Chitinozoan Newsletter

CIMP

Subcommission on Chitinozoans

Oliver Chang Paris

Edited by
Gary Mullins and Ken Dorning

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Subcommission on Chitinozoans

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EDITORIAL

Welcome to the 25th Chitinozoan Newsletter. This is the last newsletter that I and Ken will produce. I feel privileged to have served on the Subcommission, but the time has come for me let someone else take over. Details of the nominations that we have received for the posts of secretary and president are below.

It has also been a good year for chitinozoan PhD students, as both Thijs Vandenbroucke (University of Ghent) and Tony Butcher (University of Portsmouth) have graduated - congratulations to both.

Gary Mullins

FUTURE MEETINGS

IGCP 503. Changing palaeo-geographical and palaeobiogeo-graphical patterns in the Ordovician and Silurian. Glasgow, 30th August-1st September, 2006. Contact Dr Alan Owen (a.owen@ges.gla.ac.uk). See also http://sarv.gi.ee/igcp503/index.php for more information on the project.

CIMP General Meeting. 2006. Palaeozoic palynology in space and time. 2nd-6th September 2006. Academy of Sciences, Czech Republic. Contact Jiri Bek via email at bek@gli.cas.cz and see the web pages at http://www.cimp2006.wz.cz/.

7th European Palaeobotany and Palynology Conference. 6th-11th September, Prague, Czech Republic. For more information see the pages at http://www.conference.cz/eppc2006/ or email eppc2006@conference.cz.

NOMINATIONS FOR PRESIDENT AND SECRETARY

A request via email for nominations for the posts of president and secretary produced the following candidates.

President

No nominations were received for the position of President.

Secretary

Thijs Vandenbroucke has volunteered to become the secretary and will take over at the Prague CIMP meeting.

ADDRESS CHANGES

YNGVE GRAHN
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OLLE HINTS (changing mid-2006)
Institute of Geology at Tallinn University of Technology
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JAAK NÕLVAK
The address of the institute will change from July 2006.

LEONARD OLARU
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HELGA PRIEWALDER
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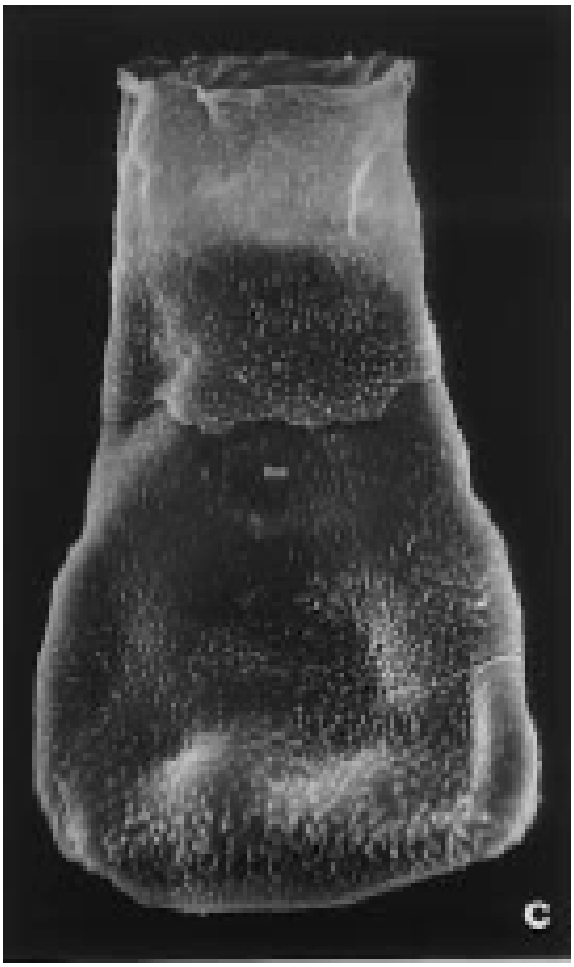
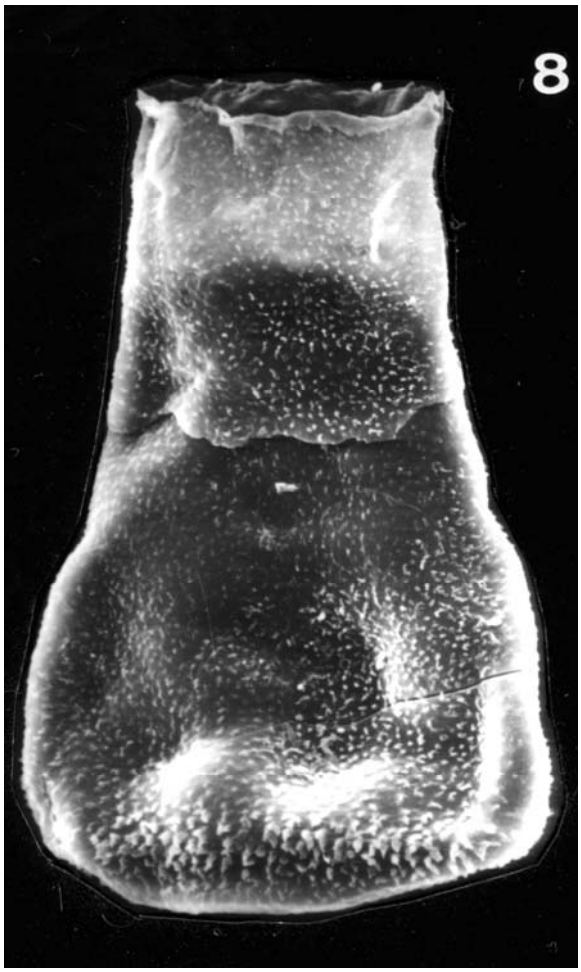
CHITINOZOAN RESOLUTION



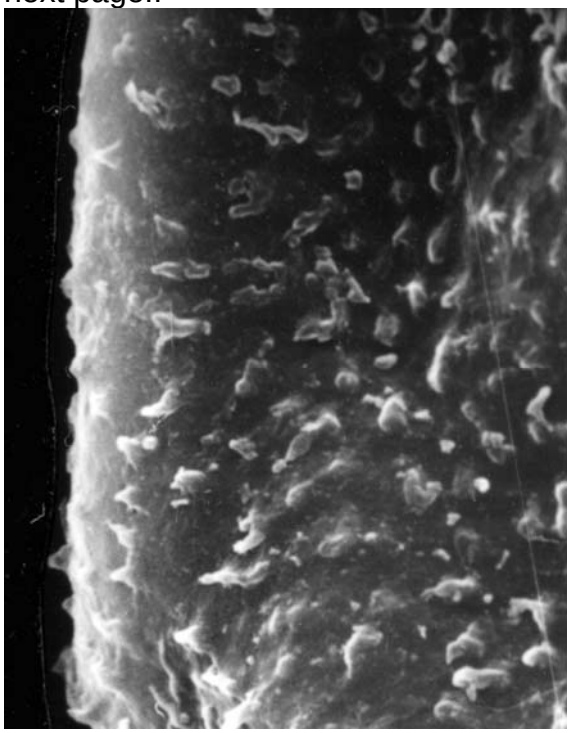
We are increasingly using pdf copies of articles in research. In some cases the quality of the plates has been compromised in order to keep the file sizes small for rapid downloading.

This led me to consider just how much detail is lost when looking at the printed version when compared with the original images. Given that they were to hand, I have used an illustration from Miller, C. G., Sutherland, S. J. E. and Dorning, K. J. 1997. Late Silurian (Ludlow - Pridoli) microfossils and sedimentation in the Welsh Basin near Clun, Shropshire. Geological Journal 32, 69-83.
Figure C is the printed illustration of the holotype of *Eisenackitina clunensis*, taken from the available pdf. Figure 8 is a photographic print. Both versions have been enlarged to twice the original size, as viewed at 100%.



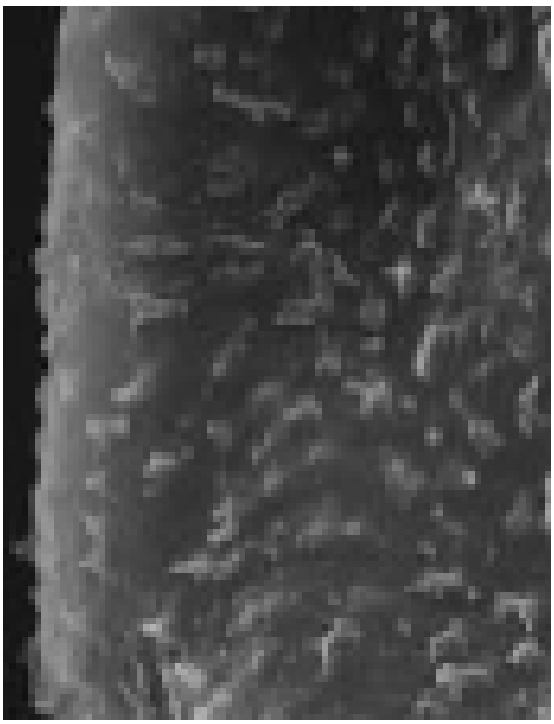
The original shows more contrast, but at this size there is only a slight loss in detail in the pdf. Vesicle length 150 µm, diameter 61 µm. At a greater magnification, this loss of detail is

more apparent, as illustrated on the next page..



Eisenackitina clunensis. Holotype. Vesicle detail.

At a larger scale, the original above shows more contrast, with the pdf below not clearly showing the minor granulate ornament.



Ken J. Dorning
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MISSING MEMBERS

The following addresses have stopped receiving emails.

C. FOSTER
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MEMBERS REPORTS

TONY BUTCHER. 2005 saw the completion of my Ph.D. entitled 'Chitinozoan biostratigraphy of the Rhuddanian of Illinois and Jordan'. My research dealt with cores from both study areas: the Jordanian material was well-constrained by graptolite data (provided by David Loydell), while the Illinois material had poor biostratigraphical constraint, thus providing an interesting opportunity to correlate using chitinozoans. Data from the thesis is in preparation for publication in 2006, in which two new species (one from Jordan and one from Illinois) will be formally named. I am working currently on a two year post-doctoral project concerning Northern Gondwanan chitinozoan biostratigraphy, with David Loydell at the University of Portsmouth.

KEN DORNING. I visited Gotland, Sweden, as part of The Dynamic

Silurian Earth Subcommission on Silurian Stratigraphy meeting in August 2005. A number of new localities were examined, and samples were collected for palynological analysis, including chitinozoans, phytoplankton and spores.

YNGVE GRAHN. Since August 2005 I work for the Brazilian national oil company Petrobras with a Bolivian project, but I am still associated with the post-graduate program at UERJ (Universidade do Estado do Rio de Janeiro). Recently I got access to shallow borings along the eastern outcrop belt of the Parnaíba Basin. The Devonian geology is here developed differently from the western and central parts of the basin. Together with geologists from the federal university in Rio de Janeiro (UFRJ) and colleagues abroad, I intend to publish a paper on the geology of this part of the Parnaíba Basin. During 2005 five new papers have been published until now (15/12/05).

OLLE HINTS (Tallinn University of Technology). Scolecodonts have remained my favourite group, but I try to keep my eye on chitinozoans as well. Together with Viiu Nestor and Mairy Killing we have an ongoing project devoted to frequency patterns of various microfossil groups, chitinozoans inclusive, at the Llandovery-Wenlock boundary interval. The main idea is to look if the frequency curves of different taxa (higher taxa as well as species) correlate with each other and if the frequency patterns are clearly related to the properties of environment (as reflected in the composition of rocks). We have quantitative data from several western Estonian drill cores. The first results are published in conference abstracts, and one short paper is currently in press. The project will continue in 2006. Together with Jaak Nõlvak we do something similar in the Middle and Upper Ordovician boundary interval of Estonia, aiming also to improve regional biostratigraphical resolution at this level. With Jaak we have a paper in press on latest Tremadocian diverse chitinozoans and scolecodonts from North Estonia.

MAIRY KILLING (Institute of Geology at Tallinn University of Technology). I am working on a MSc project devoted to the dynamics of Silurian chitinozoans. This is a joint project with Viiu Nestor, Olle Hints and other colleagues from Tallinn. We aim at obtaining quantitative data on different microfossil groups (primarily chitinozoans, scolecodonts, and conodonts) to reveal the meaning and utility of frequency patterns. Currently we have data from the upper Llandovery and lower Wenlock from the Paatsalu and Viki cores, western Estonia; material from the former section is currently in press (Hints et al., 2006).

VIIU NESTOR (Institute of Geology at Tallinn Technological University) is involved in a project, dealing with dynamics of different fossil groups (chitinozoans, scolecodonts, conodonts, thelodonts) in Silurian sections of the East Baltic area. Up to now the absolute and relative frequency and diversity of these groups, as well as different taxa have been analysed in the Llandovery and lower Wenlock of the Paatsalu drill core (the paper is in press).

All studied chitinozoan taxa (180) from Llandovery and Wenlock of 41 drill cores of Estonia and North Latvia were analyzed by methods of graphic correlation to construct a composite standard like more detailed zonal scheme. Algorithm DISTR was used to

get the scale of 83 taxa, successive first and last appearances of which defined 41 datum planes. It provides a high-resolution time scale for dating the studied sections. A multi-author paper has been prepared for publication.

JAAK NÕLVAK (Institute of Geology at Tallinn University of Technology). I am actively working on Ordovician chitinozoans and biostratigraphy from the sections of the Baltica paleo-continent focusing on:

(1) the middle - upper Ordovician chitinozoan biostratigraphy and changes in the East Baltic according to the stable isotope and biotic data (with colleagues from our institute).

(2) the Ordovician and Silurian boundary beds.

(3) North American and Baltoscandian Ordovician chitinozoan and graptolite biostratigraphy (with D. Goldman, Dayton, USA).

(4) Our joint projects (with Y. Grahn, Rio de Janeiro) regarding Ordovician chitinozoan taxonomy continues.

(5) the study of some Polish sections (with Z. Modlinski and B. Szymanski, Warszawa).

LEONARD OLARU. My news refers to the two symposiums held in Bucharest, September, 15th-17th, 2005 and in Iasi, October, 29th-30th, 2005. The first Symposium held occasionally of celebration Centenary Paleontological Laboratory of Geological Faculty, of the University of Bucharest and concomitant with the 5th Symposium of Romanian Society of Paleontologists (I was elected the president).To the Bucharest I have presented the communication: Olaru, L. Some problems of biostratigraphy and palynological correlation of the Tulghes Group from Eastern Carpathians (Romania) by acritarchs and chitinozoans. This paper will be published in the Acta Palaeontologica Romaniae, no. 5, in 2006. To the second conference, yearly Geological Symposium of our Geological Department, I have presented a communication : Olaru, L., Branzila, M., Tabara, D. Geological and palynological contribution on the Silurian from the North part of the Moldavian Platform (Romania).This paper will be published in the Analele Universitatii "Al.I.Cuza" Iasi, Geologie, 51, 2006. The abstracts of both communications were published in the scientific programs. In 2005 I have published paper : Olaru, L., Apostoae, L., Apostoae Liliana Contributions on the palynological study of the Upper Formation (Tg.4) of the Tulghes Group, Balan Zone (East Carpathians, Romania) (chitinozoans, in French) Analele Universitatii "Al.I.Cuza", Iasi, Geologie, 49-50 (2004-2005).

Now, after 44 years in University, I am a Consulting Professor and my activity is focused especially to the guide dissertations and scientific activity of Ph.D. students and my younger colleagues.

FLORENTIN PARIS. The project initiated in collaboration with BLAISE VIDET (TOTAL S.A. granted post-doc) is progressing well. We have fairly good chitinozoan calibration of third order sea-level variations in the Ordovician of northern Gondwana (Morocco, Algeria, SW Europe, Libya, Saudi Arabia, Turkey). The project will be extended in 2006 to the Silurian and Devonian of the same areas. Our aim is to document a regional sea-level curve for the early Palaeozoic of northern Gondwana and then to

compare it with the various curves available for Baltica and Laurentia.

Tang Peng from the Nanjing Institute of Geology and Palaeontology (China) is planning to stay for one year in my lab. This will be a good opportunity for improving the ties between the Ordovician Chitinozoan biozones of Central China and northern Gondwana.

I am continuing my collaboration with Saudi Aramco. Presently I am studying Silurian chitinozoans from shallow cores. This very well preserved material allows excellent correlation with the centre part of Saudi Arabia. I supervised the chitinozoan part of the thesis of MIGUEL PEREZ-LAYTON on the Devonian of Bolivia. Miguel is now writing his memoir (thesis of Brest University planned for late June 2006). Additional investigations are carried out on the Ordovician biodiversification of the chitinozoans (collaboration with A. ACHAB). The Late Ordovician crisis and the Silurian recovery of the group are studied in connection with IGCP no. 503 lead by THOMAS SERVAIS.

HELGA PRIEWALDER. I just have to report that I have finished my extensive and detailed SEM-investigations on several hundred fossil-like objects from a slightly metamorphic sample from the Tyrolian part of the Alps.

SUSANA DE LA PUENTE. I'm working on Ordovician chitinozoans from the Central Andean Basin, northwestern Argentina. I began my Ph.D. project in 2004, supervised by CLAUDIA RUBINSTEIN, in the Palaeopalynology Unit, IANIGLA-CRICYT, Argentina. I started with the chitinozoan taxonomic study of several units throughout the Ordovician. The main purpose of this study is to carry out a chitinozoan zonation for the Ordovician of northwestern Argentina, calibrated with acritarchs and graptolite zonations, among other fossil groups. First results on Lower Ordovician chitinozoans have just been presented at the Annual Meeting of the Argentinean Paleontological Association and other presentations for future meetings are in preparation.

THIJS VANDENBROUCKE. Last year, I have finished my PhD and am currently compiling several papers dealing with the results of this study, amongst which a Palaeontographical Society Monograph on the Upper Ordovician chitinozoans of the UK (the PhD volume is available on demand, as a pdf file). Further research will have the same focus on chitinozoans and the Upper Ordovician.

JAN VANMEIRHAEGHE (4th and last year PhD) is finishing the study of the Ordovician chitinozoans and sediments of the Belgian Condroz Inlier and Brabant Massif and will now compile the data to try to reconstruct the development of a part of the basin at the northern edge of the Midlands Microcraton. Recently, the chitinozoan work done on the Upper Ordovician rocks of the Puagne Inlier (western Condroz) was complemented with a microfacies (by Alain Préat, Université Libre Bruxelles) and a d13C carbon istotope study (by Johan Yans, Faculté Polytechnique Mons), demonstrating a Hirnantian age for an interval of about 100m thick, containing two conglomeratic levels (preliminary results published in Notebooks of Geology, see publications). This section was recently (16/11/04) visited by the French *Groupe Eclipse Ordovicien* and a part of the IGCP 503 group. Other studies focused on the Llanvirn and Caradoc sediments of the Huy, Sart-Bernard, Vitrival-Bruyère and the

newly discovered Ri des Chevreuils Formation (all in the Condroz Inlier). Chitinozoans in these rocks are surprisingly well preserved and will aid to set up an Avalonian chitinozoan biozonation for the Ordovician.

RYSZARD WRONA. I am continuing my work on the chitinozoan biostratigraphy and palaeobio-geography of the Polish Palaeozoic surface and subsurface strata, the Holy Cross Mountains and Malopolska Massif. I'm also actively working on chitinozoans from the Silurian-Devonian transition sequences of the Dnestr Basin, southern Ukraine. This study is conducted in the frame of the Polish-Ukrainian project supported by NATO Collaborative Linkage Grant "Environmental changes at the Silurian/Devonian boundary in the Dnestr Basin, Ukraine". The beds are transitional between the shallow water platform sediments of the East European Platform and the deeper water facies of western Ukraine and Poland, and are characterized by a number of local complex facies changes. Most of the Silurian-Devonian sequence in Podolia is part of a regressive cycle. The uppermost Silurian, belonging to the Pridoli Subsystem, is represented by over 150 m of Skala Formation, composed of nodular dolomitic limestones inter-bedding the dominantly argillaceous succession. The Formation consists of the Raskov and Dzvenygorod Members. The carbonates are largely algal bioherms (mainly stromato-poroids) but macrofossils, such as brachiopods, trilobites and corals, and microfossils, such as conodonts, scolecodonts and chitinozoans are also present. The Skala Formation ranges from the *Ozarkodina crispa* conodont zone through the *Oulodus elegans detorata* conodont zone and is considered the equivalent of the Hamra and Sundre Beds of Gotland. The Formation comprises *Eisenackitina barrandei* up to *Urnochitina urna* chitinozoan biozones. The Lower Devonian of Podolia is represented by over 530 m thick continuous marine sequence composed of flysh-like deposits of limestones and shales, containing a rich assemblage of fossils. This is one of the most completely developed Lower Devonian sections in the world. The fauna is comparatively evenly distributed throughout the section. However, studies of the fauna, including the most recent ones, do not provide details on localities nor positions within the section of even the biostratigraphically most important fossils (conodonts, brachiopods, chitinozoans). Szaniawski, H. 2005, published the first informational article on this project: *Polish-Ukrainian geological research in Podolia, sponsored by NATO*. Przeglad Geologiczny, 53 (7), 557-559 [In Polish].

WANG XIAOFENG. During the last three years CHEN XIAOHONG and I have been working on two projects related to the chitinozoans. One is a wide project including the revision of the conodonts and of the graptolite successions in the three representative sections at Huanghuachang, Chenjiahe and Jianyangping, in the Yichang area, Hubei, central China (Wang et al., 2005). The goal is to study in detail the range of the most diagnostic chitinozoans in the potential GSSP for the base of the Middle Ordovician Series at Huanghuachang and their accurate correlation with relevant conodont and graptolite biozones. Following the suggestion from F. Paris, five local chitinozoan biozones have been identified in the Dawan Formation with successively, from the older to the youngest: the *L.*

esthonica, the *C. longei*, the *C. pseudocarinata*, the *B*. cf. *henryi*, and the *S. dapingensis* biozones. Another project supported by the Natural Scientific Foundation of China is studying the Ordovician chitinozoan succession from South China and its chronostratigraphc significance. Two joint manuscripts with F. Paris and Zhang Miao, namely, the chitinozoans from the Dawan Formation (Ordovician) in Yichang area, western Hubei, China, and the chitinozoans from the Fengxiang and Honghuayuan Formations (Early Ordovician) in Yangtze platform, China with description of genera and species will be completed in 2006.

NEW TAXA

Ancyrochitina arirambaense Grahn and Melo 2005
Ancyrochitina pitingaense Grahn 2005b
Angochitina gurupiense Grahn, Melo, and Steemans. 2005
Angochitina parnaibaense Grahn and Melo 2005
Angochitina praedensibaculata Grahn 2005a
Angochitina smalli Grahn and Melo 2005
Belonechitina? *plumula* Grahn 2005b
Fungochitina microspinosa Grahn and Melo 2005
Linochitina penequadrata Grahn 2005b
Pogonochitina tianguaense Grahn Grahn, Melo and Steemans, 2005
Ramochitina kegeli Grahn and Melo 2005
Ramochitina pimenteiraense Grahn and Melo 2005
Ramochitina stiphrospinata Grahn and Melo 2005
Sphaerochitina palestinaense Grahn, Melo. and Steemans. 2005

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New figures of the paratypes of *Angochitina multiplex* and the neotype of *Desmochitina lata* have been published in Schallreuter, R. 2005. Backsteinkalk als Zeuge ordovizischer Vulkanausbrüche (Backsteinkalk as Witness of Ordovician Volcanic Ash Falls) - Geschiebekunde aktuell 21 (4): 105-114, 6 figs., 2 tables Hamburg / Greifswald December 2005 ISSN 0178-1731.

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The following new chitinozoans have been described by Thijs Vandenboucke:

Belonechitina brittanica n. sp.
Acanthochitina latebrosa n. sp.
Hercochitina frangiata n. sp.
Acanthochitina pudica n. sp.
Bursachitina umbilicata n. sp.

NEW PUBLICATIONS

ACHAB, A. and PARIS, F. (in press) The Ordovician chitinozoan biodiversification and its leading factors. Palaeogeography, Paleoclimatology, Palaeoecology.

AZEVEDO-SOARES, H. L. C. and GRAHN, Y. 2005. The Silurian - Devonian boundary in the Amazonas Basin, northern Brazil. Neues Jahrbuch für Geologie und Paläontologie Abhandlungen, 236, 79-94.

CHEN XIAOHONG, WANG CHUANSHANG and ZHANG MIAO, 2004. Chitonozoans from the Ordovician Miaopo Formation at Liaozikou of Chengkou, Chongqing.

Journal of Stratigraphy, 28, (3), 230-234. (in Chinese with English abstract).

CHEN XIAOHONG and ZHANG MIAO, 2005. Early Ordovician chitinozoans from the Honghuayuan Formation and lower parts of Meitan Formation in Datangkou of Chengkou, Chongqing. Acta Palaeontologica Sinica, 44, (1), 44-56.

GOLDMAN, D., LESLIE, S. A., NÕLVAK, J. and YOUNG, S. 2005. The Black Knob Ridge Section, Southeastern Oklahoma, USA: A Possible Global Stratotype Section and Point (GSSP) for the base of the *Diplacanthograptus caudatus* Biozone and the Middle Stage of the Upper Ordovician Series. http://www.ordovician.cn/down/bkr/BKRProposal.pdf
ISOS. 1-41.

GRAHN, Y. 2005a. Devonian chitinozoan biozones of Western Gondwana. Acta Geologica Polonica, 55, 211-227. http://www.geo.uw.edu.pl/agp/table/abstracts/55-3.htm

GRAHN, Y. 2005b. Silurian and Lower Devonian chitinozoan taxonomy and biostratigraphy of the Trombetas Group, Amazonas Basin, Northern Brazil. Bulletin of Geosciences, 80, 245-276.

GRAHN, Y. and MELO, J. H. G. 2005. Devonian Chitinozoa and biostratigraphy of the Parnaíba and Jatobá basins, northeastern Brazil. Palaeontographica B, 272, 1-50.

GRAHN, Y., MELO, J. H. G. and STEEMANS, P. 2005. Integrated chitinozoan and miospore zonation of the Serra Grande Group (Silurian - lower Devonian), Parnaíba Basin, northeast Brazil. Revista Española de Micropaleontologia, 37, 183-204.

HINTS, L., ORASPÕLD, A. and NÕLVAK, J. 2005. The Pirgu Regional Stage (Upper Ordovician) in the East Baltic: lithostratigraphy, biozonation and correlation. Proceedings of the Estonian Academy of Sciences. Geology, 54, (4), 225-259.

HINTS, O. and NÕLVAK, J. in press. Early Ordovician scolecodonts and chitinozoans from Tallinn, North Estonia. Elsevier. Review of Palaeobotany and Palynology.

HINTS, O., KILLING, M., MÄNNIK, P. and NESTOR, V. in press. Frequency dynamics of chitinozoans, scolecodonts and conodonts in the upper Llandovery and lower Wenlock of the Paatsalu core, western Estonia. Proceedings of Estonian Academy of Sciences Geology, 55.

LOYDELL, D.K. and NESTOR, V. 2005. Integrated graptolite and chitinozoan Biostratigraphy of the upper Telychian (Llandovery, Silurian) of the Ventspils D-3 core, Latvia. Geol. Mag., 142, (4), 369-376.

NESTOR, V. 2005. Chitinozoans of the *Margachitina margaritana* Biozone and Llandovery-Wenlock boundary in West Estonian drill cores. Proc. Estonian Acad. Sci. Geol., 54, (2), 87-111.

NÕLVAK, J. 2005. Distribution of Ordovician chitinozoans. Estonian Geological Sections. Bulletin 6. Mehikoorma (421) Drill Core. Geological Survey of Estonia, Tallinn. 20-22, App. 26,27.

PARIS, F. in press. Chitinozoans. In MacLeod (ed.).Paeobase: Microfossils CD.

PARIS. F., ACHAB, A., ASSELIN,E., CHEN XIAO-HONG, GRAHN, Y.,

NOLVAK, J., OBUT, O., SAMUELSSON, J., SENNIKOV, J., VERNIERS, J., VECOLI, M., WANG XIAO-FENG and WINCHESTER-SEETO, T., 2004. Chapter 28-Chitinozoans, pp. 294-311. *In* B.D. WEBBY, F. PARIS, ML. DROSER and I.G. PERCIVAL eds., The Great Ordovician Biodiversification Event. Columbia University Press, New-York. ISBN 0231-12678-6.

PARIS F. and SERVAIS, T. 2005.. Ordovicien. Ann. Soc. Géol. Nord, T.11, 133-135..

PARIS, F., and VERNIERS, J., 2005. Chitinozoa. In. SELLEY R.C., COCKS, R. K. and PLIMER, I. Encyclopaedia of Geology, 2750 p, 428-440. Academic Press / Elsevier. ISBN 0-12-636380-3

PARIS, F., A. LE HÉRISSÉ, ' O. MONOD,. KOZLU, HY, GHIENNE, J-F., DEAN, W. and VECOLI, M., and GÜNAY, M. in press. Ordovician chitinozoans and acritarchs from southern and southeastern Turkey. Revue de micropaléontologie.

SCHALLREUTER, R 2005. Backstein-kalk als Zeuge ordovizischer Vulkan-ausbrüche (Backsteinkalk as Witness of Ordovician Volcanic Ash Falls)-Geschiebekunde aktuell, 21, (4): 105-114, 6 figs., 2 tables Hamburg / Greifswald December 2005 ISSN 0178-1731 (new figures of paratypes of *Angochitina multiplex*; neotype for *Desmochitina lata*)

SERVAIS, T., BLIECK, A., CARIDROIT, M., CHEN XU, PARIS, F. and TORTELLO, F. 2005. Use and utility of plankton and nekton for Ordovician palaeogeographical recon-structions. Bull. Soc. Géol. France, 176, 531-543.

VAIDA, M., SEGHEDI, A., and VERNIERS, J., 2005. Northern Gondwanan affinity of the East Moesian Terrane based on chitinozoans. Tectonophysics, 410, 379-387.

VAIDA, M. and VERNIERS, J. 2005. Biostratigraphy and palaeogeography of Lower Devonian chitinozoans, from East and West Moesia, Romania. Geologica Belgica, 8/4, 121-130.

VANDENBROUCKE, T. R. A., RICKARDS, R. B., and VERNIERS, J. 2005. Upper Ordovician chitinozoan biostratigraphy from the Type Ashgill Area (Cautley district) and the Pus Gill section (Dufton district, Cross Fell Inlier), Cumbria Northern England. Geological Magazine.

VANDENBROUCKE, T., CHEN XU and VERNIERS, J. 2005. Short note on the preliminary chitinozoan results from the Wangjiawan section, Yichang, China. Acta Palaeontologica Sinica, 44 (2), 203-208. (in Chinese).

VANMEIRHAEGHE, J., and VERNIERS, J., 2004. Chitinozoan bio- and lithostratigraphical study of the Ashgill Fosses and Génicot formations (Condroz Inlier, Belgium). Review of Palaeobotany and Palynology, 130, (1-4), 241-267. ISSN: 0034-6667

VANMEIRHAEGHE, J. (in collaboration with Johan Yans, Alain Préat and Jacques Verniers). 2005. The Upper Ordovician of the Condroz Inlier: Belgium: an excursion guide book. Excursion pour la Réunion Eclipse Ordovicien et PICG 503, Lille, 15-16 November 2005, 9 pp.

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PhD Abstract of Thijs Vandenbroucke

Upper Ordovician Global Stratotype Section and Points and the British historical type area: a chitinozoan point of view

by Thijs Vandenbroucke

Recent developments in chronostratigraphic procedure and new biostratigraphical insights necessitated the ongoing drastic revision of the Ordovician System's chronostratigraphy. A new global subdivision of the Ordovician is being established at the expense of the British chronostratigraphical framework, which has long been used as an informal 'global' standard. Carefully evaluated graptolite and conodont index species have already been selected to define the intra-systemic boundaries in their new Global Stratotype Sections and Points, or GSSP's for short. Although historically less well studied, the chitinozoans are a fossil group with a similar biostratigraphical potential as the two aforementioned groups. However, up to the present, they remained virtually unstudied in several of the newly proposed GSSP's for the Ordovician System. The project's main objective consists of the study of the chitinozoan assemblages in those newly proposed, or already ratified Global Stratotype Sections and Points. Because the Ordovician is a long period, the present study has necessarily been restricted to its three uppermost stages, grouped into the Upper Ordovician Series. Chitinozoan abundances and preservation permitting, a biozonation is established and a proxy is selected for each of the investigated boundary levels. This approach was particularly successful in the Swedish Fågelsång section, the new GSSP for the base of the Upper Ordovician Series. Attempts to recover biostratigraphically equally significant assemblages from the Hartfell Score (Scotland) and Wangjiawan (China) sections, respectively proposed as GSSP's for the bases of the second and third stage of the Upper Ordovician Series, proved somewhat less rewarding.

In the second part of the volume, these new Upper Ordovician GSSP's are compared to the historical type areas of the British equivalent Caradoc and Ashgill Series and their subdivisions in the UK. Concomitantly, the first Upper Ordovician chitinozoan biozonation for British Avalonia is established. The historical Caradoc and Ashgill type sections in the Anglo-Welsh basin yield an important chitinozoan fauna; these data are supplemented with information from other British key sections which are famous for their accurate graptolite control. The latter include several Shelve Inlier sections, the Whitland road cutting, the Cardigan area and the Wye Valley around Rhayader. As a result, the established chitinozoan biozonation for British Avalonia is nicely tied to both the British chronostratigraphical framework and the graptolite biostratigraphy. It consists of thirteen chitinozoan biozones and subzones and is of importance as Avalonia lacks a formal biozonal scheme for the Ordovician, in contrast with the well-established biozonations in the other prominent palaeocontinents of that period in time. Interestingly, the newly drawn British biozonation scheme has a predominantly Baltoscandic signature, supplemented with endemic Avalonian and northern Gondwanan influences which fits Avalonia's migratory pattern during the Ordovician, away from Gondwana and approaching Baltica. The Baltoscandic *Fungochitina*

spinifera Biozone brackets the base of the Ashgill Series in its type area. The base of the Ashgill therefore corresponds to a level in the Baltoscandic upper Oandu or in the Rakavere Stage; previously the base of the Ashgill was thought to fall in the overlying Vormsi Stage.

Conclusions drawn in this study are based on the observation of 40 860 chitinozoan specimens in total, handpicked from 295 samples which have been collected in *c.* twenty sections, inliers or areas in Great Britain, China and Sweden.

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