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**INTERNATIONAL COMMISSION ON STRATIGRAPHY**

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## International Union of Geological Sciences

## International Commission on Stratigraphy

### CONSOLIDATED ANNUAL REPORT FOR 2001

Compiled by Felix M. Gradstein, chair, and James G. Ogg, secretary-general of ICS

The first portion of this Annual Report is a brief Summary of the accomplishments of the International Commission on Stratigraphy (ICS) and its component Subcommissions during 2001 (**items 1 - 8**) and planned activities for 2002 and five-year reviews, plus the proposed budget for 2002 (**items 9 - 12**). A list of ICS officers follows this Summary.

The second portion are the detailed annual reports from each Subcommission. All annual reports have a standard numbered format following the IUGS guidelines.

Added to this compilation are **Appendix 1**, the planning document for the Stratigraphic Information System (SIS, a focussed working group under ICS), and **Appendix 2**, the agenda for the ICS Strategic Planning Meeting in Urbino, Italy in June 2002. **Appendix 3** (in file GSSP2001.XLS) is a compilation of the established Global Boundary Stratotype Sections and Points (GSSPs) for the geological time scale.

*NOTE -- This report was submitted to the IUGS in Dec, 2001. Subsequently, a modified Permian annual report and some address corrections were received (both are included in this version).*

## 1. TITLE OF CONSTITUENT BODY

International Commission on Stratigraphy (ICS)

## 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

The International Commission on Stratigraphy (ICS) is a body of expert stratigraphers founded for the purpose of promoting and coordinating long-term international cooperation and establishing standards in stratigraphy. Its principal objectives are:

- (a) the establishment and publication of a standard global stratigraphic time scale and the preparation and publication of global correlation charts, with explanatory notes,
- (b) the compilation and maintenance of a stratigraphic data base center for the global earth sciences.
- (c) the unification of regional chronostratigraphic nomenclature by organizing and documenting stratigraphic units on a global data base,
- (d) the promotion of education in stratigraphic methods, and the dissemination of stratigraphic knowledge,
- (e) the evaluation of new stratigraphic methods and their integration into a multidisciplinary stratigraphy, and
- (f) the definition of principles of stratigraphic classification, terminology and procedure and their publication in guides and glossaries

### **Fit within IUGS Science Policy**

The objectives satisfy the IUGS mandate of fostering international agreement on nomenclature and classification in stratigraphy; facilitating international co-operation in geological research; improving publication, dissemination, and use of geological information internationally; encouraging new relationships between and among disciplines of science that relate to geology world-wide; attracting competent students and research workers to the discipline; and fostering an increased awareness among individual scientists world-wide of what related programs are being undertaken.

In particular, the current objectives of ICS relate to three main aspects of IUGS policy:

- (a) The development of an internationally agreed scale of chronostratigraphic units, fully defined by Global Stratotype Sections and Points (GSSPs) where appropriate and related to a hierarchy of units to maximise resolution throughout geological time;
- (b) Promotion of international consensus on stratigraphic classification and terminology, which is essential for advancement of earth-science research and education.
- (c) Establishment of frameworks and systems to encourage international collaboration in understanding the evolution of the Earth.

## 4. ORGANIZATION

ICS is organized in two types of constituent bodies: Subcommissions for longer-term study, and Committees for more limited, shorter term tasks. ICS is managed by the Executive Committee, which consists of elected and appointed officers. The year 2001 structure of ICS consists of the Executive Committee and 14 Subcommissions dealing with the major chronostratigraphic units, and aspects of stratigraphic classification and time scales.

Subcommissions:

Neogene	Devonian
Paleogene	Silurian
Cretaceous	Ordovician
Jurassic	Cambrian
Triassic	Terminal Proterozoic Period
Permian	Geochronology
Carboniferous	Stratigraphic Classification

The reports of each Subcommission are appended to this ICS summary compilation. There are a total of about 350 titular members among the subcommissions of ICS. When the corresponding and associated members are added, several thousand stratigraphers worldwide participate in the activities of ICS. In addition, many countries have national stratigraphic committees, with which ICS tries to establish or maintain contacts. The members of the Full Commission (i.e. the 5 members of the Bureau + webmaster and the officers of the 14 Subcommissions) come from 20 countries: Argentina, Australia, Belgium, Botswana, Brazil, Canada, China, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Romania, Russia, South Africa, Sweden, Switzerland, UK, and USA.

### **Websites of ICS and Subcommissions:**

<a href="http://www.stratigraphy.org">www.stratigraphy.org</a>	Main ICS website, with GSSP summaries
<a href="http://www.geo.uu.nl/SNS">www.geo.uu.nl/SNS</a>	Neogene Subcommission
<a href="http://www.uni-tuebingen.de/geo/isps/">www.uni-tuebingen.de/geo/isps/</a>	Paleogene Subcommission
Jurassic Subcommission	
<a href="http://www.bio.uu.nl/%7Epalaeo/Albertiana/Albertiana_index.htm">www.bio.uu.nl/%7Epalaeo/Albertiana/Albertiana_index.htm</a>	Triassic Subcommission
mirror: <a href="http://www.uni-muenster.de/GeoPalaeontologie/Palaeo/Palbot/albomsl.htm">www.uni-muenster.de/GeoPalaeontologie/Palaeo/Palbot/albomsl.htm</a>	
<a href="http://pri.boisestate.edu/permophiles/">pri.boisestate.edu/permophiles/</a>	Permian Subcommission
<a href="http://sds.uta.edu/">sds.uta.edu/</a>	Devonian Subcommission
<a href="http://ceor.seos.uvic.ca/ordovician/">ceor.seos.uvic.ca/ordovician/</a>	Ordovician Subcommission
<a href="http://www.uni-wuerzburg.de/palaeontologie/ISCS/index.htm">www.uni-wuerzburg.de/palaeontologie/ISCS/index.htm</a>	Cambrian Subcommission

## 5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Only a few of the subcommissions have formal financial contributions from external sources other than IUGS (through ICS), and these are listed in the individual reports. Informally, every officer and member of ICS donate their own time, office space, institutional facilities, and other components to the activities of the organization.

## 6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

Active and highly fruitful interfaces with many international organizations and geo-projects are a standard feature of ICS activities.

ICS has an active link to the NSF (Washington) scientific database initiative, to the ODP Stratigraphic Database center in Bremen, and to INQUA regarding the stratigraphy of the Quaternary.

ICS subcommissions are traditionally affiliated with a considerable number of IUGS and IGCP activities. Several of these are mentioned specifically by subcommissions in their annual reports:

ICS members maintains active links with international research groups, including the North American Micropaleontology Society, and the Association of American Stratigraphic Palynologists, and international research groups on Graptolites, Conodonts, Radiolarians (Interrad), Nannofossils, Foraminifera, etc., the North American Micropaleontology Society, and the Association of American Stratigraphic Palynologists.

There are close links of many ICS stratigraphers with the Ocean Drilling Project (ODP). The latter is presently undertaking a major re-organization with focus on ultra-deep drilling using riser systems (in Japan 's subduction zones), non-riser high-resolution grid drilling, riser and non-riser continental margin drilling, and mobile platform Arctic Ocean drilling (the last major stratigraphic frontier). ODP cores routinely test the global correlation potential of a great number of bio-events since the Jurassic, and this record is vital to develop integrated timescales at several scales of resolution, and global paleo-climate models.

## 7. & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

The following are a few highlights of the numerous activities of the ICS Executive Commission and the detailed reports of each subcommission.

### ICS Executive Committee

- Reorganization and streamlining with more focus on web-based data dissemination
- ICS has new Statutes consistent with IUGS guidelines and submitted for ratification
- Merger of Quaternary and Neogene Subcommissions submitted for ratification
- Dissolution of Gondwana Subcommission, Precambrian Subcommission and Committee on Quantitative Stratigraphy
- Proposal to establish Subcommission on Stratigraphic Information System
- US sponsored and ICS steered action for global stratigraphic web network ('CHRONOS'); Stratigraphy.org" central ICS website established (webmaster Dr. Sorin Filipescu, Romania; academic computer server sponsored by AMNH, New York)
- Five Global Stratotype Sections and Points (GSSPs) in advanced proposal stage
- Base of Cenomanian (Cretaceous) 100% approved in ICS and submitted for ratification
- Bases of the upper stage for the Lower Ordovician Series and of the base of the Upper Ordovician Series are currently submitted to ICS for voting. If approved, then these will be submitted to IUGS for ratification in Feb, 2002.

### Neogene Subcommittee

- Merger with the former Subcommittee on Quaternary Stratigraphy
- Miocene GSSP selection
- Working group on bases of Tortonian and Serravallian Stages have identified candidate sections with cyclically bedded enabling astronomical tuning, but these lack a good magnetic signal.

### Paleogene Subcommittee

- The base of the Carbon Isotope Excursion is established as criterion for the recognition of the Paleocene/Eocene Boundary. The Dababiya Section near Luxor (Egypt) will be proposed for the location of the future GSSP.
- K/T boundary GSSP section destroyed and likely relocated

### Cretaceous Subcommittee

- GSSP for the base of the Maastrichtian was ratified. A comprehensive volume of data on the Maastrichtian GSSP site at Tercis, France, has also been published with partial financial support from ICS.
- GSSP for base of the **Cenomanian** was approved by ICS and submitted for ratification to IUGS.
- GSSP proposal for both the base of the Turonian and the base of the Middle Turonian is now with SCS Voting Members; their vote is due by 10 January 2002.
- Another 3 GSSP proposals are at a very advanced stage.

### Jurassic Subcommittee

- Progress within the Stage Working Groups towards proposal of GSSPs has been concentrated on preparation for the Sicily Symposium to be held in Sicily in September, 2002.
- Publication of the report of the Aalenian WG on the GSSP in *Episodes*.

### Triassic Subcommittee

- The base of the Triassic is now fixed and ratified at the first appearance of the conodont *Hindeodus parvus* in the middle of bed 27, within the Yinkeng Formation at Meishan, Changxing County, Zhejiang Province, South China. Yin Hongfu, the Chair of the working group convened an International Conference on the P-T boundary in Changxing during August 2001. The GSSP was celebrated with the unveiling of an impressive 9 m tall stele with a model of the index fossil at its apex.
- Much of the year was taken up in re-organising the STS and laying the foundation for more inclusive and effective decision making, with a view to speeding up the process of GSSP definition.

### Permian Subcommittee

- Formal Proposal of the **Guadalupian** and component **Roadian**, **Wordian** and **Capitanian** Stages as International Standards for the Middle Permian Series was ratified by the IUGS.
- Co-Sponsor of the International Symposium on the Global Stratotype of the Permian-Triassic Boundary and the Paleozoic-Mesozoic Events held in Meishan, China in August, 2001.

### Carboniferous Subcommittee

- In September 2001, the SCCS sponsored a general meeting at St. Louis, Missouri, USA, with an associated field trip (with extensive guidebook) that visited the type region of the Mississippian Subsystem in the Mississippi River valley north and south of St. Louis.
- A newsletter (79 pages) with 24 articles on various topics including new proposals for series and stage subdivision of the two subsystems of the Carboniferous System; new radiometric dates, and GSSP discussions was published.

### Devonian Subcommittee

- Subcommittee on Devonian Stratigraphy - Recognition of Devonian series and stage boundaries in geological areas. -*Cour. Forsch.-Inst. Senckenberg*, 225: 347 pp. (published in 2001).
- Agreement on a threefold subdivision for the Frasnian and almost agreement on the stratigraphic levels. Substantial agreement on subdivision of the Devonian stages: Emsian, Givetian and Famennian.

### Silurian Subcommittee

- It was decided to re-examine the GSSPs of the Base of Silurian and Base of Wenlock in light of the experience that researchers have had in using these GSSPs as well as new information that had become available since they were established.
- Otherwise, the suite of Silurian series and stages are firmly established by previous GSSPs.

### Ordovician Subcommittee

- Base of the *Tetraraptus approximatus* graptolite Zone in the Diabasbrottet section in southern Sweden was approved by the Subcommittee as the GSSP for the base of the **Second Stage**, yet to be named, for the Ordovician System (upper stage of Lower Ordovician Series). The proposal is now before the ICS for a vote of approval.
- The base of the *Nemagraptus gracilis* graptolite Zone in the Fjelsjö section in Sweden was approved by the Subcommittee as the GSSP for the **base of the Upper Ordovician Series**. The proposal is now before the ICS for a vote of approval.
- The Subcommittee sponsored a successful meeting and field excursion in Morocco, 30 January to 7 February, 2001 with the title "The Gondwanan Platform during Ordovician times: Climatic, eustatic and geodynamic evolution."

### Cambrian Subcommittee

- Voting indicated that only the *Cordylodus proavus*, the *G. reticulatus*, the *Pt. Punctuosus*, *A. atavus*, the *Pt. Gibbus*, and *O. indicus* levels and horizons should be taken into consideration for closer examination as potential GSSPs for major chronostratigraphic levels in the Cambrian.
- A Working Group on a *Glyptagnostus reticulatus* level GSSP to define a Late Cambrian stage.
- The internet homepage of the International Subcommittee on Cambrian Stratigraphy includes an overview of Cambrian general bio- and chronostratigraphy, paleontology, and regional litho- and biostratigraphy.

### **Terminal Proterozoic Period Subcommittee**

- There was a very successful meeting and associated field trip to eastern Newfoundland, where participants studied terminal Proterozoic successions that contain both recently dated ash beds and exceptional assemblages of Ediacaran fossils.
- A newsletter is being distributed in December, 2001 that includes final detailed arguments for candidate GSSP sections, as well as a ballot on choice of GSSP. Therefore, the current mandate of the terminal Proterozoic subcommittee will soon be completed.

### **Geochronology Subcommittee**

- There were no significant activities in Geochronology *per-se*, but its chair edited a major volume on the Maastrichtian-Campanian GSSP published under auspices of the Cretaceous Subcommittee.

### **International Stratigraphic Classification Subcommittee**

- A research conference on "Sequence Stratigraphic and Allostratigraphic Principles and Concepts", organized by the Working Group on Sequence Stratigraphy, recommended to (1) leave sequence stratigraphy informal, (2) reconsider a modified concept of allostratigraphy, and (3) avoid conflicting definitions in the International Stratigraphic Guide and in the North American Code for Stratigraphical nomenclature.
- An ISSC Website has been prepared and will be made accessible shortly.

## **8. CHIEF PROBLEMS ENCOUNTERED IN 2001**

The following is a summary of problems or concerns of the ICS Executive Commission and a compilation of key items noted in the detailed reports of each subcommittee.

### **ICS Executive Committee**

- Progress on Global Stratotype Section and Point (GSSP) selection did not proceed in the timely manner indicated by several subcommittee projections in 2000.
- Website construction proved to be more time consuming than originally planned, partly due to lack of dedicated specialists who could freely donate their time and other efforts.
- Efforts to consolidate some subcommittees into a more streamlined framework had to be abandoned.
- Focused Precambrian subcommittees or working groups (Archean, Proterozoic) were recommended to be re-established, but enthusiasm (especially to serve as organizers) has not appeared.

### **Neogene Subcommittee**

- Merger of the Quaternary and Neogene subcommittees is accomplished in theory, but now needs to show practice.

- Selection of GSSP sections for the bases of the Langhian and Burdigalian Stages (Miocene) is certainly more difficult compared to the other intervals because much less preliminary work has been done. After consultation with Nick Shackleton (chairman of the working group on Miocene Chronology), it was decided to delay action until a synthesis on Miocene chronology has been prepared.

### **Paleogene Subcommittee**

- Some working groups are sound asleep, as reflected by the small number of annual reports.
- More and more researchers from poorer countries become marginal to the main stream of research because of financial reasons.
- Difficulty in obtaining consensus on stage subdivisions and associated GSSPs of portions of the Paleocene and Eocene; and historical usage of regional lithostratigraphic divisions have hindered decisions on global chronostratigraphy.

### **Cretaceous Subcommittee**

- GSSP recommendations of the 1995 Brussels meeting have required more further research than was initially appreciated!
- Response for formation of a Berriasian WG with responsibility for defining the base of the Cretaceous so far has been limited. The request for help will also be circulated by the Jurassic Subcommittee, which will also hold a poster session on the Jurassic/Cretaceous boundary at its next meeting

### **Jurassic Subcommittee**

- Difficulties in obtaining travel grants for meetings of Working Groups, which are often given low priority by National grant-awarding agencies.

### **Triassic Subcommittee**

- Difficulty for Russians to undertake necessary fieldwork on potential GSSP of the Olenekian near Vladivostok - lack of funds. A similar situation with participants from the former eastern block.
- Fiscal restraint and new regulation on foreign travel in Canada has also made it more difficult for the Chair to fulfil his STS duties.

### **Permian Subcommittee**

- Delays in electronic publication of *Permophiles* newsletter.

### **Carboniferous Subcommittee**

- No serious problems other than lack of reports from several project groups.

### **Devonian Subcommittee**

- No serious problems.



### **Silurian Subcommittee**

- No serious problems.

### **Ordovician Subcommittee**

- The only candidate stratotype section and the biohorizon chosen for defining the base of the Middle Ordovician Series were found to be deficient. As a result, the Subcommittee must evaluate a new biohorizon and candidate stratotype sections.
- The lack of travel support limited the participation of Voting Members from outside North America in Subcommittee activities at the Annual Meeting of the Geological Society of America.

### **Cambrian Subcommittee**

- The majority of the newly established Working Groups require intensive field studies to achieve rapid progress in long-range correlation and definition of urgently needed global stages. However, the critical ISCS members need substantial financial support to visit Subcommittee meetings and conferences.
- Both the ISCS chairman and the ISCS Secretary are momentarily without a position or without a permanent position and therefore have limited access to funding of scientific activities.

### **Terminal Proterozoic Period Subcommittee**

- Lack of a funding base and lack of initiative by many subcommittee members continue to pose problems, as outlined in previous reports. The current mandate of the terminal Proterozoic subcommittee will soon be completed.

### **Geochronology Subcommittee**

- The ICS Executive recommendation to dissolve the long-lived subcommittee has not encouraged action or volunteers willing to develop future activities. At this point, the small group has no direct focused activities.

### **International Stratigraphic Classification Subcommittee**

- Slow response from members. Difficulties in reaching a consensus within the WG on Sequence Stratigraphy.
- Postponement in forming a new WG to analyze Chemostratigraphy as a new category of stratigraphic classification.

## **10. SUMMARY OF EXPENDITURES IN 2001 (ANTICIPATED EXPENDITURES THROUGH MARCH 2002):**

The following budget was established by the ICS Executive Bureau for March 2001 — Feb 2002 after consideration for relative needs, planned activities, and funding requests of the subcommittees. Corresponding transfers were made to the Subcommittees in April, 2001, and their financial reports

are contained within their individual reports. All Subcommissions were limited to a maximum of \$750 for communications and administration costs.

	Allocated in 2000	Residual Balance Nov 2000	<b>2001 Added Allocation</b>	Comments on distribution
Quaternary	400	800		Merger with Neogene
Neogene	3700	-500	<b>4000</b>	
Paleogene	2150	-320	<b>3300</b>	
Cretaceous	1100	110	<b>1500</b>	
Jurassic	2100	500	<b>3000</b>	
Triassic	1000	670	<b>1000</b>	
Permian	1000		<b>750</b>	
Carboniferous	1000	883	<b>1000</b>	
Devonian	1800	687	<b>2000</b>	
Silurian	600	30	<b>200</b>	
Ordovician	2600	-680	<b>2950</b>	
Cambrian	3000	492	<b>3700</b>	
Precambrian	700		<b>750</b>	Currently (Nov'01) held in reserve pending re-establishment of the Subcommission
T. Proterozoic Geochronology Classification	200 1100 800	258	<b>500</b>  <b>750</b>	No request received
Gondwana	400	400		Dissolved
Quant. Strat.	1100	0		Dissolved
Seq. Strat. Comm.	1000	1000		Inactive
Strat. Info. Services			<b>3900</b>	Major web design costs and new working group start-up costs (conference, etc). Currently (Nov'01) held in reserve pending organization.
ICS Bureau	3000	800	<b>3900</b>	
Contingency	1100	°	<b>1800</b>	Held for special Subcommission and ICS needs
<b>TOTAL (USD)</b>	<b>29850</b>		<b>35000</b>	\$35,000 approved by IUGS

## **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

The following is a summary of plans of the ICS Executive Commission and a compilation of key goals noted in the detailed reports of each subcommission.

### **ICS Executive Committee**

- Strategic planning meeting. Chairs of all subcommissions will assemble in Urbino, Italy, in June 2002 to plan the directions and structure of the ICS for the next decades.

### **Neogene Subcommission**

- Tortonian (Miocene) GSSP proposal to be submitted.
- Serravallian (Miocene) GSSP section and guiding criterion to be decided.
- New working group on Pleistocene chronostratigraphy established.

### **Paleogene Subcommission**

- Complete, circulate and vote the proposal of the GSSP for the base of the Eocene.
- Complete the work on the GSSPs of the base of the Selandian, Thanetian, Ypresian and Chattian, which are well advanced.
- Revise the GSSP of the Cretaceous/Paleogene Boundary and, if necessary, propose an alternative

### **Cretaceous Subcommission**

- To continue chasing chairs of Working Groups, and to ensure that the Berriasian (J-K boundary) WG becomes active!
- Completion of at least 2 more draft GSSP proposals, for submission in 2003.

### **Jurassic Subcommission**

- GSSP proposals for the Triassic/Jurassic boundary (and Hettangian), the Pliensbachian, the Callovian, the Oxfordian and the Kimmeridgian will be submitted to the Subcommission after voting within the respective Working Groups during the Jurassic Symposium (Sicily, September 2002).
- Further preparatory and research work will be carried out on Pliensbachian/Toarcian, Bajocian/Bathonian, and Kimmeridgian/Tithonian boundary sections.
- Design and establish web-site for Subcommission, and enhance electronic communications.

### **Triassic Subcommission**

- Field workshops and excursions associated with the Shallow Tethys in Budapest are planned for July-August, 2002 to examine GSSP candidates for base-Carnian, base-Ladinian, and base-Anisian.
- Choice of Olenekian-Anisian boundary GSSP.
- Choice of Anisian-Ladinian boundary GSSP.

### **Permian Subcommittee**

- Decision on definition of the Lopingian boundary (Late Permian)

### **Carboniferous Subcommittee**

- Consensus on competing suggestions for series and stage names and classification.
- Possible proposal of a global GSSP for the Tournaisian-Visean boundary at the Pengchong section in south China.
- Establishing new working groups to establish a boundary near the classical Visean-Namurian/Serpukhovian boundary and another to establish the Bashkirian Stage as a geochronological standard.

### **Devonian Subcommittee**

- Co-organizer of International Symposium "Geology of the Devonian System" held in Syktyvkar (Russia), 9-12 July 2002.

### **Silurian Subcommittee**

- Restudy the GSSPs at the Base of Silurian and Base of Wenlock.
- Development of a more refined correlation between the graptolite zonation, which mainly represents the basal facies, and the conodont, palynomorph, and shelly fossil zonations of the shallow marine strata. Improve integration of biostratigraphic and geochronologic data into a composite, linear time scale.
- Provide web-based archival access to previous issues of *Silurian Times*.

### **Ordovician Subcommittee**

- Approval by ICS and ratification by IUGS of Diabasbrottet and Fjellingsås GSSPs.
- Determination of biohorizon for base of Middle Ordovician Series and identification and evaluation of candidate stratotype sections.
- If progress is rapid on identification and evaluation of candidate stratotype sections, approval of GSSP for upper stage of Upper Ordovician Series.

### **Cambrian Subcommittee**

- Working groups will be established for Cambrian stage boundaries: a *Acidus atavus* level GSSP, a *Cordylodus proavus* level GSSP, a *Ptychagnostus punctuosus* level GSSP, and a *Oryctocephalus indicus* level GSSP. 2002 will be mainly dedicated to collect data on the various GSSP candidates to be selected.
- First priority projects of the Cambrian Correlation Working Group are to complete correlations projects on (1) Central and Southern Europe, North Africa and parts of the Near East, (2) Avalonia, and (3) Laurentia-South America.

### **Terminal Proterozoic Period Subcommittee**

- Quite simply, we plan to submit our recommendation for an initial GSSP for the terminal Proterozoic period and complete our work.

### Geochronology Subcommittee

- The subcommittee wants the future existence of this body to be discussed.
- Clarify nomenclature in geochronology and follow progress in decay constants.

### International Stratigraphic Classification Subcommittee

- Sequence Stratigraphy -- Close discussions and define proposal on unconformity-related Units, their philosophy, methods and terminology.
- Cycle Stratigraphy -- produce a document on cyclostratigraphy.
- Produce a glossary of stratigraphy in several languages.
- Consider other possible units of stratigraphic classification.

## **15-16. BUDGET REQUEST TO IUGS FOR 2002 (USD \$)**

The following budget is for operations and special initiatives through March 2003 (the date when funds are generally transferred from IUGS). The individual "2002 Requested Allocation" from each Subcommittee and ICS Executive components has already been adjusted for residual balances of 2001, although much of these "residual funds" will be expended prior to receipt of the IUGS contribution.

	Allocated in 2001	Residual Balance Nov 2001	<b>2002 Requested Allocation</b>	Comments on requests of subcommittees and ICS Executive
Neogene	4000	1070	<b>4000</b>	
Paleogene	3300	-280	<b>3480</b>	
Cretaceous	1500	705	<b>570</b>	Reduced level from 2001
Jurassic	3000	1200	<b>3600</b>	Major Jurassic symposium to be held
Triassic	1000	1000	<b>3500</b>	Requests support for field workshops for potential GSSP evaluation
Permian	750	750	<b>750</b>	
Carboniferous	1000	1700	<b>1000</b>	
Devonian	2000	160	<b>1500</b>	Reduced from Subcomm. request
Silurian	200	22	<b>200</b>	
Ordovician	2950	-175	<b>3950</b>	Requests support for field workshops for potential GSSP evaluation

Cambrian	3700	350	<b>3800</b>	Requests support for field workshops for potential GSSP evaluation
T. Proterozoic	500	300	<b>200</b>	Subcommission will complete its mandate in 2002.
Precambrian	0	700	<b>0</b>	Residual (Nov'01) held in reserve pending establishment of a working group
Geochronology	0	0	<b>200</b>	Reduced from Subcomm. request
Classification	750		<b>1000</b>	
◦				
Strat. Info. Services	3900	3900	<b>0*</b>	Major web design costs and new working group start-up costs (conference, etc). Current funds (Nov'01) in reserve for anticipated Spring 2002 costs.
ICS Executive	3900	500	<b>4000</b>	
Contingency	1800	◦	<b>1800</b>	Held for special Subcommission and ICS needs
SPECIAL -- Strategic Planning meeting (Urbino, Italy, June 2002)			<b>15000*</b>	\$500 travel for 16 participants, \$300 accomodation and per diem for 20 participants, \$1000 facility usage

**TOTAL (in USD)      35000      48550      \$33550 for continuing operations, \$15000 for Strategic Planning meeting**

The total of all Subcommission and ICS Executive budget requests (including a special one-time request to convene a Strategic Planning meeting) is \$48550. These amounts have already been adjusted by each group for external funds from other sources.

\* Note: In August 2001 IUGS allotted \$10K US from ICSU grants to ICS for the purpose of the information services initiative. ICS will allocate these funds (2002-2003, received in Feb '02) as follows:

- a) Stratigraphic Info Services (including programming by Dr. flyvind Hammer, Oslo + manuals for three Quantitative Stratigraphy demo programs to be down loadable via ICS web) - \$5.5K
- b) Urbino ICS Future conference - \$4.5K such that the average travel grant to each of 20 participants is \$725 instead of \$500; ICS subcommission chairs have indicated that without such travel grants (which by no means takes care of individual travel costs) they will unfortunately not be able to attend the Urbino meeting.

## 17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)

A combined 4-year review was compiled as part of the ICS report for 2000, and a subset of major accomplishments is reproduced here. The 2001 accomplishments are listed in Item #7 above.

### 1. GSSPs (boundary-stratotypes) created since 1997

#### Neogene

Stabilization of the GSSP for the base of the **Pleistocene** Stage (1999)

base of the **Gelasian** Stage at Gela, Italy - *Episodes*, vol. 21/2 (1998): 82-87

base of the **Piacenzian** Stage at Punta Piccola, Italy - *Episodes*, vol. 21/2 (1998): 88-93

base of the **Zanclean** Stage and of the **Pliocene** Series at Eraclea Minoa, Italy, ratified in Jan. 2000

base of the **Messinian** Stage at Oued Akrech, Morocco, ratified in Jan. 2000

base of the **Neogene System** and of the **Aquitania** Stage, Lemme-Carrosio section, Italy - *Episodes*, vol. 20/1 (1997): 23-28.

#### **Cretaceous**

base of the **Maastrichtian**, the uppermost Cretaceous stage at Tercis, France, ratified in Jan. 2000.

base of the **Cenomanian**, and of the Late Cretaceous Series, at Risou, France, was approved by ICS in Dec. 2001.

#### **Jurassic**

base of the **Aalenian** Stage and of the **Middle Jurassic** Series at Fuentalsaz, Spain, ratified in Jan. 2000.

base of the **Sinemurian** Stage at East Somerset, England, ratified in 2001.

#### **Triassic**

base of the **Triassic System** at Meisan, China, ratified in Jan. 2001.

#### **Permian**

Base of the Guadalupian Series (Middle Permian) and component Roadian, Wordian and Capitanian Stages in Guadalupian mountains, USA, ratified in 2001.

base of the **Permian System** and of the **Asselian** Stage, in the Aidaralash Creek, Kazakhstan - *Episodes*, vol. 21/1 (1998): 11-18.

#### **Carboniferous**

base of the **Pennsylvanian Subsystem**, "Mid-Carboniferous boundary" at Arrow Canyon, Nevada, USA - *Episodes*, vol. 22/4 (1999): 272-283.

#### **Devonian**

base of the **Emsian** Stage in the Zinzilban Gorge, Uzbekistan - *Episodes*, vol. 20/4 (1997): 235-240:  
*herewith, all Devonian stage boundaries are now defined by a GSSP*

#### **Ordovician**

base of the Upper Ordovician Series (un-named fifth stage) at Fagel in Sweden is currently undergoing voting by the ICS.

base of the **Darriwilian** Stage at Huangnitang, People's Republic of China - *Episodes*, vol. 20/3 (1997): 158-166.

base of the un-named second stage (upper stage of the Lower Ordovician Series) at Diabasbrottet in southern Sweden is currently undergoing voting by the ICS.

base of the **Ordovician** System and of the **Tremadocian** stage at Green Point, Newfoundland, Canada, ratified in Jan. 2000.

## **2. Websites and Newsletters by ICS Subcommissions**

In addition to a hub Website "stratigraphy.org" of ICS, about half of the subcommissions have established websites that have placed an impressive amount of virtual information on geological time into the public domain.

Several subcommissions of ICS publish regularly newsletters or circulars of a high scientific level: Terminal Proterozoic System, Ordovician, Silurian (*Silurian Times*), Devonian, Carboniferous, Permian (*Permophiles*), Triassic (*Albertiana*), Jurassic, Paleogene, Neogene, Geochronology (*Bull. of/de Liaison*), ISSC, Committee on Quantitative Stratigraphy. They constitute an important international platform for publicizing the work of ICS bodies, allowing the stratigraphic community outside ICS to participate in discussions about boundary definitions. Most of them are circulated electronically, but hard copies are still necessary for distribution in countries without the necessary computer equipment. *Permophiles* was the first to be available on Internet, and the other subcommissions are following this example.

In this context, the very valuable correlation chart established by the Cambrian SC has to be mentioned, as well as the publication in *Episodes* of the abridged version of the International Stratigraphic Guide by ISSC.

## **3. The International Stratigraphic Chart**

Thanks to an excellent collaboration within the Intercommission Working Group for the Internal Stratigraphic Chart (J. Remane and M.-B. Cita of ICS, J. Dercourt, P. Bouysse, A. Faure-Muret of the Commission on the Geological Map of the World, and F. Repetto of UNESCO, the International Stratigraphic Chart was distributed in August 2000 at the International Geological Congress in Rio de Janeiro. This new type of International Stratigraphic Chart, highlighting all those units which are formally defined by a GSSP, and leaving in unnamed those time intervals for which no internationally recommendable divisions was available. Such a chart would give an objective picture of the present state of the art in chronostratigraphy. The colors to be used were those of the International Geological Map of the World.

## **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

The following is a summary of objectives of the ICS Executive Commission and a selection of key goals noted in the detailed reports of each subcommission.

### **ICS Executive Committee**

- Define GSSP sections for all stages of the Phanerozoic Era, and solidify subdivisions of the Precambrian. All GSSPs will be ratified by 2008.
- Placing all important information on stratigraphic standardization into a suite of websites under appropriate subcommissions and a general ICS hub.



- Support the CHRONOS initiative to develop an suite of web-accessible international databases on all aspects of chronostratigraphy (paleontology, isotopes, cycles, magnetics, etc.). The CHRONOS workshop in November 2000 has recommended that the main coordination and responsibility for the continuity of this system be placed under the auspices of ICS.
- ICS and several of the Subcommissions will hold focussed symposia and field trips during the International Geological Congress 2004 in Florence (Italy).

### **Neogene Subcommission**

- The long-term objective of the SNS has always been and still is to define GSSP sections for all stages of the Neogene system. At present 4 Neogene stages lack a GSSP.
- Evaluate the present status of Pleistocene chronostratigraphy and to possibly arrive to a formal chronostratigraphic subdivision of the Pleistocene and selection of related GSSP sections.

### **Paleogene Subcommission**

- Continue and complete the work on the remaining GSSPs of Paleogene stages. All Paleogene GSSPs should be reeady for the International Geological Congress 2004 in Florence (Italy).
- Produce an updated version of an integrated Paleogene time scale.

### **Cretaceous Subcommission**

- To bring recommendations for the remaining 9 GSSPs before ICS as soon as possible, and not later than 2006:
  - 2003 -- Hauterivian, Barremian and Santonian.
  - 2004 -- Valanginian, Albian and Campanian
  - 2005 -- Aptian and Coniacian
  - 2006 -- Barriasian (base of Cretaceous)
- To communicate the results as widely as possible.

### **Jurassic Subcommission**

- The future focus of the Subcommission will evolve away from Stage boundary GSSP proposals to further refinement of the chronostratigraphical scale by integration of multidisciplinary methods of correlation.
- The Palaeoclimate Working Group should begin to produce a series of maps showing the palaeoclimate of the Jurassic World during selected time-slices, with documentation of the supporting evidence;
- The Tectonic Events Working Group will map in time and space the major tectonic events (including basin subsidence/uplift).

### **Triassic Subcommission**

- Complete Triassic GSSP selection
  - 2002 -- Anisian and Ladinian
  - 2003 -- Carnian
  - 2004 -- Norian
  - 2005 -- Olenekian and Rhaetian

- 2006 -- Summary volume of all Triassic GSSPs. Emphasis switches to choice of non-marine auxiliary sections.

### **Permian Subcommittee**

- Complete Late Permian GSSP selection (goal is by 2003)
- Complete Early Permian GSSP selection

### **Carboniferous Subcommittee**

- Tournaisian-Visean boundary GSSP should be selected within the next three years.
- An acceptable series and stage subdivision will be achieved within the Carboniferous System and its two Subsystems.

### **Devonian Subcommittee**

- SDS plans to come to conclusions on the subdivision of the Emsian, Givetian, Frasnian and Famennian stages at the 32nd IGC, Florence, 2004. SDS has proposed a symposium on "Multidisciplinary high resolution stratigraphy of Devonian stages as a tool for standardization of global substages" for this IGC.

### **Silurian Subcommittee**

- The SSS is concerned with the relative scarcity of reliable geochronological dates that are biostratigraphically well constrained within the Silurian System. To improve the situation, the SSS executive will encourage its members to collaborate in projects that provide new calibrations for Silurian time.

### **Ordovician Subcommittee**

- Approval and ratification of GSSPs remaining to complete subdivision of Ordovician System with goal of completion by 2003.
- 9th International Symposium on Ordovician System to be held in Argentina in August 2003.
- Sponsorship of "Global Ordovician Earth Systems" symposium at 32nd International Geological Congress in 2004.
- Redirection of Subcommittee's focus to interdisciplinary investigation of the global Ordovician Earth system.

### **Cambrian Subcommittee**

- Four regional correlation chart volumes are on the way.
- During the next years, a suite of five bio-datums have been recognized as primary correlation criteria for defining GSSPs of global stages (yet to be named). In addition, the base of the *Glyptagnostus reticulatus* level is generally accepted to be suitable as the base of a formal Middle-Upper Cambrian boundary.

### **Terminal Proterozoic Period Subcommittee**

- It is recommended that the subcommittee be expanded into a more comprehensive Neoproterozoic working group that can build an improved stratigraphic framework for the entire Era. We need fresh problems, fresh ideas, and fresh blood.

### **Geochronology Subcommittee**

- The general goal is to follow up the previous historical role of SOG for preparing and recommending conventions, encouraging research, receive enquiries of the geochronological community and generally provide stratigraphers with expert information in dating rocks.

### **International Stratigraphic Classification Subcommittee**

- In addition to objectives listed for 2001, the ISSC plans publication of a document dealing with concepts, applications, terminology and operational problems of cyclostratigraphy.
- Organization of a WG on Chemostratigraphy.
- Analysis of eventual changes, additions and improvements in the International Stratigraphic Guide.

## **19. SUBMITTED JOINTLY BY:**

NAME: Felix GRADSTEIN *and* James OGG

POSITION: ICS Chair *and* ICS Secretary-General

DATE: December 6, 2001

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2000-2004**

1 Dec.2001

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## **SUBCOMMISSION OF STRATIGRAPHIC CLASSIFICATION**

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# SUBCOMMISSION ON NEOGENE STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Neogene Stratigraphy (SNS)

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

To the present day the prime objective of the subcommission was to provide optimum clarity and stability in the Neogene Chronostratigraphic Scale by carefully selecting and defining Global Stratotype Sections and Points (GSSPs) for Series and Stages. Since the merging with the INQUA Subcommission on Quaternary Stratigraphy (SQS), the SNS is also responsible for Pleistocene chronostratigraphy.

### 4. ORGANIZATION

The SNS is a subcommission of the International Commission on Stratigraphy, founded in 1971. Reference is made to the annual report of 1995 for a brief historical resume of the Subcommission. The subcommission has four regional committees (Mediterranean, Pacific, Atlantic and Nordic). Since August 21, 2001 the subcommission has been merged with the SQS but the organisation of this new subcommission has not been defined yet. The SNS proposed the ICS bureau to disband the SQS and to transfer their task to the present SNS. The bureau further proposed to maintain the name SNS for the new subcommission pending a decision to give up the antiquated Quaternary name and to use the Neogene for Miocene, Pliocene, Pleistocene, and Holocene.

The present SNS Executive consists of

Willem Jan Zachariasse (Chairman, Utrecht University, The Netherlands)  
 Davide Castradori (Vice-Chairman, ENI/Agip, San Donato M., Italy)  
 Frits Hilgen (Secretary, Utrecht University, The Netherlands)

The SNS has presently 3 working groups:

- (1) WG on Miocene Time Scale (Nick Shackleton, chair)
- (2) WG for defining GSSP sections for the Tortonian and Serravallian (Frits Hilgen, chair)
- (3) WG for defining GSSP sections for the Langhian and Burdigalian (Isabella Raffi, chair)

Current addresses of all officers are listed on our website: [www.geo.uu.nl/SNS/](http://www.geo.uu.nl/SNS/)

### 5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Financial support comes from IUGS (via ICS). The 2001 budget suffice to keep the bureau going, to set up the SNS web site, and to allow some travelling, but is too limited to completely cover the

expenses related to surveying, measuring, and sampling candidate GSSP sections. These field campaigns are costly and usually funded at the university level.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

There are close links with ODP and the IGCP. Especially, ODP has played an important role in the development of integrated time scales for the Neogene, in testing the global correlation potential of bioevents, and in a better understanding of climate and ocean history during this time span.

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

Two new working groups have been established in 2001. The mandate of the first one is to select GSSP sections for the base of the Tortonian and Serravallian Stages and is chaired by Frits Hilgen. In a first circular sent to all members of this WG the critical boundary interval is defined and suitable candidate sections are presented. All candidate sections are cyclically bedded enabling astronomical tuning but lack a good magnetic signal. Discussion on guiding criterion and selection of the most suitable section will take place via email. The second WG chaired by Isabella Raffi will focus on the selection of GSSP sections for the base of the Langhian and Burdigalian Stages. The task of this WG is certainly more difficult compared to the other WG because much less preliminary work has been done. The bureau further decided - after consultation with Nick Shackleton (chairman of the working group on Miocene Chronology) - to keep this WG dormant until time is ripe to prepare a synthesis on Miocene chronology.

The bureau further submitted a proposal for 2 excursions in Sicily and the Marche during the 2004 Florence Geological Congress. For those interested in Neogene chronology these excursions will offer a unique opportunity to visit several of the sections which have been instrumental in the construction of the late Neogene astronomical time scale.

No GSSP proposals have been prepared or submitted during 2001.

## **8. CHIEF PROBLEMS ENCOUNTERED IN 2001**

A problem not yet solved is the organisation of the new subcommission after the merging of the SQS with the SNS. Simply merging would result in an unworkable organisation consisting of 40 voting members and 2 chairmen. The SNS bureau has proposed to the ICS to 1) disband the SQS and to transfer their task to the SNS and 2) to set up a new WG on Pleistocene chronostratigraphy which include - among other members to be appointed by the SNS - a maximum of 5 voting members from the present SQS (and to be appointed by the SQS). This WG will act under the umbrella of the SNS.

## **10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):**

Carry-over from 2000	\$ 0
IUGS Contribution 2001	<u>\$ 4000</u>
<b>TOT</b>	<b>\$ 4000</b>

The contribution was divided as follows

SNS Chair/secretary (Utrecht); with expenditures as follows:	\$ 3500
<i>Business meeting with Nick Shackleton (Utrecht, March 2001)</i>	\$ 80
<i>Setting up SNS web site</i>	\$ 1600
<i>Measuring and sampling potential Serravallian GSSP section on Malta/Gozo</i>	\$ 750
<i>Planned business meetings for WG Langhian - Burdigalian GSSPs and future WG on Pleistocene chronostratigraphy</i>	\$ 1070 (reservation)
RCPNS contribution	\$ 250
RCMNS contribution	<u>\$ 250</u>
<b>TOT</b>	<b>\$ 4000</b>

#### **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

Potential Tortonian GSSP sections have been measured, sampled, and tuned. Detailed calcareous plankton biostratigraphies are available. The lack of magnetostratigraphy might be overcome by importing (tuned) magnetostratigraphies from elsewhere. The bureau expects that the WG chaired by Frits Hilgen will be able (1) to prepare a proposal for the Tortonian GSSP, and (2) to reach a decision on the Serravallian GSSP section and guiding criterion in 2002. The WG chaired by Isabella Raffi is expected to have reached substantial progress in the discussion on guiding criteria for Langhian and Burdigalian boundaries and potential GSSP sections in 2002. The bureau further expects that soon approval of its proposal to the ICS on the new organisation of the SNS will allow the formation of a new WG on Pleistocene chronostratigraphy in 2002.

The SNS web site is almost ready and will be officially in the air in November of 2001 ([www.geo.uu.nl/SNS](http://www.geo.uu.nl/SNS)). The site provides a platform for SNS information and discussion and replaces the good old hardcopy Newsletter.

#### **15-16. BUDGET AND ICS COMPONENT FOR 2002**

INCOME	\$ 0
Request from ICS	<u>\$ 4000</u>
<b>TOT</b>	<b>\$ 4000</b>

#### **ANTICIPATED EXPENDITURES**

Maintaining web site	\$ 250
Travel/organisation workshops	\$ 3250
RCPNS contribution	\$ 250
RCMNS contribution	<u>\$ 250</u>
<b>TOT</b>	<b>\$ 4000</b>

## **17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)**

**1997:** Ratification of Piacenzian GSSP section and submission of the Gelasian (ratified in 1996) and Piacenzian GSSP sections to Episodes. Preparing and distributing a questionnaire on Neogene chronostratigraphy and evaluating the results. Release of Newsletter 4.

**1998:** Preparation and submission to the ICS of proposals for Zanclean and Messinian GSSP sections. Organisation of a postal ballot within SQS and SNS on the proposal to lower the Pliocene/Pleistocene boundary from its defined position in the Vrica section to a new position corresponding with the Gelasian GSSP section. Preparing a memorandum against such a lowering by the SNS bureau as attachment to the postal ballot. Release of Newsletter 5.

**1999:** Acceptance of proposals for Zanclean and Messinian GSSP sections by the ICS. Proposal for lowering the position of the Pliocene/Pleistocene boundary rejected. Requests to the ICS by the SNS bureau to communicate the outcome of the voting on the lowering of the P/P boundary in Episodes or any other suitable journal failed. Setting up of a WG on Miocene chronology chaired by Nick Shackleton. Beginning of the reorganisation of the SNS. Release of Newsletter 6.

**2000:** Ratification of Zanclean and Messinian GSSP sections by IUGS and publication in Episodes 23. Reorganisation of SNS completed. The new organisation consists of 20 voting members and 38 corresponding members. Chairman is W.J. Zachariasse (Utrecht University, The Netherlands), vice-chairman is D. Castradori (ENI/Agip, San Donato, Italy), and secretary is Frits Hilgen (Utrecht University, The Netherlands).

**2001:** see above.

A clickable chart of all 6 ratified GSSPs with pages detailing the stratigraphy is on our website: [www.geo.uu.nl/SNS/](http://www.geo.uu.nl/SNS/).

## **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

The long-term objective of the SNS has always been and still is to define GSSP sections for all stages of the Neogene system. At present 4 Neogene stages lack a GSSP. The ambition of the present bureau is to get proposals for Tortonian and Serravallian GSSP sections ratified before August 2004 (end of present office). The bureau anticipates that it will take another 4 to 5 years to complete the selection of GSSP sections for the Langhian and Burdigalian. Now the SQS has been merged with the SNS, Pleistocene chronostratigraphy belongs to the responsibility of the present bureau. For this purpose, the SNS bureau plans to set up a new WG whose mandate will be to evaluate the present status of Pleistocene chronostratigraphy and to possibly arrive within a period of 5 years to a formal chronostratigraphic subdivision of the Pleistocene and selection of related GSSP sections.

## **19. SUBMITTED BY:**

NAME: W.J.Zachariasse  
 POSITION: Chairman SNS  
 DATE: 31/10/2000

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# SUBCOMMISSION ON PALEOGENE STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

International Subcommission on Paleogene Stratigraphy (ISPS)

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

- a) to agree on an international set of stages and series for the Paleogene
- b) to establish boundary stratotypes of the Paleogene stages and series
- c) to encourage research into the Paleogene by setting up Working Groups and Regional Committees to study and report on specific problems.

A set of Paleogene stages has been voted and agreed on by the ISPS in 1989. Subsequently, Working Groups have been set up to find a Global Stratotype Section and Point (GSSP) for the lower boundary of each of these stages. At present, the GSSPs of the Danian (= Cretaceous/Paleogene Boundary) and of the Rupelian (= Eocene/Oligocene Boundary) and of the Aquitanian (Paleogene/Neogene Boundary) have been established and ratified by the International Union of Geological Sciences.

The search for the remaining GSSPs has been continued in 2001. Good progress has been made mainly in the early and middle Eocene and the Oligocene. We hope to present proposals for the remaining GSSPs prior to the next International Geological Congress in 2004.

### 4. ORGANIZATION

ISPS is a Subcommission of the International Commission on Stratigraphy.

Officers:

H.P.Luterbacher (Chairman, Germany)

J.Hardenbol (Vice-Chairman, U.S.A.)

No 1 Vandenberghe (Secretary, Belgium)

Birger Schmitz has asked to be relieved as Secretary of ISPS because of other commitments. I regret his decision and thank him very much for all the time and nerves he spent for ISPS. No 1 Vandenberghe (University of Leeuven, Belgium) has accepted to replace him as secretary.

20 Voting Members (see Appendix) and 82 Corresponding Members

Voting and Corresponding Members are selected regionally to provide representative expertise in the Paleogene stratigraphy of each major area and according to their speciality in order to cover the main fields of stratigraphic tools used in the Paleogene. In 2001, Jerry Hooker (UK) and No 1 Vandenberghe (Belgium) have become new Voting Members of ISPS.

Under the umbrella of the Subcommittee, we have set up the following Working Groups and Regional Committees:

- a) Paleocene Working Group  
Chairman: B.Schmitz, Sweden
- b) Paleocene/Eocene Boundary Stratotype Working Group  
Chairwoman: M.-P.Aubry, France; Secretary: E.Molina, Spain
- c) Ypresian/Lutetian Boundary Stratotype Working Group  
Chairman: E.Molina, Spain; Secretary: C.Gonzalvo, Spain
- d) Lutetian/Bartonian Stratotype Working Group  
Chairman: R.Fluegeman, U.S.A.
- e) Bartonian/Priabonian und Rupelian/Chattian Boundary Stratotypes Working Group  
Chairwoman: I.Premoli Silva, Italy
- f) Regional Committee on North-European Paleogene Stratigraphy  
Chairman: E.Sturbaut, Belgium; Secretary: J.W.Verbeek, Netherlands
- g) South American Regional Committee on Paleogene Stratigraphy  
Chairman: N.Malumian, Argentina; Secretary: C.Naez, Argentina
- h) Middle East Regional Committee on Paleogene Stratigraphy  
Chairman: A.Strougo, Egypt
- i) Regional Committee on Pacific Paleogene Stratigraphy  
Chairman: E.Fordyce, New Zealand
- j) Regional Committee on Paleogene Stratigraphy of the Indian Subcontinent  
Chairman: A.A.Butt, Pakistan
- k) Paleogene Commission of Russia  
Chairman: M.A.Akhmetiev; Secretary: G.N.Aleksandrova
- l) Paleogene Planktonic Foraminifera Working Group  
Chairman: W.A.Berggren, U.S.A.; Secretary: B.Huber, U.S.A.
- m) Paleogene Benthos Working Group  
Chairman: L.Hottinger, Switzerland
- n) Working Group on Paleogene Stratigraphy of the North Pacific  
Chairman: Yu.B.Gladnikov, Russia

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

In 2001, ISPS received USD \$3,300.00 as support from IUGS/ICS.

A large part of the administrative and other costs of ISPS is paid for by the parent institutions of the chairpersons and secretaries of working groups and regional committees and of the executive members. National support is derived from the participating members, regional support is derived via Working Groups and Regional Committees; global support for research is undertaken via world wide projects such as the Ocean Drilling Programme and the IGCP 393.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

IGCP No.393 - Neritic events at the Middle-Upper Eocene Boundary: Transtethys-Caribbean correlations and the genesis of faunal provinces, E.Caus, Spain (started 1996). Some of our members participate also in the work of the Ocean Drilling Programme, International Subcommittee on Neogene Stratigraphy, International Subcommittee on Cretaceous Stratigraphy.

## 7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

The decision of the Voting Members of ISPS in 2000 to adopt the base of the Carbon Isotope Excursion as criterion for the recognition of the **Paleocene/Eocene Boundary** has cleared the way for the proposal of a GSSP for the base of the Eocene (i.e. the base of the Ypresian). The Chairwoman and some members of the Working Group on the Paleocene/Eocene Boundary have decided to propose the Dababiya Section near Luxor (Egypt) for the location of the future GSSP. The corresponding proposal will have to be voted by all members of the P/E boundary Working Group and then to the Voting Members of the ISPS. We hope that this vote will take place early in 2002.

Newsletter No.9 has been distributed to the members of ISPS. This newsletter has been largely dedicated to the controversy on the criteria and procedure for the placement of the P/E boundary and the selection of the GSSP. All parties have been given ample opportunity to present their arguments. For these reasons, this newsletter has become considerably more voluminous (and also more expensive) than the previous ones.

A new website of ISPS is now under construction and will be ready soon.

The Regional Committee on Northern Paleogene has met in Schloss Salzau (Germany).

ISPS has taken actively part in the meeting on "Cyclostratigraphy" in Sorrento (Italy) in May 2001 and in the Hedberg Conference on "Sequence Stratigraphy" in Dalles end of August 2001.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

The problems addressed in previous annual reports continue to exist.

Until now, most of the costs for secretarial expenses and meetings have been covered by the institutions of the officers and other members of the ISPS. The continued degradation in funding of basic research renders it more and more difficult to draw on these 'unofficial' sources. The lack of funds does not allow the ISPS to support meetings and publications organised by the various working groups and regional committees. This is particularly true for those regional committees active outside western Europe and North America.

It is frustrating that more and more researchers from poorer countries become marginal to the main stream of research because of financial reasons. In general, research on stratigraphic problems is given rather low priority by funding agencies and particularly scientists tend to turn to more 'glamorous' areas. ISPS has some problems to attract fresh blood..

The output of several working groups and regional committees could be considerably increased, others are sound asleep as also reflected by the small number of annual reports received from the individual working groups and regional committees.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

*[NOTE — Version from Hans-Peter Luterbacher had 2000 and 2001, rather than 2001 and 2002; so I presumed that it was an accidental cut-and-paste -- J Ogg.]*

I. Income (IUGS Subvention 2001):    US\$    3,300.00    (DM 7.553)

II. Expenditures:

Carry- over deficit 2000	US\$	320.00
Secretarial and postage	US\$	600.00
Support Working Groups and Regional Committees 2001	US\$	1.200.00
Newsletter	US\$	860.00
Home Page	US\$	<u>600.00</u>
 Total expenditures for 2001	 US\$	 3.580.00
 III Deficit for 2001:	 US\$	 280.00

#### **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

- Complete, circulate and vote the proposal of the GSSP for the base of the Eocene.
- Complete the work on the GSSPs of the base of the Selandian, Thanetian, Ypresian and Chattian, which are well advanced.
- Revive or close those Regional Committees and Working Groups which are inactive.
- Rejuvenate the membership of ISPS.
- Produce a newsletter and reactivate the ISPS website.
- Revise the GSSP of the Cretaceous/Paleogene Boundary and, if necessary, propose an alternative .

#### **15-16. BUDGET AND ICS COMPONENT FOR 2002**

Newsletter	US\$	300.00
Secretarial and postage (ISPS)	US\$	800.00
Conferences and meetings	US\$	500.00
Support to Working Groups and Regional Committees	US\$	1.400.00
Maintenance Home Page	US\$	200.00
Carry-over deficit 2001	US\$	<u>280.00</u>
 Total request for 2001	 US\$	 3.480,00

#### **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

- Continue and complete the work on the remaining GSSPs of Paleogene stages. All Paleogene GSSPs should be ready for the International Geological Congress 2004 in Florence (Italy).
- Produce an updated version of an integrated Paleogene time scale.
- An "International Congress on Paleogene Stratigraphy" will be held in Leeuven (Belgium in 2003 (Organizer: N.Vandenberghe).

#### **19. SUBMITTED BY:**

Name and signature of Chairman: Hanspeter Luterbacher

Position: Chairman ISPS  
Date: Tbingen, 27. October 2001

Prof. H.Luterbacher  
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## APPENDICES

1. List of Voting Members
2. Annual Report 2000 of the Paleocene/Eocene Boundary Stratotype Working Group
3. Annual Report 2000 of the Ypresian/Lutetian Boundary Stratotype Working Group
4. Annual Report 2000 of the Working Group on Paleogene Stratigraphy of the North Pacific
5. Annual Report 2000 of the Regional Committee on North-European Paleogene Stratigraphy
6. Russian Paleogene Commission activity during 2001

### 1. List of Voting Members (20):

M.-P.Aubry (USA)	J.Hooker (USA)	I.Premoli Silva (Italy)
W.A. Berggren (USA)	L.Hottinger (Switzerland)	B.Schmitz (Sweden)
G.Bignot (France)	V.A.Krasheninnikov (Russia)	C.P.Strong (New Zealand)
C.Cavelier (France)	H.P.Luterbacher (Germany)	A.Strougo (Egypt)
G.C. Chaproniere (Australia)	N.Malumi n (Argentina)	N.Vandenberghe (Belgium)
K.Drobne (Slovenia)	K.G.Miller (USA)	Pinxian Wang (China)
J.Hardenbol (USA)	E.Molina (Spain)	

### 2. Annual Report 2000 of the Paleocene/Eocene Boundary Stratotype Working Group

The Working Group on the Paleocene/Eocene Boundary has been actively engaged for the last ten years in (1) describing marine and terrestrial events that occurred during Chron C24r, (2) correlating between sections representing the interval of Chron 26 C26n to C24n (NP7 to NP11 essentially) and (3) establishing a reliable numerical chronology of Chron C24r. It has also been involved in describing the relationship between formations upon which the concepts of Thanetian and Ypresian stages have evolved and in discussing the relationships that have traditionally been used between these stages and the Paleocene and Eocene Series.

Although our objectives have not been completely met, the WG has agreed to come forward and propose the Dababiya Section, located ~ 35km south of Luxor, on the right bank of the Nile Valley, as the Global Standard Stratotype-Section for the Paleocene/Eocene boundary. The proposal follows detailed stratigraphic studies of 6 well exposed sections though the Esna Shales along the Nile Valley or near the Red Sea Coast (in addition to other sections located elsewhere in the world). The efforts of the WG in the last 12 months have thus focused on documenting the section and determining the horizon that would best serve as boundary definition.

Last March a group of us met in Luxor with our Egyptian colleagues from the University of Assiut under the leadership of Professor Khaled Ouda and the auspices of the University of Assiut to

review the appropriateness of the Dababiya Section to serve as a GSSP. More specifically we finalized the stratigraphy of the section and resampled a few critical horizons.

Professor K.Ouda was visiting with us at the Woods Hole Oceanographic Institution and Rutgers University last June to refine our framework of correlation between the Dababiya Section and other Nile Valley sections.

Last July, at the Conference on Paleogene warm climates organized in Powell by Dr.Scott Wing, an ad hoc meeting was organized for the members of the WG who attended the conference. The Dababiya Section was presented and agreed upon as P/E GSSP. This choice was formally announced at the end of the Conference.

Full geological documentation of the Dababiya Section will appear as a special publication of Micropaleontology Press due June 2002. This document will serve in support of the proposal for a P/E GSSP currently being prepared by the WG.

The participants to the meeting in Luxor were:

From Egypt: Prof.Khaled Ouda, Dr.Mamdouh F.Soliman, Ayman Abdel-Sabour Ahmed, Wael Fathi Hassan Gialal.

From the P/E Working Group: M.-P.Aubry, W.A.Berggren, B.Cramer, C.Dupuis, D.V.Kent, R.Knox, J.A.Van Couvering.

*Report by M.-P.Aubry, Chairwoman P/E Working Group*

### **3. Annual Report 2001 of the Ypresian/Lutetian-Boundary Stratotype Working Group**

Since the last report was submitted, the Ypresian/Lutetian section located in Agost (Alicante Province, Betic Cordillera) was published by Molina,E., Cosovic,V., Gonzalvo,C. & Von Salis,K. in *Revue de Micropal ontologie*, vol.43,no.3 (September 2000). It was an interdisciplinary study integrating planktic foraminifera, larger foraminifera and calcareous nannoplankton. Apart from that, during the last year the Y/L Boundary Stratotype Working Group continued looking for suitable sections in which eventually to define the boundary stratotype. The Spanish subgroup has been one of the most active, looking for sections in the Pyrenees and more intensively in the Betic Cordilleras. The best section found is the Fortuna Section, located in the Murcia region (Betic Cordilleras). A preliminary paper by Gonzalvo,C., Manche o,M.A., Molina,E., Rodriguez-Estrella,T. and Romero,G. is in press in *Geogaceta* (October, 2001) A more detailed study is in progress integrating stable isotopes, mineralogy, planktic foraminifera and calcareous nanofossils.

To inform and to generate a more active participation a web page was established that can be visited at the following address: <http://wzar.unizar.es/perso/emolina/ypresian.html> . This page is updated frequently in order to explain the aims, how and where to define the boundary stratotype, which are the best potential sections , who is participating in the Working Group and to indicate the recent bibliography on the Ypresian/Lutian boundary.

*Report by Eustoquio Molina, Chairman of the Ypresian/Lutetian Boundary Working Group*

### **4. Annual Report 2000 of the Working Group on Paleogene Stratigraphy of the North Pacific**

1. In April, the Russian specialists met to discuss problems of the Eastern Russian Paleogene. The emphasis was placed on integrating all available data to elaborate high-resolution stratigraphic schemes.
2. In June-September the Paleogene sections of Kamchatka and Sakhalin were studied in the field. A group of Japanese specialists (K.Ogasawara and others) examined the key sections of North Kamchatka.
3. A number of articles dealing with the Paleogene of the Far East (e.g. geological events in Sakhalin, Oligocene diatom zonation, ...) was published. A monograph on the Upper Paleogene of Kamchatka

that summarizes foraminiferal, molluscan and floral data is being prepared. Another monograph on the Late Cretaceous-earliest Paleogene flora of Kamchatka has gone to press.

4. Several Russian geologists took part in the international meeting on the early Paleogene climates and biota in Wyoming, USA (July, 2001). One of the reports delivered was devoted to the North Pacific.

5. Plans for the cooperation of Russian and Japanese specialists for comparative studies of Paleogene sections of Japan and Kamchatka were discussed in September.

*Report by Yuri Gladenkov, Chairman (gladenkov@geo-tv-sign.ru)*

## **5. Annual Report 2001 of the Regional Committee on North-European Paleogene Stratigraphy**

The main activity of the RCNPS are the biannual meetings held jointly with the Regional Committee for Northern Neogene Stratigraphy.

In 2001, the proceedings of the 1999 Leuven 7th biannual meeting were published as the Aardkundige Mededelingen Volume 11, distributed by University Press Leuven (<http://www.lup.be>). The volume is entitled Contributions to the Paleogene and Neogene Stratigraphy of the North Sea Basin. The papers presented in this special volume are the reviewed selection of papers and posters presented at the meeting. In Paleogene Stratigraphy, a review of the Heers Formation in Belgium is presented and two papers are published on interregional Rupelian correlations., one using biostratigraphy and the other based on geophysical log correlations. Detailed correlation schemes of the Rupelian sections in boreholes in Belgium, the Netherlands and the Lower Rhine area in Germany are included as separate plates in the publication.

In October 2001, the 8th biannual joint meeting of the regional Committees on Northern Paleogene and Neogene Stratigraphy at the Salzau Castle, Cultural Centre of the State Schleswig-Holstein, Germany. It was organised under the direction of Dr. Karl G r s. There were 43 participants, 28 lectures and 7 poster contributions.

Contributions were presented on the Paleocene of Belgium, on the upper Lower Eocene of Belgium, (dinoflagellates and foraminifera), on the paleogeography and paleoecology of the Eocene of Denmark, on the Kysing 4 research borehole in Denmark (Eocene to Lower Oligocene), on the marine and terrestrial interfingering of the Eocene in SE Germany, on the stratigraphy of the Oligocene in the Mainz Basin in Germany, on a dinoflagellate marker in the Rupelian of the whole North Sea Basin, on the Upper Oligocene of Denmark, on the sequence types in the Cenozoic of the southern North Sea, on stratigraphic nomenclature across the political borders and on Baltic amber.

Two field trips were organised.

A one day field trip was organised to examine the coastal cliffs of the Isle of Fehmarn and around Heiligenhafen in North Germany under the direction of Hans-J rgen Stephan and Karl G r s. Glacially thrust Lower Eocene plastic clays were observed in Fehmarn and glacially thrust and folded Middle Eocene sand-to siltstones were observed below the tillites of the Heiligenhafen "Hohes Ufer".

A second one day trip was organised to Southwest Mecklenburg-Southeast Holsatia by Werner von Bloow and Karl G r s. The Cenozoic strata outcropping on top of the Conow salt-dome in the neighbourhood of Grebs, Karenz, Maliss, were visited. Additional Neogene deposits were visited at Loosen and Gross Pampau.

It was decided that the next biannual meeting in 2003 will be organised by Kirsten and Matthias Grimm, Institut f r Geowissenschaften, J.Gutenberg University, Mainz, Germany.

The general assembly agreed also to simplify the board of the regional committees. As both the Paleogene and the Neogene committees have joint activities, it was decided that in the future one president would chair a joint board (Klaus-J rgen Meyer), assisted by two vice-chairman (for the

Neogene Robert-J.W. van Leeuwen and for the Paleogene Etienne Steurbaut) and one secretary (Jost Verbeek).

From now on a joint website is operational: <ftp://nitg.tno.nl/public/rcns/index.html>.

*Report by No l Vandenberghe,*

## **6. Russian Paleogene Commission activity during 2001**

The activity of the Russian Paleogene Commission was directed on several projects:

1. There were completion and preparation for publication Paleogene Stratigraphic scheme for East European Platform and West Siberian plate. The main Paleogene cross-sections and localities of these regions joint biostratigraphic studying, connected with problems are not clear yet.
2. The regional investigation connected with the mainly more precise stratigraphical questions of the East Siberia, Far East and Arctic ocean coast.
3. The monographic studying and description of the Paleogene fossils, analyses of their diversity etc.
4. Analyses palaeogeographical connections Paleogene epicontinental seas with Arctic sea and Tethys.

The more important results are:

1. The group of paleontologists combined to study 250 m bore holes section SW Omsk (South West Siberia). The 4 assemblages Paleogenic planktonic foraminifera were discovered first time at this region (Ypresian, Lutetian (2 levels), Bartonian). This assemblages in accordance with four transgressive sequences. The regional zonal subdivisions by diatoms, radiolaria and dinocysts at this cross-sections were correlated for the Thanethian and Ypresian.
2. The dinocysts assemblages with Apectodinium plexus (Late Thanetian) were recognized by different West Siberian plate cross-sections. ("sapropel" and benthonic clays). This levels were known before West European countries, North Caucasus, Middle Asia and another regions.
3. The Amur basins coal-bearing cross-sections (Danian and Zelandian Russian Far East) were studied and collected fossil plants from the new localities.

The members of commission were published 23 papers (listed below)

*Professor M.A. Akhmetiev*

*Chairman of Russian Paleogene Commission*

Interdepartment Russian Stratigraphic Committee, Paleogene Commission

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# SUBCOMMISSION ON CRETACEOUS STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Cretaceous Stratigraphy (SCS)

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

- \* To establish a standard global stratigraphic subdivision and nomenclature for the Cretaceous, as part of the ICS standard global stratigraphic scale;
- \* To produce a stratigraphic table displaying agreed subdivision to substage level and intervals of disagreement, marking boundaries that are defined by a GSSP.

We have not seen a statement of IUGS science policy.

### 4. ORGANIZATION

SCS is a Subcommission of the International Commission on Stratigraphy.

Chair: Professor Peter F Rawson,  
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 Gower Street, London WC1E 6BT, United Kingdom  
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Secretary: Dr Silvia Gardin  
 ESA-CNRS 7073, Laboratoire de Micropalaeontologie, case 104,  
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We are pleased to note that Dr Silvia Gardin has agreed to serve as Secretary.

There are an additional 17 Voting Members of the Subcommission. Over 130 Cretaceous scientists belong to one or more of the 12 Stage Working Groups of the SCS, or to the Lower Cretaceous Ammonite WG (see 17 below). All WG members are treated as Corresponding Members of the Subcommission. Effectively, anyone with interest and expertise that can contribute to our objectives

is welcome to do so. The great bulk of the Subcommittee's work is carried out by these Working Groups.

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

SCS receives no formal support other than that from IUGS/ICS.

Working Group members are drawn from every continent. Individual members depend on formal or informal support from their host institutions, for both necessary research and travel to appropriate meetings. Unfortunately, few institutions provide any direct financial support.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

The Subcommittee has liaised with successive meetings of the International Cretaceous Symposium, which until now have been promoted by the German Subcommittee on Cretaceous Stratigraphy. The 6th Symposium was held in Vienna in August 2000. There it was agreed that the Subcommittee would take over the responsibility for selection of future venues, though the successful applicants would organise individual congresses. The next Congress will take place in Neuchâtel, Switzerland, in 2005.

The Subcommittee also liaises closely with the Subcommittee on Jurassic Stratigraphy, especially over the definition of the Jurassic/Cretaceous boundary.

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

The preliminary recommendations/progress reports presented at the Second International Symposium on Cretaceous Stage Boundaries (Brussels, September 1995) continue to form the basis for finalising GSSP proposals. 2001 saw the following major steps forward:

**Maastrichtian:** The proposed GSSP for the base of the Maastrichtian was ratified by ICS.

**Cenomanian:** A final proposal for the base of the Cenomanian (prepared by Prof. W.J. Kennedy and colleagues) was submitted to ICS in July 2001 and is currently with ICS Voting Members for their vote.

**Turonian:** A final proposal for both the base of the Turonian and the base of the Middle Turonian (prepared by Professor W. J. Kennedy and colleagues) was accepted by Turonian Working Group members and is now with SCS Voting Members; their vote is due by 10 January 2002.

Another 3 proposals are at a very advanced stage. Our first electronic newsletter was circulated in summer 2001. In that newsletter, which goes to over 140 Cretaceous specialists, we sought support for the formation of a Berriasian WG (to replace our old Jurassic/Cretaceous boundary WG), with responsibility for defining the base of the Berriasian Stage and the base of the Cretaceous. Our

request for help will also be circulated by the Jurassic Subcommittee, which will also hold a poster session on the Jurassic/Cretaceous boundary at its next meeting. The response so far has been limited.

Gilles Odin has submitted a summary of the Maastrichtian GSSP proposal to Episodes. The huge volume of data on the Maastrichtian GSSP site at Tercis, France, has also been published\*. This provides extensive documentation on all aspects of the Maastrichtian proposal:

Several Spanish members of the Barremian WG have completed and published research on the palaeontology of possible sites for the Barremian GSSP in SE Spain, an area recommended for further research in the Brussels volume.

\*Odin, G.S. (Editor) 2001. The Campanian-Maastrichtian boundary: characterisation at Tercis-les-Bains, France: correlation with Europe and other continents. IUGS Special Publication (monograph) Series, v. 36; Developments in Palaeontology and Stratigraphy Series, v. 19. Elsevier Sciences, Amsterdam, 910 pp.

## **8. CHIEF PROBLEMS ENCOUNTERED IN 2001**

As noted in previous years, some of the preliminary recommendations of the 1995 Brussels meeting have required more further research than was initially appreciated! But this has led to further publications aimed especially at resolving the problems raised (see above).

## **10. SUMMARY OF EXPENDITURES IN 2001 (ANTICIPATED THROUGH MARCH 2002):**

### **I. INCOME**

carry-over from 2000	\$ 110
ICS Subvention for 2001	<u>\$ 1500</u>
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Total income	\$ 1610

### **II. EXPENDITURE**

Chairman's office expenses (telephone, photocopying, fax etc.)	\$ 85
Vice-chair's office expenses	\$ 70
Vice-chair's expenses incurred in attending meetings	\$ 230
Duplicating and circulating Turonian GSSP proposal to SCS VM members	\$ 120
Support for WG activities	<u>\$ 400</u>
Total expenditure	\$ 905

CURRENT RESIDUAL BALANCE (Nov, 2001)	\$ 705
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## **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

To continue chasing chairs of Working Groups! The SCS Chair monitors progress of Lower Cretaceous GSSPs, and the SCS Vice-Chair monitors progress of Upper Cretaceous GSSPs.

To ensure that the Berriasian/J-K boundary WG becomes active.

Communications -- To improve communication between our working groups through the issuing of more frequent electronic newsletters. To continue communicating with the broader Cretaceous world through brief reports in Cretaceous Research. To improve communication with Russian colleagues (Dr Annie Dhondt, our Vice-Chair, will represent the Subcommittee at the First Russian Cretaceous Symposium in Moscow next February).

Completion of at least 2 more draft GSSP proposals, for submission in 2003.

## **15-16. BUDGET AND ICS COMPONENT FOR 2002**

### ESTIMATED EXPENDITURE

Chairman's office expenses (Fax, phone, postage etc)	\$ 80
Chairman's expenditure on duplicating GSSP proposals for SCS Voting Members	\$ 150
Vice Chair's office expenses (ditto)	\$ 50
Secretary's office expenses (ditto)	\$ 100
Working Group Chairs	
expenses incurred in preparatory work for draft GSSP proposals etc:	\$ 500
Santonian WG chair:	
support for arranging field/indoor meeting to finalise Santonian GSSP	\$ 400
 Total estimated expenditure	 \$ 1280

Subtract current residual (Nov 2001)   \$ 705

ALLOTMENT REQUESTED FROM ICS FOR 2002:   \$ 575

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NOTE: Chairs of WG will need increasing support as proposals near fruition.

There are no formal funding sources outside IUGS.

## **17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)**

Publication in 1996 of the Proceedings of the Subcommittee's Second International Symposium on Cretaceous Stage Boundaries, held in Brussels in 1995. This made preliminary recommendations for GSSPs for 11 of the 12 Cretaceous stages and has formed the foundation of all subsequent work.

Renewed research (much now published) by WG members, based on research needs pinpointed by the above publication.

Completion of the first 3 GSSP proposals: Maastrichtian (ratified 2001), Cenomanian (currently being voted on by ICS) and Turonian (currently being voted on by SCS).

The Lower Cretaceous Cephalopod Team, formerly attached to IUGS Projects 262 and 362, agreed to become a WG of the SCS at its meeting in Vienna in September 2000.

The Chair or Vice Chair represented the SCS at:

4th International Workshop of the Lower Cretaceous Cephalopod Team (IGCP 362): London, September 1997

150 years of the Maastrichtian Stage: Maastricht, November 1999.

6th International Cretaceous Symposium: Vienna August 2000.

Colloque sur le C nomanien: Rouen, October 2001

## **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

### Objectives

- \* To bring recommendations for the remaining 9 GSSPs before ICS as soon as possible, and not later than 2006.
- \* To communicate the results as widely as possible.

### Work Plan

2003 Finalise proposals for Hauterivian, Barremian and Santonian

2004 Finalise proposals for Valanginian, Albian and Campanian

2005 Finalise proposals for Aptian and Coniacian

2006 Finalise proposal for Berriasian (J/K boundary)

2002 Annie Dhondt (Vice Chair) to represent the Subcommittee at the First Symposium on Russian Cretaceous.

2002 Meeting on the proposed Santonian GSSP, Spain (Santonian WG)

2002 Chair to attend ICS meeting in Urbino, Italy

2004 SCS session at 32nd International Geological Congress, Florence

2005 Present results to 7th International Cretaceous Symposium, Neuch tel, Switzerland.

## **19. SUBMITTED BY:**

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Position: Chair, SCS

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# SUBCOMMISSION ON JURASSIC STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

International Subcommittee on Jurassic Stratigraphy

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

#### **Mission Statement**

The Subcommittee is the primary body for facilitation of international communication and scientific cooperation in Jurassic stratigraphy, defined in the broad sense of multidisciplinary activities directed towards better understanding of the evolution of the Earth during the Jurassic Period. Its first priority is the unambiguous definition, by means of agreed GSSPs, of a hierarchy of chronostratigraphic units which provide the framework for global correlation.

#### **Goals**

These fall into two main areas:

- (a) The definition of basal boundary stratotypes (GSSPs) and the refinement of standard chronostratigraphical scales, through the establishment of multidisciplinary Working Groups;
- (b) Coordination of international research on Jurassic environments, through the establishment of Thematic Working Groups, for example on Palaeobiogeography, Palaeoclimate, Sequence Stratigraphy and Tectonics.

#### **Fit within IUGS Science Policy**

The objectives of the Subcommittee relate to two main aspects of IUGS policy:

- (i) The development of an internationally agreed scale of chronostratigraphic units, fully defined by GSSPs where appropriate and related to a hierarchy of units to maximise relative time resolution within the Jurassic period;
- (ii) Establishment of frameworks and systems to encourage international collaboration in understanding the evolution of the Earth during the Jurassic Period.

### 4. ORGANIZATION

The Subcommittee is organised by a Bureau consisting of Chairperson, Vice-Chairperson and Secretary, who are all Voting Members of the Subcommittee. There are seventeen other Voting Members, each with defined areas of responsibility. The objectives of the Subcommittee are pursued by Working Groups, both Stratigraphical and Thematic, and each group is organised by one (occasionally two) Convenors. In addition to the Voting Members there are Corresponding Members, who have a responsibility for communication in both directions between the Subcommittee and researchers on Jurassic topics in their region.

## 5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

The Jurassic Subcommittee does not receive financial support from outside IUGS-ICS, except for office support (computer, access to internet services, telephone, etc.) from the host institutions of the Bureau. Specific activities, such as meetings and some Working Groups, sometimes receive small grants to Convenors and Organisers from various sources, for example the Kimmeridgian Working Group received support from the Royal Society for fieldwork and a meeting in Britain. Members obtain individual research or conference grants for activities related to the Subcommittee.

## 6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

These are mostly informal, through the activities of individual members; for example, Peter Baumgartner is President of Interrad and Jim Ogg is Secretary of ICS. The Subcommittee, and especially the Triassic/Jurassic Boundary Working Group, interface with IGCP Project 458 (Triassic-Jurassic Boundary Events) through co-leader Jozsef Palfy who is a Voting Member of the Subcommittee. Voting Member Kevin Page has particular responsibility for Conservation issues and interface with recently established Unesco World Heritage projects.

## 7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

The year 2001 has been essentially a year for organising and establishing membership and goals for the new Thematic Working Groups of the Subcommittee, with the target the next International Symposium on Jurassic Geology being held in Sicily in September 2002. Progress within the Stage Working Groups towards proposal of GSSPs has also been concentrated on preparation for the Sicily Symposium. These Symposia, held every four years or so, are the main occasions when the objectives of the Subcommittee are carried forward, through meetings of the Working Groups and thematic sessions.

Liaison between the **Triassic/Jurassic Boundary** Working Group and IGCP Project 458 is being established with a joint meeting/workshop at the candidate GSSP in Somerset.

The **Sinemurian** WG are preparing for submission to *Episodes* their report on the GSSP in East Somerset approved by IUGS.

The **Pliensbachian** WG are preparing for submission to the Subcommittee a proposal for a GSSP in Yorkshire, and a project has been initiated to obtain geomagnetic data from the section.

The **Aalenian** WG report on the approved GSSP in Spain was completed and submitted to *Episodes* and has now been refereed for publication.

The **Bajocian** and **Bathonian** WGs held a joint meeting in Budapest and this year the Proceedings of this have been refereed and will be published by November this year. Some members have also been involved in a revision of a classic work on ammonites from Sicily by Gemmellaro and in fieldwork in preparation for the Sicily Symposium.

The **Callovian** WG are preparing a GSSP proposal for presentation next year in Sicily.

The **Oxfordian** WG have been seeking new data on the Callovian/Oxfordian boundary sections in Britain to improve Boreal/Tethyan correlations before GSSP proposal can be voted on by the WG members.

The **Kimmeridgian** WG held a field meeting in Isle of Skye and report that "progress has been achieved mostly in stratigraphical recognition of the Oxfordian/Kimmeridgian boundary interval in

Britain. Field studies on the Staffin Bay section in Isle of Skye (Flodigarry) were carried out in July 2001: this included collecting of ammonites (B.A.Matyja, K.Page, A.Wierzbowski, J.Wright) together with sampling for micropaleontology (N.Hogg, S.Lang, H.Tykoezinski), isotope stratigraphy (D.R.Grocke) and magnetostratigraphy (M.Hounslow). Some preliminary results should be presented in the next ISJS Newsletter, and more detailed results during the ISJS Symposium in Sicily in 2002. In addition, the detailed succession of ammonites in the uppermost Oxfordian (Pseudocoradata Zone) in southern England has been recognized, and the results will be published soon."

A meeting of the **Tithonian** WG, planned to be held in Stuttgart this year, had to be postponed because of insufficient numbers.

Chief products in 2001 include:

- (i) Publication of proceedings of joint meeting of the Bajocian and Bathonian Working Groups held in Budapest.
- (ii) Publication of the report of the Aalenian WG on the GSSP in *Episodes*.
- (iii) ISJS Newsletter 28 was produced early in 2001 and circulated mainly by email to all Voting, Honorary and Corresponding Members and forwarded to other interested workers through national (e.g. Britain, Germany) or local networks.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

These remain as they have been in recent years, mostly related to difficulties in obtaining travel grants for meetings of Working Groups, which are often given low priority by National grant-awarding agencies. The Convenor of the Bajocian WG reported difficulties in raising financial support for publication of their conference proceedings (but too late to be offered support by the Subcommittee).

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

Delays in establishing a bank account for the new Subcommittee because of the Chairman's move to France have delayed receipt and allocation of the Subcommittee's budget this year. The figures are provisional allocations and include deliberate carry-over to 2002 to enable increased support to Working Groups to facilitate report to the Subcommittee during the Sicily Symposium.

### INCOME

Transferred from 2000	US\$ 500
Allowances for 2001	<u>US\$3,000</u>
TOTAL	US\$3,500

### EXPENDITURE (through Nov 2001)

Support for preparation of Jurassic Symposium in Sicily	US\$1,500
Support for establishing Liaison WG	US\$ 200
General office expenses	US\$ 250
Provision towards setting up website	<u>US\$ 350</u>
TOTAL	US\$2,300

Carried forward to 2002

US\$1,200

**11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

(a) Design and establish web-site for Subcommittee, and enhance electronic communications:

The Jurassic Subcommittee website will provide a more widely accessible source of information about the Subcommittee, including the Newsletter, and Working Group activities. It will include biographical details of the Voting Members, with their allocated areas of responsibility, and contact details for all Working Group Convenors and Corresponding Members. Each Working Group will be invited to submit material, including discussion documents, details of GSSP sites, etc. Preliminary work and planning were carried out during 2001 and will be developed in the following years.

Electronic communication has now been established as the norm within the Subcommittee. The main means of communication is through an annual Newsletter reporting the main activities from each of the Working Groups, distributed by email to all Members. National onward distribution networks are being actively encouraged and have been established in several countries. The possibility of introducing additional Newsletters which are oriented more to discussion of selected topics is being planned. Establishment of the Subcommittee website will make wider access possible.

(b) GSSP proposals:

It is expected that GSSP proposals for the Triassic/Jurassic boundary (and Hettangian), the Pliensbachian, Callovian, Oxfordian and Kimmeridgian will be submitted to the Subcommittee after voting within the respective Working Groups during the Sicily Symposium. Further preparatory and research work will be carried out on Pliensbachian/Toarcian, Bajocian/Bathonian, and Kimmeridgian/Tithonian boundary sections.

After the Jurassic Symposium in Sicily (see below), it is anticipated that four or five GSSP proposals will be formally submitted to the Subcommittee and the to ICS.

(c) Other Stage WGs:

The Working Groups who have already submitted GSSP proposals, are now beginning to investigate the refined definition of boundary stratotypes for the Standard Zones, with emphasis on multidisciplinary methods of correlation, and the international refinement of biostratigraphical scales at Subzone and Horizon level.

(d) Thematic Working Groups:

These were established to provide sources of information and consultation to the Stage WG Convenors, and to broaden the range of activities facilitated and supported by the Subcommittee, especially into integrated international research on the Jurassic environment. It is expected that During the first year networks of potential contributors will be set up and the objectives of each WG specified in more detail. Preliminary results from the WGs should be presented next year at the Sicily Symposium

## (e) 6th International Symposium on the Jurassic System

The next major Jurassic Symposium will be held in Sicily in September 2002; the organising committee is chaired by Prof. Giulio Pavia, former Chairman of the Subcommittee. It will include several special sessions as well as general sessions and business meetings of the Subcommittee and its Working Groups.

The regular Jurassic Symposia have been the main occasions when significant progress in forward the objectives of the Subcommittee is achieved. In addition to formal meetings of the Subcommittee, all the Working Groups will hold open meetings after which the Convenors will report to the Subcommittee. It is expected that proposals for GSSPs for the bases of the Jurassic System (and Hettangian Stage), Pliensbachian, Callovian, Oxfordian and Kimmeridgian Stages will be submitted, discussed and approved.

In addition the success of the establishment of new Thematic Working Groups, broadening the range of Subcommittee activities, will be examined.

For the Sicily Symposium field excursion guides and abstracts of communications will be produced for participants, and possibly published.

**15-16. BUDGET AND ICS COMPONENT FOR 2002**

(a) General office expenses	400US\$
(b) ISJS Newsletter no 30	200US\$
(c) Contribution towards cost of web-site	400US\$
(d) Contributions to Convenors to help costs of Working Groups	1,000US\$
(e) Support for meetings	2,000US\$
(f) Editing and production of GSSP proposals	800US\$

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TOTAL 2002 BUDGET	4,800US\$ (through Mar, 2003)
Carried forward from Nov 2001	<u>1,200US\$</u>
TOTAL BUDGET REQUEST	3,600US\$

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**Potential Funding Sources**

The Subcommittee does not envisage being able, as an organisation, to obtain significant funding from outside IUGS/ICS sources.

As in previous years, financial support will be sought by individual members from their grant-awarding bodies for specific projects such as research projects and meetings.

General support will be provided to the Secretary by University College, London, for equipment including computers, email access and telephones. In addition the School of Earth Sciences at Birkbeck College will host the planned web-site of the Jurassic Subcommittee as part of the School's web-site within that of Birkbeck College. This will include assistance with setting up and operating the site, for a nominal payment.

## **17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)**

The Jurassic Subcommittee has now made three successful GSSP proposals for Stages and the relevant Working Groups have made progress in preparing for further proposals. The main difficulty identified has been provinciality of ammonite faunas at the level of detail required.

The most significant results of the Subcommittee activities, however, has been the bringing together at regular international Symposia of large numbers of specialists in diverse fields working on Jurassic geology. The field guides, abstracts of communications and edited and refereed proceedings have all been published. These provide accessible detailed up-to-date accounts of our current knowledge about Jurassic geology worldwide.

## **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

The future focus of the Subcommittee will evolve away from Stage boundary GSSP proposals to further refinement of the chronostratigraphical scale by integration of multidisciplinary methods of correlation. In addition, the Thematic Working Groups can be expected to start producing the results of a period of international collaboration which is coordinated by the Convenors; for example:

The Palaeoclimate Working Group should begin to produce a series of maps showing the palaeoclimate of the Jurassic World during selected time-slices, with documentation of the supporting evidence;

The Tectonic Events Working Group will map in time and space the major tectonic events (including basin subsidence/uplift).

Depending on the progress of these Thematic Working Groups, a special thematic session on the Jurassic environment has been proposed for the next International Geological Congress in 2004.

## **19. SUBMITTED BY:**

Nicol MORTON

Chairperson, International Subcommittee on Jurassic Stratigraphy

5th November 2001

Le Chardon, Quartier Brugiere, 07200 Vogé, France

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NICOL.MORTON@wanadoo.fr



# SUBCOMMISSION ON TRIASSIC STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Triassic Stratigraphy (STS) of the International Commission on Stratigraphy (ICS).

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

- Rationalisation of global chronostratigraphical classification.
- Intercalibration of fossil biostratigraphies, integrated zonations, and recognition of global datums.
- Establishment of magneto- and chemo-stratigraphic scales.
- Definition of Stage boundaries and selection of global stratotype sections.
- Correlation of Triassic rock successions and events, including marine to non-marine.
- Climatic evolution and modelling.

The objectives satisfy the IUGS mandate of fostering international agreement on nomenclature and classification in stratigraphy; facilitating international co-operation in geological research; improving publication, dissemination, and use of geological information internationally; encouraging new relationships between and among disciplines of science that relate to Triassic geology world-wide; attracting competent students and research workers to the discipline; and fostering an increased awareness among individual scientists world-wide of what related programs are being undertaken.

### 4. ORGANIZATION

STS is a Subcommission of the Commission on Stratigraphy. Officers (chairman, two vice-chairmen, past chairman, secretary), web-master/ editor of newsletter, voting members, and corresponding members. These individuals represent a broad spectrum of specialised stratigraphical disciplines from those countries or regions where Triassic rocks are extensively studied in relation to fundamental and/or applied geological research. Participation in working groups on the Permian-Triassic, Triassic-Jurassic and Stage boundaries. Publication of a bi-annual STS newsletter *Albertiana* in both hardcopy and as a web release.

Chairman: M. J. Orchard,  
 Geological Survey of Canada, 101-605 Robson Street, Vancouver, B.C. V6B 5J3, Canada, e-mail: morchard@nrcan.gc.ca

Vice Chairman: Yin Hongfu,  
 China University of Geosciences, Yujiashan, Wuhan, Hubei, 430074, Peoples Republic of China. hfyin@cug.edu.cn

Vice Chairman: Y. Zakharov,

Russian Academy of Sciences, Far East branch, Prospect Stoletiya Vladivostoka 139,  
Vladivostok 22, 690022, Russia, e-mail: fegi@online.marine.su

Past Chairman: M. Gaetani,

Dipartimento di Scienze della Terra, via Mangiagalli 34, I-20133 Milano (Italy), tel.: 0039 02  
23698 207, fax 0039 02 706 38 261, e-mail: maurizio.gaetani@unimi.it

Secretary: G. Warrington,

British Geological Survey, Kinsley Dunham Centre, Keyworth, Nottingham NG1 5GG, U.K., e-mail: gwar@wpo.nerc.ac.uk

21 other voting members, total of 26.

*Albertiana* editor and Webmaster: Wolfram M. Kuerschner,

Laboratory of Palaeobotany and Palynology, Utrecht University, Budapestlaan 4, 3584 CD  
Utrecht, The Netherlands. W..M.Kuerschner@bio.uu.nl

103 other corresponding members, total of 104.

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

Support (non-financial) of the Chairman's Institute (GSC Vancouver), and of the Earth Science Sector of Natural Resources Canada.

Support (not financial) of various national stratigraphical commissions, national geological surveys. General support of Commission on Stratigraphy.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

IGCP Project 458: Triassic/ Jurassic Boundary Events

IGCP Project, proposal pending: Triassic time and trans-Panthalassan correlations

Japan-New Zealand collaboration on Southern High Latitude Radiolarian Faunas (13 Universities)

US-China-Australia collaboration on: Evaluation of Controls on Carbonate Platform Evolution and Architecture through Comparative Platform Analysis, Nanpanjiang Basin, South China.

Co-operation with the PANGEA Project.

Co-operation with the Peri-Tethys Programme.

Co-operation with Shallow Tethys Programme.

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

Much of the year was taken up in re-organising the STS and laying the foundation for more inclusive and effective decision making, with a view to speeding up the process of GSSP definition.

The Chairman undertook a major renewal of voting and corresponding members during 2000-01.

Voting membership was reduced from 31 to 26, by dropping 11 and adding 6. This was the first time that a significant turnover of voting members had been attempted, many of the voters having been in

place since inception of the STS in the 1960s. New voters included the first representatives from South America and the first radiolarian specialist. Total corresponding membership was increased significantly even though over 20 members were dropped. An effort was made to bring in representatives from under-represented regions, including Eastern Europe, E. Asia, South America, and Australasia.

The entire cast of STS members provided a synopsis of their Triassic research interests which will be published in *Albertiana* 26 (Fall 2001) and concurrently released on the web. This list will also identify Working Group chairs, four of whom were newly appointed; each stage boundary, as well as the Non-Marine Working Group, now has an individual to focus on the task at hand. Amongst the membership, the published research synopses will enable Chairs to more formally constitute a working group. All have been asked to produce a list of participants and a short list of GSSP candidates.

Two issues of the STS newsletter *Albertiana* were published: 25 and 26.

The STS co-sponsored:

The International Conference in Oman: Permo-Triassic deposits: from shallow water to base of slope; Abstract volume and field guides.

The International Symposium on the Global Stratotype of the Permian-Triassic boundary and the Paleozoic-Mesozoic events; Abstract volume and field guides.

#### **Progress on specific boundaries:**

**Base of the Triassic/ Induan.** This boundary is now fixed and ratified at the first appearance of the conodont *Hindeodus parvus* in the middle of bed 27, within the Yinkeng Formation at Meishan, Changxing County, Zhejiang Province, South China. Yin Hongfu, the Chair of the working group convened an International Conference on the P-T boundary in Changxing during August 2001. The GSSP was celebrated with the unveiling of an impressive 9 m tall stele with a model of the index fossil at its apex. The Chinese hosts and invited guests, including 3 of the 5 STS executives and an ICS/ IUGS representative (R. Lane), were present alongside an impressive line-up of government dignitaries. The search for a non-marine auxiliary section proceeded apace with candidates from China and South Africa being documented.

**Base of Olenekian.** Sections in Russia, especially near Vladivostock, continue to pose problems, partly financial, for access and detailed study. Yuri Zacharov, the Chair of the WG, continues his work there in collaboration with Japanese geologists. Meanwhile, new candidates are now presented from China, and were visited during a field trip that followed the Changxing Symposium. Work is in its early stages but the fossil control is quite good and it is planned to continue multidisciplinary studies. A second area in Guizhou Province being studied by a joint Chinese-US-Australian group has also been suggested to have good potential.

**Base of Anisian.** Biostratigraphic, magnetostratigraphic and chemostratigraphic events are fairly well understood in the section at Desli Caira, in Dobrogea, Romania, which stands as the only well known candidate for the O-A GSSP. The field workshop organised in June 2000 by Dr. Eugen Gradinaru did not result in a formal proposal but it served to stimulate further work and there is now a clear commitment for a proposal to come forward in the Spring of 2002.

**Base of Ladinian.** Deliberations on this boundary ground to a halt some years ago with polarisation around alternate horizons at Bagolino in Italy and at Felsőors in Hungary. The Hungarian section is now beautifully prepared as a geotourist destination but the preferred level best developed there is not favoured by workers outside Hungary, although there are now new data on radiogenic dates and ammonoid stratigraphy to be published. A new WG Chair (A. Baud) has been appointed to carry the final decision forward next summer. It is hoped that it will be the next GSSP to be agreed.

**Base of Carnian.** There is a formal GSSP proposal for the section at Prati di Stuares in the Dolomites of northern Italy. Some of the fossil data from there is rather weak and much better successions are present in condensed sections in Spiti in the Himalaya, although access is not so good. New work underway in Nevada, USA should be of great importance too. Decisions on this boundary should probably be delayed for a while. M. Gaetani retains the Chairmanship of this WG.

**Base of Norian.** A new working group has been formed by the STS Chair, who has worked actively this last year with a multidisciplinary group on a section in British Columbia, Canada. The section lacks a preserved magnetic signal, but the fossil succession is superb. An alternate section in Pizzo Mondello, Sicily is not so good paleontologically, but does have a magnetostratigraphic record that permits comparison with the non-marine Newark successions in eastern USA. The same is allegedly true of an unpublished section in Slovenia. The WG plans a busy schedule of workshops to try and resolve issues around this GSSP with a goal of 2004 for a decision.

**Base of Rhaetian.** A new WG is being organised by L. Krystyn.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

Ongoing problems: Difficulty for Russians to undertake necessary fieldwork on potential GSSP of the Olenekian near Vladivostok - lack of funds. A similar situation with participants from the former eastern block. It is envisaged that this problem will become more acute with the push toward GSSP definition. Working Group meetings and field trips are unlikely to be inclusive unless some member's costs are covered.

Fiscal restraint and new regulation on foreign travel in Canada has also made it more difficult for the Chair to fulfil his STS duties.

The *Albertiana* newsletter continues to be heavily subsidised by Utrecht University. The WEB-release is now reality, but hard copy is still offered and necessary for some. This issue may become more critical if, as expected, the activity of the STS increases and more contributions are offered.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

Mail out to STS membership	\$426.30
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## **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

STS meeting in conjunction with that of Shallow Tethys in Budapest, Hungary 26-31 August. Field workshops and excursions associated with the Shallow Tethys in Budapest are planned for July-August, 2002 in:

- Bagolino, Italy - candidate for the Anisian-Ladinian boundary
- Stoures, Italy - candidate for the Ladinian-Carnian boundary
- Felsoors, Hungary - candidate for the Anisian-Ladinian boundary
- Desli Caira, Romania - candidate for the Olenekian-Anisian boundary.

A business meeting at the Shallow Tethys conference will attempt to reach consensus on GSSPs for these boundaries. If successful, the proposition will go to a vote within STS next fall.

### **Anticipated results/ products next year**

- Choice of Olenekian-Anisian boundary GSSP.
- Choice of Anisian-Ladinian boundary GSSP.

The *Albertiana* web-site will be expanded to include more past issues of the volume as time permits. In addition it will become the main medium for news and announcements, and possibly for discussion groups. Links to related sites will be added.

## **15-16. BUDGET AND ICS COMPONENT FOR 2002**

Contribution to production of <i>Albertiana</i> :	1000
Financial support for administration and communication:	500
Financial support to participants in Field Workshops:	3000*
<i>*this amount is set at a nominal amount considering previous levels of funding for subcommissions. However, it is unlikely to go far and any supplement would help.</i>	

Total expenses            4500

### **Potential funding sources outside IUGS**

Limited support from Chairman's institute, particularly through a 'Pathways' project on "Triassic time and correlation."

Pending new IGCP Project proposed by Chairman on "Triassic time and trans-Panthalassan correlation"

## **17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)**

Permian-Triassic boundary in China agreed and ratified.

Induan-Olenekian boundary -- Working group established, 2 candidates identified and preliminary descriptions presented.

Olenekian-Anisian boundary -- Field workshop in Romania to view boundary candidate, now characterised by ammonoid, conodont, chemo- and magneto-stratigraphic profiles.

Anisian-Ladinian boundary -- Additional work done on 2 competing candidates in Italy and Hungary.

- Ladinian-Carnian boundary -- Field workshop in Italy to view Ladinian-Carnian boundary candidate and publication of a comprehensive volume on its character and attributes.
- Carnian-Norian boundary -- New working group established. Data from 2 candidate sections in Canada and Sicily published.
- Norian-Rhaetian boundary -- New working group established. Non-marine auxiliary GSSP sections identified.

## **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

### **Year 1 (2002)**

- Field work in some key North American Triassic successions contributing data to boundary resolutions: Crittenden Springs, Fossil Hill, New Pass, Shoshone Mts.
- Field workshop in Italy and Hungary, August 20-25th: Anisian-Ladinian boundary GSSP candidates at Bagolino, Italy and Felsoors, Hungary; Ladinian-Carnian boundary GSSP candidate at Prati di Stuares, Italy.
- Special Session on Middle Triassic boundaries - joint meeting with Shallow Tethys, Budapest, Hungary, 26-31 August 2002.
- Field workshop to Olenekian-Anisian GSSP candidate at Deli Caira, Romania, September 2002.
- Triassic Symposium as part of the Paleontological and Biostratigraphic Congress, Corrientes Province, Argentina, October 2002.
- Choice of Olenekian-Anisian GSSP candidate; proposal prepared.
- Choice of Anisian-Ladinian boundary GSSP; proposal prepared.
- Short list of Ladinian-Carnian boundary GSSP candidates.

### **Year 2 (2003)**

- Special Session on Upper Triassic events and boundaries - joint meeting with Geological Association of Canada, Vancouver, BC, 26-28 May, and IGCP project 486.
- Field workshop on Carnian-Norian boundary GSSP candidate at Black Bear Ridge, northeast British Columbia, 29 May-2 June.
- Field workshop on Carnian-Norian boundary non-marine auxiliary candidate at Petrified Forest Park, New Mexico, end May.
- Field workshop on the base of Norian and Rhaetian, NW Moresby Island, Queen Charlotte Islands, British Columbia, Canada.
- Special Session/ Field Workshop on the Lower-Middle Triassic of the U.S.A. - meeting with the Geological Society of America, Seattle, 2-5 November.
- Special publication on Upper Triassic events and boundaries.
- Short list of Carnian-Norian boundary GSSP candidates.
- Choice of Ladinian-Carnian boundary GSSP; proposal prepared.

### **Year 3 (2004)**

- Field workshops on Upper Triassic GSSP candidates in Austria (Salzkammergut), Italy (Sicani-Lagronegro Basin, Pizzo Mondello), Turkey (Taurus Nappes), Silick Brezov, August.
- Meeting with the STS as part of a proposed special session on "Triassic in the Tethys Realm"- 32nd International Geological Congress, Florence, Italy, 20-28 August 2004.
- Special session/ workshop on Upper Triassic boundaries, IGC.
- Short list of Norian-Rhaetian boundary GSSP candidates.
- Short list of Induan-Olenekian boundary GSSP candidates.

- Choice of Carnian-Norian boundary GSSP; proposal prepared.

**Year 4 (2005)**

- ?Field workshop to Induan-Olenekian boundary GSSP candidates in Guizhou and Anhui provinces, China, and to South Primorye, Russia.
- Special session/ conference workshop on Induan-Olenekian boundary, venue undetermined.
- Choice of Induan-Olenekian boundary GSSP; proposal prepared.
- Choice of Norian-Rhaetian boundary GSSP; proposal prepared.

**Year 5 (2006)**

- Summary volume of all Triassic GSSPs.
- Emphasis switches to choice of non-marine auxiliary sections.
- Special volume on trans-Panthalassan Triassic terrane stratigraphies and correlation.

**19. SUBMITTED BY:**

Name Michael J. Orchard

Position Chairman, STS

Date 29/10/2001

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# **SUBCOMMISSION ON PERMIAN STRATIGRAPHY**

## ANNUAL REPORT 2001

### **1. TITLE OF CONSTITUENT BODY**

Subcommission on Permian Stratigraphy

### **2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY**

To establish a reliable chronostratigraphic timescale for and subdivisions of the Permian and to promote and refine regional correlation.

### **4. ORGANIZATION**

Chairman:

Bruce R. Wardlaw

U.S. Geological Survey, 926A National Center, Reston, VA, 20192-0001 USA

bwardlaw@usgs.gov

1st Vice Chairman:

Ernst Ya. Leven

Geol. Inst. RAS 10917, Pyjevskiy per. 7, Moscow, Russia

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2nd Vice Chairman:

Clinton B. Foster

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### **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

The SPS receives strong support from Russian, Chinese, and American governments and individuals when working on the specific Series and Stages proposed in each country. The marine-terrestrial correlation activity, especially for the Upper Permian receives strong support from European countries, specifically from Italy, Germany, Russia and France. The University of Calgary (Canada) and Boise State University (USA) helped support our operations. Russia and the Kazan government



help support efforts for the regional Volga standards for the Middle and Upper Permian and their correlation to the international standard. Individual donors and the U.S. Geological Survey strongly supported the activities of SPS this year.

## 6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

I G C P Project 359: Correlation of Tethyan, Circum-Pacific and marginal Gondwanan Permo-Triassic.

The marine-terrestrial working group of the SPS is establishing a working relationship with working groups of the former "Subcommission on Gondwana Stratigraphy" specifically, those under the umbrella of Event Stratigraphy: Floral Correlation, Faunal Correlation, and Physical Correlation with the common aim toward resolution of global correlation of late Paleozoic- early Mesozoic terrestrial and marine sequences.

## 7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

**Current Permian Time Scale** (*ratified units in bold*):

	Series		Stage
	<b>Permian</b>	Upper	Lopingian
Wuchiapingian			
<b>Middle</b>		<b>Guadalupian</b>	<b>Capitanian</b> GSSP
			<b>Wordian</b> GSSP
			<b>Roadian*</b> GSSP
<b>Lower</b>		<b>Cisuralian</b>	Kungurian
			Artinskian
			Sakmarian
			Asselian* GSSP

- a. The formal acceptance for the **Guadalupian** and its constituent stages was achieved and the final write-up for *Episodes* was completed and is now in review.
- b. Major breakthroughs were achieved in clearing the taxonomic log-jam that was holding up the formal proposal for the **Lopingian** (Upper Permian) and its constituent stages (Wuchiapingian and Changhsingian, see *Permophiles* no. 38), and formal proposals are anticipated within the year.
- c. Work continues on the **Cisuralian** (Lower Permian), specifically refined conodont/fusulinid correlations and numeric age dating, and proposals for the Sakmarian, Artinskian, and Kungurian boundaries are making progress.
- d. The SPS Special Project "*The Permian: from glaciation to global warming to mass extinction*" to use detailed biostratigraphy and numerical age dates to create an initial framework for

correlating and evaluating global events during the Permian made significant progress this year. Several tuff beds in the Upper Carboniferous and Lower Permian of Russia and Kazakhstan yielded wonderful conodonts and zircons! This special project will help in the development of the Permian GSSP's by providing important stratigraphic, biostratigraphic and numerical age dates to the specific Subcommittee working groups.

- e. The Subcommittee successfully sponsored and participated in:  
 North American Paleontological Convention (NAPC) at which it had its formal annual meeting  
 Sponsored and participated in *The International Symposium on the Global Stratotype of the Permian-Triassic boundary and the Paleozoic-Mesozoic events* and held a working meeting,  
 Sponsored and participated in the *International Conference on the Geology of Oman, Pangaea Symposium and Field Meeting*  
 Participated in the field conference on the *Stratigraphic and Structural evolution on the Late Carboniferous to Triassic continental and marine successions in Tuscany (Italy), regional reports and general correlation.*
- f. Publication of the newsletter, *Permophiles*, no. 37, and preparation of no. 38.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

The printing and publication of the SPS newsletter, *Permophiles*, was switched from Boise State University to the University of Calgary this year. As an interim measure, the USGS published issue no. 37, but issue no. 38 has been greatly delayed in setting up the printing procedure at the University of Calgary.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANTICIPATED THROUGH MARCH 2002):

a. Publication and distribution of two issues of <i>Permophiles</i> the official newsletter of SPS	2,000
b. Executive Business meetings to plan activities and edit and compile <i>Permophiles</i> .	3,000
c. Travel "gifts" for Kozur to attend Oman meeting and for Lozovsky to attend Sienna meeting	850
d. Working meeting with Guadalupe Mountain National Park on creation of monuments for the Guadalupian and component stages	3,000
e. Henderson's travel to China for the Permian-Triassic Boundary meeting	3,000
f. Compilation and digitization of past issues of <i>Permophiles</i>	1,000
g. Miscellaneous Supplies....	<u>150</u>
Total	13,000

### Funding:

\$700 was received from ICS this year.

Other funding sources included:

Boise State University:	1,000
University of Calgary and local Consortium	4,000
Individual donations	500
Personal donation from the Chair	1,850
U.S. Geological Survey	5,650

## 11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:

### Anticipated results/ products next year

Choice of GSSP for base of the **Lopingian** (Upper Permian) Series and **Wuchiapingian** Stage.  
Choice of GSSP for base of the **Changhsingian** Stage GSSP.

### Work plan

Publication of the above mentioned formal proposals.

Conduct annual business meeting at ECOS VIII, Eighth International Conodont Symposium held in Europe.

Sponsor and participate in symposium on the *Permian of the Southwest (USA)* and lead a field trip on *Middle Permian Stratotypes of the Guadalupe Mountains National Park* in conjunction with the South-Central Section, GSA (Geological Society of America).

Publication of two issues of *Permophiles* (and in a more timely fashion). It is planned to continue to use *Permophiles* as our major format for open and lively communication and as many international meetings as possible. Work on making all past issues of *Permophiles* available on the internet should be nearing completion.

## 15-16. BUDGET AND ICS COMPONENT FOR 2002

a. Publication and distribution of two issues of <i>Permophiles</i> the official newsletter of SPS	2,000
b. Executive Business meetings to plan activities and edit and compile <i>Permophiles</i>	3,000
c. Travel "gifts"	1,000
d. Sponsorship and participation in " <i>Permian of the Southwest</i> " symposium and field trip in conjunction with the South-Central Geological Society of American Meeting	3,000
e. Henderson's travel	3,000
f. Compilation and digitization of past issues of <i>Permophiles</i>	<u>1,000</u>
Total	13,000

REQUEST FOR SUPPORT FROM ICS, IUGS = \$1,000

### Potential funding sources outside IUGS

Boise State University  
University of Calgary and local consortium  
U.S. Geological Survey  
Individual Personal Donations

## 17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)

Formal ratification and publication of "Proposal of Aidaralash as Global Stratotype Section and Point (GSSP) for **base of the Permian** System" (*Episodes*, v. 21, no. 1).

Formal ratification of **Guadalupian (Middle Permian) Series** and its component stages (Roadian, Wordian, and Capitanian) GSSPs.

Digitization of many past issues of *Permophiles* and establishment of available website at Boise State University, Permian Research Institute (<http://pri.boisestate.edu/index.html>) under SPS-Newsletter.

Publication of the bi-annual newsletter *Permophiles* and its steady improvement and circulation. Publication runs were 100 before 1997 and have increased to 300 today.

## 18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)

### Year 1 (2002)

Formal proposal of the **Lopingian** (Upper Permian) Series and **Wuchiapingian** Stage GSSPs.  
Formal proposal of the **Changhsingian** Stage GSSP.

### Year 2 (2003)

Formal proposal of the **Sakmarian** Stage GSSP.  
Formal proposal of the **Artinskian** Stage GSSP

### Year 3 (2003)

Formal proposal of the **Kungurian** Stage

### Continuously throughout this 5-year period:

- Publication of refined biostratigraphy and numerical age dates of the international Permian standard scale and its correlation to regional standards.
- Continue improving and publishing the biannual newsletter in both paper and digital formats.
- Complete digitization of past issues of *Permophiles* (from 1978) so that all are available over the internet.

## 19. SUBMITTED BY::

Bruce R. Wardlaw (Chair, Subcommittee on Permian Stratigraphy)  
Chief Paleontologist, U.S. Geological Survey

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# SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Carboniferous Stratigraphy (SCCS)

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

The SCCS promotes and coordinates international cooperation among various geologic specialists for the purpose of defining standard global chronostratigraphic boundaries within the Carboniferous System. The Devonian-Carboniferous boundary at the base has been selected in southern France, and the Carboniferous-Permian boundary at the top has been selected in northern Kazakhstan. Also, the Mid-Carboniferous boundary has been selected in Nevada, USA, and subdivides the Carboniferous into two subsystems, the Mississippian Subsystem below and the Pennsylvanian Subsystem above. Series and stage subdivision names and boundaries remain to be determined.

### 4. ORGANIZATION

SCCS is a subcommission of the International Commission on Stratigraphy (ICS). Current Chair is Philip H. Heckel (USA); Secretary is David M. Work (USA); Vice-Chair is Geoff Clayton (Ireland). There are a total of 21 voting members (see list at end of report), and approximately 350-400 corresponding members. Meetings of the SCCS are held every two years, both at the quadrennial meetings of the Carboniferous-Permian Congress, and at a Field Meeting convened by the SCCS alone midway between the Congresses.

There are several extant Working Groups and exploratory Project Groups:

Working Group to establish a boundary close to the Tournaisian-Visean boundary, chaired by George Sevastopulo (Ireland).

Working Group to establish a boundary close to the Moscovian-Kasimovian boundary [which is also close to the Desmoinesian-Missourian boundary], chaired by Elisa Villa (Spain). This group is also looking at potential boundaries close to the Kasimovian-Gzhelian [and Missourian-Virgilian] boundary.

Project Group on a chronostratigraphic level around the Visean V3a-V3b boundary, chaired by Nick Riley and Bernard Owens (UK).

Project Group on a boundary close to the Visean-Namurian/Serpukhovian boundary, chaired by Nick Riley (UK) [new, approved at the Calgary Congress in 1999].

Project Group on zonation in late Namurian successions to help establish the Bashkirian Stage as a geochronological standard, chaired by Juergen Kullmann (Germany).

Project Group on Comparative Angara and Gondwana Biostratigraphy, chaired by Marina Durante (Russia) [new, approved at the Calgary Congress in 1999].

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

The SCCS receives no formal financial support outside of IUGS/ICS allocations, and is grateful for the grant of \$1000 in 2001. The SCCS does receive small voluntary personal contributions from some of its members. The entire account is drawn upon to support the production of its annual 'Newsletter on Carboniferous Stratigraphy' and to cover unexpected operating expenses incurred by the officers. Individual voting members of the SCCS depend upon direct support from the institutions with which they are affiliated, specifically universities and governmental agencies such as institutes and surveys. This includes provision of technical services, secretarial support, and limited subsidies for travel to present work at meetings of the SCCS. Supplemental support is provided by some institutions or individuals that supply mailing envelopes and postage costs after the Newsletters have been delivered to them in bulk via economy airmail from the site of printing.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

The SCCS has worked with the Subcommissions and Working Groups on Devonian and Permian Stratigraphy; with IGCO 343 (Peri-Tethyan Program Working Group); and with former members of the now concluded IGCP 328 Paleozoic Microvertebrates, some of whom have commenced study of Carboniferous material. The current status of these interactions is unknown.

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

Geoff Clayton of Ireland was elected Vice-Chair of the SCCS in early 2001. In consultation with him, I have produced a short document concerning the new official nomenclature of the two parts of the Carboniferous System that was officially approved by the SCCS, ICS and IUGS in 1999-2000. We are in the process of sending it out to all journals of international distribution, notifying them that the two basic subdivisions of the Carboniferous System are the Mississippian Subsystem and the Pennsylvanian Subsystem, rather than Lower and Upper Carboniferous (used in many parts of the world), which are ambiguous terms from one part of the world to another.

In September 2001, the SCCS sponsored a general meeting at St. Louis, Missouri, USA, with an associated field trip that visited the type region of the Mississippian Subsystem in the Mississippi River valley north and south of St. Louis. This meeting was attended by a total of 22 people, including 7 voting members of the SCCS and 1 member of the ICS executive board. A total of 8 participants, including 4 voting members, came from Europe. The SCCS meeting included 9 presentations, which focused on the promising candidate section in south China for a GSSP for the Tournaisian-Visean boundary, and on biostratigraphy of the Tournaisian-Visean and Visean-Serpukhovian boundary intervals in Russia. The field trip of four and one-half days was led by Paul Brenckle and Richard Lane who had carried out intensive biostratigraphic work in this region while employed in the paleontological research group of Amoco Production Company. It covered the entire type Mississippian succession from base to top and focused on both the boundaries between the regional American subdivisions and on the probable intervals within which the classic European boundaries can be correlated. Many samples across the boundary intervals were collected by the

foreign participants for reference material to complement their collections from elsewhere, with the hope of enhancing the biostratigraphic definitions of the eventual global boundaries.

We have established contact with a radiometric dating laboratory directed by E.T. Rasbury at State University of New York at Stony Brook, which has produced some new radiometric dates for the upper part of the Pennsylvanian succession in the Appalachian Basin, as reported by Becker et al. in the July 2001 issue of the Carboniferous Newsletter. These dates are based on U-Pb dating of fresh-water limestones and paleocaliches, the latter of which are more common in the cyclic fossiliferous marine sections that are better biostratigraphically constrained than many of the terrestrial or volcanic sections from which many of the existing dates for the Pennsylvanian have been obtained. We have provided several biostratigraphically constrained samples of paleocaliche from the classic middle and upper Pennsylvanian succession in Midcontinent North America to this research group, in the hopes of procuring more useful dates near the top of the Carboniferous.

### **Chief Products in 2001:**

*Newsletter on Carboniferous Stratigraphy*, Volume 19, published July 2001. Its 79 pages contain reports of Working Groups for 2000, and 24 articles on various topics including: New proposals for series and stage subdivision of the two subsystems of the Carboniferous System; new radiometric dates from Europe and the Appalachian Basin of North America; tetrapod biochronology; position of the Kinderhookian-Osagean boundary in the Appalachian Basin; new biostratigraphic data on the Tournaisian-Visean boundary in Czech Republic, and in Kyrgyzstan; new data on the Visean-Serpukhovian boundary, and summaries of Serpukhovian foraminiferal and ammonoid biostratigraphy in parts of Russia; marine and glacial deposits in Argentina; reports of paleobotanical studies in the paleotropical realm; lower and middle Pennsylvanian conodont zonation in North America; correlation, and fusulinid and conodont zonation of the Moscovian Stage; Orenburgian versus Bursumian as the terminal stage of the Carboniferous; the Carboniferous-Permian boundary in Bohemia. This newsletter is a very valuable product because it summarizes briefly in a timely fashion certain ongoing work in many parts of the world, much of which will not be published very soon or in readily accessible literature. I have found it invaluable in keeping up with current trends in research covering the entire Carboniferous. This issue contains several articles invited by me, including those on possibilities for series and stage classification in order to encourage the entire membership to provide suggestions to the voting members on a topic that must soon be dealt with in a formal fashion, and on radiometric dating in order to provide the latest dates that are available, so as to keep all members current on new data in this extremely important aspect of chronostratigraphy, within which there is much variance from different methods and different areas in which the same names are used, throughout the Carboniferous.

*Stratigraphy and Biostratigraphy of the Mississippian Subsystem (Carboniferous System) in its Type Region, the Mississippi River Valley of Illinois, Missouri, and Iowa* [108 pp.] published September 2001 as the guidebook for the field trip associated with the SCCS meeting in St. Louis. This guidebook summarizes the basic lithostratigraphy of the type Mississippian, and most importantly, it summarizes the immense amount of biostratigraphic information collected and analyzed during the 1970s by Paul Brenckle and Richard Lane while supported by Amoco Production Company, which provided a significant data base for correcting some misconceptions about global correlation of the regional American subdivisions. This provides a data base that should enhance selection of global boundaries within that subsystem. In addition to articles directly related to the field trip, it includes a



summary of current knowledge on the Mississippian succession in Iowa, which contains some enigmatic units that only now are becoming better understood.

### **Summary of Working and Project Group Reports**

The Working Group on the **Tournaisian-Viséan boundary**, chaired by George Sevastopulo, is now concentrating on the analysis of the Pengchong section, south China, which seems to be the most promising for selection of a GSSP. This section was cleaned, logged and sampled in detail in April 2000 (Devuyst et al. 2000 Carboniferous Newsletter, 18: 11-12). Analysis of thin sections by Dr X.H. Wu, Guizhou Bureau of Geology, China and F-X Devuyst and Dr Luc Hance, Unit de Géologie, Université Catholique de Louvain, Belgium, confirmed the promise of earlier sampling and has led to the identification of the horizon in the section where *Eoparastaffella simplex* Morphotype 2 [nomenclature of Hance (1997 Cushman Found. Foram. Res. Spec. Pub. 36: 59-62)] first occurs, which is where the GSSP will be defined. Conodont samples have been initially studied by H. Hou and S. Tian, Institute of Geology, Beijing, China. A meeting, attended by H. Hou, S. Tian, M., F-X Devuyst, E. Groessens, L. Hance and G.D. Sevastopulo, was held at Université Catholique de Louvain, Belgium in May 2001, where the material from the April 2000 sampling was reviewed. The distribution of conodonts was found to be consistent with that in Tournaisian-Viséan boundary sections in Belgium.

Devuyst spent March and April in Dublin with Sevastopulo working on Irish sections through the Tn/V boundary. The boundary can be identified accurately using foraminiferans but supporting evidence from conodonts was poor in the sections studied. Work in Belgium by F-X Devuyst and L. Hance has shown that Tournaisian representatives of the *Eoparastaffella* lineage are present and that the abrupt entry of *E. simplex* morphotype 2 in the previously proposed Belgian Tn/V boundary section can be explained within a sequence stratigraphic model of sedimentation.

Clayton, Devuyst, Hance, and Sevastopulo attended the meeting of the SCCS at St Louis, Missouri, USA in September and presented the results of recent work (Sevastopulo et al. 2001 Carboniferous Newsletter, 19: 7-8). Coen, Devuyst and Hance will visit China in November 2001, and, with Hou, Tian and Wu, will carry out further work on the Pengchong section, particularly the collection of additional conodont samples. They will also study other sections closer to the contemporary shelf, which it is hoped will provide information about the distribution of macrofossil groups not available in the Pengchong section.

Plans for 2002 are to consolidate the information for the Pengchong section, particularly with regard to conodont distribution; processing and study will be undertaken in Dublin by Sevastopulo. We hope that it will be possible to arrange a field visit to Pengchong and nearby sections in south China, after which we plan to propose the selection of the GSSP for the base of the Viséan in the Pengchong section.

The Working Group on GSSP close to the **Moscovian-Kasimovian boundary**, chaired by Elisa Villa, continued studies on several potential levels of correlation within the interval from the uppermost Moscovian (upper Desmoinesian) to the lower Gzhelian (lower Virgilian) in the Pennsylvanian Subsystem. These levels are in the paleotropical areas [Donets and Moscow Basins of eastern Europe, Cantabrian Mountains of Spain, and Midcontinent region of North America]. The potential stratigraphic events related to conodont and fusuline evolution were summarized through early 2001 in the 2001 Carboniferous Newsletter (19, 8-11).

More recent fusuline studies by Villa and others (2001; in press) and Villa and Ueno (in press; see references below) illustrate two significant points: (1) a strong fusuline provincialism existed in

Eurasia during late Kasimovian time, making it difficult to correlate on the basis of fusulines between Paleo-Tethys areas (Cantabrian Zone, Carnic Alps, Central Asia) and the Donets and Moscow Basins; and (2) some lower Gzhelian fusuline faunas [e. g. *Rauserites rossicus* (Schellwien)] show wider distribution, and, therefore may have a potential for correlation within Eurasia. This wider geographic distribution could be the consequence of an early Gzhelian transgression.

Recent conodont work also has provided two significant discoveries bearing on long-distance correlation. (1) Carlos M ndez (University of Oviedo, Spain) discovered *Idiognathodus eccentricus* (Ellison) [whose first appearance defines the base of the Missourian Stage in Midcontinent North America] in the top of the Protriticites Zone of the Las Llacerias section in the Cantabrian region of Spain, which could suggest the correlation of a level within the upper Krevyakinian with the lower Missourian. (2) Aleksander Alekseev and Natalya Goreva (Moscow State University and RAS Geological Institute, respectively) discovered *Idiognathodus fischeri* sp. nov. in limestone N3/2 of the Kalinovo section (Donets Basin, Ukraine), suggesting a correlation of this limestone with the upper part of the Suvorovo Fm. (lowermost Kasimovian) of the Moscow Basin.

Although the Working Group did not hold a general meeting, the Moscow group (coordinated by Alekseev) carried out field work in the Dalniy Tyulkas section in Bashkiria (South Urals) in August 2001, to prepare for a future Working Group meeting and field-trip scheduled for the summer of 2002. The Dalniy Tyulkas section is of great interest because it has yielded deeper water conodont faunas that have potential relevance for global correlation. The interval investigated by the Moscow group during this last trip was extended to include the Kasimovian-Gzhelian transition.

#### References

- Villa, E., and Working Group, 2001, [Report of Working Group to define a GSSP close to the Moscovian / Kasimovian boundary. *Newsletter on Carboniferous Stratigraphy*, v. 19, p. 8-11.
- Villa E., Ueno K. & Bahamonde J. R. (2001) - Late Carboniferous fusulinoideans from the Cantabrian Zone, Spain: characteristics of the westernmost Paleo-Tethys faunas. *Abstracts of PaleoForams 2001*, International Conference on Paleozoic Benthic Foraminifera, Ankara Turkey, p. 48.
- Villa E., Dzhenchuraeva A., Forke H. C. & Ueno, K. (in press) - Distinctive features of Late Carboniferous fusulinoidean faunas from the western Paleo-Tethyan realm. In: Hills L. V., Henderson C. M. & Bamber E. W. (Eds.) - Carboniferous and Permian of the World, XIV International Congress on the Carboniferous and Permian. *Canadian Society of Petroleum Geologists, Memoir 19*.
- Villa E. & Ueno K. (in press) - Characteristics and paleogeographic affinities of the early Gzhelian fusulinoideans from the Cantabrian Zone (NW Spain). *Journal of Foraminiferal Research*, 32/2 (2002).

The Project Group on **Zonation in Late Namurian** successions to establish the Bashkirian Stage as a geochronological standard, chaired by Juergen Kullmann, reports that E.I. Kulagina, V.N. Pazukhin and colleagues (Ufa, Bashkiria, Russia) and S.V. Nikolaeva (Moscow) continued work on descriptions of the standard sections of the Bashkirian Stage. A 2001 monograph by Kulagina and others summarizes all material on Bashkirian stratigraphy and contains the new stratigraphic scheme proposed for the Bashkirian, including four substages: Syuranian, Akavassian, Askynbashian and Arkhangelskian (previously upper Bashkirian), and six further subunits (horizons). It also correlates the ammonoid, conodont, ostracode and foraminiferal zonations. A comparison of the Syuranian and Bogdanovskian sections showed that the Bogdanovskian unit has to be considered a part of the Syuranian substage. Distribution of the Kulagina et al. publication at the moment has been held up by postal problems.

The other project groups have not yet reported.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

No serious problems other than lack of reports from several project groups.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANTICIPATED THROUGH MARCH 2002):

STATEMENT OF OPERATING ACCOUNTS FOR 2000/2001, Prepared by David Work, Secretary

INCOME (Oct. 2000--Sept. 2001)	\$US
IUGS Grant in 2001	1,000.00
Donations from Members	<u>225.54</u>
TOTAL INCOME	1225.54

### EXPENDITURE

Feb. 2001 informational letter bulk mailing	200.00
Newsletter 19 printing and postage	1995.31
Mailing Supplies (Newsletter 19)	63.52
Bank Charges [~\$25/month]	<u>126.94</u>
TOTAL EXPENDITURE	2385.77

### BALANCE SHEET (2000- 2001)

Funds carried forward from 1999 - 2000	2853.07
PLUS Income 2000 - 2001	1225.54
LESS Expenditure 2000 - 2001	<u>-2385.77</u>
CREDIT balance carried forward to 2001- 2002	1692.84

## 11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:

For the Working Group on the **Tournaisian-Visean boundary**, Coen, Devuyt and Hance will visit China in November 2001, and, with Hou, Tian and Wu, will carry out further work on the Pengchong section, particularly the collection of additional conodont samples. They will also study other sections closer to the contemporary shelf, which it is hoped will provide information about the distribution of macrofossil groups not available in the Pengchong section. Plans for 2002 are to consolidate the information for the Pengchong section, particularly with regard to conodont distribution; processing and study will be undertaken in Dublin by Sevastopulo. We hope that it will be possible to arrange a field visit to Pengchong and nearby sections in south China, after which we plan to propose the selection of the GSSP for the base of the Visian in the Pengchong section.

I am optimistic that the Working Group on the Tournaisian-Visean boundary will be much closer to proposing a global GSSP at the Pengchong section in south China.

For the Working Group on the **Moscovian-Kasimovian boundary**, Russian colleagues based in Moscow (coordinated by voting member Aleksandr Alekseev) have scheduled a meeting and field trip in Bashkiria (South Urals) in mid-August 2002. This meeting will be headquartered in Krasnousolsk and will visit the Dalniy Tyulkas section, which is of great interest because it has yielded deeper water conodont faunas that have potential relevance for global correlation. The intervals to be visited will include uppermost Moscovian to basal Kasimovian and a newly exposed section across the Kasimovian-Gzhelian transition.

I am hopeful that the Krasnousolsk meeting of the Working Group to establish a boundary close to the Moscovian-Kasimovian and Kasimovian-Gzhelian [and Desmoinesian-Missourian, and Missourian-Virgilian] boundaries will provide enough biostratigraphic data, particularly with respect to conodonts, that the Working Group can begin to narrow down the possibilities of faunal lineages for defining those boundaries.

For the Working Group on the **Bashkirian Stage**, the Russian members will devote effort to substantiate the Bashkirian-Moscovian boundary.

I am hopeful that there is enough progress in the 'Project Group on zonation in late Namurian successions to help establish the Bashkirian Stage as a geochronological standard', that a working group can be established to begin an earnest search for a boundary close to the existing Bashkirian-Moscovian boundary.

In line with the effort to speed up work on global boundary selection within the Carboniferous System, I plan to begin the establishment of two new working groups:

1. One will be entitled something like '**Working Group to establish boundary[ies] near the existing Visean-Serpukhovian boundary**'. This will combine the purposes and efforts of two project groups: a) on a chronostratigraphic level around the Visean V3a-V3b boundary, and b) on a boundary close to the Visean-Namurian/Serpukhovian boundary.
2. The other will be entitled '**Working Group to define a Bashkirian-Moscovian boundary**' and will provide final focus for the 'Project Group on Zonation in Late Namurian successions to establish the Bashkirian Stage as a geochronological standard'.

I also plan to continue to encourage movement toward consensus on competing suggestions for series and stage names and classification, as initiated by the two articles on the subject in the 2001 *Newsletter on Carboniferous Stratigraphy* [v. 19], one by myself entitled 'New proposal for series and stage subdivision of the Carboniferous System' [p. 12-14], and one by A.S. Alekseev entitled 'Stage Subdivision of the Carboniferous System' [p. 14-16].

In addition, I plan to continue close contact with the radiometric dating laboratory directed by E.T. Rasbury at State University of New York at Stony Brook. I will monitor their progress on the several biostratigraphically constrained samples of paleocaliche from the classic middle and upper Pennsylvanian succession in Midcontinent North America that our group has already supplied them, and we will provide more samples as we collect them in our ongoing field work. I also remain in contact with Manfred Menning of Geoforschungs Zentrum in Potsdam, Germany, who continues to compile and evaluate the entire range of Carboniferous radiometric dating.

It is uncertain how much progress will be made on the upper Visean through Serpukhovian boundaries. Because of lack of progress reports from the Project Groups Chair, I need to be careful about the chairmanship of the Working Group to be established, which combines these two project groups.

Most written communications available to the voting membership and the membership in general, takes place through the Newsletter on Carboniferous Stratigraphy, which is published annually in July. The definite product for 2002 will be volume 20 of the *Newsletter on Carboniferous Stratigraphy*, which will summarize progress of the various working and project groups in the previous 12 months, and present current views and brief summaries of current research efforts of both the voting and nonvoting members of the Subcommittee on a variety of topics dealing with Carboniferous stratigraphy.

Particularly significant, longer stratigraphic and biostratigraphic contributions typically are submitted for publication in such journals as *'Episodes'*, *Newsletters in Stratigraphy*, *Journal of Paleontology*, etc.

## 15-16. BUDGET AND ICS COMPONENT FOR 2002

### PROJECTED EXPENSES

Postage for bulk mailing of informational letter early in year	\$200
Newsletter printing (est. 400 copies @ 80 pages at commercial rates)*	\$1800
Supplies and postage for bulk mailing of Newsletter to various areas*	\$600
Bank charges for international account [at \$25/month]	<u>\$300</u>
TOTAL PROJECTED EXPENSES	\$2900

### INCOME

Carryover (from CREDIT balance in item # 10 above)**	\$1693
Estimated donations	<u>\$250</u>
TOTAL INCOME	\$1943

### BALANCE

Estimated deficit from above	(\$957)
BUDGET REQUEST FROM ICS for 2002	\$1000

\* These items are separately listed here [cf. item # 10] and are anticipated to rise in cost from last year because there has been a continual steady increase in the number of scientists who have asked to become corresponding members and thus to receive the Newsletter.

\*\* This item is larger than shown last year in the previous Secretary's report because the entire donation account is now included in this figure. Unfortunately, donations seem so far to be diminishing from previous years.

No direct funding sources for SCCS exist beyond voluntary donations from some SCCS members, which fluctuate from year to year, and have recently diminished.

## 17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)

This summary is based largely on information derived from the working and project group reports in volumes 15-19 of the *Newsletter on Carboniferous Stratigraphy* [1997-2001].

An initial 1997 ballot on the naming of the two subdivisions of the Carboniferous System resulted in a close vote that rejected the names Lower and Upper, and approved the names Mississippian and Pennsylvanian, but just short of the required 60% majority to be declared final. After a long period of wrangling over procedure as well as the nomenclatural issues, the final ballot was ultimately taken at the mandate of former ICS Chair Jurgen Remane in late 1999. As reported in the 2000 Carboniferous Newsletter [v. 18, p. 3], this ballot resulted in approval of the names Mississippian and Pennsylvanian by a 76% majority, along with a reconfirmation of the previous decisions of the SCCS to regard their rank as subsystems, by the same 76% majority.

Work on the Tournaisian-Visean boundary in the lower part of the Mississippian Subsystem was reported in 1997, 2000, and 2001 as well as in other publications mentioned in the most recent report of this working group. These efforts appear to have progressed to the point that its biostratigraphic definition will soon be approved, and field work is currently going on that hopefully will finalize choice of the section at which the GSSP will be selected.

The status of current work is uncertain on the next higher boundary[ies] in the Mississippian around the Visean V3a-V3b level and the Visean-Namurian/Serpukhovian level, for which project groups were approved for the former in 1995 and for the latter in 1999. Since an informative article in the 1997 Carboniferous Newsletter [v.15, p. 19-22], official reports in the 1999 and 2000 Carboniferous Newsletters [v. 17, p. 6; v. 18, p. 7] were quite brief, and I have not received any report from the project groups Chair in either late 2000 or 2001.

Work on characterization and subdivision of the type Bashkirian [the lower subdivision of the Pennsylvanian Subsystem] in the southern Urals was reported extensively in 1997 and 1998, and briefly in 1999 and 2001. Russian workers made illustrated verbal presentations on the most recent progress at the September 2001 meeting in St. Louis, and some of this work was published as separate articles in the 2001 Newsletter.

Work on the Moscovian-Kasimovian boundary [essentially between the middle and upper Pennsylvanian] has been extensively reported in all 5 Newsletters. Much new work has been stimulated on both fusulines and conodonts as a result of the collaboration engendered within the Working Group at its nearly annual meetings in Ukraine in 1996, Spain in 1997, Moscow region of Russia in 1998, Midcontinent USA in 1999, Spain again in 2000, and planned for the south Urals region of Russia in 2002. Fusuline workers have recognized problems of provincialism in much of the Kasimovian part of the succession in Eurasia. Conodont workers are in the process of clearing up the serious taxonomic problems that have stymied progress within that group, and also have recognized more provincialism than was once thought to exist between Eurasia and North America during the Kasimovian/Missourian Epoch of time.

Radiometric dating throughout the Carboniferous, most of it published in detail elsewhere, has been summarized in the Newsletter several times by Manfred Menning and his colleagues, who have shown that use of different methods in different places, many on samples from sections without good marine biostratigraphic constraints, has resulted in inconsistencies [for example, of up to 7.5 million years at the Mid-Carboniferous boundary]. A new laboratory dating paleocaliches at SUNY Stony Brook has produced some new dates on upper Pennsylvanian units in the Appalachian Basin where there is good marine biostratigraphic control, which are inconsistent with previous dates of supposedly the same interval in areas where marine biostratigraphy is lacking.

## 18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)

This is necessarily brief and only based on trends that I perceive now within the SCCS, and what I hope to do about them within the near future. I will certainly encourage all members to maintain progress on researching and selecting GSSP boundaries

The **Tournaisian-Visean boundary GSSP** should be selected within the next three years, based on the extensive work that has been done and is currently underway by members of the Working Group.

I am cautiously hopeful that a Working Group to be established on boundary[ies] near the existing **Visean-Serpukhovian boundary** will successfully combine and promote the efforts of the two project groups looking for potential boundaries within the upper part of the Mississippian Subsystem.

It is possible that significant progress will be made toward selecting a **Bashkirian-Moscovian boundary**, now that extensive research that has dealt mainly with subdivision within the Bashkirian, is planned to be focused on its upper boundary.

It is possible that that the two higher boundaries within the Pennsylvanian will be able to be selected once the conodont taxonomy is clarified enough to determine which of the two successions, the south Urals or Midcontinent North America, has a correlatable transition within an evolutionary lineage.

It is possible that through reasoned and pragmatic discussion, an acceptable series and stage subdivision will be achieved within the Carboniferous System and its two Subsystems.

It is quite likely that new radiometric dating, particularly on biostratigraphically well constrained marine successions, will narrow the age disparities that currently exist within much of the Carboniferous.

## 19. SUBMITTED BY:

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**SUBCOMMISSION ON CARBONIFEROUS STRATIGRAPHY (SCCS)  
OFFICERS AND VOTING MEMBERS 2000-2004**

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# SUBCOMMISSION ON DEVONIAN STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Devonian Stratigraphy

### 4. ORGANIZATION

#### 1. Executive body

Chairman: P. Bultynck (Belgium)

Vice Chairman: R. Crick (U.S.A.)

Secretary: T. Becker (Germany)

#### 2. Other voting members

I. Chlupac (Czech Republic)

A. El Hassani, new member (Morocco)

R. Feist (France)

J. Garcia-Alcalde (Spain)

Hou Hong Fei (P.R. China)

M. H nicken (Argentina)

W.T. Kirchgasser (U.S.A.)

G. Klapper (U.S.A.)

V. Menner (Russia)

P. Morzadec (France)

J.B. Richardson (United Kingdom)

C. Sandberg (U.S.A.)

M. Strel (Belgium)

J. Talent (Australia)

S. Turner (Australia)

T. Uyeno (Canada)

K. Weddige (Germany)

E.A. Yolkin (Russia)

W. Ziegler (Germany)

Zou Han, new member (P.R. China)

### 7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

**Joint Meeting of SDS and IGCP, n. 421** ("North Gondwanan Mid-Paleozoic bioevent/biogeography patterns in relation to crustal dynamics"), hosted by the 15th International Senckenberg Conference Frankfurt am Main, May 11-21, 2001.

Main scope of the conference: Mid-Paleozoic bio- and geodynamics - The North Gondwana - Laurussia Interaction. SDS participation consisted in the presentation of about 50 lectures/posters at the conference by SDS members and in the organization of the annual SDS Business Meeting. The latter meeting was attended by 12 voting members, 32 corresponding members and many participants of the conference. The agenda is appended (appendix 1). The scientific discussion mainly focused on the subdivision of the Devonian stages: Emsian, Givetian, Frasnian and Famennian. Before the discussion I informed the participants that the ICS Executive Committee "*discourages formalization of outcrop-based GSSP's for substages or finer subdivisions of stages. However, standardization of global substages or other finer divisions using voted agreements on correlation criteria, such as primary biostratigraphic or magnetic markers, is to be encouraged when appropriate*". As SDS chairperson I can agree with the first part of the ICS Executive Committee recommendation, because

formally defined GSSP's are not the ultimate goal of our substage programme. Our substage objective is in complete agreement with the second part of your recommendation.

### Progress on GSSPs

- Large majority for a twofold division of the **Emsian** and for a level close to the Daleje Event.
- An upper **Givetian** stage defined in relation to the Taghanic Event. A threefold division deserves serious consideration.
- Agreement on a threefold subdivision for the **Frasnian** and almost agreement on the stratigraphic levels.
- Substantial argumentation/documentation for either a threefold or fourfold subdivision of the **Famennian**.

Contributions to these topics will be published in *Newsletter* n.17 (late 2001-early 2002).

### Publications

Subcommission on Devonian Stratigraphy - Recognition of Devonian series and stage boundaries in geological areas. -*Cour. Forsch.-Inst. Senckenberg*, 225: 347 pp. (published in 2001).

Proceedings of the SDS-IGCP 421 Morocco Meeting. - *Travaux de l'Institut Scientifique - Srie G ologie et G ographie physique*, 20: 116 pp. (published in 2001).

Moroccan Meeting of the Subcommission on Devonian Stratigraphy (SDS) and IGCP 421, April 24th-May 1st 1999. Excursion Guidebook. - *Notes et M m. Serv. G ol. Maroc*, 399: 128 pp. (published in 2001).

SDS Newsletter n#17: 70 pp. Edited by Rex E. Crick, Arlington TX (published in 2001).

## **10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):**

Operating accounts	in US \$
Income for 2001	
. carried forward from 1999	687.41
. IUGS-ICS Subvention for 2001	2,000
	2,687.41
Expenditure for 2001	
. Financial support for 3 SDS members (EI Benfrika, Ovnatanova, Tsyganko) to attend the SDS Meeting in Frankfurt	1,800
. Secretary expenses	300
. Contribution to Newsletter n(18 costs	400
. Bank commission	21.83
	2,521.83
Total	
Balance	165.58

**11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

. 2002, June 22-25, Eighth International Conodont Symposium held in Europe (ECOS VIII), Toulouse-Albi with meetings of the SDS and IGCP 421. ECOS VIII will focus on all aspects of conodont research and there will be a special session on "Bias and completeness in the conodont fossil record".

. 2002, July 9-12, International Symposium "Geology of the Devonian System" held in Syktyvkar (Russia), organized by the Institute of Geology of the Komi Science Centre (V.S. Tsyganko and T.M. Beznosova). SDS participates in the organization of the symposium.

Main themes of the symposium:

1. Evolution of Devonian sedimentary basins; 2. Main issues of Devonian sections subdivision; 3. Peculiarities in Devonian biota evolution; 4. Multidisciplinary approaches to subdivision and correlation of marine and continental deposits of the Devonian; 5. Patterns in the occurrences of hydrocarbon deposits in Devonian sediments; 6. Geology of Devonian stratiform solid mineral deposits.

**Future plans**

. SDS introduced a Symposium proposal for the 32nd IGC, Florence, 2004 on "Multidisciplinary high resolution stratigraphy of Devonian stages as a tool for standardization of global substages". SDS plans to come to conclusions on the subdivision of the Emsian, Givetian, Frasnian and Famennian stages.

**15-16. BUDGET AND ICS COMPONENT FOR 2002**

	in US \$
. Financial support for SDS members to attend the SDS meeting held during ECOS VIII	1,800
. Secretary expenses	300
. Contribution to Newsletter n#19	400
Total	2,500

**19. SUBMITTED BY:**

Name: P. Bultynck  
 Position: Chairperson SDS  
 Date: November 6th, 2001

## APPENDIX: SDS Business Meeting 2001

We are looking forward to the SDS Business Meeting to be held during the 15th International Senckenberg Conference on May 16 at 2 pm at the Naturmuseum Senckenberg, Senckenberganlage 25, Frankfurt am Main.

### AGENDA

1. Introduction and apologies for absence.
2. Approval of the Minutes of the previous meeting held at Rio de Janeiro on August 7th 2000 (circulated with SDS Newsletter 17).
3. Chairman's Business.
4. Devonian substages and possibly additional stages.
  - A. Reports from the Working Groups.
  - B. Oral contributions (o.c.) and discussion of submitted documents (doc.).
    - . O.H. WALLISER & A.J. KIM: Lowermost Emsian tentaculites from the Zinzilban boundary section (o.c.).
    - . U. JANSEN: The classical boundary Lower/Upper Emsian in Germany (doc.).
    - . R.T. BECKER & S.Z. ABOUSSALAM: Proposal for the definition of an Upper Givetian substage (doc.).
    - . P. BULTYNCK: Updating of the distribution of conodonts and other faunal groups in the Fromelennes type section (Upper Givetian, Ardenne) (doc.).
    - . R.T. BECKER et al.: A potential Middle Frasnian stratotype section at Chut River (Southern Timan, Russia) (doc.).
    - . P. BULTYNCK: Lower, Middle and Upper Frasnian in the type area for the naming of the stage (o.c.).
    - . M. PIECHA & E. SCHINDLER: Frasnian and Famennian subdivision - Results of the German Late Devonian Working Group sessions 2001 (doc.).
    - . M.C. PERRI & C. SPALLETTA: Results on conodont samples from Mrakib section (Morocco) (o.c.).
    - . R.T. BECKER: Alternatives for a substage subdivision of the Famennian (doc.).
    - . M. STREEL: The Uppermost Famennian around the world (definition, biostratigraphical and sedimentological context) (o.c.).
5. General oral contributions and documents.
  - . R. CRICK: Status of magnetostratigraphy susceptibility with emphasis on regional and global correlation.
  - . K. WEDDIGE: Various topics (see Newsletter 17: 65-69).
6. Discussion of ICS news.
7. Membership.
  - A. Election of TM's.
  - B. Election of CM's.
8. Financial report.
9. Future Meetings.
  - . Joint Field Meetings of IGCP 410 & IGCP 421: Palaeozoics of Central Asia: Mongolia and the Altai Mountains of SW Siberia (August 3 - September 6 2001).
  - . V. TSYGANKO: About the International Symposium "Geology of Devonian System" in Syktyvkar, 2002 (Tsyganko, Beznosona & Antoshkina).

- . SDS meeting during the VIII International Conodont Symposium held in Europe, Toulouse - Albi (June 22-25, 2002).
  - . First International Palaeontological Congress (Macquarie University Center for Ecostratigraphy and Palaeobiology, Sydney, 6-10 July 2002).
  - . Invitation by CM A.R. ASHOURI for a Devonian symposium, SDS Business Meeting and field excursion in Iran, Ferdowsi University of Mashad, in spring 2003
  - . Possible Devonian meeting and field excursions to SW Morocco (Dra-Valley area) in spring 2004 (proposed by CM A. EL HASSANI).
10. Any other business.

With best wishes from SDS Chairman P. BULTYNCK and SDS Secretary R. Thomas BECKER.

# **SUBCOMMISSION ON SILURIAN STRATIGRAPHY**

## **ANNUAL REPORT 2001**

### **1. TITLE OF CONSTITUENT BODY**

Subcommission on Silurian Stratigraphy (SSS)

### **2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY**

- a) Elaboration and improvement of the standard global stratigraphical (SGS) scale for the Silurian System, including definition of boundaries and the selection of Global Stratotype Sections and Points (GSSP) under IUGS guidelines.
- b) Refinement of international correlation within the Silurian System, with particular emphasis on development of a generalized scheme of zonal fossils for global applications.
- c) Stimulation of research and international cooperation, with particular emphasis on the coordination of working groups focused on various zonal fossils such as graptolites, conodonts, chitinozoans, etc.
- d) Evaluation and integration of new approaches to the correlation of Silurian strata on a global scale.

### **4. ORGANIZATION**

The SSS is a subcommission of the International Commission on Stratigraphy, consisting of 15 Voting and 48 Corresponding members. Voting members are selected to achieve regional representation and a balanced stratigraphic expertise. Corresponding membership is open to all individuals demonstrating a commitment to scholarship in Silurian stratigraphy.

Officers:

Chairman: Rong Jia-yu

Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, People's Republic of China

Vice-chairman: Tatjana N. Koren

All Russian Geological Research Institute -VSEGEI, Sredny pr. 74, 199026, St. Petersburg, Russia

Secretary: Michael J. Melchin

Department of Geology, St. Francis Xavier University, P.O. Box 5000, Antigonish, Nova Scotia B2G 2W5, Canada

The SSS Treasury is maintained as a separate organizational account at St. Francis Xavier University.

## 5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

Membership in the SSS is represented by specialists from 29 countries and from all continents except Antarctica. Most of the major regions of the world with extensive exposures of Silurian strata are covered, especially Eurasia, North America, South America, Australia, and Africa.

The 3rd and 2nd International Symposia on the Silurian System (convened in Rochester, N.Y. in August 1996 and in Orange, New South Wales (Australia) in July 2000 under sponsorship of the SSS) enjoyed significant financial support from educational institutions, private science foundations, and corporate sponsors. Institutional support will also be provided for the upcoming Silurian Field Meeting in Argentina (August, 2003). Ongoing grant support exists for symposia publications through the cooperation of the New York State Museum (Albany) and the Australian Museum (Sydney).

Substantial national-based support was contributed for other SSS field meetings in Australia (2000), Spain and Portugal (1998), Austria (1994), the Czech Republic (1992), Estonia (1990), Australia (1986), the Ukraine (1983), Norway (1982), Canada (1981), and the United Kingdom (1979, 1989).

## 6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

SSS members are very active in the IPA international research groups on graptolites, conodonts, chitinozoans, and vertebrates. In addition, there is considerable overlap of the activities of many SSS members with the Subcommittee on Ordovician Stratigraphy, particularly regarding the events surrounding the Late Ordovician mass extinction event and subsequent biotic recovery. The SSS field conference held in Spain and Portugal in 1998 was arranged to coincide with the Sixth International Graptolite Conference. The 2003 SSS field conference is scheduled to be held in connection with the International Graptolite Conference and an International Symposium on the Ordovician System in Argentina.

## 7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

### Summary table of Silurian subdivisions

<u>System</u>		<u>Series</u>	<u>Stages</u>
<b>Silurian</b>	Upper	<b>Pridoli</b>	(no subdivisions)
		<b>Ludlow</b>	Ludfordian Gorstian
	Lower	<b>Wenlock</b>	Homerian Sheinwoodian
		<b>Llandovery</b>	Telychian Aeronian



## Rhuddanian

*Source: Holland, C.H. and Bassett, M.G. (1989). A Global Standard for the Silurian System, National Museum of Wales, Geological Series No. 9, p. 24.*

No changes or additions to this scheme have been made during the last seven years. As recently as the last biennial meeting of the SSS in Spain in 1998, the membership confirmed its majority support for the status quo. New officers of the subcommission did not take the decision to reopen nomenclatural questions after July 2000 at the biennial meeting of the SSS in Australia, July 2000. However, they did agree that some boundary stratotypes required re-examination (see below).

The ninth issue of *Silurian Times* - the official newsletter of the Silurian Subcommission (edited by Secretary Mike Melchin) was circulated in April 2001 to all subcommission members, as well as a broad constituency of Silurian researchers around the world. This is the first year that the newsletter was produced as a world-wide web document and it forms the main part of a new WWW Site for the SSS. Almost all SSS members were able to read the document in this way and relatively few copies needed to be circulated through the normal postal system. By this means, the SSS continues to realize substantial savings in postal costs. In addition, this form of transmission of *Silurian Times* means that all researchers and members of the general public who have an interest in the Silurian System can learn of the activities of the SSS. In addition, updates to the site can be posted at intervals other than the annual time of delivery so that the news can remain more current.

A decision was made that some the GSSPs of the Silurian System should be re-examined in light of the experience that researchers have had in using these GSSPs as well as new information that had become available since they were established. This decision was based on discussions that took place at the most recent meeting of the SSS in Australia (July 2000), and subsequently received the support of the majority of titular members. It was also decided that initially two stratotypes should be restudied, possibly with others to follow. The two that will be restudied are the Base of Silurian and Base of Wenlock. Full discussions of the rationale for conducting these restudies can be found in the *Silurian Times* web site at: <http://iago.stfx.ca/people/mmelchin/os-gssp9.htm> and: <http://iago.stfx.ca/people/mmelchin/lw-gssp9.HTM>.

Two SSS titular members have been asked to organize new boundary restudy working groups: Mike Melchin (Canada) for the Base of Silurian; and David Loydell (UK) for the Base of Wenlock. They have been given the mandate to organize a working group with broad representation internationally as well as among researchers in the various biostratigraphic and stratigraphic fields that bear upon problems of international correlation. The process of forming these working groups has begun.

The other project that has begun in earnest in 2001 was the planning of the next field meeting of the SSS, in Argentina in 2003, in connection with an International Symposium on the Ordovician System and an International Graptolite Conference. Field trips itineraries are planned to include many well-known Silurian localities in the Argentine Precordillera. Mike Melchin has been asked to serve as Technical Programme Co-ordinator for the in-house portion of the Silurian Field Meeting, with assistance from Argentine colleagues. Information pertaining to this conference can be found at: <http://iago.stfx.ca/people/mmelchin/isos-igc-sss1.HTM>.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

A decision was taken in 1998 to divide the keynote manuscripts from the 2nd International Symposium on the Silurian System into two volumes, based on the length of the early manuscripts submitted for editorial review. The last manuscript necessary for the volume on "Silurian Lands and Continental Margins, Exclusive of North America" was collected in March and has now gone through technical and peer reviews. As a result of delays in the review and revision process, the entire volume should be ready to go to press by the end of 2001 or early in 2002.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANTICIPATED THROUGH MARCH 2002):

### Income (U.S. dollars)

1. Carryover from 2000	\$ 30.97
2. 2001 ICS subvention	<u>200.00</u>
Total operating funds	230.97

### Expenditures

1. Newsletter production	78.00
2. Postage	20.70
3. Technical (student) assistance with setup of <i>Silurian Times</i> web page (15 hrs @ \$8/hr)	<u>120.00</u>
Total expenditures for 2001	\$218.70

Net balance at the end of 2001                      \$ 22.27

## 11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:

As noted above, the boundary working groups are in the process of being established to restudy the GSSPs at the Base of Silurian and Base of Wenlock. The first step in the restudy process will be an examination of the current GSSP, to see if it adequately serves its purpose of providing a precise frame of reference for workers taking a variety of approaches in stratigraphic correlation. These studies will particularly consider information that has come to light since the establishment of these GSSPs. If such study finds that the current GSSP does not provide an adequately precise and useful point of reference for international correlation, then the task of seeking an alternative GSSP will be undertaken.

In addition to the work on GSSPs, the SSS executive is also concerned with the relative scarcity of reliable geochronological dates that are biostratigraphically well constrained within the Silurian System. At the present time, a small group of Ordovician and Silurian workers are compiling all available data on radiometric dates applicable to the calibration of the Silurian time scale as part of the production of the next edition of "The Geologic Time Scale" for Cambridge University Press. They have also been developing new means of integrating biostratigraphic and geochronologic data into a composite, linear time scale. Once this work has been completed, the SSS executive will consider ways to improve the situation by encouraging its members to collaborate in projects that

provide new calibrations for Silurian time. This will also be one consideration of the working groups restudying GSSPs.

Another priority of the SSS is development of a more refined correlation between the graptolite zonation, which mainly represents the basinal facies, and the conodont, palynomorph, and shelly fossil zonations of the shallow marine strata. This is a continuing effort of the Subcommittee.

Publication of "*Silurian Lands and Continental Margins, Exclusive of North America*" by the end of 2001 or early in 2002 will permit work to begin on the third volume from the James Hall Symposium, "*Silurian Lands and Continental Margins of North America*".

Planning will continue for the Silurian Field Meeting in Argentina, to be held in August, 2003.

The secretary plans to provide web-based archival access to previous issues of *Silurian Times*, once the new issue is released early in 2002. The plan is to have these available as PDF downloads from the *Silurian Times* web site.

#### **15-16. BUDGET AND ICS COMPONENT FOR 2002**

1. Production & mailing of newsletter	\$100.00
2. Purchase of software (Adobe Acrobat, full version) for archival storage and deliver of <i>Silurian Times</i>	\$50.00
3. Student technical assistant for archival storage and delivery of <i>Silurian Times</i> (10 hrs @ \$8/hr)	<u>\$80.00</u>
Total Budget for 2002	\$230.00

ALLOTMENT REQUESTED FROM ICS FOR 2000 - \$200.00

#### **Potential funding sources outside IUGS**

A publication fund, based on revenues raised for the James Hall Meeting and ongoing grant contributions is established. These funds are being released to the New York Geological Survey in order to cover initial editing costs of symposium volumes. Other potential funds through the New York State Museum may facilitate publication based on anticipated reimbursement from sales of symposium volumes. The 1998 volume entitled "*Silurian Cycles - Linkages of Dynamic Stratigraphy with Atmospheric, Oceanic, and Tectonic Changes*" (New York State Museum Bulletin 491, 327 p.) has enjoyed a solid sales profile.

#### **19. SUBMITTED BY:**

Name of Chairperson: Rong Jia-yu

Date: November 27, 2001

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 Koren, Vice-chairman  
 (Russia)  
 Melchin (Secretary)  
 Brett (U.S.A.)  
 Caputo (Brazil)

Cocks (UK)  
 Le Herisse (France)  
 Jell (Australia)  
 Johnson (U.S.A.)  
 Kaljo (Estonia)  
 Kriz (Czech Rep.)

Lenz (Canada)  
 Loydell (U.K.)  
 Serpagli (Italy)  
 Verniers (Belgium)

**Corresponding members SSS**

Aldridge (UK)  
 Antoskhina (Russia)  
 Baarli (USA)  
 Barnes (Canada)  
 Bassett (UK)  
 Berry (US)  
 Bjerreskov (Denmark)  
 Bleick (France)  
 Boucot (US)  
 Chen (China)  
 Chlupac (Czech Rep.)  
 Dufka (Czech Rep.)  
 Einasto (Estonia)  
 Ferretti (Italy)  
 Fu (China)  
 Geng (China)  
 Gutierrez-Marco (Spain)  
 Hansch (Germany)

Holland (Ireland)  
 Jeppsson (Sweden)  
 Jin (China)  
 Kozłowska-Dawidzuik  
 (Poland)  
 Larsson (Sweden)  
 Laufeld (Sweden)  
 Lawson (UK)  
 Legrand (France)  
 Lesperance (Canada)  
 Mannik (Estonia)  
 Marsss (estonia)  
 Maletz (Germany)  
 Musteikis (Lithuania)  
 Nestor (Estonia)  
 Norford (Canada)  
 Paris (France)  
 Peralta (Argentina)

Picarra (Portugal)  
 Bogolepova (Russia)  
 Predtechensky (Russia)  
 Rickards (UK)  
 Robardet (France)  
 Simpson (Australia)  
 Schonlaub (Austria)  
 Sennikov (Russia)  
 Storch (Czech Rep.)  
 Strusz (Australia)  
 Su (China)  
 Teller (Poland)  
 Tesakov (Russia)  
 Walliser (Germany)  
 Yolkin (Russia)  
 Wang (China)  
 Zhang (China)

# SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY

## ANNUAL REPORT 2001

### 1. TITLE OF CONSTITUENT BODY

Subcommission on Ordovician Stratigraphy (SOS)

### 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

The Subcommission promotes international cooperation in Ordovician Stratigraphy. Specific objectives are:

- a. To delimit and subdivide the Ordovician System (and Period) as a part of the overall ICS mission to elaborate the standard global stratigraphic scale. This work aims to establish the boundaries (GSSPs), the correlation of the subdivisions (Stages and Series), and the nomenclature of the subdivisions.
- b. To promote regular international meetings on aspects of Ordovician geology, especially those devoted to clarifying stratigraphic procedures, nomenclature and methods for use in establishing a unified global time scale, and to prepare correlation charts with explanatory notes (this latter task now completed).
- c. To encourage, promote, and support research on all aspects of Ordovician geology worldwide and to provide outlets, Ordovician News, international meetings, and a web page, for promoting discussions and reporting results of this research.
- d. To encourage, promote, and support interdisciplinary research on the Ordovician global Earth system, addressing topics that require high-resolution, global correlation.

The ultimate goal of the Subcommission is to provide a high-resolution geological time scale that will be a critical foundation for interdisciplinary research on the global Earth system during the Ordovician Period. The work is broad based and must include specialists in paleontology, all subdisciplines of stratigraphy (bio-, litho-, chemo-, and magneto-), sedimentology, geochemistry, and tectonics. With active participants from more than 25 countries, the Subcommission involves much of the global geological community.

### 4. ORGANIZATION

- a. Subcommission Executive
  - Chairperson, S.C. Finney (U.S.A.)
  - Vice-chairperson, Chen Xu (P.R. China)
  - Secretary, G.L. Albanesi (Argentina)
- b. Members
  - 17 other Voting Members
  - 92 Corresponding Members
- c. Informal intra-Ordovician Working Groups
  - Conveners of these groups are as follows:

- (i) base of laevis (base of Middle Ordovician Series) - R. Ethington, S. Finney,
- (ii) base of ordovicicus (base of upper Stage of Upper Ordovician Series) - S. Bergström and C.R. Barnes
- d. GOES Program - research committee
  - Secretary, W.B. N. Berry (U.S.A.)
  - 4 other members

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

SOS receives no formal support from international organizations outside IUGS/ICS. The activities of some Subcommittee members (voting and corresponding) have been supported in part by IGCP 410. Independent support for projects comes mainly from individual Ordovician workers, through their employer organizations and through individual to multidisciplinary, cooperative, team activities supported by grants from national/regional government-funded bodies. In late 2000, SOS received grants from the American Chemical Society-Petroleum Research Funds and International Division of the Geological Society of America to support the travel of several non-North American colleagues to the Annual Meeting of the Geological Society of America (Reno, Nevada; November 2000), where the Subcommittee organized a symposium session and a field excursion on selection of a GSSP for the base of the Middle Ordovician Series.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

The membership of the Subcommittee both geographically and in terms of research interests effectively reflects available expertise in aspects of Ordovician stratigraphy.

The Subcommittee has no formal links with other global projects, though some individual Ordovician workers are members of IGCP projects, most notably the following:

- Project 386: Response of the Ocean/Atmosphere System to Past Global Changes
- Project 410: The Great Ordovician Biodiversification Event

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

- a. The base of the *Tetragraptus approximatus* graptolite Zone in the Diabasbrottet section in southern Sweden was approved by the Subcommittee as the GSSP for the base of the Second Stage, yet to be named, for the Ordovician System (upper stage of Lower Ordovician Series). The vote was Yes - 20, No - 1. The proposal is now before the ICS for a vote of approval.
- b. In early November 2001, the base of the *Nemagraptus gracilis* graptolite Zone in the Fagelsjö section in Sweden was approved by the Subcommittee as the GSSP for the base of the Upper Ordovician Series. The vote was Yes - 18, No - 0, abstain - 2. The proposal is now before the ICS for a vote of approval.
- c. An Ordovician Stratigraphy Discussion Group website (<http://seis.natsci.csulb.edu/ordstrat2/default.htm>) was set up to facilitate discussion on the GSSP for the base of the Middle Ordovician Series. Posted reports described serious deficiencies with the proposed biohorizon and stratotype section (the base of the *Tripodus laevis* conodont Zone at

- Whiterock Narrows, Nevada) and proposed other biohorizons and stratotype sections for the GSSP. The web site proved invaluable in facilitating discussion and making important progress.
- d. At a Subcommittee business meeting in Boston, Massachusetts in November, 2001 (at the Annual Meeting of the Geological Society of America), the GSSP for the base of the Middle Ordovician Series was a major topic of discussion. The consensus of those in attendance was to consider a new biohorizon (the FAD of the conodont *Protoprioniodus aranda*) and new candidate stratotype sections. A report of this meeting is now being distributed to all voting members, requesting their comments and opinions. If a majority wish to consider the new biohorizon, the Subcommittee will move quickly to consider potential stratotype sections and to evaluation the correlation potential of the biohorizon. A general interest Friends of the Ordovician meeting was attended by 45 participants of the GSA meeting, and 15 papers were presented in a topical session titled "New insights into Late Ordovician Climate, Oceanography, and Tectonics."
  - e. The GOES (Global Ordovician Earth Systems) Program stimulated research on the Late Ordovician mass extinction as recorded in stratigraphic successions in the Carnic Alps, the results of which will be incorporated with those from similar integrated multi-disciplinary studies of Late Ordovician successions in Nevada.
  - f. The Subcommittee sponsored a successful meeting and field excursion in Morocco, 30 January to 7 February, 2001 with the title "The Gondwanan Platform during Ordovician times: Climatic, eustatic and geodynamic evolution." The field excursion examined Ordovician strata in the coastal Meseta, central High Atlas, and central and eastern Anti-Atlas.
  - g. The WOGOGO (Working Group on Ordovician Geology of the Baltic) held its biennial meeting 16-17 May 2001 in Copenhagen, Denmark with a field excursion to Scania, Sweden, 18-20 May 2001.
  - h. On May 31, 2001, a formal ceremony took place at Green Point, western Newfoundland for dedication of the GSSP for the base of the Ordovician System.
  - i. An 94-page issue of *Ordovician News*, No. 18, edited by G.L. Albanesi, was published and posted on the Subcommittee's web page (<http://ceor.seos.uvic.ca/Ordovician/>).

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

The lack of travel support limited the participation of Voting Members from outside North America in Subcommittee activities at the Annual Meeting of the Geological Society of America.

The only candidate stratotype section and the biohorizon chosen for defining the base of the Middle Ordovician Series were found to be deficient. As a result, the Subcommittee must evaluate a new biohorizon and candidate stratotype sections.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

### Allocations

Annual Budget from ICS	\$2950
Travel Support for Chair to attend Annual Meeting of Geological Society of America for Subcommittee Business Meeting (provided by California State University/Long Beach)	\$1200
Travel Support for Chair to attend dedication ceremony of Green Point GSSP in western Newfoundland	

(provided by California State University/Long Beach)	<u>\$1500</u>
Total	\$5650

#### Expenditures

Travel expenses for Chair to attend Annual Meeting of Geological Society of America	\$1900
Travel expenses for Secretary to attend Annual Meeting of Geological Society of America	\$800
Travel expenses for Chair to attend dedication ceremony in Newfoundland	\$1500
Ordovician News No. 18 (printing & postage)	\$750
Room Rental for Subcommittee Business Meeting at GSA	\$125
Computer upgrade for Secretary to facilitate electronic communications and to improve preparation of newsletter and its electronic distribution	<u>\$400</u>
Other administrative expenses: telephone, fax, postage, copying (provided at no charge by Calif. State Univ. - Long Beach)	
Total	\$5575
Balance	(\$175)

#### **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

- a. *Ordovician News*, No. 19, assembled by G.L. Albanesi, will be published in the Spring 2002.
- b. It is anticipated that the GSSPs for the base of the second stage of the Ordovician System (upper stage of Lower Ordovician Series; yet to be named) and for the base of the Upper Ordovician Series (and its lowest stage; yet to be named) will be approved by the International Commission on Stratigraphy in late 2001 and ratified by IUGS in 2002.
- c. Voting members are presently being consulted regarding the course to take on selection of a GSSP for the base of the Middle Ordovician Series. Options are to consider new candidate stratotype sections for the FAD of the conodont *Tripodus laevis* or, instead, to choose a new biohorizon (the FAD of the conodont *Protoprioniodus aranda*) for definition of the boundary. A decision on the biohorizon will be made by the end of 2001, and a strict deadline of 3 months will be set for submission of potential candidate stratotype sections. The best potential candidate stratotype section is at Niquivil in the Precordillera of Argentina. A field business meeting is planned for November 2002 to visit this section; it will be in conjunction with the biennial meeting of the Argentine Congress on Paleontology and Biostratigraphy. Investigations of other candidate sections may be needed, but the Subcommittee's goal is to be evaluating and possibly voting on stratotype sections before the end of 2002.
- d. The Working Group on the GSSP for the base of the upper stage of the Upper Ordovician Series has been dormant, while the Subcommittee concentrated its efforts on other stage and series boundaries. However, now that GSSP will receive considerable attention. The Working Group is being reconstituted. Candidate stratotype sections will be evaluated in 2002. Whether or not voting takes place in 2002 depends on the progress of the Working Group.
- e. The steering committee of the GOES (Global Ordovician Earth Systems) Program will be encouraging work towards, and recruiting papers for, a symposium session that the



Subcommission will sponsor at the 32nd IGC. The session title is titled "Global Ordovician Earth System."

**Critical milestones to be achieved next year:**

- a. Approval by ICS and ratification by IUGS of Diabasbrottet and F gels ng GSSPs.
- b. Evaluation of new biohorizon for base of Middle Ordovician Series and of candidate stratotype sections, especially the section at Niquivil in the Argentina Precordillera.
- c. Evaluation of candidate stratotype sections for base of upper stage of Upper Ordovician Series.

**Anticipated results/products next year:**

- a. Publication of Ordovician News No. 19.
- b. Determination of biohorizon for base of Middle Ordovician Series and identification and evaluation of candidate stratotype sections.
- c. If progress is rapid on identification and evaluation of candidate stratotype sections, approval of GSSP for upper stage of Upper Ordovician Series.

**Communication plans:**

- a. Ordovician News will be published each spring and posted on the Subcommission's web site. A limited number of hard copies will be printed for archives and for distribution to members specifically requesting hard copies.
- b. The web site for the Ordovician Stratigraphy Discussion Group will continue active use. Its primary focus is the GSSP for the base of the Middle Ordovician Series. However, it will evolve to include discussions of other topics.
- c. The 9th International Symposium on the Ordovician System will be held in San Juan, Argentina in August 2003. A web site is being constructed for dissemination of information, circulars, and registration for the meeting.
- d. The Subcommission Chair will spend March to July 2002 in Austria. During that time, he will schedule a formal Subcommission Business meeting for members in Europe. The purpose of the meeting will be to further discussions on the two boundaries still to be defined.
- e. A Subcommission business meeting will be scheduled at the Annual Meeting of the Geological Society of America to be held in Denver, Colorado in October 2002. The purpose will be to discuss candidate stratotype sections for the base of the upper stage of the Upper Ordovician Series. Most members of the boundary working group are located in North America as are some of the best potential stratotype sections. Funding will be sought to support the travel of working group members located outside North America.

**15-16. BUDGET AND ICS COMPONENT FOR 2002**

Requested Allocation	\$3950
Anticipated Expenses	
Ordovician News No. 19	\$500
Administrative Expenses (copying, postage, telephone)	\$250
Travel Subsidy for Subcommission Chair to attend Geological Society of America meeting in Denver, Colorado to lead Subcommission Business meeting	\$500

Travel Supplement for Chair to attend Field Business Meeting to examine candidate stratotype section at Niquivil, Argentina	\$900
Travel Subsidy for additional boundary working group members to attend Field Business meeting in Argentina	\$1800

**Potential funding sources outside IUGS:**

California State University at Long Beach will support most of the Chair's travel expenses to the Geological Society of America meeting. The Chair will apply for a research grant for a project in Argentina. If funded, he will travel to Argentina with grant support for field research at the time of the meeting on the Niquivil section. Thus, he will not need to use Subcommittee funds for that purpose and the request in next year's budget can be used instead to further support the travel of other members of the boundary working group. Those proposing candidate stratotype sections for the base of the Middle Ordovician Series or the base of the upper stage of the Upper Ordovician Series will need to apply to foundations, their institutions, and other sources for support of any additional investigations of the sections that might be needed.

**17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)**

- a. Approval, ratification, and dedication of the Green Point GSSP for the base of the Ordovician System.
- b. Approval, ratification, and dedication of the Huangnitang GSSP for the base of the Darriwilian Stage (upper stage of Middle Ordovician Series).
- c. Approval by the Subcommittee of the Diabasbrottet and Fagelsng GSSPs for the bases of the upper stage of the Lower Ordovician Series and the Upper Ordovician Series, respectively.
- d. Significant progress on definition of series and stages for the Ordovician System with only two GSSPs remaining to be selected and approved by the Subcommittee.
- e. With publication in 2000 of A Revised Correlation of Ordovician Rocks in the British Isles, correlation charts have been completed for Ordovician rocks on all continents.
- f. 8th International Symposium on the Ordovician System in Prague, Czech Republic in July 1999, and publication of a 543 page proceedings volume (Acta Universitatis Carolinae, Geologica, v. 43, no. 1/2). 147 participants represented 21 countries; 142 papers were presented in technical sessions.
- g. Publication of Ordovician News nos. 14-18 and the posting of nos. 16-18 on the Subcommittee's web site.
- h. Development of the web site "Ordovician Stratigraphy Discussion Group" to facilitate discussions on selection of the GSSP for the base of the Middle Ordovician Series.
- i. Sponsorship of a technical session and field excursion on the GSSP for the base of the Middle Ordovician Series at the Annual Meeting of the Geological Society of America in November 2000.
- j. Sponsorship at the 31st International Geological Congress of the symposium "Paleontological, stratigraphical, and paleogeographical relations among South America, Laurentia, Avalonia, and Baltica during the Ordovician."
- k. Launched GOES (Global Ordovician Earth System) Program to stimulate integrated multi-disciplinary studies of global events (mass extinction, sea-level changes, greenhouse conditions, tectonics) during the Ordovician Period.

**18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

- a. Approval and ratification of GSSPs remaining to complete subdivision of Ordovician System with goal of completion by 2003.
- b. 9th International Symposium on Ordovician System to be held in Argentina in August 2003.
- c. Sponsorship of "Global Ordovician Earth Systems" symposium at 32nd International Geological Congress in 2004.
- d. Redirection of Subcommittee's focus to interdisciplinary investigation of the global Ordovician Earth system.

**19. SUBMITTED BY:**

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Chair - Subcommittee on Ordovician Stratigraphy  
November 1, 2001  
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# SUBCOMMISSION ON CAMBRIAN STRATIGRAPHY

ANNUAL REPORT 2001

## 1. TITLE OF CONSTITUENT BODY

International Subcommission on Cambrian Stratigraphy.

## 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

- a. To complete and publish regional correlation charts for the Cambrian System.
- b. To develop a global stage-level chronostratigraphic classification of the Cambrian System.

The Cambrian System is currently without formally agreed international stages. This partly reflects the scarcity of suitable biostratigraphic markers for intercontinental correlation at the stage level and faunal provincialism. However, research in progress on trilobites and conodonts (for the latter half of the Late Cambrian) show promise for long range correlation and definition of stages. The time interval is of growing international interest and research is being actively pursued by ISCS members, particularly by the members of the Cambrian Subdivision Working Group.

The objectives of the International Subcommission on Cambrian Stratigraphy reflect a purely scientific approach to problems and methods of stratigraphy (biostratigraphy, lithostratigraphy, chronostratigraphy, sequence stratigraphy, chemostratigraphy, etc.), regional, intercontinental and global correlation as well as sedimentology and reconstruction of environmental conditions during the Cambrian. These problems are of worldwide significance, and their solution requires international and interdisciplinary cooperation so that the goals of the ISCS are consistent with the IUGS science policy.

## 4. ORGANIZATION

The ISCS executive has been re-elected unanimously for a second term following the 31st International Geological Congress in August 2000.

Chairman,	J.H. Shergold
First Vice Chairman,	E. Landing
Second Vice Chairman,	A. Yu. Zhuravlev
Secretary,	G. Geyer
Past Chairman,	M. D. Brasier

The ISCS's voting members were selected to maintain a balance between regional experience and the expertise of various stratigraphic and paleontologic disciplines. Expertise is supplemented by corresponding members from individual countries or regions. Corresponding members are encouraged to communicate with ISCS working groups and the ISCS executive to actively participate in the development of a global stage-level chronostratigraphic classification of the Cambrian System.

Voting Members (19), see separate list

Honorary Members (8), see separate list  
 Corresponding Members (91), see separate list

Three Working Groups of the ISCS existed in 2001:

- The Cambrian Subdivision Working Group makes recommendations for global stage subdivisions.
- The Regional Correlation Charts Working Group is active in production of regional correlation charts for the Cambrian System.
- Working Group on a *Glyptagnostus reticulatus* level GSSP

Seven additional ISCS Working Groups await formal ratification by the Voting Members:

- Working Group on a *Cordylodus proavus* level GSSP
- Working Group on a *Ptychagnostus punctuosus* level GSSP
- Working Group on a *Acidusus atavus* level GSSP
- Working Group on a *Oryctocephalus indicus* level GSSP
- Working Group on Isotope Stratigraphy and Radiometric Dating
- Working Group on Dynamic Lithostratigraphy
- Working Group on the Yangtze Platform

## 5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

The objectives of the ISCS are largely dependent on informal, logistical, and administrative support from host institutions. The small sums received from IUGS/ISC are needed to offset the cost of mailing, to prepare materials for meetings, and partly to support travel expenses of members to formal ISCS meetings. The cost of research and the major part of travel expenses to meetings has been met by "home institutions", national academies of sciences, and the Institute for Cambrian Studies, Boulder, CO.

The list of Corresponding Members indicates the geographically widespread interest in the activities steered by the International Subcommittee of Cambrian Stratigraphy and the necessary amount of support. The Institute for Cambrian Studies supplied about US \$7000 in grants-in-aid over the past decade to individual Subcommittee members working on correlation charts and for support of the Third International Symposium on the Cambrian System in Novosibirsk in 1990 as well as the 5th International Field Conference on Cambrian subdivisions and the official meeting of the Cambrian Stage Subdivision Working Group in 1999.

## 6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS

The ISCS is traditionally affiliated with I.G.C.P. projects, particularly the following:

- Project 376 (Laurentian-Gondwana Connections Before Pangea); and
- Project 410 (The Great Ordovician Biodiversification Event; ranges from latest Cambrian to early Silurian).

Past projects include:

- Project 29 (Working Group on the Precambrian-Cambrian Boundary)
- Project 156 (Proterozoic and Cambrian Phosphorites)
- Project 303 (Working Group on Precambrian-Cambrian Event Stratigraphy)

- Project 319 (Global Paleogeography of Late Precambrian and Early Paleozoic)
- Project 366 (Ecological Aspects of the Cambrian Radiation; until end of 1997).

The ISCS Chairman is a voting member of the Cambrian-Ordovician Boundary Working Group and Cambrian Correlation Charts Working Group coordinator.

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

### **1. Regional correlation charts**

Regional correlation charts have not been published in 2001. The correlation chart on the Cambrian System of the Mediterranean Region and the Gondwanan sector of Central Europe is in progress. More-or-less completed are the chapters on Morocco, Algeria, Libya, Israel, Jordan, Germany and Bohemia. In a meeting in Zaragoza in May 2001 the authors responsible for the chapter on the Iberian Peninsula promised to supply the texts and data by the end of 2001.

Regional correlation charts published in previous years include:

The Cambrian System in the Near and Middle East 1983. R. Wolfart, compiler. J.H. Shergold and A.R. Palmer, eds. *IUGS Publication 15*, 72 pp.

The Cambrian System in Australia, Antarctica and New Zealand 1985. J.H. Shergold, J.B. Jago, R.A. Cooper, and J.H. Laurie, compilers. J.H. Shergold and A.R. Palmer, eds. *IUGS Publication 19*, 85 pp.

The Cambrian System in East Asia 1988. W.T. Chang, compiler. J.H. Shergold and A.R. Palmer, eds. *IUGS Publication 24*, 81 pp.

The Cambrian System on the East European Platform 1990. K. Mens, J. Bergström, and K. Lenzion, compilers. J.H. Shergold, A. Yu. Rozanov, and A.R. Palmer, eds. *IUGS Publication 25*, 73 pp.

The Cambrian System on the Siberian Platform 1991. V.A. Astashkin, T. Pegel', Yu. Shabanov, S. Sukhov, V. Sundukov, L.N. Repina, A. Yu. Rozanov, and A. Yu. Zhuravlev, compilers. J.H. Shergold, A. Yu. Rozanov, and A.R. Palmer, eds. *IUGS Publication 27*, 133 pp.

The Cambrian System of the Foldbelts of Russia and Mongolia 1995. V.A. Astashkin, T. Pegel', L.N. Repina, G.A. Belyaeva, N.V. Esakova, A. Yu. Rozanov, A. Yu. Zhuravlev, D.V. Osadchaya, and N.N. Pakhomov, compilers. A.R. Palmer, J.H. Shergold and A. Yu. Zhuravlev, eds. *IUGS Publication No. 32*, 132 pp.

### **2. Cambrian Working Groups**

The major focus of activities in 2001 on the Cambrian Global Subdivision Project (CGSP) led to further progress on this field. A first phase served a general reconnaissance during international field conferences of the Cambrian Subdivision Working Group in Morocco (1995), Spain (1996), eastern Canada (1997), Sweden (1998), the Great Basin area, U.S.A. (1999), and Argentina (2000). The scientific meetings focused on Cambrian global correlation levels and possible chronostratigraphic units.

G. Geyer and J.H. Shergold reviewed potential correlation (presented with explanatory remarks in *Episodes* issue 23 (3) (September 2000), p. 188-195; together with a comprehensive correlation

table, assembled by G. Geyer, J.H. Shergold and S. Peng. Reviewed horizons included the lowest local occurrences of:

- Cordylodus proavus
- Irvingella
- Glyptagnostus reticulatus
- Glyptagnostus stolidotus
- Agnostus pisiformis
- Leiopyge laevigata
- Ptychagnostus punctuosus
- Acidusus atavus
- Ptychagnostus gibbus
- Eliasum-Cristallium assemblage
- Oryctocephalus indicus
- Protolenus-Hamatolenus-Cobboldites-Orytocara assemblage
- Hebediscus atleboensis-Calodiscus-Serrodiscus-Triangulaspis assemblage
- First occurrence of trilobites
- Sub-trilobitic Small Shelly Fossils

These activities of the CGSP Working Group are to a progressive agreement on a number of major chronostratigraphic levels in the Cambrian. The majority of the Voting Members attested a suitability for the reviewed levels for interprovincial and intercontinental correlation and their suitability as a stage- or series-boundary for the horizons in the younger part of the Middle Cambrian and the Upper Cambrian. Four out of the 16 Voting Members refused to vote one of them declaring no longer being interesting in being a Voting Member. A sixty percent plus majority of support was attained only by the *Cordylodus proavus*, the *G. reticulatus*, the *Pt. Punctuosus*, *A. atavus*, the *Pt. Gibbus*, and *O. indicus* levels, which indicates that only these horizons should be taken into consideration for closer examination as potential GSSPs.

Discussions on procedural matters about the way to arrive at Cambrian subdivisions followed led to a formal ballot of the ISCS Voting Members in December 2000/January 2001. The ballot asked the Voting Members for agreement or disagreement on the procedure suggested by Geyer & Shergold (2000) that the way to arrive at Cambrian subdivisions should commence with the selection of horizons which allow a precise interprovincial and intercontinental correlation and which are suitable to define the bases of Cambrian subdivisions. Working Groups should then search for the best sections in which these levels might be found to establish a GSSP.

Of the 17 ISCS Voting Members, three did not respond. Twelve voted with "Yes", two with "No". According to generally accepted democratic rules this calculates to a 85.7 percent majority in favor of the suggested procedure of selecting key correlatable horizons suitable to define a global stage or series boundary.

The clear majority support for defining the first Cambrian GSSP at the level of *Glyptagnostus reticulatus* and a similarly large agreement on the *Acidusus atavus* and the *Ptychagnostus gibbus* level as suitable for global subdivision suggested the installation of Working Groups. Other horizons that received a positive review are *Cordylodus proavus* level and the newly discussed *Oryctocephalus indicus* level. The latter recently received particular consideration (e.g., during the Field Conference Laurentia 1999), and it was generally agreed that additional studies should add valuable information before this level should be selected as a candidate for a stage- and series-boundary.

A refined subdivision, however, can only be achieved with refined knowledge. The necessary next step is to commence assessment of suitable sections. Accordingly, the ISCS executive proposed to establish Working Groups for careful examination of candidate sections in respect to requirements

to be satisfied. An informal Subcommittee meeting took place during the 6th Field Conference of the Cambrian Subdivisions Working Group at Purmamarca, Argentina. During this meeting it was suggested and unanimously accepted by the ISCS members to establish a number of new Working Groups on various stratigraphic aspects. The Working Groups on GSSPs include:

- \* Working Group on a *Cordylodus proavus* level GSSP
- \* Working Group on a *Glyptagnostus reticulatus* level GSSP
- \* Working Group on a *Ptychagnostus punctuosus* level GSSP
- \* Working Group on a *Acidusus atavus* level GSSP
- \* Working Group on a *Oryctocephalus indicus* level GSSP

Pending formal approval by the ISCS Voting Members.

The next Ballot sought for an approval of this next step: to establish a framework for the further procedure. In March 2001, the Voting Members and Honorary Members were asked to vote or, respectively, to offer their opinion about the FAD of *Glyptagnostus reticulatus* to define a Late Cambrian GSSP. From the 17 Voting Members, 13 responses were received. All of them agreed that the FAD of *Glyptagnostus reticulatus* should define the base of a global Late Cambrian stage, so that a **Working Group on a *Glyptagnostus reticulatus* level GSSP** was formally established. Attached to the ballot were two Questionnaires. One of them asked for suggestions of experienced members to form a Working Group on the *G. reticulatus* level. Suggested members of such a WG are A.R. Palmer, B. Pratt, S. Peng, G. Ergaliev, J.H. Shergold, T. Pegel', L. Peregoedov, P. Ahlberg, J. Laurie, G. Geyer, R.A. Robison, J. Jago, L. Babcock, S. Westrop, J. Adrain.

The second Questionnaire asked for a personal rating of the momentarily best known sections with diverse faunas that include the *G. reticulatus* level. The sections include Siberia, South central China, Kazakhstan, Australia, and Laurentia.

First examination of potential GSSPs took place during the field excursions of the China 2001 conference, August-September 2001 (see under 7.3). The occurrence of *Glyptagnostus reticulatus* and the rock successions were studied at the Wa'ergang, Wangcun and Paibi sections in Hunan, accompanied with examination of various aspects critical for the value of these sections for international correlation.

In addition to the Working Group on a *Glyptagnostus reticulatus* level GSSP, the ISCS executive brought a second ballot on the way asking the ISCS Voting Members to decide about installation of a Working Group on a *Acidusus atavus* level GSSP.

Further ballots will be to decide about the following potential WGs:

- \* Working group on a *Cordylodus proavus* level GSSP
- \* Working Group on a *Ptychagnostus punctuosus* level GSSP
- \* Working Group on a *Oryctocephalus indicus* level GSSP

The *Oryctocephalus indicus* level was studied during the China 2001 conference in the Kaili Formation at the Miaobanpo and Wuliu sections in Guizhou.

Additional Working Groups on non-biostratigraphic data, such as information from isotopes and radiometric datings were also suggested to be established:

- \* A Working Group on Isotope Stratigraphy and Radiometric Dating should be formed from the expertise of members within the subcommission. The major task of such a WG would be the application of non-conventional (i.e. non-paleontologic) correlation techniques and aspects of Cambrian stratigraphy such as isotope profiles based on carbon, oxygen, strontium and sulphur, and



magnetostratigraphy, and numeric age determinations and to calibrate them with biostratigraphic data. A number colleagues have been contacted and agreed to participate.

\* A Working Group on Dynamic Lithostratigraphy was suggested to calibrate results from the examination of depositional environments and the analysis of eustatic sea-level changes. However, until now only few colleagues showed interest in such a WG.

\* A Working Group on the Yangtze Platform was suggested to calibrate interests and activities of scientists working on various aspects of the Cambrian in South China.

### 3. South China 2001

South China 2001, the 7th Field Conference of the Cambrian Subdivisions Working Group was held in the Hunan and Guizhou provinces, China, 18 August-5 September, 2001. A post-conference field excursion took place in Yunnan, 6-8 September, 2001.

Institutions organizing this meeting were: Nanjing Institute of Geology and Palaeontology (NIGPAS), Chinese Academy of Sciences; Laboratory of Palaeobiology and Stratigraphy (LPSCAS), Chinese Academy of Sciences; Guizhou University of Technology (GUT); and the Palaeontological Society of China (PSG). The Organizing Committee consisted of Peng Shanchi (NIGPAS), Zhao Lyuanlong (GUT), Zhu Maoyan (NIGPAS), Loren Babcock (Columbus, OH) and Bernd-D. Erdtmann (Berlin, Germany).

A total of 75 scientists attended the meeting, 43 from China and 32 from overseas (Australia, France, Germany, Kazakhstan, Russia, South Korea, Sweden, United Kingdom and the U.S.A.). Scientific sessions were held following an opening ceremony on 28 August in Zhangjiajie City, on the evening of 2 September in Taijiang, and on the afternoon and evening of 3 September at the Guizhou University of Technology. During these sessions 21 presentations were made, followed by a business meeting of the Working Group. Minutes from this meeting are available separately.

Field excursions occupied the remainder of the China 2001 conference. These concentrated on the occurrence of *Glyptagnostus reticulatus* at the Wa'ergang, Wangcun and Paibi sections of Hunan, and the *Oryctocephalus indicus* level in the Kaili Formation at the Miaobanpo and Wuliu sections in Guizhou. A monument commemorating the discovery of the Kaili Biota was unveiled at the type section. Other sections visited included: the Sancha section in Hunan; the Lower Cambrian at Huanglian, Songtao, Guizhou; Upper Sinian-Cambrian at Wuhe, Guizhou; and the lowermost Cambrian phosphorite deposit at Gezhongwu, Guizhou. The post-conference excursion was based on Kunming, Yunnan and focused on the Chengjiang biota at Maotianshan and Ma'anshan, and on the quarry section at Ercaiun. Classical Precambrian-Cambrian sections were visited near Meischucun. During the meeting members of the ISCS were introduced to many local dignitaries, prefects and county governors and the directors of the host organizations. Much interest was perceivable in what the ISCS was doing in China. ISCS members were also exposed to the culture of Miao, Tujia and Dong national minorities.

Many short papers and abstracts were generated by this meeting. Sixteen are included in a special volume of *Acta Palaeontologica Sinica* (The Cambrian of South China. Zhu Maoyan, Heyo Van Iten, Peng Shanchi, and Li Guoxiang, eds. *Acta Palaeontologica Sinica* 40, Supplement, 240 pp., Science Press, Beijing, 2001). A further 42 articles and abstracts are published in "Cambrian System of South China. Peng Shanchi, L.E. Babcock, and Zhu Maoyan, eds. *Palaeoworld* 13, 310 pp., University of Science and Technology of China Press, Hefei, 2001. This volume also includes the excursion Guide Book. A further 14 papers mostly concerned with the Kaili biota had been published in *Acta Palaeontologica Sinica*, 38, Supplement, 164 pp.

#### **4. Early Palaeozoic Palaeogeographies and Biogeographies of Western Europe and North Africa**

A meeting titled Early Palaeozoic Palaeogeographies and Biogeographies of Western Europe and North Africa took place at the Universit  des Sciences et Technologies de Lille (USTL) in Villeneuve d'Ascq, September 24-26, 2001, with a pre-conference field excursion to the Lower Palaeozoic of Belgium and a post-conference field excursion to the Montagne Noire, southern France.

Organizing institutions were the Universit  des Sciences et Technologies de Lille; the Centre National de la Recherche Scientifique (CNRS, UPRESA 8014); the Groupe Franais du Palozoique; the Soci t  Gologique du Nord; the Soci t  Gologique de France; Geologica Belgica; IGCP Projects 410 and 421; and the Ministerio Espaol de Educaci n y Ciencia. Organizers of the scientific sessions were J.J. Ivarro and T. Servais (USTL). The pre-conference field excursion was organized by A. Herbosch (Brussels) and J. Verniers (Gent), the post conference excursion by D. Vizcaino (Carcassonne).

A total of 35 presentations were made at the scientific sessions, eleven of which were concerned with Cambrian topics. Additionally, a Workshop on Cambrian Palaeo(bio)geography was convened by J.J. Ivarro and J.H. Shergold. The meeting was notable for its multidisciplinary approach to the topics addressed: biostratigraphic, sedimentologic, geochemical, and geophysical. The post-excursion guidebook (The Cambrian and Lower Ordovician of the southern Montagne Noire: a synthesis for the beginning of the new century. J.J. Ivarro and D. Vizcaino, eds.) is published in the Annales de la Soci t  Gologique du Nord, 2 mesrie, vol. 8, fasc. 4, p. 183-242.

#### **5. Homepage of the International Subcommittee of Cambrian Stratigraphy**

The updated internet homepage of the International Subcommittee on Cambrian Stratigraphy, which can be accessed now under the new address:

***<http://www.uni-wuerzburg.de/palaeontologie/ISCS/index.html>***

and with a revised layout. It is being consulted at an average rate of approximately four times per day. This homepage, maintained by G. Geyer, is under permanent revision and presents a section with reports and announcements of the Subcommittee as well as a general section which presents an overview of Cambrian general bio- and chronostratigraphy, paleontology, and regional litho- and biostratigraphy. Kevin Evans recently offered help with a mirror site for North America.

#### **6. Publications**

A wealth of articles of general interest have been published after completion of the ISCS 2000 Annual Report. The period 2000/2001 brought again an unusually large number of important publications on the Cambrian. We registered more than 300 articles, books, and abstracts published in 2000 and in 2001, which deal, at least in part, with aspects of Cambrian stratigraphy. Articles that focus purely on stratigraphy are a significant part among them.

A set of thematic reports on the Cambrian subdivisions was presented on the Field Conference of the Cambrian Subdivision Working Group "China 2001". Sixteen articles are included in a special volume of Acta Palaeontologica Sinica (The Cambrian of South China. Zhu Maoyan, Heyo Van Iten, Peng Shanchi, and Li Guoxiang, eds. Acta Palaeontologica Sinica 40, Supplement, 240 pp., Science Press, Beijing, 2001). A further 42 articles and abstracts are published in "Cambrian System of South China. Peng Shanchi, L.E. Babcock, and Zhu Maoyan, eds. Palaeowprld 13, 310 pp., University of Science and Technology of China Press, Hefei, 2001. This volume also includes the excursion Guide Book.

An abstract volume for the meeting Early Palaeozoic Palaeogeographies and Biogeographies of Western Europe and North Africa (Universit  des Sciences et Technologies de Lille (USTL) in Villeneuve d'Ascq, September 24-26, 2001) was generated by the meeting organizers J.J. Ivaro and T. Servais (78 pp.). A Guidebook for the post-meeting excursion (The Cambrian and Lower Ordovician of the southern Montagne Noire: a synthesis for the beginning of the new century. J.J. Ivaro and D. Vizcano, eds.) is published in the Annales de la Soci t  G ologique du Nord, 2e s rie, vol. 8, fasc. 4, p. 183-242.

A number of abstracts of presentations relevant for Cambrian stratigraphy are included in an abstract volume of the First Nordic-Baltic Cambrian Geo-Energy Seminar (1st Nordic-Baltic Cambrian Geo-Energy Seminar, 15-16 September 2001, Jgersborg-Gentofte, Denmark. Nordisk Energiforskningsprogram).

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

The ICS subvention of 3700 US\$ was the only financial source that was directly available for the ISCS. Including the carry-over from 2000 and a small amount of bank interests, this adds to 9649.64 DM. The ICS subvention by ICS was raised considerably compared to earlier years, and this amount for the first time permitted direct activities of the ISCS executive, including a planned executive meeting with Voting Members (and possible Honorary members) to be held at the end of 2001. However, this amount does not permit field activities which imminently contribute to a progress in global stage-level chronostratigraphic classification of the Cambrian System.

The majority of the newly established Working Groups require intensive field studies to achieve rapid progress in long-range correlation and definition of urgently needed global stages. However, the ability of active pursue is limited to a number of critical ISCS members, which would need a substantial financial support to visit Subcommittee meetings and conferences. Both the ISCS chairman and the ISCS Secretary are momentarily without a position or without a permanent position and therefore have limited access to funding of scientific activities.

*ISCS Corresponding Member Mikhail K. Apollonov (Almaty) deceased of cancer on 6 August, 2001. Misha was one of the most active Corresponding Members, and we will sorely miss him.*

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

### A) 2001 Income

a. ICS subvention, US\$ 3700.00	DM	8470.00
b. Carry-over from 2000, US\$ 492.40	DM	1147.29
c. Bank interests	DM	<u>32.35</u>
Total funds available, 2001	DM	9649.64

### B) Expenditures obligated

a. General administrative expenses (e-mail, fax, postage, photocopying, paper, printer supplies, misc.)	DM	45.52
b. Executive attendance funds and funding of the organization of the 7th Field Conference, China 2001	DM	3525.00

c. Attendance funds for T. Pegel for the 7th Field Conference, China 2001	250.00 US\$	DM	557.50
d. Partial reimbursement of travel expenses for regular executive meetings in W rzburg		DM	650.00
e. Partial reimbursement of travel expenses for executive meeting, December 2001		DM	<u>4100.00</u>
Total expenses, 2001		DM	8878.02
Remainder above expenses, 2001		DM	771.62

## **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

### **1. Meetings**

The 8th Field Meeting of the Cambrian Subdivision Working Group of the International Subcommission on Cambrian Stratigraphy is tentatively planned to be held in September 2002 in Carcassonne, France, with field excursions to the Montagne Noire. The meeting will be organized by J.J. Ivaro (Lille) and D. Vizcano.

An additional field excursion could be connected with the Australian Geological Convention in Adelaide, planned to be held in late June, 2002. It will visit Proterozoic and Cambrian rocks of the Flinders Ranges of South Australia.

A Formal executive meeting of the Subcommission is planned to take in December 2001. A second meeting of the ISCS executive together with a majority of the Voting Members is tentatively planned to take place during the 8th Field Meeting of the Cambrian Subdivision Working Group in Carcassonne. Funds are requested to support the attendance of ISCS executive officers and Voting Members.

### **2. The Cambrian Subdivisions Project (CSP)**

As noted earlier, the main goal of the Cambrian Subdivisions Working Group is to achieve a decision on formal Cambrian global stages and to choose GSSPs. The selection of global Cambrian subdivisions is the most difficult task of the ISCS and will require compromises to be made. Scientific progress in fields which require a formal framework for orientation is generally in need of guidance, and, thus, the ISCS executive began to act as a steering committee. A general article on Cambrian global correlation levels and possible chronostratigraphic units (G. Geyer and J.H. Shergold, 2000, *Episodes* vol. 23 (3), September 2000, p. 188-195) was published together with a comprehensive correlation table compiled by G. Geyer, J. H. Shergold, and S. Peng. The correlation table is regularly updated (latest edition: September 2001).

The activities of the Working Group and a formal ballot on the utility as potential GSSP levels has led to a progressive agreement on a number of major chronostratigraphic units in the Cambrian and to the establishment of new Working Groups on the biostratigraphic level which were chosen as suitable for potential GSSPs. Already established is the Working Group on a *Glyptagnostus reticulatus* level GSSP. A Working Group on a *Acidusus atavus* level GSSP is on the way while this report is being written. The year 2002 should see a Working Group on a *Cordylodus proavus* level

GSSP, a Working Group on a *Ptychagnostus punctuosus* level GSSP, and a Working Group on a *Oryctocephalus indicus* level GSSP to be formally established.

These Working Groups have the major task to agree on potential candidate sections and to examine for all these sections the geological requirements to be satisfied, such as exposure over an adequate thickness, continuous sedimentation, sufficiently rapid sedimentation rate and absence of metamorphism and strong diagenesis; biological requirements such as abundance and diversity of well preserved fossils, absence of vertical facies changes and favorable facies for long-range correlation; and other desirable requirements such as suitability for radioisotope dating, magnetostratigraphy, chemostratigraphy and sequence stratigraphy, indication by a permanently fixed marker, avoidance of very remote locations, free access by researchers regardless of nationality, free access for research and permanent site protection.

### 3. Regional Correlation Charts

First priority projects of the Cambrian Correlation Working Group are to complete correlations projects on (1) Central and Southern Europe, North Africa and parts of the Near East, (2) Avalonia, and (3) Laurentia-South America. The following Correlation Charts are under construction:

- 1) The Cambrian System of the Mediterranean Region and Central Europe. G. Geyer, coordinator. In progress.
- 2) The Cambrian System of Avalonia. Ed Landing, coordinator.
- 3) The Cambrian System of Laurentia. A.R. Palmer, lead coordinator.
- 4) The Cambrian System of Central Asia. G. Kh. Ergaliev, coordinator.

Some progress was achieved in the last year for chart 1). However, relevant authors for the chapters on the Iberian Peninsula, Sardinia and Turkey still have not submitted their contributions. A draft manuscript for the Cambrian of Iberia was promised by the authors for the end of 2001 so that the volume for the Mediterranean Region and Central Europe could be close to completion toward the end of 2002.

A.R. Palmer, lead coordinator of the Laurentia volume, announced to expect rapid progress after completion of the trilobite synonymy files (see 12.3).

G. Kh. Ergaliev, coordinator of the Central Asia volume, declared during the China 2001 meeting to have problems with the preparation of the manuscript. This requires a fundamental reorganization of the coordination in 2002.

### 4. Regional Correlation Charts

Although the Cambrian Subdivision project has the highest priority among the activities of the ISCS, 2002 will be mainly dedicated to collect data on the various GSSP candidates to be selected. These data will be a major source of publications of various stratigraphical aspects. Particularly the Working Group on a *Glyptagnostus reticulatus* level GSSP and the Working Group on a *Acidusus atavus* level GSSP should trigger a wealth of new results. Most active are the members of the Working Group on the Yangtze Platform, which partly interface with the Working Group on a *Glyptagnostus reticulatus* level GSSP, but also generate results that are helpful for the intercontinental correlation of the Lower Cambrian and contribute to a better knowledge of the Precambrian-Cambrian boundary and the famous Chengjiang lagerst te of Yunnan.

## 5. Synonymy Files

The principal project of the Institute for Cambrian Studies is in the process of developing electronic databases for objective synonymy files on the major groups of Cambrian organisms. The trilobites are most complete in card files, olenelloid and other data already available as electronic files.

F. Debrenne has prepared files for the archaeocyaths, S. Bengtson for small shelly fossils, G. Geyer on Eodiscina. These files are still in progress. The Treatise on Invertebrate Paleontology group at Kansas University is in the process of developing Paleobank, a sophisticated database and retrieval system for all invertebrate groups.

Nevertheless, members of the ISCS are seeking for acceptable conditions to make available data files on modern electronic devices.

## 15-16. BUDGET AND ICS COMPONENT FOR 2002

### A) Income

Carry-over from 2001, 771.62 DM	US\$	349.94
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### B) Planned Expenditures

a. Organization of 2002 Field Conference, Montagne Noire	US\$	1200.00
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b. Executive and VM attendance funds for meeting during Field Conference	US\$	2200.00
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c. Postage for Annual Newsletter and other materials	US\$	100.00
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d. Regular executive meetings	US\$	600.00
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e. General administrative expenses (postage, fax, e-mail, photocopies, paper, printer supplies, misc.)	US\$	50.00
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Total 2002 planned expenses	US\$	4150.00
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C) ICS 2002 budget request	US\$	3800.06
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## Potential funding sources outside IUGS

Logistical, financial and publicational funding of ISCS activities (direct or indirect) in 2001 came from a number of sources, namely:

- National Science Foundation of the U.S.,
- National Science Foundation of China,
- Deutsche Forschungsgemeinschaft,
- New York State Museum, Albany,
- Institut für Paläontologie, Würzburg.

The Institut für Paläontologie, University of Würzburg, provides space and facilities for the ISCS Secretariat. Furthermore, the institute provides hardware to run and maintain the ISCS homepage. John Shergold is able to communicate electronically thanks to the Institut des Sciences de l'Évolution, Université de Montpellier II.

a) The Institute for Cambrian Studies, Boulder, Colorado, supports A.R. Palmer's subcommission and working group works by providing space, equipment, and postage. Grants-in-aid are available to

Cambrian scientists by successful application. The Institute for Cambrian Studies is prohibited by its by-laws from providing salary or travel funds to officers of the corporation (A.R. Palmer, President; M.E. Taylor, Secretary-Treasurer; L.E. Babcock, Vice Chairman; J.H. Shergold, N. Hughes).

b) The Cambrian System has oil and gas resources, which seem to have developed during the initial rifting of supercontinents. As our integrated stratigraphy-chemostratigraphy-sequence stratigraphy improves, there is growing potential to explore for some commercial funding. The Nordisk Energiforskningsprogram organized a Seminar termed 1st Nordic-Baltic Cambrian Geo-Energy Seminar, 15-16 September 2001, J gersbor-Gentofte, Denmark. This documents the economic interest of Cambrian deposits.

## **17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)**

### **1. Regional correlation charts**

Regional correlation charts have not been published since 1995. However, four correlation chart volumes were chosen to be generated. The correlation chart on the Cambrian System of the Mediterranean Region and the Gondwanan sector of Central Europe (G. Geyer, coordinator) has made good progress during this time. First data sets have been assembled for the volume on the Cambrian System of Laurentia (A.R. Palmer, lead coordinator).

### **2. Cambrian Working Groups**

After formal selection of the Cambrian lower and upper boundaries (Precambrian-Cambrian boundary and Cambrian-Ordovician boundary GSSPs) during the early and mid 1990s, the major focus of the activities of the International Subcommittee on Cambrian Stratigraphy shifted to a formal subdivision of the Cambrian into series and stages. The Cambrian Global Subdivision Project (CGSP) led to a notable progress on this field. A first phase served a general reconnaissance during international field conferences of the Cambrian Subdivision Working Group in Morocco (1995), Spain (1996), eastern Canada (1997), Sweden (1998), the Great Basin area, U.S.A. (1999), and Argentina (2000). The scientific meetings during the 4th and 5th Field Conferences in southern Sweden and the Great Basin focused on Cambrian global correlation levels and possible chronostratigraphic units. A comprehensive correlation table, assembled by G. Geyer, J.H. Shergold and S. Peng, was presented in 1998. This correlation table was aimed to record suggestions for a general framework and the practical utility of particular horizons for interprovincial correlation and to be used as a tool to help orientation in the list of recently discussed biostratigraphic horizons that were thought to be useful for international correlation.

G. Geyer and J.H. Shergold reviewed potential correlation levels with explanatory remarks. This review, first published in the 1998 issue of the Trilobite Papers, was revised and presented with explanatory remarks in Episodes vol. 23 (September 2000).

The activities of the CGSP Working Group are leading to a progressive agreement on a number of major chronostratigraphic levels in the Cambrian. The majority of the Voting Members attested a suitability for the reviewed levels for interprovincial and intercontinental correlation and their suitability as a stage- or series-boundary for the horizons in the younger part of the Middle Cambrian and the Upper Cambrian. A sixty percent plus majority of support was attained only by the *Cordylodus proavus*, the *G. reticulatus*, the *Pt. Punctuosus*, *A. atavus*, the *Pt. Gibbus*, and *O. indicus*

levels, which indicates that only these horizons should be taken into consideration for closer examination as potential GSSPs.

Discussions on procedural matters about the way to arrive at Cambrian subdivisions followed a straw vote of December 1999. This led to a formal ballot of the ISCS Voting Members in December 2000/January 2001. The ballot asked the Voting Members for agreement or disagreement on the procedure suggested by Geyer & Shergold (2000) that the way to arrive at Cambrian subdivisions should commence with the selection of horizons which allow a precise interprovincial and intercontinental correlation and which are suitable to define the bases of Cambrian subdivisions. Working Groups should then search for the best sections in which these levels might be found to establish a GSSP.

The clear majority support for defining the first Cambrian GSSP at the level of *Glyptagnostus reticulatus* and a similarly large agreement on the *Acidusus atavus* and the *Ptychagnostus gibbus* level as suitable for global subdivision suggested the installation of Working Groups. Other horizons that received a positive review are *Cordylodus proavus* level and the newly discussed *Oryctocephalus indicus* level. The latter recently received particular consideration (e.g., during the Field Conference Laurentia 1999), and it was generally agreed that additional studies should add valuable information before this level should be selected as a candidate for a stage- and series-boundary.

A refined subdivision, however, can only be achieved with refined knowledge. The necessary next step is to commence assessment of suitable sections. Accordingly, the ISCS executive proposed to establish Working Groups for careful examination of candidate sections in respect to requirements to be satisfied. An informal Subcommittee meeting took place during the 6th Field Conference of the Cambrian Subdivisions Working Group at Purmamarca, Argentina. During this meeting it was suggested and unanimously accepted by the ISCS members to establish a number of new Working Groups on various stratigraphic aspects. The Working Groups on GSSPs include:

- \* Working Group on a *Cordylodus proavus* level GSSP
- \* Working Group on a *Glyptagnostus reticulatus* level GSSP
- \* Working Group on a *Ptychagnostus punctuosus* level GSSP
- \* Working Group on a *Acidusus atavus* level GSSP
- \* Working Group on a *Oryctocephalus indicus* level GSSP

Pending formal approval by the ISCS Voting Members.

The next Ballot sought for an approval of this next step: to establish a framework for the further procedure. In March 2001, the Voting Members and Honorary Members were asked to vote or, respectively, to give their opinion about the FAD of *Glyptagnostus reticulatus* to define a Late Cambrian GSSP. All responding VMs agreed that the FAD of *Glyptagnostus reticulatus* should define the base of a global Late Cambrian stage, so that a Working Group on a *Glyptagnostus reticulatus* level GSSP was formally established.

First examination of potential GSSPs took place during the field excursions of the China 2001 conference. The occurrence of *Glyptagnostus reticulatus* and the rock successions were studied at the Wa'ergang, Wangcun and Paibi sections in Hunan, accompanied with examination of various aspects critical for the value of these sections for international correlation. In addition to the Working Group on a *Glyptagnostus reticulatus* level GSSP, the ISCS executive brought a second ballot on the way asking the ISCS Voting Members to decide about installation of a Working Group on a *Acidusus atavus* level GSSP.

The *Oryctocephalus indicus* level, indicative of a designated Working Group and thus a potential GSSP was studied during the China 2001 conference in the Kaili Formation at the Miaobanpo and Wuliu sections in Guizhou.



Additional Working Groups on non-biostratigraphic data, such as information from isotopes and radiometric datings were also suggested to be established, namely

\* A Working Group on Isotope Stratigraphy and Radiometric Dating. The major task of such a WG would be the application of non-conventional (i.e. non-paleontologic) correlation techniques and aspects of Cambrian stratigraphy.

\* A Working Group on Dynamic Lithostratigraphy was suggested to calibrate results from the examination of depositional environments and the analysis of eustatic sea-level changes.

\* A Working Group on the Yangtze Platform was suggested to calibrate interest and activities of scientists working on various aspects of the Cambrian in South China.

### 3. IGCP projects

The ISCS is traditionally affiliated with I.G.C.P. projects. The following projects were initiated, directed, or in general supervised by members of the ISCS:

Project 303 (Working Group on Precambrian-Cambrian Event Stratigraphy)

Project 319 (Global Paleogeography of Late Precambrian and Early Paleozoic)

Project 366 (Ecological Aspects of the Cambrian Radiation).

## 18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)

### 1. Regional correlation charts

Four regional correlation chart volumes are on the way. The correlation chart on the Cambrian System of the Mediterranean Region and the Gondwanan sector of Central Europe (G. Geyer, coordinator) is in progress and is expected to be completed in 2003. The volume on the Cambrian System of Laurentia (A.R. Palmer, lead coordinator) is planned to enter the creative phase in 2002. Due to an already available data set, completion could be expected relatively soon.

Problems exist with the volume on the Cambrian System of Central Asia (G. Kh. Ergaliev, coordinator) and the Cambrian System of Avalonia (Ed Landing, coordinator). Additional meetings in 2002 will be needed to clarify responsibilities and authorships for the major regions covered by these volumes, but both volumes will hopefully be completed before the end of 2006.

### 2. Cambrian Working Groups

Activities of the CGSP led to a progressive agreement on major chronostratigraphic levels in the middle and upper part of the Cambrian. Suitability for reviewed levels for interprovincial and intercontinental correlation and their suitability as a stage- or series-boundary for the horizons in the younger part of the Middle Cambrian and the Upper Cambrian suggested introduction of Working Groups on potential GSSPs (already established or awaiting formal ratification). These WGs will examine suitable sections with the following levels of biostratigraphically useful fossils:

\* *Cordylodus proavus*

\* *Glyptagnostus reticulatus*

\* *Ptychagnostus punctuosus*

\* *Acidusus atavus*

\* *Oryctocephalus indicus*.

It is expected that during the next years these levels will be accepted to furnish GSSPs of global stages (yet to be named). In addition, the base of the *Glyptagnostus reticulatus* level is generally accepted to be suitable as the base of a formal Middle-Upper Cambrian boundary.

Further progress is to be made to lay the foundation of a subdivision of the Lower/Early Cambrian, which would be extremely difficult on the basis of the available data. The Subcommission seeds to assemble data from nonconventional (i.e. non-paleontologic) correlation techniques and aspects of Cambrian stratigraphy such as isotope profile based on carbon, oxygen, strontium and sulphur, and magnetostratigraphy, and numeric age determinations. These data, calibrated with biostratigraphic data, are expected to solve the intricate problem of stage definitions for the Lower Cambrian.

### 3. Meetings

A major driving agent of the CGSP activities during the last years were the international field conferences held in various regions with critical Cambrian outcrops. Further such meetings are planned to take place in the Montagne Noire, France (2002) and in South Korea (2004). The newly developed Working Groups will lead to smaller and more specified meeting at various potential GSSPs. Planning of such special meeting is momentarily in process and includes a field campaign in Hunan, China, in 2002, and a field campaign in Yunnan, China, in 2002.

The Fourth International Symposium on the Cambrian System is planned to be held in China in 2004, organized by members of the Nanjing Institute of Geology and Paleontology, Academia Sinica. Pre- and post-symposium excursions will offer the possibility to visit a number of Cambrian localities in China, such as Yunnan, Guizhou, Hunan, Xinjiang, and Liaoning. The field excursion in South Korea is planned to take place in addition to this meeting to enable the visit of Upper Cambrian fossil localities.

### 19. SUBMITTED BY:

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 Date: 26 October, 2001

Apl. Prof. Dr. Gerd **Geyer**, ISCS Secretary  
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### APPENDIX -- VOTING MEMBERSHIP OF THE INTERNATIONAL SUBCOMMISSION ON CAMBRIAN STRATIGRAPHY (ISCS)

Dr. John H. Shergold	France
Prof. Dr. Per Ahlberg	Sweden
Dr. J. J. Ivaro	France

Dr. Loren Babcock	USA
Dr. Martin D. Brasier	UK
Prof. Duck Keun Choi	Korea
Dr. G. Kh. Ergaliev	Republic of Kazakhstan
Dr. James B. Jago	Australia
Dr. V. V. Khomentovsky	Russia
Dr. P. D. Kruse	Australia
Dr. Ed Landing	USA
Prof. Dr. Eladio Li n Guijarro	Spain
Prof. Dr. M. Moczydlowska-Vidal	Sweden
Prof. Peng Shanchi	People's Republic of China
Prof. Alexey Yu. Rozanov	Russia
Prof. Dr. Stephen R. Westrop	USA
Dr. Xiang Liwen	China
Prof. Andrey Yu. Zhuravlev	Russia

# **SUBCOMMISSION ON THE TERMINAL PROTEROZOIC PERIOD**

ANNUAL REPORT 2001

## **1. TITLE OF CONSTITUENT BODY**

ICS Subcommittee on the Terminal Proterozoic Period

## **2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY**

To better understand the geological and biological history of the late Neoproterozoic Era, to construct global correlations of uppermost Proterozoic strata, and to recommend a definition and characterization of a terminal Proterozoic period. The subcommission's work is part of a longstanding program in international stratigraphy and geological correlation

## **4. ORGANIZATION**

The subcommission has a chairman (A.H. Knoll, USA), vice-chairman (M.R. Walter, Australia), a secretary (G. Narbonne, Canada), and 16 additional voting members. Our newsletters go out to more than 100 individuals, of which ca. 40 are active as corresponding members.

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

The subcommission receives no sustaining support from any external agency. In past years, national and regional authorities have supported subcommission field-based conferences in Russia, China, Norway, Australia, India, and Namibia. Partial costs of miscellaneous expenses and newsletter preparation are supported by the Department of Geological Sciences, Queen's University, Canada, and Harvard University, USA. Individual subcommission members are, of course, supported by their own national funding agencies. A 2001 meeting and associated field excursion was supported in part by the Geological Association of Canada.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

Historically, the Subcommittee worked closely with IGCP Project 320 (Neoproterozoic Events and Resources), now completed. We also had ties to the more recently completed IGCP Project 303 (Late Proterozoic and Cambrian Event Stratigraphy -- which covers Precambrian-Cambrian boundary events but not earlier terminal Proterozoic stratigraphy) and are in contact with IGCP Project 319 (Global Paleogeography of Late Precambrian and Early Paleozoic), and IGCP Project 366 (Ecological Aspects of the Cambrian Radiation).

## 7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001

In May 2001, Guy Narbonne (Canada) and Jim Gehling (Australia) led a very successful meeting and associated field trip to eastern Newfoundland, where participants studied terminal Proterozoic successions that contain both recently dated ash beds and exceptional assemblages of Ediacaran fossils.

A newsletter was also prepared that included final detailed arguments for candidate GSSP sections, as well as a ballot on choice of GSSP. (In 2000, we reached agreement on level of an initial GSSP for the terminal Proterozoic period; the current ballot lists candidate GSSPs that satisfy the constraints of level approved in the first vote.) Personal difficulties on the parts of several key subcommission members slowed our progress in completing and distributing this newsletter, but it now finished and will be distributed before December 1, 2001.

The field trip, newsletter, and ballot noted above represent the subcommission's principal corporate contributions. Subcommission members continue to refine our sense of terminal Proterozoic stratigraphy through their individual publications. For example, we have new radiometric constraints which suggest that the "Marinoan" Nantuo (China) and Gaskiers (Newfoundland) tillites are >600 Ma and 580 Ma, respectively. This refines our sense of terminal Proterozoic climate change and its relationship to biological radiations.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

Lack of a funding base and lack of initiative by many subcommission members continue to pose problems, as outlined in previous reports. The current mandate of the terminal Proterozoic subcommission will soon be completed. Certainly, the subcommission will have finished its task by the time of the 2004 IGC. It is recommended that the subcommission be expanded into a more comprehensive Neoproterozoic working group that can build an improved stratigraphic framework for the entire Era. We need fresh problems, fresh ideas, and fresh blood.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

Beginning Balance:	US\$ 258.45
8/14/01 Partial support of Newfoundland meeting and associated field excursion	200.00
11/1/01 Encumbered for newsletter printing and mailing (Queens Univ.)	250.00
6/26/00 Received from IUGS	<u>500.00</u>
Ending Balance:	US\$308.45

**11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

A second formal ballot, asking members to indicate preference for one of four proposed type areas has been completed. If one candidate receives a strong majority of votes, we will press on with a final ballot, specifying precise GSSP location and (sure to be controversial) name of the period. This will bring the current incarnation of the subcommission to its conclusion.

We will complete our deliberations by means of newsletters. Should a GSSP be recommended and approved, we will prepare a paper for *Episodes* describing the new period.

Quite simply, we plan to submit our recommendation for an initial GSSP for the terminal Proterozoic period and complete our work.

**15-16. BUDGET AND ICS COMPONENT FOR 2002**

Printing and mailing expenses for two newsletters, each estimated at US\$ 250.00 = US\$500.00  
Given our current balance, the subcommission requests US\$ 200.00 in support of 2002 activities.

**19. SUBMITTED BY:**

Andrew H. Knoll  
Chairman, ICS Subcommission on the Terminal Proterozoic Period  
November 28, 2001  
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Telephone: (617) 495-9306; Telefax: (617) 495-5667  
e-mail: aknoll@oeb.harvard.edu

**Appendix : Terminal Proterozoic Subcommission Membership**

Chairman:

Andrew H. Knoll (USA)

Vice-Chairman:

Malcolm Walter (Australia)

Secretary:

Guy Narbonne (Canada)

Additional Voting Members:

John Shergold (France; Chairman, Cambrian Subcommission)	
Laurence Robb (South Africa, former Chairman of previous Precambrian Subcommission)	
Richard Jenkins (Australia)	Gopendra Kumar (India)
Wolfgang Preiss (Australia)	Anna Siedlecka (Norway)
Hans Hofmann (Canada)	Mikhail Fedonkin (Russia)
Sun Weiguo (China)	Mikhail Semikhatov (Russia)
Xing Yusheng (China)	Gerard Germs (South Africa)
Janine Sarfati (France)	Martin Brasier (UK)

Brian Harland (UK)  
Ian Fairchild (UK)

Nicholas Christie-Blick (USA)

# SUBCOMMISSION ON GEOCHRONOLOGY

ANNUAL REPORT 2001

## 1. TITLE OF CONSTITUENT BODY

Subcommission on Geochronology, of the International Commission on Stratigraphy (SOG)

## 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

SOG is a body which has long contributed to insure standardisation in the geochronological knowledge allowing information to be more easily and widely used especially, though not only, in the domain of stratigraphy. This goal has been fulfilled during the recent past which justifies the need for such a body of IUGS to exist. SOG will fill its role if it insures conventions to be applied in all countries for the reporting of data allowing possible comparison between scientific information published in all countries.

Particular domains of recent action comprise the Miocene and Cretaceous time scales, the discussion of decay constants, the reference materials for analysis, the nomenclature. SOG has also been the mover of integrated stratigraphic research when favourable sections were discovered.

### **Stratigraphical geochronology**

a- Application of Geochronology to Stratigraphic investigation for the whole geological history with emphasis on the time interval 600 Ma to 5 Ma; encourage search for datable material correlated to the stratigraphical sequence documented with litho- bio- magneto- and chemostratigraphical evidence; numerical dating and contribution to the improvement of the synthetic Geologic Time Scale for the Phanerozoic;

b- Application of Geochronology to Stratigraphic definitions: coordination of multidisciplinary research on stratigraphical events including

i- geochronological information;

ii- definition of dated key points with application to GSSP;

iii- collection of results and diffusion of knowledge.

### **General geochronology**

Development of research in the field of Geochronology (Standardisation of methods, techniques, reliability of dating results, reporting, nomenclature). The Sub commission on Geochronology is the appropriate body for study, discussion and recommendation of conventions in the domain of the physical decay constants for which developments of research in cooperation with physicists and chemists will be followed.

## 4. ORGANIZATION

Members comprise 1- the board 2- other voting members (including honorary ex-officio members: the past chairpersons of SOG; total: 10 to 15 voting members); 3- about 20 corresponding members and 4- members of Working Groups (lead by SOG voting members) when needed.



Members are continuing for as long as they contribute to the yearly activity of SOG.

- The board comprises a Chairman : G. S. Odin and a Vice-Chairman: I. Kaneoka (the secretariat is handled by the chairman).

- Voting members are the persons who vote when formal conventions are needed;

- Voting members must contribute and corresponding members are encouraged to contribute to the life of the Sub commission;

- Working Group members develop research for restricted actions during restricted intervals of time.

Six Working Groups proposed in 2001:

1- Time scale

2- Reference materials and conventions

3- Reliability of Geochronometers

4- Integrated Stratigraphy of the Miocene Sequence, Miocene from Japan (M. Takahashi)

5- Fission Track Dating

6- Maastrichtian

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

As for France and in year 2001, support came from national authorities (Centre National de la Recherche Scientifique).

Active research in Japan (M. Takahashi) was supported by the Geological Survey of Japan.

Support of WG "Stratigraphy at the Campanian-Maastrichtian Stage Boundary" came from regional and local authorities in SW France, private industry (Calcia), University P. & M. Curie Paris, and ICS.

Support for research and action toward the goals of SOG has been provided to active members by their own funding sources.

The main Commission (ICS) did not provide funding in 2001 for SOG.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

a) There could be actions relevant to ICS Sub commissions for Systems and relevant Working Groups for boundaries: Cretaceous (Campanian-Maastrichtian boundary definition), Palaeogene (WG on the Palaeocene-Eocene boundary) and Neogene Sub commissions.

b) IGCP Programme (IUGS-UNESCO) project IGCP n<sup>o</sup>246 Pacific Neogene Events in Space and Time (contribution by Japanese members of the WG leads by M. Takahashi).

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

Accomplishments and products from SOG in 2001 are scientific results. These results are not the direct product of the action of the Sub commission. Some progresses developed in connection to the Subcommission were quoted in the Bulletin vol. 16 published this year.

A 880-page volume published this year (mainly under the auspices of the Subcomm. on Cretaceous Stratigraphy): Odin G. S., editor, 2001. *The Campanian - Maastrichtian stage boundary: characterisation at Tercis les Bains (France): correlation with Europe and other continents*. IUGS Special Publication (monograph) Series, 36; Developments in Paleontology and Stratigraphy Series, 19, Elsevier Sciences Publ. Amsterdam, xxviii + 881 pp..

WG 2- Reference materials and conventions:

The question of reference materials is a key one which has been addressed

Marvin Lanphere has proposed a new fluence monitor for  $^{40}\text{Ar}/^{39}\text{Ar}$  dating: replacement for the exhausted 85G003 sanidine from the Taylor Creek Rhyolite (New Mexico); name: TCR-2.

WG 4- Miocene from Japan:

Research was active for radiometric documentation of the biostratigraphically controlled

Miocene sequence in the Karasuyama area (Central Japan) under the leadership of M. Takahashi.

WG 6- Maastrichtian:

The definition of the GSSP for the Campanian-Maastrichtian boundary was under the leadership of this sub commission's leader. The proposal was ratified in 2001.

## **8. CHIEF PROBLEMS ENCOUNTERED IN 2001**

The action of SOG has not been favoured by the lack of funding from ICS. In addition, the ICS board's suggestion to cancel the long lived, active, and necessary subcommission has not encouraged action. Volunteers willing to contribute action in a questioned body with no funding resulted rarer than usual. This point has to be clarified as soon as possible with ICS board and IUGS for efficiency to be encouraged. All members approached by the present chairman had urged that an independent body be maintained.

See also the SOG annual report of 2000 for the fundamental question of decay constants.

## **10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):**

No funding received.

## **11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

Actions of SOG will generally follow-up on the long term action quoted above; but the future existence of this IUGS body has first to be discussed, clarified and insured.

Key actions include:

- nomenclature in geochronology (French version proposed in 1995, vol. 13 of the Bulletin of liaison)

- follow the progress in decay constants

Information related to SOG is published in a newsletter.

## 15-16. BUDGET AND ICS COMPONENT FOR 2002

IUGS funding is necessary if IUGS wishes to maintain a living body devoted to the problems of geochronology. Administration of the body is a "source" of expenditures in itself. Plans to attend and contribute the ICS Urbino and Florence meetings make another important need.

- contribution to fees related to the Bulletin n°16 published 2001	US \$	190
- travel expenses to Urbino ICS meeting	US \$	340
- supply* for Florence IGC	US \$	270
- office expenses	US \$	200
- Contributions to enquiries related to convention in nomenclature, decay constants, reference material	US \$	<u>400</u>
Total request for year 2002		1400

\* I propose to ICS to make a total supply 800 US \$ split in 3 years for this IGC

Funding from national funding sources for each active member is the main source for action.

## 17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)

-1997 Montanari A., Odin G.S. & R. Coccioni, (1997). Miocene Stratigraphy; An integrated approach. *Developments in Stratigraphy Series*, Elsevier, 15: 694 +XVII pp.

The volume publishes the largest source of geochronological information about stratigraphically calibrated Miocene sequence and recommends a simplified chronostratigraphical scheme with appropriate candidates for GSSP.

- papers on biostratigraphical-geochronological calibration of Miocene Japanese sequence

- Bulletins of liaison of SOG with activity reports 1997 to 2001: 152 pages published with news and reports on

time scale

reliability of geochronometers

reference materials

nomenclature

decay constants especially volume 15, 1999, including:

Odin G. S., G. Audi & M-M. B, 1999. The  $^{238}\text{U}$ ,  $^{235}\text{U}$ ,  $^{232}\text{Th}$ ,  $^{187}\text{Re}$ ,  $^{176}\text{Lu}$ ,

$^{147}\text{Sm}$ ,  $^{87}\text{Rb}$ , and  $^{40}\text{K}$  half-lives used by physicists, geochronologists, chemists; a review of their funding data. *B.L.I. S.G.*, 15: 31-41.

and a number of contributions from North American experts

-2001 Odin G. S., editor. *The Campanian - Maastrichtian stage boundary: characterisation at Tercis les Bains (France): correlation with Europe and other continents*. IUGS Special Publication (monograph) Series, 36; *Developments in Paleontology and Stratigraphy Series*, 19, Elsevier Sciences Publ. Amsterdam, xxviii + 881 pp.

The volume publishes the most recent and largest source of stratigraphical information available on a single section devoted to the definition of a GSSP.

## **18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)**

The general goal is to follow up the previous historical role of SOG for preparing and recommending conventions, encouraging research, receive enquiries of the geochronological community and generally provide stratigraphers with expert information in dating rocks.

The action of SOG depends on the advancement of knowledge more than on an administrative action and then cannot be precisely planned. But preparing an English convention in nomenclature and an up to date review of decay constant knowledge able to be published would be good objectives if the body is allowed to work.

## **19. SUBMITTED BY:**

NAME: G. ODIN with collaboration of I. Kaneoka (Vice-chair)

POSITION: Chair of SOG

DATE: 15-XI-2001

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As a member of SOG, I. Kaneoka is chairman of the Committee on Geochronology in Japan, the single one authorized body of the National Committee on Geology, supported by the Science Council of Japan.

# INTERNATIONAL SUBCOMMISSION ON STRATIGRAPHIC CLASSIFICATION

ANNUAL REPORT 2001

## 1. TITLE OF CONSTITUENT BODY

International Subcommission on Stratigraphic Classification (ISSC)

## 2.-3. OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

To conduct and animate international discussions and to produce recommendations on stratigraphic classification, terminology and procedure.

For almost forty years the ISSC has worked to reach an international consensus on stratigraphic terminology and classification. The forum provided by ISSC has been used by representatives from different countries and regions to expose and discuss their ideas. Opinions and decisions taken by the ISSC were included in the two editions of the International Stratigraphic Guide (1976, 1994), and are transferred by national and regional representatives to their own countries and regions, where they were usually incorporated into national and regional codes. Permanent existence of this feedback process helps to have a rather uniform terminology and classification all over the world and prevents existence of large differences on these matters. Continuing work by the ISSC is devoted to improve the existing classification and terminology and to examine old and new ways to classify rock bodies to see the convenience to incorporate them as formal units of Stratigraphic Classification.

ISSC fits, through promotion of international consensus on stratigraphic classification and terminology, within the following items of IUGS Strategic Plan:

- Advancement of earth-science research.
- Collaboration between developed and developing countries.
- Formal earth-science education.
- Communications by expanding the web site.

## 4. ORGANIZATION

ISSC is a Subcommission of the Commission on Stratigraphy.

Membership:

Chair           A.C. Riccardi, Argentina  
 ViceChair    M.B. Cita, Italy  
 Secretary    to be designated  
 30 Individual Members  
 20 Ex-Officio Members  
 21 Organizational Members

Individual Members are selected because their dedication to matters of stratigraphic classification and terminology and their interest in the work of the ISSC. Ex-officio Members include the Bureau of the ICS and the Chairpersons of its subcommissions, working groups and technical or regional committees. Organizational Members include national or multinational stratigraphic committees and commissions, national geological surveys, and national or multinational geological societies. Decision on the admission of all three types of members is the responsibility of the ISSC Membership Committee and the Executive of the IUGS Commission on Stratigraphy.

## **5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS**

Individual Members are supported by their host institutions to carry out their stratigraphic studies and to participate in the ISSC activities. Ex-Officio and Organizational Members may be subsidized by international and/or national institutions, but this type of support is quite variable and difficult to quantify.

## **6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS**

Important scientific input to ISSC comes from:

(a) Members which at the same time belong to National or Regional bodies working on the same problems, i.e. Organizational and/or Individual Members from Argentina, Australia, Austria, Brazil, Bulgaria, Canada, Colombia, Czech Republic, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Lithuania, New Zealand, North America, Norway, People's Republic of China, Russia, South Africa, South Korea, Spain, Sweden, The Netherlands, U.K., Yugoslavia.

(b) Members which at the same time belong to other Subcommissions, committees or working groups of the ICS, i.e. all ex-officio members.

## **7 & 9. CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2001**

Results of this period are:

### **(1) Sequence Stratigraphy**

The Working Group on Sequence Stratigraphy (WG), under the co-ordination of Amos Salvador, produced Memo 18 (January 22, 2001), Memo 19 (March 2, 2001), Memo 20 (April 3, 2001), and Memo 21 (May 24, 2001).

A research conference on "Sequence Stratigraphic and Allostratigraphic Principles and Concepts" was organized by the WG (Dallas, Aug. 26-29, 2001) jointly with the American Association of Petroleum Geologists (AAPG), the North American Commission on Stratigraphic Nomenclature (NACSN), and the Petroleum Technology Transfer Council. The objective of the conference was to provide input into the deliberations of the International Subcommittee on Stratigraphical Classification and of the North American Commission on Stratigraphic Nomenclature on allostratigraphic and sequence stratigraphic units for possible amendment to the International Stratigraphic Guide and the North American Stratigraphic Code. Recommendations may be summarized as follows:

a) Leave sequence stratigraphy informal, and revisit the issue in - maybe - ten years from now;

- b) Reconsider allostratigraphy. There is a need for defining rock units bounded by unconformities (better, by discontinuities) especially for continental Quaternary deposits but also for extrusive volcanics and volcanoclastic deposits. The basic unit might be called synthem or allothem or similar, and a hierarchic approach is advisable. These units should not be restricted to the sedimentary rocks. A formal definition with definite rules is a prerequisite for a stable (versus floating or chaotic) nomenclature;
- c) Avoid conflicting definitions in the International Stratigraphic Guide and in the North American Code for Stratigraphical nomenclature.

## (2) Cycle Stratigraphy

The WG on cyclostratigraphy, formed by Prof. F. Hilgen, W. Schwarzacher and A. Strasser analyzed comments received on a first report and questionnaire and a second report is near completion to be circulated.

## (3) Publications and Other Communications

ISSC Circular (#99, July 26, 2001) was distributed. Besides administrative matters, it included information on: 1) proposals of the ISSC WG on Sequence Stratigraphy; 2) AAPG Hedberg Research Conference; 3) comments on the first report on Cyclostratigraphy; 4) ISC News; 5) a listing of some new publications on stratigraphic classification, etc.; and 6) three documents on stratigraphic matters. ISSC Circular No. 100 is under preparation and will be distributed before the end of 2001.

An ISSC Website has been prepared and will be made accessible in a few days.

Preparation of a glossary of stratigraphic terms in several languages is underway under the direction of Prof. I. Chlup c (Czech Republic)

Memo 18 (January 22, 2001), Memo 19 (March 2, 2001), Memo 20 (April 3, 2001), and Memo 21 (May 24, 2001) of the Working Group on Sequence Stratigraphy.

## 8. CHIEF PROBLEMS ENCOUNTERED IN 2001

Slow response from members. Difficulties in reaching a consensus within the WG on Sequence Stratigraphy.

Postponement in forming a new WG to analyze Chemostratigraphy as a new category of stratigraphic classification.

## 10. SUMMARY OF EXPENDITURES IN 2001 (ANCIPATED THROUGH MARCH 2002):

INCOME	US DOLLARS
Carry-over from 2000	.00
2001 ICS subvention	739.44
<u>Bank deposit interest</u>	<u>.00</u>
Total Receipts	739.44

EXPENDITURES	US DOLLARS
Total Expenses	c. 800

**11-14. WORK PLAN, CRITICAL MILESTONES AND ANTICIPATED RESULTS TO BE ACHIEVED FOR NEXT YEAR:**

- (1) Sequence Stratigraphy
  - a. Close discussions and define proposal on unconformity-related Units, their philosophy, methods and terminology.
  - b. Publication of a proposal on unconformity-related Units, their philosophy, methods and terminology.
  
- (2) Cycle Stratigraphy
  - a. Further discussions on cyclostratigraphy.
  - b. Document on cyclostratigraphy.
  
- (3) Publications and Other Communications
  - a. Advance communications and discussions through the new ISSC website, which has been prepared and will be accessible in a few days. The new ISSC Website will be used: (i) to publicize new and recent ISSC Circulars and the *Abridged version of the International Stratigraphic Guide* and; (ii) as a forum to speed up the Subcommittee work.
  - b. Produce a glossary of stratigraphy in several languages.
  - c. Promotion of compliance of principles and rules on stratigraphic classification.
  - d. Consider other possible units of stratigraphic classification.

**15-16. BUDGET AND ICS COMPONENT FOR 2002**

INCOME	US DOLLARS
Carry-over from 2001	-
IUGS subvention	1000.00
EXPENDITURES	US DOLLARS
<u>Circulars and mail</u>	<u>1000.00</u>
Total Expenses	1000.00

ALLOTMENT REQUESTED FROM ICS FOR 2002    \$ 1000

ISSC has no regular, formal funding sources outside of IUGS. ISSC does not conduct field or laboratory projects, and so there are no regular contributions required. Regular, hidden funding from Member's host institutions takes the form of Member's time and overheads and secretarial assistance. This is not regularly recorded or costed, and so cannot be accurately quantified. For 2002, informal funding of overheads for Chair, Vice Chair and Members, by their "Home Institutions", is estimated as \$10,000.



## 17. REVIEW CHIEF ACCOMPLISHMENTS OVER LAST FIVE YEARS (1997-2001)

### (1) Publications and Other Communications

- Reprinting of the *International Stratigraphic Guide* by the Geological Society of America (500 copies).

- Publishing of the "*International Stratigraphic Guide. An Abridged Edition*" (M. Murphy and A. Salvador, eds.) in Episodes and as separates.

- Edition and distribution of eight *ISSC Circulars* (No. 92, March 25, 1997; No. 93, May 26, 1998; No. 94, May 24, 1999; No. 95, June 14, 1999; No. 96, October 29, 1999; No. 97, July 10, 2000; No. 98, October 27, 2000; No. 99, July 26, 2001). Besides administrative matters, these included discussions on: 1) proposals of the ISSC WG on Sequence Stratigraphy; 2) a draft of a poster on guidelines for lithostratigraphic units; 3) discussions and comments in relation to a new Global Stratigraphic Chart; on the Geological Map AAPG Hedberg Research Conference; 4) discussions and comments on Cyclostratigraphy; 5) ISC News; 6) listing of some new publications on stratigraphic classification, etc.

- A WG to work in a glossary of stratigraphic terms in several languages was organized and a document is being prepared.

- An ISSC Website has been prepared and will be made accessible within 2001.

### (2) Sequence Stratigraphy

- The Working Group on Sequence Stratigraphy (WG), under the co-ordination of Amos Salvador, produced Memo 7 (February 28, 1997), 8 (August 15, 1997), 9 (January 12, 1998), 10 (May 15, 1998), 11 (November 11, 1998), 12 (January 11, 1999), 13 (January 29, 1999), 14 (March 19, 1999), 15 (May 24, 1999), 16 (July 30, 1999), 17 (September 15, 2000), 18 (January 22, 2001), 19 (March 2, 2001), 20 (April 3, 2001), and 21 (May 24, 2001). A research conference on "Sequence Stratigraphic and Allostratigraphic Principles and Concepts" was organized by the WG (Dallas, Aug. 26-29, 2001) jointly with the American Association of Petroleum Geologists (AAPG), the North American Commission on Stratigraphic Nomenclature (NACSN), and the Petroleum Technology Transfer Council. A set of recommendations is now under consideration of the full Subcommittee.

### (2) Cycle Stratigraphy

- A WG on cyclostratigraphy was organized and produced a first report and questionnaire and a second report is near completion to be circulated

## 18. OBJECTIVES AND WORK PLAN FOR NEXT 5 YEARS (2002-2006)

- Publication of a proposal on unconformity-related Units, their philosophy, methods and terminology.

- Publication of a document dealing with concepts, applications, terminology and operational problems of cyclostratigraphy.

- Publication of a glossary of stratigraphy in several languages.

- Organization of a WG on Chemostratigraphy.

- Analysis of eventual changes, additions and improvements in the International Stratigraphic Guide.

**19. SUBMITTED BY:**

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POSITION: ISSC Chairman

DATE: November 6, 2001

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*APPENDIX 1 to ICS Annual Report 2001*

**STRATIGRAPHIC INFORMATION SYSTEM**  
ANNUAL REPORT 2001

**TITLE OF CONSTITUENT BODY**

Stratigraphic Information System (SIS), a focussed working group under ICS

**OVERALL OBJECTIVES AND PROPOSED FIVE-YEAR PLAN (2001-2006)**

In 2000, the Executive Committee of ICS, with the agreement of IUGS, established a working group to propose a formalize Stratigraphic Information System (SIS). Stratigraphy as a science has a vast amount of information that is often hard to find and often poorly presented; teaching modules are scarce and as a discipline we often do not aggressively enough market our achievements relative to other geoscience disciplines. This is where SIS comes in, which has a great opportunity and exciting tasks ahead that can be very fruitful and rewarding globally.

The following are a suite of proposed components of the Stratigraphic Information System, with some condensed explanations of their importance to the global geoscience community. It is planned that most of these components will be on-line at the ICS/SIS Web site *www.stratigraphy.org*.

**(1) Data-bases.**

- Facies Stratigraphy: Data base of outcrop and core sections. Iconographic atlases showing types of siliciclastic and carbonate macro- and microfacies, diagnostic sedimentary structures, ichnofossils/ ichnofabrics and ichnofacies, etc., including, wherever possible, interpretations, paleogeographic/ facies models, and references.
- Paleogeographic and Paleoclimatic Maps. The data base for the paleogeographic maps, sourced from the published literature, ongoing research, and from still unpublished M.Sc./Doctorate research results, could be collected and plotted on base paleogeographic maps (e.g., <http://www.scotese.com>).
- Continental Ecosystems. Stratigraphic correlations, distribution of paleoclimatic indicators, and the relationship (depositional and time-equivalence of events) of continental ecosystems with adjacent marginal marine basins.
- Marine Ecosystems. Paleoclimatic belts, approximate paleobathymetric contour curves, areas of paleo-upwelling, phosphate deposits, black shales, carbonate platforms, turbidites, major trends of surface and bottom currents.

**(2) Iconographic Atlases.**

- Index fossil species: systematics, biostratigraphy and paleoecology. Iconographic atlases of stratigraphically significant fossil groups (ammonites, inoceramids, foraminifers, ostracodes, radiolarians, calcareous nannofossils, palynomorphs), to be accompanied by biostratigraphic frameworks for the various basins worldwide.

- Biostratigraphy in thin-sections. Atlas of index fossil species (e.g., foraminifers, radiolarians, pithonellid calcispheres, calpionellids, roveacrinids) examined in thin sections, illustrating the diagnostic features.

Biostratigraphic and paleoecological data are indispensable to establish an integrated stratigraphy for interbasinal correlation. While an enormous amount of data exist based mainly on outcrop sections and on thousands of oil exploration boreholes, surprisingly few recent synthetic biostratigraphic and paleogeographic studies have actually been published. In addition, many of the published data are in need to be brought up to date.

To be able to acquire these, it would be necessary to determine and illustrate (with good SEM photographs), if not all, at least the index species and these illustrations along with the stratigraphic distribution of these species. Simply giving stratigraphic charts without illustrations is not sufficient, as diverse forms are often used as index species under the same name.

The final aim would be, among others, the publishing of iconographic atlases of index fossils for the various sedimentary basins around the globe.

In some offshore basins, with well established stratigraphic scales, the solution would be simple, if oil companies active in the area allow the release of existing data and make possible to present these in published format through the ICS/SIS website. The first step could be to approach individually prospective authors, who could accept to collaborate and, if necessary, contact officially their company.

To maximize application, the biostratigraphic frameworks, to be included as part of the Taxonomic, Iconographic and Biostratigraphic Atlases of Index Fossil Species, have to be presented per study basin, thus reflecting differences in regional tectono-sedimentary characteristics and biogeographic differentiation.

### **(3) Stratigraphic Lexicons**

- Regional lithostratigraphic frameworks and time scales, with definitions of individual lithostratigraphic units, photos of type-sections, chronostratigraphic correlations, and references.
- Regional biozonal schemes: with definitions of zones and type-sections (link to the iconographic atlases of index fossil species).

This would have the enormous advantage of making easily accessible the regional lithostratigraphy and time scales of basins worldwide, with links to related data-bases.

### **(4) Quantitative Biostratigraphy Programs**

- Interest in quantitative biostratigraphy is flourishing, and there is demand for teaching modules of key techniques and its computer programs. Hence, in 2002-2003 compact demonstration modules will be prepared of the three methods Unitary Association (UA), Ranking and Scaling (RASC) and Constrained Optimisation (CONOP) that can be downloaded via the ICS master website.

### **(5) Teaching & Research.**

- Virtual field-trips to key type-sections: stratotypes, GSSP's, stage boundaries' sections: with location map; photos and zoom showing details of beds down to thin sections; stratigraphic charts with litho-, magneto-, isotope-, chemo-, and biochronostratigraphy; distribution charts of fossils, composite graphic correlation of key markers, etc.; published references and non-published theses on the area.
- Easy-to-follow teaching guides: quantitative techniques of stratigraphic interpretation, chemostratigraphy, cyclostratigraphy, and Sr-stratigraphy, applied techniques to sequence stratigraphy: state-of-the-art, among others.

**(6) ICS/SIS Website**

- Develop a method of classification to organize, logically, the data-bases, related links and make easy search and use of the contents.
- Open forum: Electronic discussion group (SIS-Net ?). In addition to the Web site, a link to a thematic discussion group (electronic mailing list) could be set up for SIS. Its purpose would be to make it possible to exchange useful information quickly and efficiently. Scientific comments, debates, and discussions of problems within the areas of interest, announcements and specifically addressed questions, would be all encouraged, as long as they are of relevance to SIS. Maps and stratigraphic charts are of obvious interest and photographs of taxonomically significant and/or problematic fossils could be launched for discussion among specialists.

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*APPENDIX 2 to Annual Report 2001*

**Conference on Future Directions in Stratigraphy**

**International Commission on Stratigraphy  
Urbino, Italy  
14-16 June 2002**

**Meeting by invitation for chairs of the ICS Subcommissions and ICS Executive  
Conference chaired by Prof. Stan Finney**

**AGENDA**

Challenge from the IUGS: Global Boundary Stratotype Section and Point (GSSP) for all Phanerozoic stages in place by the year 2008.

Response from the ICS: Completion of primary mission (selection of GSSPs) by 2008.  
Future Direction of ICS: Geological Process Oriented Stratigraphy.

**I. Response to Challenge**

**A. Selection of GSSPs for all Phanerozoic stages**

1. Reports from each system based Subcommission to include:
  - a. present status
  - b. plans for completion by 2008

**B. Strategies to ensure progress within Subcommissions**

1. Impediments to progress (historical precedence, regional preferences, financial support, leadership, etc.)
2. Methods of overcoming impediments

**C. Contributions of ICS**

1. Scientific results and their dissemination in papers, reports, and charts
2. Development of international relationships and cooperation
3. Stimulus for international conferences, symposia, field meetings
4. Stratigraphic Information Services

**II. Future of ICS**

**A. Mission - Geological Process Oriented Stratigraphy**

1. New Mission: high-resolution global chronostratigraphy (developed by ICS) applied to problem of global change.
2. Purpose/Future of Commission and Subcommissions
  - a. ICS - Commission or future Association
  - c. Consolidation of Subcommissions
  - b. new Subcommission on Stratigraphic Information Services
2. Recruitment of young participants
3. Increased scope/discipline of membership to reflect new mission

- B. Dissemination of knowledge/results/products to greater scientific community
  - 1. SIS (Stratigraphic Information Services)
  - 2. Web site
  - 3. Linkage of regional time scales to ICS standard global time scale
  - 4. Publications/reports/charts
  - 4. International symposia, conferences, workshops
  - 5. KRONOS Award - International Stratigraphic Prize
  
- III. Plans for 32nd IGC, Florence
  - A. Subcommission sponsored symposia
  - B. Used of global correlation to address global issues

***APPENDIX 3 to ICS Annual Report 2001***

Summary sheet with the established Global Boundary Stratotype Sections and Points (GSSPs) (Excel file GSSP2001.XLS; and posted with updates at ICS website: <http://www.stratigraphy.org>).