prague) has established the Foundation of Silesia, Moravia and Bohemia, which brings together scholars with interests in industrial archaeology and mining history. To this is related the Georgius Agricola Foundation in Horní Slavkov, near the world-famous spa Karlovy Vary, which has uncovered and preserved mining works from as far back as the sixteenth century. The Foundation is developing in co-operation with the 'Georgius Agricola Research Centre' in Chemnitz (Germany), where Andrea Kramarczyk works.

Jan Kozák continues his work on earthquake iconography, with the help of recent study-periods in Portugal and the US. And Rudolf Musil has prepared and published a well illustrated and attractive memorial volume *Personalities of the Faculty of Science of Masaryk University in Brno*, where one can read *inter alia* about geographer Frantisek Koláček (1881–1942), anthropogeographer Frantisek Ríkovský (1901–1942), petrologist Vojtech Rosický (1880–1942), and climatologist Bohuslav Hrudická (1904–1942). The work of those who died in the struggle for Czech freedom is highlighted.

Josef Haubelt, Prague

France

The French Committee on the History of Geology returned to a more normal (less intensive!) activity in 1998, as it was only organizing, as usual, three annual meetings. The contributions of ten authors were collected by the secretary, who is currently completing his editorial work for the corresponding volume of *Travaux* (3rd series, Vol. 12). Its contents include:

Georges Fichard, 'Représentation et compréhension du terrain chez les ingénieurs du génie au XVIIIe siècle'.

Hervé Goix, 'De l'intérêt de l'histoire des sciences dans la formation des enseignants'.

Bernard Guy, 'Réflexions sur les notions de faits et de lois géologiques — Comparaison avec la physique'.

Ezio Vaccari, 'Quelques réflexions sur les instructions scientifiques destinées aux géologues voyageurs aux dix-huitième et dix-neuvième siècles'.

Vincent Deparis, 'La controverse sur la fluidité de la terre au XIXe siècle'.

Philippe Renault, 'Les mythes de la karstologie'.

Pierre Rat, 'Avec les géologues dijonnais et quelques autres dans la Chaîne cantabrique (des itinéraires de reconnaissance à la marge ibérique)'.

Christiane Demeulenaere-Douyère, 'Un regard sur l'Égypte: le carnet de Pierre-Louis Cordier (1798)'.

Jean Prouvost, 'Alfred Lacroix (1863–1948) ou l'œuvre inachevée'.

Gabriel Gohau, 'Léonce Élie de Beaumont (1798–1874). Pour le bicentenaire de sa naissance'.

Additionally, we are currently preparing Tables (alphabetic, chronological and thematic) for the first twenty years of *Travaux du Comité français d'Histoire de la Géologie*. We expect to mail them together with the annual volume for 1998 (3rd series, Vol. 12).

Finally, a significant participation of COFRHIGEO members should be noted at the INHIGEO Symposium held in September, 1998 in Neuchâtel, as about fifteen of its members were present, including some of the Swiss convenors and several other foreign (Australian, British, and Italian) members. The Symposium was a great success, as it was perfectly organized under

the leadership of Jean-Paul Schaer. During the meeting a preliminary round table discussion was held, devoted to the project of establishing a European journal on the History of Geology. (See p. 17.)

Jean Gaudant, Paris*

Germany

Meetings

The German working group on the History of Geological Sciences held its annual meeting at the Geological Institute at the University of Erlangen. On the occasion of this meeting, Gottfried Hofbauer (Erlangen) organized a two-day workshop on 'actualism' (June 19–20, 1998). The papers presented included: Gottfried Hofbauer (on the previous historical discussion on actualism); Rudolf Koetter ('The Methodological Structure of the Principle of Actualism'); Werner Buggisch ('The Current Use of the Principle of Actualism in Earth Sciences'); Hansmartin Hüssner ('Models in Paleontology'); Ilse and Werner Seibold ('Karl Ernst Adolf von Hoff'); and Peter Schimkat ('Actualism and Nebular Hypotheses in the Nineteenth Century'). In addition, Hofbauer and Koetter led an excursion to sites of 'geo-historical' interest in the surroundings of Erlangen.

On September 15, 1998, the History of Meteorology Specialist Group held a session on the 'Reconnaissance of the Third Dimension' (chaired by Cornelia Lüdecke, Munich, and Hans Volkert, Oberpfaffenhofen) on the occasion of the Conference of the German Meteorological Society at Leipzig.

Exhibitions

Professor Wolfhart Langer supervised an exhibition (50 showcases) on 'Georg August Goldfuss: The Life of a Scientist in the Romantic age' at the Goldfuss-Museum at Bonn from November 1998 until March 1999. The exhibition was very well reviewed by newspapers, radio broadcasting and television. On its opening, a Goldfuss-Colloquium was held on Goldfuss's 150th anniversary, with four lectures being presented. From April to July 1999, the exhibition has been shown in a slightly modified version at the 'Biohistoricum' at Neuburg/Donau. The opening lecture has been given by Professor Langer, who is also currently preparing a comprehensive paper on Goldfuss.

Martina Koelbl-Ebert and Bernhard Fritscher are currently preparing a small exhibition on 'Geology and culture in Eighteenth century' for A.G. Werner's 250th anniversary. The exhibition will be displayed from June to September 1999 at the Museum of the Bavarian States Geological Collection at Munich.

An exhibition was held on June 2nd, 1998, in honour of Carl Abraham Gerhard (1738–1821) at Berlin, including the unveiling of a memorial tablet at Gerhard's house (Berlin, Stadtbezirk Mitte, Neue Gruenstr. 27). This was arranged by Professor Rudolf Daber.

Lecture courses

Lecture courses were given by Dr Fritscher, Professor Langer and Dr Lüdecke. Fritscher gave a course on 'History of the Earth Sciences in Nineteenth century' at The University of Munich; Langer on the 'History of the Geological Exploration of the Rhine Region (including two excursions)' at the University of Bonn; and Lüdecke lectured on 'History of Meteorology in Polar Regions', also at The University of Munich.

Lectures and Poster-Presentations

- Engelhardt, Wolf von, 'Did Goethe discover the Ice Age?', XXIII INHIGEO Symposium, 'From Folds to Nappes to Plates: The History of Ideas about Glaciation', Neuchâtel (11 September 1998).
- Fritscher, B., 'Goethe: Ein Lehrstueck zum Thema 'Aktualismus'', Erlangen, Workshop 'Aktualismus', Geologisch-paläontologisches Institut der Universität Erlangen (20 June 1998).
- Fritscher, B., 'Glaciers between Nature and History: Hermann and Adolf Schlagintweit's Physical Geography of the Alps', 23rd INHIGEO Symposium, 'From Folds to Nappes to Plates: The History of Ideas about Glaciation', Neuchâtel (11 September 1998).
- Fritscher, B., 'Hegel und die Geologie um 1800', Lübeck, Symposium Hegel und die Lebenswissenschaften, Institut für Geschichte der Medizin (12 September 1998).
- Fritscher, B., 'Naturforschung an der Grenze von Antike und Moderne: Zur Bedeutung der antik-mittelalterlichen Naturwissenschaft fuer die romantisch-idealistische Naturphilosophie', Wolfenbuettel, Jahrestagung der Deutschen Gesellschaft für Geschichte der Medizin, der Naturwissenschaften und der Technik, Herzog-August-Bibliothek (26 September 1998).
- Fritscher, B., 'Humboldtsche Wissenschaft' und die 'Visualisierung der Natur': Die Forschungsreisen der Gebrueder Schlagintweit in Indien und Hochasien', Berlin, Arbeitskolloquium 'Umbrueche in der Wissenschaft des 19./20. Jahrhunderts', Alexander von Humboldt Forschungsstelle der Berlin-Brandenburgischen Akademie der Wissenschaften (7 October 1998).
- Fritscher, B., 'Von 'Feuer- und Wassermineralien': Zur Rolle der Geologie und Mineralogie in der Naturphilosophie Lorenz Okens', Berlin, Geowissenschaften in Oekonomie und Oekologie, Das System Erde, Jahrestagung der Deutschen Geologischen Gesellschaft, Sektionssitzung 'Philosophische Aspekte der Geowissenschaften' (9 October 1998).
- Fritscher, B., 'Die 'Entmoralisierung der Natur': Naturgewalten und politische Revolutionen im System der Natur', Eisenstadt, Naturgewalten als Thema von Politik, Wissenschaft und Kunst im 18. Jahrhundert (19 November 1998).
- Lüdecke, C., 'Erich von Drygalski: Altvater der deutschen Polarforschung', München, Haus des Deutschen Ostens (19 February 1998).
- Lüdecke, C., 'The Belgian Attempt to Institutionalize Polar Research (1905–1915) and the German Point of View', Brussels, Belgica Antarctic Expedition Centennial Symposium (15 May 1998).
- Lüdecke, C., 'Greenland as Study Area for Glaciological Theories at the Turn of the Century', Reykjavik, International Congress on the History of the Arctic and Sub-Arctic Region (21 June 1998).
- Lüdecke, C., 'Über die Ursprünge der Geopolitik: Ein Projektbericht (Von C. Ritter zu K. Haushofer)', Munich, Institut fuer Geschichte der Naturwissenschaften (9 July 1998).
- Lüdecke, C., 'Karl Haushofer (1868–1946): Vom Offizier zum Honorarprofessor', Universität München, HSP-Kolloquium SS 1997 (15 July 1998).

* We have heard recently that the Wegmann Prize in 1999 is to be awarded to the American historian of geology Professor Albert V. Carozzi. We take this opportunity to congratulate Professor Carozzi. We hope that his citation and reply will be published in next year's *Newsletter*. (Ed.)

- Lüdecke, C., 'The Formation of the North German Lowland: Erich von Drygalski's Expeditions to Greenland (1891, 1892–1893) in Search for an Explanation of the Ice Movement', XXIII INHIGEO Symposium, 'From Folds to Nappes to Plates: The History of Ideas about Glaciation', Neuchâtel (11 September 1998).
- Lüdecke, C., 'Aerologische Untersuchungen in Spitzbergen (1906–1914): Eine Initiative von Hugo Hergesell', Leipzig, Deutsche Meteorologentagung 1998 (15 September 1998).
- Lüdecke, C. (with G. Tieftrunk-Lüdecke), 'Der Beitrag der deutschen Polarforschung zum Kenntnisstand der Vitaminmangelkrankung Beriberi um 1900', Bern, 19. Internationale Polartagung (1.10.1998).
- Lüdecke, C. (with U. Leuschner), 'Die Entdeckung der Arktis in Geschichte und Literatur: Ein interdisziplinäres Experiment', Universität München, HSP Kolloquium WS 1998/99 (16 December 1998).
- Lüdecke, C. (with P. Seibert), 'Meteorologinnen: Quellen aus drei Jahrhunderten', Leipzig, Deutsche Meteorologentagung 1998 (14–18 September 1998) (Poster).
- Lüdecke, C. (with H. Volkert), 'Geschichte der Meteorologie: Ein neuer Fachausschuss der Deutschen Meteorologischen Gesellschaft stellt sich vor', Leipzig, Deutsche Meteorologentagung 1998 (14–18 September 1998) (Poster).
- Lüdecke, C., 'The German Influence in Polar Research until World War II', Bern, 19. Internationale Polartagung (30 September 1998) (Poster).

Publications

- Albrecht, H., Arnold, W., and Schmid, P. (eds), *Beiträge zur Geschichte von Bergbau, Geologie und Denkmalschutz: Festschrift zum 70. Geburtstag von Otfried Wagenbreth*, Freiberg, Technische Universität Bergakademie, 1998, pp.190.
- Daber, R., 'Das Leben des Carl Abraham Gerhard', *Geohistorische Blätter*, 1998, 1, 81–93.
- Daber, R., 'Der 72jährige Leopold von Buch, die Paläobotanik der Steinkohlen und zwei Jahre vor der Gruendung der Deutschen Geologischen Gesellschaft', *Geohistorische Blätter*, 1998, 1, 109–111.
- Daber, R., '150 Jahre Deutsche Geologische Gesellschaft: Warum erst 1848?' *Terra nostra: Schriften der Alfred Wegener-Stiftung*, 1998, 3, 26–27.
- Fritscher, B., 'The Fabrication of Rocks: The Geophysical Laboratory and the Production of Modernity in Mineralogy and Geochemistry', in: B. Fritscher and F. Henderson (eds), *Toward a History of Mineralogy, Petrology and Geochemistry: Proceedings of the Symposium on the History of Mineralogy, Petrology and Geochemistry, 8/19.3.1996, Algorismus: Studien zur Geschichte der Mathematik und der Naturwissenschaften 23*, Munich, 1998, 357–379.
- Fritscher, B., Henderson, F. (eds), *Toward a History of Mineralogy, Petrology and Geochemistry: Proceedings of the Symposium on the History of Mineralogy, Petrology and Geochemistry, 8/19.3.1996, Munich, Algorismus: Studien zur Geschichte der Mathematik und der Naturwissenschaften, 23*, Munich, 1998.
- Fritscher, B., 'Ein 'physisches System' der Erde: Zur Bedeutung der Geognosie A.G. Werners fuer die Entwicklung einer chemischen Geologie', in: H. Albrecht, W. Arnold, P. Schmidt (eds), *Beitraege zur Geschichte von Bergbau, Geologie und Denkmalschutz: Festschrift zum 70. Geburtstag von Otfried Wagenbreth*, Freiberg, 1998, 54–58.
- Fritscher, B., 'Petrologie am Vorabend der Moderne: Physikalische Chemie und 'Petrogenese' bei Cornelio Doelter', in: M. Buettner and F. Richter (eds), *Geisteshaltung und Umwelt: Stadt und Land, vol. 2, Geographie im Kontext, 4*, Frankfurt, 1998, 81–104.
- Fritscher, B., 'Paul Groth, Mineraloge: Aspekte einer Wissenschaftlerkarriere im Deutschen Kaiserreich', *Sudhoffs Archiv*, 1998, 82, 30–51.
- Fritscher, B., 'Volcanoes and the 'Wealth of Nations': Relations between the emerging Sciences of Political Economy and Geology in Eighteenth-Century Scotland', in: N. Morello (ed.), *Volcanoes and History: Proceedings of the 20th INHIGEO Symposium Napoli-Eolie-Catania (Italy), 19–25 September 1995*, Brigati, Genoa, 1998, 209–228.
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- Guntau, M., 'Zu einigen Vorstellungen ueber die Natur der Erde im Rahmen physikotheologischer Konzepte des 18. Jahrhunderts', in: H. Albrecht, W. Arnold, P. Schmidt (eds), *Beitraege zur Geschichte von Bergbau, Geologie und Denkmalschutz: Festschrift zum 70. Geburtstag von Otfried Wagenbreth*, Freiberg, 1998, 59–63.
- Guntau, M., 'Zur Entstehung der Geochemie als naturwissenschaftlicher Disziplin', in: B. Fritscher and F. Henderson (eds), *Toward a History of Mineralogy, Petrology and Geochemistry: Proceedings of the Symposium on the History of Mineralogy, Petrology and Geochemistry, 8/19.3.1996, Algorismus: Studien zur Geschichte der Mathematik und der Naturwissenschaften 23*, Munich, 1998, 327–359.
- Guntau, M., 'Georgius Agricola und der Geist seiner Zeit', in: 2. *Rundbrief Agricola*, ed. Forschungszentrum Chemnitz (AFC), Chemnitz, 1998, 3–12.
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Other matters

A group of historians of geology at Berlin founded a new society for the history of earth sciences in 1998, called 'Berlin-Brandenburgische Geologie-Historiker 'Leopold von Buch' e. V.' INHIGEO member Peter Kuehn is its chairman. The society publishes a new journal for the history of earth sciences entitled *Geohistorische Blaetter*; the first issue of which was published in 1998. Contributions are welcome and should be sent to Dr Kuehn.

Bernhard Fritscher, Munich*

Hungary

1998 was the 150th anniversary of the Hungarian Geological Society. Efforts and publications were focused on this jubilee. Nevertheless, eight regular meetings were held, with the following topics being presented and discussed.

19 January

Károly Brezsnayánszky, 'On the Traces of James Hutton (Edinburgh, Scotland)'.

Irma Dobos, 'The Third Fifty Years of the Hungarian Geological Society. Part IV'.

Károly Brezsnayánszky, Presentation of G. Csiky's book *From the History of Earth Sciences in Hungary (1997)*.

23 February

György Bárdossy, Attila Pataki, and János Tiszai, 'Exploration History of the Halimba Bauxite Deposits (Bakony Mountains, Hungary)'.

László Korössi, 'A Hungarian Oil Geologist in China (1959–1962)'.

16 March

Commemorative Meeting on the Occasion of the 150th Anniversary of Béla Zsigmondy's Birth. Held jointly with several other scientific and engineering societies.

18 March

Celebratory General Assembly of the 150-Year Old Hungarian Geological Society. Held at the Headquarters of the Geological Institute of Hungary.

Endre Dudich, 'Milestones of 150 Years'

21 April

Gusztáv Morvai, 'Brief History of the Hungarian Central Office of Geology (1953–1993)'

Béla Víz, 'History of the Hungarian Aluminium Industry, with Particular Regard to the Exploration of Bauxite. Part I'.

11 May

Vilma Széky-Fux, 'Commemoration of Béla Inkey on the Occasion of the 150th Anniversary of his Birth'.

László Kuti, 'Béla Inkey's Agrogeological Work'.

3 September

Special Symposium I of the XVIth Congress of the Carpathian-Balkan Geological Association. Theme: '19–20th-Century Exploration History of the Carpathian-Balkan Region'. Co-Convenor Endre Dudich on behalf of INHIGEO.

Gusztáv Morvai, 'Brief History of the Carpathian-Balkan Geological Association'.

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

Teréz Póka, 'Propylites and the 19th-Century Hungarian School of Petrography'.

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

19 October

József Cseh-Németh, 'History of the Exploration of the Metallic and Non-Metallic Minerals in Hungary'.

Béla Csath, 'Water Exploration in Hungary and the National Directorate of Geology'.

György Vitális, 'Concerning the Hydrogeological Activities of Károly Papp, on the Occasion of the 125th Anniversary of his Birth'.

* The help of INHIGEO-members M. Guntau, C. Lüdecke, W. Langer, W. von Engelhardt, and G. Wagenbreth in the compilation of this report is gratefully acknowledged.

30 October

Placement of flowers at the former Kubinyi Mansion at Vidéfalva (Vidina) near Losonc (Lucenec) in Southern Slovakia, where the Hungarian Geological Society was founded on 3 January, 1848. Joint celebration with the Slovak Geological Society. Talks were delivered by Géza Császár (Secretary-General of the Slovak Geological Society), Peter Reichwalder (President of the Slovak Geological Society, and Dionyz Vass (representing the geologists now working in the area).

16 November

Lajos Stegena Memorial Day (a meeting held jointly with the Society of Hungarian Geophysicists and the Hungarian Society of Geodesy, Cartography, and Remote Sensing at the Eötvös Institute of Geophysics)
Károly Posgay, 'The Connection of the Szolnok-Mármaros Flysch Belt with the Mid-Hungarian Lineament'.
Rolf Meissner (Kiel), 'Rheological and Seismological Properties of the Earth's Crust'.
Robert Gutdeutsch (Vienna), 'The Resolution Power of Historical Data with Respect to Seismological Parameters'.
Bruno d'Argenio, (Naples), 'Time Sampling and Time Gaps in the Earth's History: Are we Aware of the Missing Links?'.
Sierd Cloething (The Netherlands), 'Perspectives of Basin Research: From the Pannonian Basin to the Norwegian Continental Margin'.
László Rybach (Zurich), 'Lajos Stegena's Contributions to Geothermy'.
István Klinghammer, 'Lajos Stegena as an Authority on Old Maps'.
Imre Kubovics, 'Lajos Stegena and the Study of Meteorites in Hungary'.
Andrea Mindszenty, 'Carbonate Sedimentology, Bauxite Formation, and Geodynamics', Contributions to the Cretaceous Evolution History of the Transdanubian Central Range'.
Ferenc Horváth, 'A Great Opportunity for Hungarian Geology: Integrated Quaternary Research'.

30 November

Béla Vizi, 'History of the Hungarian Aluminium Industry from 1945, With Particular Regard to the Exploration for Bauxite. Part II'.

Károly Ferenckz, 'My Geological Explorations in Guinea in the Sixties'.

15 December

Tibor Kecskeméti, 'Early Scientific Interrelations of the Hungarian Geological Society and the Hungarian National Museum'.
István Zoltán Nagy, 'Commemoration of Agoston Kubinyi, One of the Founding Fathers of the Hungarian Geological Society'.
Endre Dudich, 'Chairman's Report for 1998'.

Selected Publications

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Endre Dudich, Budapest

Ireland

In 1998 Ireland was gripped by commemorative events marking the bicentenary of a doomed uprising. The National Committee for the History of Science and Philosophy organised a half-day symposium, 'Science in Ireland in 1798: A Time of Revolution', which was held in the Royal Irish Academy in November. Papers dealt with the work of civil engineers, chemists, biologists, and the geologists who debated the nature of the igneous rocks of north-east Ireland. The proceedings of this meeting are due to be published by the Royal Irish Academy in mid-1999. Following the symposium, a reception was held in the Geological Museum, Trinity College, to mark the acquisition of William Henry Fitton's 1852 Wollaston Medal of the Geological Society of London. By a series of coincidences, this rare geological medal, struck in palladium, was acquired in Canada by a geology graduate of Trinity College Dublin and donated by him to the Department of Geology. Fitton was also graduate of the University and was arrested in Dublin in 1798 while engaged in field work. See Wyse Jackson's paper, referenced below, for a fuller account of the work of Fitton and the travels of his Medal.

Paul Mohr is currently working on a history of geologists who worked in Connaught in the west of Ireland from earliest times up to 1950. His book should be published later this year. Patrick Wyse Jackson is working on a biography of John Joly, and, with David Attis, on a bibliography of the history of science and technology in Ireland.

Publications

Wyse Jackson, P.N., 'Veronica Burns 1914–1998, Curator Geological Museum, Trinity College, Dublin 1964–1980', *The Geological Curator*, 1998, 6, 339–340.

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Patrick N. Wyse Jackson, Dublin

Israel

In August 1998, Professor Dan Yaalon organised a Symposium on 'Attitudes to Soil Care and land Use through Human History', during the 16th World Congress of Soil Science (WCSS), in Montpellier, France. Seven oral and some twenty poster presentations were discussed during the well attended meeting (150 participants). Extended Abstracts and brief papers are available in the CD-ROM Congress publications. A special volume on *Advances in Geoecology* is planned for the publication in full of selected papers from the Symposium. A list of titles is included in the *Committee Newsletter* No. 7, issued before the WCSS.

The Committee on the History, Philosophy, and Sociology of Soil Science re-elected Professor Dan H. Yaalon as Chair and Dr Douglas Helms as Secretary of the now joint IUSS and IUHPS Committee.

Dan Yaalon, Jerusalem

Italy

The main event of 1998 was the publication of the *Proceedings of the XXth Symposium of INHIGEO, Volcanoes and History*, which was held in Naples, the Aeolian Islands, and Catania from 19–25 September, 1995. The profusely illustrated book, with 755 pages, is edited by Nicoletta Morello and contains thirty-nine papers (see review in this *Newsletter* at p. 32). The price is 115,000 Italian lire (85,000 for INHIGEO Members). For enquiries and orders, please contact: Stamperia-Editoria Glauco Brigati, via Isocorte 15, 16164 Genova-Pontedecimo (Italy) (Tel./Fax (39) 010 714535; Email, <brigati@iol.it>).

Also the *Proceedings of the Symposium on 'Earth Sciences in the Venetian region during the 19th century'*, organized by the Istituto Veneto di Scienze, Lettere ed Arti of Venice in October 1995, has been published. The book contains eleven papers on the following topics: the palaeontological researches of Tommaso Antonio Catullo (N. Morello), the theory of submarine volcanoes by Giambattista Brocchi (L. Ciancio), the role of the geologists from the Vicentine area (P. Pretò), the history of some geo-palaeontological collections in the Natural History Museums of Trento and Verona (G. Tomasi and L. Sorbini); the geological work of Luigi Castellini and Pietro Maraschini (E. Vaccari); the geological studies in Lombardy (A. Visconti); the background of the mineral surveys of John Williams in Veneto (H. Torrens); the mining school of Agordo (L. Santomaso); the situation of Venetian mines and metallurgy (R. Vergani); the discovery of glaciers in Veneto (G. Zanon). For further information and orders please contact Dr Alessandro Franchini, Istituto Veneto di Scienze Lettere ed Arti, Campo S. Stefano 2945, 30124 Venezia, Italy; Fax (39) 41 5210598; Email <vsla@unive.it>.

Professor Morello and Dr Vaccari were invited to Paris at different times and gave lectures and seminars on the history of Italian geology and mineralogy at the Centre Alexandre Koyré, CHRST Cité des Sciences et de l'Industrie, and COFRHIGEO. In October, Dr Vaccari took part in the meeting 'Sciences et Montagne: Histoire d'une Cordée Originale' in Geneva, presenting a paper on 'Scientific Travellers in the Apennines between the Seventeenth and Eighteenth Centuries: Geological Perspectives'.

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- Vergani, R., 'L'Industria Mineraria e Metallurgica: Tecniche, Economiche, Società', in: Vaccari, E. (ed.), *Le scienze della Terra nel Veneto dell'Ottocento*, Istituto Veneto di Scienze, Lettere ed Arti, Venice, 1998, 231–302.
- Visconti, A., 'Geologia, Istituzioni Naturalistiche e Descrizione del Territorio nell'area Milanese Asburgica della Restaurazione', in: Vaccari, E. (ed.), *Le scienze della Terra nel Veneto dell'Ottocento*, Istituto Veneto di Scienze, Lettere ed Arti, Venice, 1998, 135–149.
- Zanon, G., 'Sulla Scoperta e l'Individuazione dei Ghiacciai delle Dolomiti Attraverso le Fonti Cartografiche e Bibliografiche Ottocentesche', in: Vaccari, E. (ed.), *Le scienze della Terra nel Veneto dell'Ottocento*, Istituto Veneto di Scienze, Lettere ed Arti, Venice, 1998, 303–346.

Ezio Vaccari, Genoa

Also, Professor Piccoli of the University of Padua has written to inform us that a short account of the history of his Department of Geology, Paleontology and Geophysics is now in press. It contains a complete list of publications since 1988, when the former independent institutes of Geology, Paleontology, and Applied Geology (with a large Museum, started in 1734!), and Earth Physics and Geodesy, joined forces to form the present Department.

Japan

The Japanese Association for History of Geological Sciences (JAHIGEO) had an opportunity to communicate and exchange information with the History of Science Society of Japan in 1998. Members of the Association attended a conducted tour of the

exhibition of the geographic maps by Tadataka Ino (1745–1814) at Edo-Tokyo Museum, Tokyo, under the sponsorship of the Society on April 21, 1998. Ino was the first cartographer who drew maps of the Japanese islands by geodetic and astronomical methods. The Society had its annual meeting at Aichi University on May 30 and 31, when an evening meeting of the Association was held. The Society was founded in 1941, and has 951 members of whom 29 have majored in the history of geosciences. The Association was founded in 1994 and has 72 members specializing in the history of geology and paleontology. The Society and the Association expect to work together in close cooperation to promote the history of geosciences.

The Association had an evening meeting at the annual meeting of the Geological Society of Japan at Shinshu University on September 27, 1998, and a general meeting at Hokutopia, Tokyo on December 23, 1998. At this time, I. Imai was elected as the chairman and M. Omori retired. The secretariat consists of M. Kin, T. Kutsukake, D. Shimizu, Y. Suzuki, T. Tatezawa and M. Yajima.

The following presentations were given at the evening meeting during the general meeting of the History of Science Society of Japan at Aichi University on May 31, 1998:

I. Imai, 'History of INHIGEO and Japanese delegates'.

D. Shimizu, 'T. Ino's geographic maps from the view points of the world and Japan'.

T. Yamada, 'Steno's life and works'.

In the evening meeting at Shinshu University on September 21, 1998, the following papers were read:

R. Sugiyama, 'Outline of the foundation of the Geology Department, Shinshu University'.

J. Sakai, 'Quaternary research at Shinshu University'.

H. Komatsu, 'History and present state of education of geology in Nagano Prefecture'.

In the general meeting at Hokutopia, Tokyo on December 23, 1998, the following presentations were given:

Y. Fujii, 'Seismology in Japan before and after the discovery of deep earthquakes'.

M. Kin, 'Scientists called at the Kosaka Mine in the Meiji Era'.

M. Yajima, 'The life of Mary Anning and her contributions to the vertebrate paleontology'.

The Association published its *Newsletters* 10 and 11 in 1998. The editorial committee for the history of geosciences in the Geographical Society of Japan has published a chronological history of geosciences in Japan. The history of contributions to applied geology, seismology, geophysics, oceanography, and meteorology from 1892 to 1923 was published in *Journal of Geography*, 1998, 107, 386–412. S. Kurabayashi has published a history of education in elementary and high schools. The Association is preparing an English version of the JAHIGEO newsletter for foreign geoscientists. It will be published in early May.

Y. Suzuki, Tokyo, and K. Yagi, Sapporo

Portugal

- Andrade, A.A.S., 'A Mineralogia de Abraham Gottlob Werner (1750–1817) nas "Prelecções Filosóficas" de Silvestre Pinheiro Ferreira (1769 – 1846)', *Boletim do Centro Estudos de História e Filosofia da Ciência e da Técnica, Universidade de Aveiro*, 1998, 2, 26–28.
- Andrade, A.A.S., 'A Descoberta do Tempo Geológico', *Boletim do Centro de Estudos de História e Filosofia da Ciência e da Técnica, Universidade de Aveiro*, 1998, 2, 3–10.
- Antunes, M. Telles, 'Jubilacao do Prof. Francisco Gonçalves: Intervenção do Professor Miguel Telles Antunes', *Universidade de Évora, Évora*, 1997, 7–9.
- Antunes, M. Telles, 'Dinossáurios e Portugal: Dois casos menos conhecidos. I Encontro Internacional sobre Paleobiologia dos Dinossáurios. Programa de Musealização para pistas de Dinossáurios em Portugal', *Museu Nacional de História Natural, Grupo PALEO, Liga dos Amigos do MNHN, Universidade de Lisboa*, 1998, *Ciências da Terra (Universidade Nova de Lisboa)*, Lisbon, 1998, 13.
- Antunes, M. Telles, 'A New Upper Jurassic Paulchoffatiid Multituberculate (Mammalia) from Pai Mogo, Portugal, and a Few Comments on Walter Georg Kühne', *Memórias da Academia das Ciências de Lisboa, Classe de Ciências*, 1998, 37, 125–153.
- Ferreira, M.R.P.V., *200 Anos de Mineralogia e Arte de Minas: Desde a Faculdade de Filosofia (1772) até à Faculdade de Ciências (1972)*, Faculdade de Ciências e Tecnologia, Universidade de Coimbra, 1998, 188 pp.
- Lima-de-Faria, J., 'Past, Present and Future of the Classification of Minerals', *Proceedings of the International Symposium on the History of Mineralogy, Petrology, and Geochemistry, 8–9 March, 1996*, Munich, 1998, 17–28.
- Malaquias, I. and Pinto, M.S., 'Ciência e Tecnologia na Mineração do Ouro e Diamantes no Brasil durante o Século XVIII', *Abstracts, V Congresso Latino-Americano de História das Ciências e da Tecnologia, Rio de Janeiro, 28–31 de Julho, 1998*, 155–156.
- Malaquias, I. and Pinto, M.S., 'Technology, Instrument Making, and Economic Power in the Eighteenth Century: Portugal and the Brazilian Gold and Diamonds', *Abstracts, 25th Symposium: International Committee for the History of Technology, Lisbon, 24–28 August, 1998*, 99.
- Pinto, M.S., 'Effects of Eruptions on Society – The Case of the Azores Archipelago: A Brief Historical Account', in: Morello, N. (ed.), *Vocanoes and History: Proceedings of the 20th INHIGEO Symposium, Napoli–Eolie–Catania, 19–25 September, 1995*, Brigati, Genoa, 1998, 565–580.
- Pinto, M.S., 'Gaspar Frutuoso, os Açores e a Atlântida de Platão', *Boletim do Centro de Estudos de História Filosofia Ciência e da Técnica, Universidade de Aveiro*, 1998, 2, 3–8.
- Pinto, M.S., 'Vulcanismo dos Açores – Nota Sobre as Primeiras Erupções Históricas de São Miguel', *Actas do V Congresso Nacional de Geologia, Lisboa, 18–20 November, 1998*, Instituto Geológico e Mineiro, Lisbon, 84, H4–H7.
- Pinto, M.S. and Andrade, A.A.S., 'Sobre o Conhecimento dos Recursos Minerais de Portugal no Século XVIII', *Actas V Congresso Nacional Geologia, Lisboa, 18–20 November, 1998*, *Comunicacoes do Instituto Geológico e Mineiro, Lisboa*, 84, H38–H41.
- Pinto, M.S., 'O Intendente Câmara', *Brasil Mineral*, 1998, 167, 46–49.
- Ribeiro, A., 'Oceanos e Continentes – No Fim do Século XV e no Fim do Século XX', *Actas V Congresso Nacional Geologia, Lisboa, 18–20 November, 1998*, Instituto Geológico e Mineiro, Lisboa, 84, H3.

Miguel Telles Antunes, Lisbon, and Manuel Pinto, Aveiro

New Zealand

Papers published in 1998 in the *Newsletter* of the Historical Studies Group of the Geological Society of New Zealand include the following:

Mason, Alan, 'The Golden Years of Auckland University Geology: 1894–1906', *16*, 29–36.

Mason, Alan, 'James Mackintosh Bell: Some New Information and a New Appraisal', *17*, 3–16.

Mason, Alan and Watters, Bill, 'The Discovery of the New Zealand Cambrian', *17*, 21–29.

Stevens, Graeme, 'Charles Andrew Cotton: 1885–1970', *16*, 3–9.

Stevens, Graeme, 'John Bradley: A New Zealand Pioneer in Continental Drift Studies', *17*, 30–38.

An index to Numbers 1–15 of the *Newsletter* was published during the year.

The Historical Studies Group has only sixty New Zealand Members; yet of the 613 articles in the recently published Volume 4 of the *Dictionary of New Zealand Biography*, six are by members of the group. Research on the Gideon Mantell material in New Zealand has continued, with several new items being discovered. The work of the Historical Studies Group has been recognised by the Royal Society of New Zealand by the reward of a New Zealand Science and Technology Medal.

Alan Mason, Auckland.

Poland

Studies and editorial activity on the history of geosciences in our country have, as in previous years, been concentrated mainly in the 'Museum of the Earth' of the Polish Academy of Sciences in Warsaw, where archival materials on former geologists and geological institutions are collected and analyzed. Research works in this field are also preserved in some local state and private museums and carried out by individual university scientists. Worth emphasising is the activity of the Commission of Natural sciences (including geology) of the Committee on History of Sciences and Technics affiliated to the Polish Academy of Sciences (Warsaw). Moreover, a new Commission on History of Sciences was formed in the more than 100 years old Polish Academy of Arts and Sciences in Cracow. Several Polish INHIGEO members are co-operating with it.

As mentioned, editorial activity concerning the history of geosciences is predominantly associated with the Museum of the Earth. The most recent (45th) volume of the *Transactions of the Museum of the Earth (Prace Muzeum Ziemi)* is wholly devoted to the history of geology. It contains the following papers (written in Polish with English summaries):

Michał Szulcowski, 'Nature in Stanisław Staszic's World View' (5–37).

Joanna Popiolek, 'Stanisław Staszic on the Youngest Deposits in Poland' (39–44).

Joanna Popiolek, 'The Organizational Activity of Antoni Bolesław Dobrowolski in the Natural Sciences' (45–65).

Wiesław Gabzdyl, 'Systematics, Terminology and Description of Minerals and Rocks in *Catalogus fossilium in maiori armaris contentorum* of Leopold Jan Szersznik of 1800' (67–80).

Jadwiga Garbowska, 'Dissertations for Scientific Degrees in Geological Sciences at Vilna University in the Years 1813–1830' (81–184).

The last paper presents an important contribution to the knowledge of the early development of geosciences in Poland, documenting the rather high standard of education at Vilna in that period.

Zbigniew Wojcik has published a series of biographic monographs on the Polish explorers of the vast Russian territories in Asia. His latest book, published in 1998 in Polish with an English summary, is devoted to *Karol Bohdanowicz: Geologist and Traveller, Explorer of Siberia* (410 pp.). In Russia, Bohdanowicz is called the 'Father of domestic petroleum geology'.

In addition, the Museum of the Earth has edited (in Polish) two popular scientific booklets, being commentaries to recently inaugurated exhibitions on the history of geology: *The Sources of Modern Geological Ideas* by Joanna Popiolek, and *The Initial Period of Geology in Poland* by Jadwiga Garbowska.

The Stanisław Staszic Museum in Pila (NW Poland, the birthplace of this 'Father of Polish Geology') has edited the first volume of a new periodical *Staszic's Fascicules* containing, among others, the following papers (in Polish):

Zbigniew Wojcik, 'Is Staszic's Geological Collection Preserved?' (9–20).

Andrzej Abramowicz, 'Stanisław Staszic: Between Buffon and Cuvier' (21–41).

Janusz Skoczylas, 'The Reception of Stanisław Staszic's Activities in Some Publications in the Great Duchy of Poznan' (69–81).

Stanisław Czarniecki, 'Stanisław Staszic and Hugo Kollataj in Polish Geology' (83–89).

Zbigniew Wojcik, 'Stanisław Staszic and the Problem of Rock Salt in Poland' (91–106).

Józef Olejnicz, 'A Previously Unknown Fragment of Stanisław Staszic's Travel Diary' (117–129).

Polish historians of geosciences participated in several international and domestic scientific conferences. During the celebration of the bicentenary of the birth of eminent Polish Romantic poet, Adam Mickiewicz, in Byelorussia, Zbigniew Wojcik and Marian Hermanowicz delivered lectures entitled respectively 'Ignacy Domeyko: Mickiewicz's Friend in Niedzwiedka', and 'The History of the Domeyko Family'. The talks were published in the periodical *Albainruthenia* (pp. 418–428). Domeyko is considered to be the 'Father of Polish mineralogy'.

Zbigniew Wojcik and Wojciech Narebski prepared a lecture entitled 'Centenary of Victor Uhlig's Monograph on the Geology of the Tatra Mountains', which was presented by Endre Dudich at the INHIGEO Conference in Vienna, devoted to the exploration history of the Carpathian–Balkan region.

Janusz Skoczylas organized a scientific session in Poznan to celebrate the bicentenary of the birth of Paweł Edmund Strzelecki. In addition, Antoni Kleczkowski and Zbigniew Wojcik participated in a symposium on the Polish state mining and metallurgical enterprises in the years 1789–1989. Kleczkowski spoke on the role of Stanisław Staszic in this field and Wojcik on state geological survey in general.

Zbigniew Wojcik, Warsaw; Wojciech Narebski, Krakow

Russia

The following report has been received from Professor Evgenij Milanovsky:

I. During 1998, I participated in two international meetings conducted by INHIGEO, participated in the field-trips, and presented two papers.

1. Congress of the Carpathian-Balkan Geological Association (CBGA) in Vienna (30 August–29 September, 1998, with a 6-day pre-congress geological excursion through the eastern (Austrian) Alps. The Congress programme included an INHIGEO symposium devoted to the development of notions on the geology of Carpathian fold system, where I presented a

paper entitled 'The role of the Moscow school of geology in the study of the structure and development of the Ukrainian (Central) Carpathians';

2. Conference of INHIGEO in Neuchâtel, Switzerland (8–11 September, 1998, devoted to:

- a) The evolution of ideas on the tectonic structure and development of folded belts (from folds to nappes and plate tectonics), and;
- b) The development of knowledge of ancient (late Cenozoic) glaciation.

This meeting also involved a 2-day pre-congress, a half-day mid-congress, and a 3-day post-congress geological excursions in the Western (Swiss and French) Alps and the Jura mountains. My oral presentation was devoted to the development of ideas and notions on the ancient glaciation of northern Eurasia and the Caucasus region.

I have also participated in the meeting of the Moscow Naturalists Society and the Moscow Geological-prospecting Academy devoted to the 90th anniversary of the birth of the outstanding Russian geologist and corresponding Member of Academy of Sciences of USSR, Professor M.V. Muratov. For this, I presented a lecture on 'The main types of modern oceans and their role in the structure and geological history of the Earth' (recently published in the *Bulletin of the Moscow Naturalist Society, Geological Section*, 1998, Vol. 5).

II. During the INHIGEO meeting in Neuchâtel, according to my nomination, Dr I.A. Rjasanov from the Moscow Institute of the History of Natural Sciences and Technology of the Russian Academy of Science was re-elected (rehabilitated) as a Member of INHIGEO. A month ago Dr. Rjasanov published his new book *The History of Interrelations between Earth Sciences*. [See 'Books Received' (ed.)]

III. During 1997 I published the following papers on topics related to the history of earth sciences:

1. 'The Problem of Atlantis in the Light of Geological and Archaeological Researches on the Santorini Volcanic Archipelago in the Aegean Sea' in: N. Morello (ed.), *Volcanoes and History. Proceedings of the 20th INHIGEO Symposium Napoli-Eolie-Catania*, Brigati, Genoa, 1998, 323–349.
2. 'The Main Development Stages of Volcanological Researches in Russia', *ibid.*, 351–370.
3. 'The Role of the Moscow Geological School in the Study of the Structure and Knowledge of the Ukrainian Carpathians', *Abstracts of Papers of the 16th Congress CBGA*, Vienna, 1998, 387.
4. 'The Development of Ideas on the Ancient Glaciation of the Great Caucasus', *Resumés (abstracts) of the INHIGEO Conference in Neuchâtel, Switzerland, 9–11 September, 1998*.
5. 'The Rise and Development of Notions on the Ancient Glaciation of Eastern Europe and Siberia', *Resumés (abstracts) of the INHIGEO Conference in Neuchâtel, Switzerland, 9–11 September, 1998*.
6. Khain, V.E., Milanovsky E.E., and Sokolov B.A., 'The Study of Geotectonics and Geodynamics at Moscow University', *Abstracts of the Conference of the Russian Tectonic Committee, January 1998* (in Russian).
7. Khain, V.E., Milanovsky, E.E., and Sokolov, B.A. 'Geotectonics at Moscow University (1938–1998)', *Moscow University Herald, Geology Series*, 1998, Vol. 6. (in Russian).
8. 'In search of Atlantis', in: 'Smirnovsky sbornik-98', *Scientific Literary Almanac*, ed. V.E. Starostin, 1998 (in Russian).
9. 'Problems of the Geology of the Kazakh Highlands and the Urals–Mongolian Fold Belt in the Works of A.A. Bogdanov', in: *Problems in the Geology of the Urals–Mongolian belt (for the 90th birthday of Professor A.A. Bogdanov)*, Moscow University Publishers, Moscow, 1998, 10–14 (in Russian).
10. *Problems in the Geology of the Urals–Mongolian belt (for the 90th birthday of Professor A.A. Bogdanov)*, edited by E.E. Milanovsky, Moscow University Publishers, Moscow, 1998, 118 pp. (in Russian).

Other publications reported are:

Khain, V.E. and Ryabukhin, A.G., *History and Methodology of Geological Sciences*, Moscow State University, Moscow, 1997, 224 pp. (in Russian).

Ryabukhin, A., 'Ideas of the Catastrophism in Geology (Yesterday, Today, Tomorrow)', in: *Annual Scientific Conference: Lomonosov Memorial*!, Moscow State University, Moscow, 1997, 64–65.

Spain

Anniversaries

We have had three anniversaries. The first one was the tercentenary of José Torrubia (1698–1761), author of *Apparatus for the Natural History of Spain*, the first approach to Spanish natural history from a scientific point of view, specially to the Paleontology. (There is a facsimile edition of this work by the Instituto Tecnológico GeoMinero de España and another by The Spanish Society of Palaeontology.)

The second anniversary was the 150th year of Ramón Adán de Yarza (1848–1917), a mining engineer—and a man linked with Basque nationalism—who was the first to carry out a systematic study of the geology, physical environment, and natural resources of the three provinces of the Spanish Basque Country.

Another anniversary has been the eighth centenary of the Hispanoarabian philosopher-scientist, Averroes (Ibn Rusd, born 1198), author of a 'Mineralogy'.

1998 was also the centenary of the construction of the first seismograph in Spain, located in the San Fernando Naval Observatory of the Navy (Cádiz). A seminar was organized to mark the occasion.

The Geological Society of Spain held a special Session in May on José Torrubia.

Principal Publications

The Geological Society of Spain has published a facsimile edition of the Spanish translation of Charles Lyell's *Elements of Geology*, performed in 1848 by Joaquín Ezquerro del Bayo, General Inspector of Mines. In addition, the Instituto Tecnológico GeoMinero de España published a facsimile edition of *Physical and Geological Description of Madrid Province*, first issued in 1864 by Casiano de Prado, a mining engineer of the Spanish Geological Survey.

Ayala-Carcedo, F.J., 'Notas sobre la evolución histórica del conocimiento, las estrategias y técnicas de mitigación de las inundaciones y los movimientos de ladera en España', *Boletín Geológico y Minero*, 1998, 109, 69–76.

Ayala-Carcedo, F.J., '150 Aniversario de Ramón Adán de Yarza (1848–1917)', *Industria y Minería: Consejo General de Colegios de Ingenieros de Minas*, 1998.

Mazadiego, L.F., Puche, O. and García, A., 'Propuesta de catalogación del Patrimonio Minero-Metalúrgico madrileño', *X Congreso Internacional de Minería y Metalurgia: Consejo Superior de Colegios de Ingenieros de Minas*, 1998.

Mazadiego, L.F. and Puche, O., 'Mitología del oro: el oro y el sol', *Boletín Geológico y Minero*, 1998, 109, 109–219.

- Orche, E. and Puche, O., 'Devenir histórico de la relación entre la joyería y las ciencias mineras y de los minerales', X Congreso Internacional de Minería y Metalurgia, Valencia, *Consejo General de Ingenieros de Minas*, 1998.
- Orche, E. and Puche, O., 'Intercambio tecnológico en la minería y metalurgia hispanoamericana de la plata y el mercurio durante el Imperio', *II Congreso Europeo de Latinoamericanistas*, Halle (Germany), 1998.
- Puche, O. and Mazadiego, L.F., 'La conservación del Patrimonio Minero-Metalúrgico europeo', *Boletín Geológico y Minero*, 1998, 109, 77-90.
- Puche, O. and Orche, E., 'Los museos del oro en Europa', *Boletín Geológico y Minero*, 1998, 109, 197-207.
- Puche, O. and Orche, E., 'Algunos datos sobre el trabajo de los niños en las minas en Europa y América', *II Congreso Europeo de Latinoamericanistas*, Halle (Germany), 1998.
- Puche, O., Ayarzagüena, M., and Mazadiego, L.F., 'Salinas históricas de la Comunidad de Madrid: caso particular de Espartinas', *III Sesión Científica de la Sociedad Española para la Defensa del Patrimonio Geológico y Minero: Patrimonio Minero-Metalúrgico*, La Rábida (Huelva), 1998.
- Puche, O., García, I., and Mazadiego, L.F., 'Minas del Cerro de la Plata de Bustarviejo (Madrid)', *III Sesión Científica de la Sociedad Española para la Defensa del Patrimonio Geológico y Minero: Patrimonio Minero-Metalúrgico*, Rábida (Huelva), 1998.

The volume edited by INHIGEO member Octavio Puche is especially interesting: 'El oro en España' ('Gold in Spain'), *Boletín Geológico y Minero*, 1998, 109, 244 pp., ITGE, Madrid, which gives a complete overview of history, geology, and mining.

Other activities
The Spanish Society for the Preservation of the Geological and Mining-Metallurgical Heritage (SEDPGYM) organized a scientific conference on 'Mining-Metallurgical Heritage' in La Rábida, the place from which Columbus's ships sailed for America.

An exhibition on gold was organized by Dr Octavio Puche at the Mining School of Madrid.

The History of Geology Commission of the Spanish Geological Society has published three numbers of its *Bulletin*, edited by Dr Leandro Sequeiros.

The ITGE has published a poster on 'Mining-Metallurgical Heritage' designed by Octavio Puche and F.J. Ayala-Carcedo.

Francisco J. Ayala-Carcedo, Madrid

Switzerland

The greatly valued contributions of the Swiss contingent of INHIGEO, acting as hosts for the conference held at Neuchâtel in September, 1998, are referred to in a number of places in the present *Newsletter*. Arrangements for the publication of selected conference papers in *Eclogae Geologicae Helveticae* are in the hands of Professor Jean-Paul Schaer. The following publications have been received:

Schaer, J.-P., *Les Géologues et le Développement de la Géologie en Pays de Neuchâtel*, Institut de Géologie and Muséum d'Histoire Naturelle de Neuchâtel, Neuchâtel, 1998, 81 pp.

Trümpy, R. and Lemoine, M., 'Marcel Bertrand (1847-1907): Les Nappes de Charriage et le Cycle Orogénique', *Comptes Rendus de l'Académie des Sciences, Paris: Sciences de la Terre et des Planètes*, 1998, 327, 211-224.

The Netherlands

In 1998 the Committee for the History of the Earth Sciences of the Koninklijke Nederlandse Akademie van Wetenschappen (KNAW) saw the completion of two major works that have been at the centre of its activities for many years: a multi-author book on the history of earth sciences in Suriname, and a monograph by Professor Emile den Tex (Chairman of the Commission from 1981 to 1996) on the beginnings of a 'volcano-oriented science' in Western Europe, and in the Republic of the United Netherlands (ca 1600-1800) in particular. Both books are superbly edited and may be obtained directly from Edita KNAW (Amsterdam) or from book stores.

Though the background of the books may be somewhat different—a long-standing project of the Commission with successive editorial committees and many invited authors for the first book, and a personal initiative of den Tex for the second, the role of the Commission has been essential in both instances with careful reviews by its members and occasional assistance from external experts. Both books are being well received by the Dutch and Suriname earth sciences communities and they deserve attention from a wide circle of the scientific and educated lay public as well.

The History of Earth Sciences in Suriname covers all aspects of geology and related sciences in that country, with special attention to its natural resources, their exploitation and mining (notably bauxite, hydrocarbons, and water management). Particularly valuable is an exhaustive bibliography of publications pertaining to this relatively remote and little-known part of South America, many of them published in journals that are difficult to access. This lengthy list—thirty-two closely printed pages—witnesses the importance of the work done by the Dutch during the administration of the country prior to 1975. By far the greater part thereof has never been published in easily accessible form.

Den Tex's book should intrigue all volcanologists with an affinity to the Dutch tongue, though it contains also an extensive summary in English. Its title, rendered in English, reads: *A Prelude to Early Modern Volcanology in Western Europe, with Emphasis on the Republic of the United Netherlands (ca 1600-1800)*. It demonstrates that during the period when Dutch sailors and merchants were travelling all over the world to bring highly lucrative spices and silk from India, China, Japan, and the Indonesian archipelago their concerns were not solely mercantile. They made many observations on the volcanoes that they discovered during their travels, notably in the East Indies (now Indonesia). Although some of these were discussed extensively in the many learned societies of their time, much information was hidden in the journals of little-known travellers and in the internal reports of the Dutch-East- and West-India Companies. These have been systematically investigated for the first time by den Tex. Interestingly, many of the observations, made 'unintentionally' by sailors equipped only with their common sense, prove to be more correct than the highly theoretical views on volcanoes that dominated the scene in seventeenth-century Europe, which have commonly been assumed to represent the first precursors of volcanology.

The Commission met only once in 1998, due to the sudden grave illness of its honorary secretary, the historian Dr Emile Willem Alexander Henssen in the early autumn. As a result, the meeting scheduled for October had to be cancelled.

The safeguarding of biographical material is being continued, as well as present circumstances permit.

Compiled by Emile den Tex from an evaluation by Jaques Tourret

United Kingdom

The History of Geology Group of the Geological Society (HOGG)—which now numbers about a hundred members—organised two meetings during the year, the first being a week-end excursion through the Welsh Marches, revisiting the prehistory of the Silurian System and sites of Roderick Murchison's early exploration. It arose from a large poster display on the history of the Lower Palaeozoic, presented by the Society at Dallas, Texas, for the Annual Convention of the American Association of Petroleum Geologists.

On September 24, in the company of curators and conservators, HOGG held a meeting at the Geological Society, Burlington House, entitled 'Has the Past a Future?'. Eight papers reviewed the ever-growing problem of archival conservation. They are being published in *Geological Curator* in 1999.

A major event for 1999 will be the Mary Anning Symposium, to be held at Lyme Regis, Dorset, June 2–4. The meeting, now heavily subscribed, is to celebrate the discoveries of British palaeontology, 1820–1850.

Professor Gordon Craig writes that a large new building near Holyrood Palace, Edinburgh, will house an exhibition on 'The Dynamic Earth', opening in May, 1999. Some half a million visitors a year are expected.

James Secord spent the 1998–99 academic year on sabbatical leave, with a grant from the British Academy, and has completed the manuscript for a book on the reception of Robert Chambers's *Vestiges of the Natural History of Creation* (1844), entitled *The People's Evolution*. It is to be published by The University of Chicago Press.

Beryl Hamilton is lecturing on the history of geology for an MSc course at Liverpool and is continuing with her work on Charles Lapworth.

Looking ahead, HOGG is planning the William Smith meeting of the Geological Society for 2000, under the working title: 'A Celebration of the Age of the Earth'.

Publications

Craig, G.Y. and Hull, J.H. (eds), *James Hutton: Present and Future*, The Geological Society, London, 1998, 184 pp.

Ford, T.D. and Marion Weber, 'Relief Carvings of Hallein in the Carolino Augusteum Museum at Salzburg, Austria', *Mining History*, 1998, 13, 44–50.

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John Fuller, The Geological Society, London

[It is with great sadness that we report the tragic death on May 6, 1999, of John C. Thackray. A great friend and helper to all who knew him, John was for many years Honorary Archivist of the Geological Society of London, and was, at the time of his death, President of the Society for the History of Natural History. A full obituary will be published in *Newsletter* No. 32. Ed.]

* A modified version of this review appears on p. 43.

United States

The History of Geology Division, The Geological Society of America

At the annual meeting of the GSA, which convened in Toronto, Canada, October 25–29, 1998, the Division held a symposium, chaired by INHIGEO member Keith Tinkler and Gerard Middleton, titled: *Hutton, Lyell, Logan, and their Influence in North America*. The invited speakers, who had thirty minutes for talks and discussions, included INHIGEO President Hugh S. Torrens, who spoke on 'James Hutton (1726–1797) and the Historians', and INHIGEO member Robert H. Dott, Jr who asked 'How Significant were Lyell's Contributions to North American Geology?'. Other speakers included Dennis Dean on 'Hutton and North America', Leonard G. Wilson on 'The Influence of the Geology of Madeira on Sir Charles Lyell', Suzanne Zeller on 'Sir William Logan, Victorian Geology, and the Growth of a Canadian Identity, 1842–69', Peter H. von Bitter on 'Sir William Logan's Geological Maps of Canada: Field Methods and Scientific Instruments', and Susan Sheets-Pyenson, 'Shaping a Career in Geology: William Logan, Charles Lyell, and John William Dawson'.

The Division also held a technical session, 'Crustal Evolution and Historical Studies of American Geology', chaired by John Murray, Robert H. Dott, Jr, and Gerard Middleton. This session included twelve fifteen-minute presentations: Karl W. Luckert, 'From Ocean Floor Chronology to Expansion Tectonics', Paul D. Lowman, 'Assembly of a Continent? A Planetary Perspective', John J. Murray, 'The United Plates of Europe and the Inescapable Velocity of the Plate Tectonics Genom', Hugh S. Torrens, 'New Light on Logan in Britain', Robert H. Silliman, 'Bolstering Uniformitarianism: Lyell, Dawson, & The Geology of Nova Scotia', Laing Ferguson, 'Sir Charles Lyell's Work at Joggins, Nova Scotia, Canada: Vertebrate Taphonomy and Late Carboniferous Tree Stumps', William R. Brice, 'Charles Frederick Hartt (1840–1878) and John William Dawson (1820–1899): A Fruitful Encounter for Canadian Geology', William M. Jordan and Robert H. Dott, Jr, 'Doctor Albert C. Koch's Horrendous Hydrarchos', Dorothy Sack, 'The Scientific Study of Lake Bonneville During the Nineteenth Century', Clifford M. Nelson, 'The Health of USGS Science: NAS Membership as One Measure', and Gary D. Rosenberg, 'Da Vinci, Steno, and Wright: The Continuity of Space Through Time'.

The Division held a day-long field trip to Niagara Falls, led by Keith Tinkler and Gerard Middleton, who provided an historical overview of changing geological and geomorphic perspectives of a single, well-defined landform assemblage during the course of three centuries.

GSA History of Geology Symposium on Geology and Travel held at the University of Oklahoma, March, 1998

The symposium, part of the program for the annual meeting of the Geological Society of America's South Central Section, drew an enthusiastic audience to hear presentations by scholars from as distant as California, Maryland, Massachusetts, and England.

The GSA/SC annual meeting, hosted by OU's School of Geology and Geophysics, and the Oklahoma Geological Survey, took place March 22–24, with field trips before and after the meeting. The Geology and Travel symposium was organised by Ken Taylor of the History of Science Department. Nine presentations by eleven authors addressed topics ranging from the travels of Linnaeus, Guettard and Desmarest, Hutton, and Townson in the eighteenth century, through explorations during the nineteenth century by Brongniart and Lyell on the Continent and British geological surveyors in India, to the twentieth-century world travels of American paleontologist/biologist George G. Simpson. Thematic interpretations included the interplay between field and laboratory investigation, practical and theoretical motivations for travel, conceptual insights uniquely accessible through travel, and preparedness to travel as an indicator of innovative capability. Throughout the sessions, and in the concluding discussion, authors and audience joined in spirited exchanges.

Presentations were made by Dan Merriam (Kansas Geological Survey), Ken Taylor (OU), Nowell Donovan and U.S. Hargrove (TCU), Sally Newcomb (Prince George's Community College, Maryland), Hugh Torrens (Keele University), Ken Bork (Denison University), Bob Silliman (Emory University), Al Leviton and Michele Aldrich (California Academy of Sciences and Cornell University, respectively), and Léo Laporte (University of California at Santa Cruz). Several participants took advantage of the opportunity, while on campus, to do research in the History of Science Collections.

In conjunction with the symposium, Ken Taylor and Kerry Meek collaborated to mount an exhibit of historical materials, 'Geological Travelers, 1750–1850', in the History of Science Collections. The exhibit, literally showcasing a small fraction of the rich resources offered by the Collections to students and researchers in the history of geology, remained on display for several weeks. During the GSA/SC meeting, Marilyn Ogilvie, Collections Curator, conducted groups of attendees through the Collections.

Honours and Awards

The Geological Society, London, presented the Sue Tyler Friedman Medal to INHIGEO member Kenneth Taylor (see Citation and Response, pp. 18–19). At the Division's Business Meeting of the Geological Society of America, the History of Geology Award was presented to Hatten S. Yoder, Jr for his work on the history of petrology (see p. 19).

In 1998 the GSA Council elected INHIGEO member Victor Khain an Honorary Fellow. This is an honour reserved for geologists, from other countries, who have achieved the highest level of distinction in their fields. Professor Khain is a principal researcher at the Institute of the Lithosphere, Russian Academy of Sciences, and Professor Emeritus at Moscow Lomonosov State University.

USA Participants in the INHIGEO Conference in Neuchâtel, Switzerland

Seven Americans presented papers in the sessions. Robert H. Dott, Jr spoke on 'The Geosynclinal Theory for the Origin of Mountains'. Joe D. Burchfield discussed 'John Tyndall on the Physics of Glaciers'. R. Silliman spoke on 'Uniformitarianism and the Tardy Acceptance of Agassiz's Glacial Theory'; and Dennis R. Dean, on 'John Muir and the Origin of Yosemite Valley'. Sandra Herbert illustrated her talk 'Charles Darwin and the Beryl Blue Glaciers of Tierra del Fuego' by distributing copies of a beautiful water colour painting by Conrad Martens, the *Beagle's* artist, showing a large glacier with blue vertical cliffs where it joins the Beagle channel in front of Mt Sarimento. Ursula Marvin, INHIGEO Vice-President for North America, spoke on iron meteorites and the controversies they generated with respect to the origin of erratic boulders. Finally, in a talk titled 'Arnold Guyot and the Pestalozzian Approach to Geology Education: A Model for 21st-Century College Science?', Ph. K. Wilson described the influence of Neuchâtel-born Arnold Guyot, Professor of Physical Geography and Universal History at the University, who fled in 1848 to America where he revolutionized the teaching of geography and geology. Wilson argued that American education would benefit today if Guyot's approach to science were to be applied to the teaching of biology.

All the American participants and accompanying guests enjoyed one or more of the field excursions, beginning with the pre-meeting trip led by Rudolf Trümpy through the Glarus Alps and across Lake Lucerne for spectacular views of Nappes, Folds, Molasse and Flysch—plus a monument to Wilhelm Tell, whom Trümpy views as a late fifteenth-century incarnation of Egil the Smith, a hero of much older Nordic sagas. Egil shot his arrow from a long-bow whereas Tell (ca 1480) used a newfangled cross-bow. Of geological interest is Trümpy's report that Tell escaped from the sheriff while being ferried to prison across the

lake by jumping overboard onto a slab of Kieselkalk, a lime-silica rock that keeps a rough surface even while wet. Tell then ambushed and killed the sheriff. On Wednesday afternoon a tour visited outstanding sites in the history of geology in and around Neuchâtel. On the weekend a post-meeting trip, led by Henri Masson, visited sites of historical importance in the understanding of folds, nappes and giant erratic blocks in western Switzerland and the adjacent French Alps. Congratulations and many thanks to the organizers of the Swiss meeting.

The History of Geophysics Committee of the American Geophysical Union, which has become very active in investigating the history of geophysics and related fields, convened two symposia in 1998. The first, held in Boston in May was an all-day session on Geophysics and the Military. The papers, including one by Naomi Oreskes, have been submitted for consideration as a special issue of *Historical Studies in the Physical and Biological Sciences*. The second, was a half-day session at the December meeting of AGU in San Francisco, entitled, 'Plate Tectonics after Thirty Years', co-sponsored by the History of Geophysics Committee and the History of Earth Science Society (HESS). The program, organized by Homer Le Grand and INHIGEO members Naomi Oreskes and Kenneth Taylor, featured talks by participants in the plate tectonics revolution, including Neil D. Opdyke, John F. Dewey, William R. Dickinson, Peter Molnar, and others. Brian Isacks presented a paper by Jack Oliver, and Allan Alwardt spoke on the contributions of Harry H. Hess, of Princeton University, who first envisioned the spreading and recycling of the ocean floors. A volume containing the papers will be published by the AGU in 2000.

At their Business Meeting in Boston, the History of Geophysics Committee discussed further cooperative efforts with HESS. Homer Le Grand, the history editor of *Eos*, and Gregory Good, the new editor of HESS's *Earth Sciences History*, will carry these out. They propose that (1) articles submitted to ESH could appear initially in a shortened and more 'popular' form in *Eos*, and (2) articles submitted and published in *Eos* could be subsequently expanded and more fully documented (*Eos* has a restriction on the number of references per article) and published in *ESH*. This arrangement will give a much larger readership to *ESH* authors (by a factor of about a hundred) and will help to secure a stream of history articles for *Eos*.

The AGU has obtained funding to explore the usefulness of the Web as a tool for historians to document the recent history of science. The first website was on the History of Research on Solar Variability and Climate Change; others were being developed for the history of research on black smokers, and on the origin of the Earth's magnetic field. In time, each of the ten AGU sections may have a website with historical content on its home pages.

The History of Earth Sciences Society

While serving as president of HESS in 1998, Kenneth Taylor sought closer links with both the History of Geophysics Committee of the AGU, as indicated by his co-convening of the special session on plate tectonics at the fall AGU meeting, and the History of Geology Division of the GSA. INHIGEO member Kennard Bork, who was elected in 1998 to succeed Ken Taylor as president of HESS, plans to continue, and if possible, strengthen these links.

Volume 17, No. 1, 199 was the final issue *Earth Sciences History* to be edited by Mott Greene, who passed the editorial baton to Professor Gregory Good of West Virginia University. Many thanks are due to Mott Greene for his stewardship of the journal over the past few years.

New Harmony Seminar on History of North American Geology

This meeting entitled, 'The Granary: New Harmony's Geologic Legacy, 1818-1998', was held at New Harmony, Indiana, July 25th, 1998. Seven speakers reviewed historical aspects of this experimental community from its founding to the present day.

Communications from Members

Kennard Bork

I presented a paper on 'Travels and Geo-insights of Alexandre Brongniart (1770-1847)' at the symposium held in March 1998 at the University of Oklahoma (see p. 69). I also took advantage of an R.C. Good Research Fellowship, awarded by Denison University, to research the correspondence and shared interests of three key figures in the 'Birth of Modern Mineralogy: Alexandre Brongniart, Parker Cleaveland, and Benjamin Silliman, Sr'. In 1998, I was elected President of HESS for 1999-2000.

Albert V. Carozzi

The various activities planned in Geneva during 1998 to commemorate the bicentennial of the death of Horace-Bénédict de Saussure took place as scheduled.

I was involved during most of the year with the preparation of an exhibit at the Museum of Ethnography of Geneva together with the team of Professor Bernard Crettaz who is curator at the European department of the Museum. The exhibit entitled '*Les plis du temps, mythe, science et H.-B. de Saussure*' emphasizes Saussure's major discovery of the concept of large-scale horizontal thrusting in the formation of the Alps as well as the significance of the interaction between scientific research and the Alpine popular myth. The exhibit was inaugurated on October 16, 1998, and will run until July, 1999, before travelling to Annecy and other major cities of the Alpine area.

A book entitled *Les plis du temps, mythe, science et H.-B. de Saussure*, Nouveaux itinéraires Amoudruz No. 5, was published for the opening of the exhibit. It consists of a series of essays on the various aspects of the question. (A. V. Carozzi, B. Crettaz and D. Ripoll, editors, 368 pages with 80 photographs and illustrations).*

In association with the exhibit, an international symposium entitled *Colloque Science et Montagne* was organized on October 14-17, 1998 by Professor Jean-Claude Pont, Chairman of the unit of history and philosophy of science, University of Geneva. It featured thirty-eight scientists and historians among them INHIGEO members A. V. Carozzi, G. Gohau, and E. Vaccari. The papers presented at the symposium are in press.

Publications for 1998

Carozzi, A.V., 'Études de géologie structurale alpine au XVIII^{ème} siècle: la méthodologie de Horace-Bénédict de Saussure', in: Michel Delaloye, Claude Raffestin et Marino Buscaglia (eds), *Les Alpes et la Science: une Relation Complexe*, Institut Universitaire Kurt Bösch, Université alpine d'été, 4-6 septembre 1996, Sion, 1998, 27-45.

Carozzi, A.V., 'Horace-Bénédict de Saussure, pionnier en 1784 du concept de 'refoulements horizontaux en sens contraires' en géologie structurale', *Travaux du Comité Français d'Histoire de la Géologie (COFRHIGÉO)*, Troisième série, 1998, 11, 89-112.

Carozzi, A.V. (ed.), *Discours préliminaire aux Voyages dans les Alpes par H.-B. de Saussure*, Éditions Zoé, Geneva, 1998, Minizoé No. 34, 48 pp.

* Copies may be ordered from: Editions du Musée d'Ethnographie, case postale 1919, CH-1211 Genève 8, CH-france 29.00, not including mailing and shipping.

Carozzi, A.V., 'Découverte d'une grande découverte: Horace-Bénédict de Saussure et les refoulements en sens contraires dans la formation des Alpes', in: Albert V. Carozzi, Bernard Cretatz, et David Ripoll (eds), *Les Plis du Temps, Mythe, Science et H.-B. de Saussure*, Collection nouveaux itinéraires Amoudruz, No. 5, Musée d'Ethnographie de Genève, Annexe de Conches, 223-367.

Work in progress:

I am presently working on a bilingual volume (English-French) entitled: *Manuscripts and publications of Horace-Bénédict de Saussure on the origin of basalt (1772-1797)*. It includes the English annotated translation of unpublished manuscripts with the transcription of their original French pertaining to Saussure's studies on basalt during his travels to Italy (1772-1773), Auvergne and Vivarais (1776), Alpes (1779-1796), Provence (1780-1787), Brisgau (1791-1794), and Auvergne (1795). Other related unpublished manuscripts of 1796 and 1797 are also analyzed in context.

Robert Dott Jr

As my contribution to the 150th anniversary celebration of the University of Wisconsin, I am deeply involved in writing papers about early Wisconsin geologists, especially those who founded a Wisconsin School of Precambrian Geology around the turn of the twentieth century.

Publications during 1998

'Recognition of the Tectonic Significance of Volcanism in Ancient Orogenic Belts' in: Nicoletta Morello (ed.), *Volcanoes and History*, Brigati, Genoa, 1998, 123-131.

'Charles Lyell's Debt to North America: His Lectures and Travels from 1841 to 1853', in: D.J. Blundell and A.C. Scott (eds), *Lyell: The Past is the Key to the Present*, The Geological Society, London and Bath, 1998, 53-69.

Naomi Oreskes

Naomi Oreskes, who was elected to INHIGEO in 1998, participated in the two AGU history of geophysics symposia (described above) and published the following two articles:

Oreskes, Naomi, 'Evaluation (not Validation) of Quantitative Models', *Environmental Health Perspectives*, 1998, 106, 1453-1460.

Oreskes, Naomi, 'La Lente Plongée vers le fond des Océans', *Science et Vie*, Mars 1998, 84-90.

[Her book (1999) on the history of plate tectonic theory, with special reference to the United States, will be reviewed in the next INHIGEO Newsletter. (Ed.)]

Alexander Ospovat

Alexander Ospovat writes that in 1998 he gave his copies of Abraham Gottlob Werner manuscripts, together with related materials, to the newly established Werner Research Collection at Oklahoma University, which is a joint venture with the Bergakademie at Freiberg, Saxony. Ospovat also is assisting with preparation for publication of Werner's talk to the Dresden Mineral Society in 1817. It was the last talk Werner ever gave and was published posthumously.

Cecil Schneer

Cecil Schneer is working on his history of the IUGS, as time permits. He is very appreciative of valuable new information and pictures he has received in response to his request for such materials in an earlier INHIGEO Newsletter. Although he has personally corresponded with all those who have contacted him, he wishes to express his thanks once again in this issue, and to encourage any others who have letters, reprints, or other memorabilia relating to the IUGS to write to him.

Ursula Marvin

Ursula Marvin formally retired on January 3, 1998, after serving thirty-seven years as a geologist in the Planetary Sciences Division of the Harvard-Smithsonian Center for Astrophysics. She devoted the bulk of her career to research on the mineralogy-petrology of meteorites and lunar samples before becoming interested in the history of geology and meteoritics, which has brought her a world of new friends and the honour of serving INHIGEO. She still occupies her office and may be reached at her usual mailing, telephone, fax, and E-mail addresses. She currently is involved in several historical studies, but is pleased to pursue them at a more leisurely pace than was possible in the past.

In 1997 and 1998 Marvin was in constant demand as a speaker to scholarly and general audiences on the subject: 'Meteorites from Mars: Do They Contain Evidence of Early Life?'. The Martian meteorite in which such signs were reported was collected in Antarctica, and she was seen as an authority because she chaired the committee that allocates Antarctic meteorite samples to research laboratories worldwide. Her own opinion, then and now, is that the case for ancient Martian life is far from proved, and the burden of proof lies with those making the claim. However, that claim generated torrents of new and very fruitful research by international consortia. One result was to discredit the creepy-crawly-looking features that looked so good on television: even the original authors have withdrawn the notion that these are fossil microbes. At present, the 'best' (and only) evidence offered for possible Martian consists of nanometer-sized (10^{-9} m) rods of magnetite of a type known, on Earth, only in magnetobacteria. But few materials have been searched for magnetite at such extreme magnifications. In 1998, Marvin participated in the INHIGEO conference at Neuchâtel (see above) and published the following paper and reviews:

Marvin, Ursula B., 'The Shower of Stones at Sienna, 1794: History's Most Consequential Meteorite Fall', in: Nicoletta Morello (ed), *Volcanoes and History: Proceedings of the 20th INHIGEO Symposium, Napoli-Eolie-Catania (Italy)*, Brigati, Genova, 1998, 303-321.

Marvin, Ursula B. Review of: Steven J. Dick, *The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science*, Cambridge University Press, New York, 1996. In: *Earth Sciences History*, 1998, 17, 64-66.

Marvin, Ursula B. Review of: Sara Schechner Genuth, *Comets, Popular Culture, and the Birth of Modern Cosmology*, Princeton University Press, Princeton (New Jersey), 1997. In: *Isis*, 1998, 89, 705-706.

Marvin, Ursula B. Review of: Hal Provenmire and John A. O'Keefe (eds), *Tektites: A Cosmic Paradox*, privately printed, 1997. In: *Meteoritics and Planetary Science*, 1998, 33, 950-951.

Venezuela

Dr Anibal Martinez has written to say that he has been elected a Full Member of newly established Venezuelan Academy of Engineering Sciences and the Environment.

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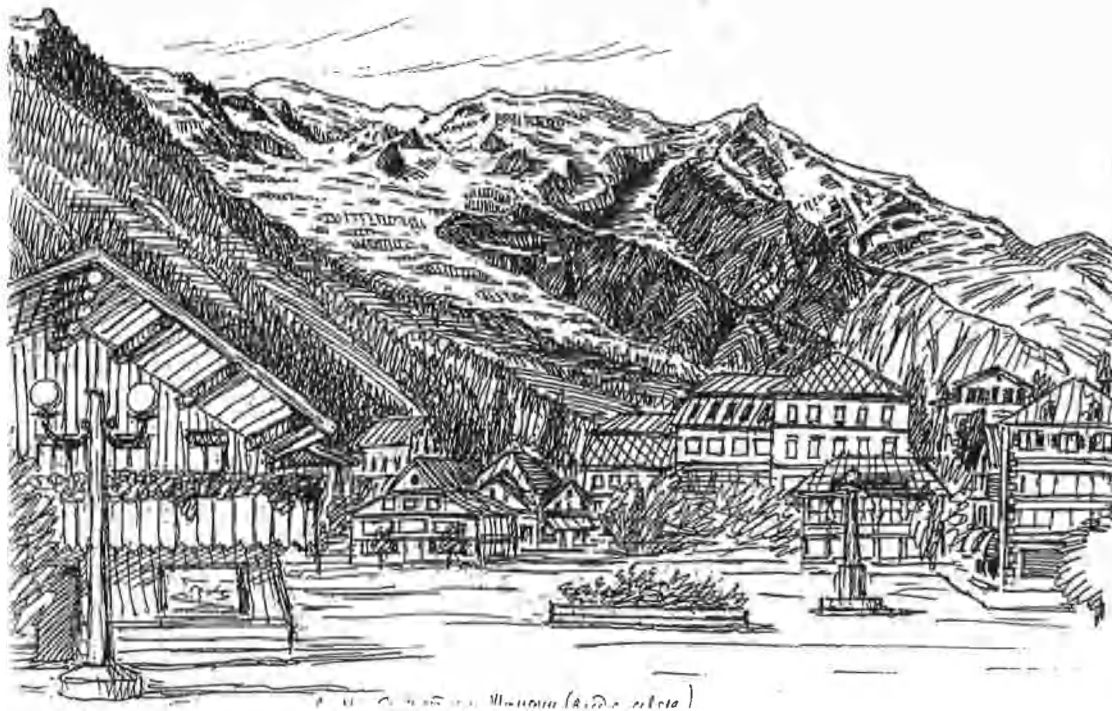
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Author(s), 'Title [Capitalized]', *Journal Title [Not Abbreviated, Capitalized, Italicized]*, date, *Volume number [italicized]*, page numbers.

E.g.

Rudwick, Martin, 'Cuvier and Brongniart, William Smith, and the Construction of Geohistory', *Earth Sciences History*, 1996, 15, 25-36.

(Note that volume numbers only, not issue numbers, are needed.)

For chapters in books:

Author(s), 'Title [Capitalized]', in: Book editor(s), *Full Title and Subtitle [Capitalized and Italicized]*, Publisher, Place, date, page numbers.

E.g.

Briggs, John C., 'Mass Extinctions: Fact or Fallacy?', in: William Glen (ed.), *The Mass-Extinction Debates: How Science Works in a Crisis*, Stanford, Stanford University Press, 1994, 230-236.

For book reviews:

Author of review. Review of: Author of Book, *Title of Book*, Publisher, Place of publication, date. Number of pages. Price (if known). In: *Title of Journal*, date, *Volume number*, pages.

E.g.

Sarjeant, William A.S. Review of: Jerry MacDonald, *Earth's First Steps: Tracking Life Before the Dinosaurs*, Johnson Books, Boulder (Colorado), 1994. xiv + 290 pp. US\$ 22.95. In: *Earth Sciences History*, 1996, 15, 84-85.

Please use single inverted commas.

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