I SIMPÓSIO BRASILEIRO DE PALEOARTROPODOLOGIA

I SIMPÓSIO SUDAMERICANO DE PALEOARTROPODOLOGÍA

I INTERNATIONAL MEETING ON PALEOARTHROPODOLOGY

COORDENATION: RAFAEL GIOIA MARTINS-NETO
EDITORATION: VINICIUS MORENO GODOI

ABSTRACTS

RIBEIRÃO PRETO – SP, BRAZIL 3 TO 8.9.2000

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1. Simpósio Brasileiro de Paleoartropodologia. I. Título.

ABSTRACTS

AUSPICE

The I Simpósio Brasileiro de Paleoartropodologia, I Simposio Sudamericano de Paleoartropodología and I International Meeting on Paleoarthropodology counts with the auspice of the following organizations: Pró- Reitoria de Pesquisa - USP, Pró-Reitoria de Graduação USP, Pró-Reitoria de Pós Graduação - USP, Faculdade de Filosofia Ciências e Letras, Universidade de São Paulo -USP, campus de Ribeirão Preto, SP; Universidade do Vale do Rio dos Sinos -UNISINOS; Museu de Zoologia MZUSP, SP; Centro Paleontológico de Mafra, SC, CENPALEO; Centro Universitário Barão de Mauá RP; Centro de Pesquisas da Chapada do Araripe -CPCA; Departamento Nacional da Pesquisa Mineral -DNPM, Distrito do Ceará; Sociedade Brasileira de Entomologia SBE, Sociedade Brasileira de Paleontologia SBP, Sociedade Brasileira de Paleoartropodologia SBPr, MEGANEURA - Paleoentomological Newsletter; Sociedad Española de Paleontología -SEP; Asociación Geológica Argentina -AGA, Asociación Paleontológica Argentina -APA; Sociedad Entomológica Argentina -SEA; and Departamento Científico Paleozoología Invertebrados -Museo de La Plata.

The Organizing Committee thanks the editors of Noticias Paleontológicas, Sociedad Española de Paleontología; Paleontologia em Destaque, Sociedade Brasileira de Paleontología; Boletín, Sociedad Entomológica Argentina; Boletín informativo, Asociación Paleontológica Argentina; Boletín, Asociación Geológica Argentina, and Acta Geológica Leopoldensia, UNISINOS, for the promotion of the event.

The Organizing Committee thanks to the Institutions, Faculdade de Filosofia Ciências e Letras, USP, campus de Ribeirão Preto , Fiocruz, Rede Net, and MEGANEURA for the promotion of the event through the internet sites:

http://www.ffclrp.usp.br/site/home/eventos/Paleontologia/indice.htm
http://www.iris.dbbm.fiocruz.br/www~mem
http://www.paleoartropodologia.saopaulo.net
http://www.ub.es/dpep/meganeura/meganeura.htm

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PRESENTATION

It is a high occasion when colleagues of any persuasion can convene for a meeting that is dedicated to the singular purpose of assembling and promoting knowledge within their discipline and intergrating it with allied fields. The First International Meeting on Paleoarthropodology is such an event, and it will serve to link researchers of diverse interests that share a common theme: an avid interest in fossil arthropods. Although the globalization of science is viewed as a fait accompli, ironically many of us do not cross paths, as our areas investigation are becoming increasingly specialized along taxonomic lines. Additionally, other areas of research*such as the taphonomy of arthropod cuticle, cladistic systematics, and investigations into fossil plant-insect associations*have emerged, further segregating interests within the general study of fossil arthropods. It is in the sense of global arthropod ecumenicism (if I can coin a phrase) that we launch this symposium, here in Ribeirão Prêto. It is expected that this International Meeting of Paleoarthropodology, centered in South America, become a periodical event, bringing the advances of our research to all that are interested in a timely manner. Students and colleagues in allied, even remote, areas of arthropod research will always be welcomed.

Thanks must go to the organizing committee, who spent countless, hectic days of receiving and transmitting e-mail messages, faxes, phone calls, and surface mail to bring this symposium to a successful beginning. Our deep appreciation is extended to Rafael Martins-Neto, chairman; vice-chairmen Carlos Brandão and Julián Petrulevicius; treasurers Deborah Brunherotto, Jean Zamboni and Vinícius Moreno Godoi; members of the Committee of Institutional Relationships Carlos Brandão, Julián Petrulevicius, Oscar Gallego, Renata Netto and Tania Dutra; members of the Committee on Trips Reinaldo Bertini and Lilian Paglarelli Bergqvist, Secretary Renata Aparecida de Oliveira, and many others for which I apologize not mentioning. As we inaugurate this symposium, let us committ ourselves to advancing the study of fossil arthropods in

all of its varied aspects, particularly since they are the dominant life on the planet and we have the high honor of studing their success.

Dr. Conrad C. Labandeira

APRESENTAÇÃO

Quando, ao final de Agosto de 1999, foi lançada a idéia do I Simpósio Brasileiro de Paleoartropodologia, sabíamos que muito trabalho teríamos pela frente. Nossos primeiros contatos e providências foram no sentido de trazer às nossas fileiras os amigos que pudessem aceitar esse enorme desafio. A resposta foi imediata e em um curto período de tempo toda a Comissão Organizadora foi constituída e diversas instituições emprestaram seu apoio. A acolhida junto aos colegas e instituições da América do Sul também foi tão imediata que viabilizou a realização conjunta do I Simpósio Sudamericano de Paleoartropodologia. As primeiras circulares enviadas trouxe a atenção internacional e graças principalmente a Dra. Maria Luiza Martinez Chacon, representando a Sociedad Española de Paleontología e ao Dr. Xavier Martinez DelClòs, representando a Meganeura Newsletter nosso evento foi internacionalmente divulgado. Agradecimentos especiais são devidos ao Dr. Conrad Labandeira quem primeiro aceitou o convite de participar e desde o início mostrou-se disposto a colaborar com sua experiência e prestígio. O apoio Internacional viabilizou, finalmente, o I International Meeting on Paleoarthropodology e nossos especiais agradecimentos aos colegas Dr. Brauckmann e sua equipe de Clausthal, Alemanha, Drs. Gorochov, Kluge e Popov da Rússia, Drs. DelClòs e Wagensberg, da Espanha, Dr. Lovisolo, da Itália, Dr. Krzeminski, da Polonia. Dr. Jarzembowski, da Inglaterra, além do Dr. Labandeira, que emprestaram seu prestígio dando um brilho de primeira grandeza ao nosso encontro. Nossos colegas sul americanos Drs. Genise, Levicius, Gallego, Verde e Musacchio recebem também nossos agradecimentos ao inestimável apoio e acima de tudo os agradecimentos pela amizade. Aos colegas brasileiros que nos apoiaram nossos sinceros agradecimentos.

Dado o caráter específico e pioneiro de nosso simpósio, as oitenta contribuições recebidas aqui apresentadas representam um marco importante para o futuro dessa área do conhecimento na América do Sul e sub áreas ainda pouco

desenvolvidas como é o caso da Paleoicnologia de Artrópodes, Interações Artrópodes/Plantas e Inclusões de artrópodes em âmbar, cujas conferências e sessões técnicas estão sobre a responsabilidade de coordenação dos competentes profissionais, respectivamente, Drs. Renata Guimarães Netto, Tania Lindner Dutra e Carlos Roberto Ferreira Brandão. Certamente o nível dos trabalhos ora apresentados nesse encontro superou as expectativas mais otimistas quando de sua idealização o que nos dá a certeza que os próximos encontros serão ainda melhores e a satisfação de termos cumprido o principal objetivo que é a divulgação do específico ramo da ciência, a Paleontologia de Artrópodes.

A todos os participantes nossos agradecimentos e boas vindas, esperando poder revê-los em um futuro próximo no II Simpósio Brasileiro e Sul Americano e II International Meeting on Paleoarthropodology.

Saudações paleoartropodológicas, em nome de toda a Comissão Organizadora

Rafael Gioia Martins-Neto

Homenagem ao Prof. Dr. Irajá Damiani Pinto

Falar do Prof Irajá é resgatar toda a história da Paleontologia de Artrópodes na América do Sul do qual foi o pioneiro e sua dedicação a esse ramo da ciência foi sempre o estímulo para toda a sua legião de seguidores na qual me incluo. Bastaria uma rápida leitura de seu extenso currículo para perceber que não cabe ali toda sua experiência muito menos tudo o que representa para a Ciência Nacional e Internacional. O Prof. Irajá é muito mais que as simples palavras que tentam traduzir sua brilhante carreira. A admiração e o respeito de todos que o cercam e tem o privilegio de com ele conviver são por si só homenagens prestadas somente aos grandes nomes de nossa história e esta, mais uma gota apenas em seu oceano de homenagens, não é apenas mais uma, mas a nossa. Em um evento pioneiro na América do Sul, nada mais justo que nosso cientista pioneiro na área receba essa homenagem de todos os seus seguidores, colegas, amigos e admiradores.

Rafael Gioia Martins Neto

Dados Biográficos

IRAJÁ DAMIANI PINTO nasceu em Porto Alegre em 1919, filho de Luiz Oswaldo Pinto e de Lina Damiani Pinto. Durante os primeiros estudos, residiu com seus avós Agostino e Teresina Damiani, ambos nascidos na Itália, que muito contribuíram para a sua formação pessoal. Cursou o Ginásio Nossa Senhora do Rosário, de irmãos maristas.

Casou-se com Erna Bins e cursou o 2º Grau no Colégio Universitário Estadual Júlio de Castilhos. Em 1942, iniciou seu curso de História Natural na Faculdade de Filosofia da então Universidade de Porto Alegre. Graduou-se bacharel em 1944 tendo o diploma nº 1 registrado à folha 1 do livro 1 daquela Faculdade.

Licenciou-se no ano seguinte, no mesmo curso. Durante o curso de graduação foi contratado pela Universidade como auxiliar de ensino. Em 1945, ainda como aluno no curso de licenciatura, foi contratado como Assistente das Cadeiras de Geologia e Paleontologia. Nesse ano participou de sua 1ª excursão científica chefiada pelo Dr. Llewelyn Ivor Price, que muito contribuiu com sua orientação científica. Ainda em 1945 realizou estágio no DNPM, no Rio de Janeiro, com o Dr. Paulo Ericksen de Oliveira e orientado pelo Dr. Price e, com recursos que seu avô lhe emprestara, começou a formação da biblioteca de Geologia e Paleontologia da Universidade, adquirindo nos Antiquários as primeiras revistas e livros.

Em 1946 assumiu a regência da disciplina de Paleontologia na mesma Faculdade e de Professor Adjunto no Colégio Estadual Júlio de Castilhos. No mesmo ano assumiu, como 1º regente, a disciplina de Paleontologia da Faculdade de Filosofia da Universidade Católica do Rio Grande do Sul. A falta de reconhecimento da sua atividade de pesquisa no campo das ciências Naturais pelo Universidade, fez com que resolvesse prestar vestibular para Medicina onde ingressou em 1952. Em 1953 já no 2º ano, recebeu bolsa da Universidade de São Paulo proposta pelo Prof. Paulo Sawaya que considerava importante a continuação dos trabalhos que vinha realizando na Paleontologia. Assim, foi para a USP onde fez seu curso de doutoramento, embora desde 1950 fosse Catedrático de Geologia e Paleontologia da Universidade. Na USP contou com a colaboração extraordinária de professores do Curso de História Natural, em especial de Josué Camargo Mendes e marcante influência de Viktor Leinz. Em 1953 passou a organizar o Instituto de

Ciências Naturais da UFRGS tendo sido eleito seu diretor, exercendo mandato até 1957. Neste período, com a visita da extraordinária personalidade de Harry Miller da Rockefeller Foundation pode obter substanciais recursos financeiros especialmente para os setores de Genética, Paleontologia e Botânica, os quais modificaram totalmente as condições de trabalho fundamentalmente com relação à bibliografia e equipamento. Em 1956 convidado pelo Petrobrás, organizou na Bahia, o 1º curso de formação de geólogos de Petróleo. Em seu retorno a Porto Alegre, foi convidado para organizar o Curso de Geologia que se iniciava na Universidade, transformando-a na 1ª Escola de Geologia do país, reconhecida pelo MEC. Foi seu diretor por 11 anos. Em 1968 implantou o Curso de Pós-Graduação em Geociências a nível de mestrado e doutorado. Como pesquisador criou as primeiras revistas na Universidade na área de Ciências Naturais, o que permitiu grande intercâmbio internacional contribuindo assim para a formação de uma das melhores bibliotecas nesta área no país. Neste período organizou e dirigiu o Centro de Investigação do Gondwana. Foi bolsista da Rockefeller Foundation, British Council, Cooperation Technique Française, Agency for International Development e Academia de Ciências da União Soviética. Em 1974 foi eleito Presidente da Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul, sendo reeleito duas vezes, permanecendo por 9 anos naquela posição. Deixou aquele cargo para dedicar-se com mais afinco às suas pesquisas e ao novo Centro que havia criado no litoral gaúcho - o CECLIMAR - Centro de Estudos Costeiros Limnológicos e Marinhos cuja direção exerceu por 11 anos. Foi Presidente da Sociedade Brasileira de Geologia em 1968/1969 e 1978/1979. Foi Membro e Coordenador da Comissão de Geologia do CNPq. Além das Medalhas de ouro José Bonifácio de Andrada e Silva da Sociedade Brasileira de Geologia, Llewelyn Ivor Price da Sociedade Brasileira de Paleontologia e Silvio Torres da Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul, recebeu outras de escolas e universidade de municípios gaúchos assim como homenagens especiais de cientistas estrangeiros que lhe dedicaram espécies novas de ostracode, o Dr. Karl Krömmelbein da Kiel Universität; de conchostráceo o Professor Emérito Paul Tasch da Wickita State University; a Dra. Laurence Beltán do Museum d'Histoire Naturelle de Paris, bem como de pesquisadores nacionais. Como Professor Universitário, suas pesquisas resultaram em 40 trabalhos sobre insetos fósseis, 23 sobre ostracodes recentes e fósseis e 31 com fósseis de grupos tais como: filópodes, malacostráceos, corais, escolecodontes, ictiodontes e arachnida. Nestes grupos foram orientados, além de uma série de pesquisadores de várias universidades, 24 mestres e 9 doutores.

Em 1990 recebeu o título de Professor Emérito pela Universidade Federal do Rio Grande do Sul e, em 1998, por indicação da Academia Brasileira de Ciências, foi nomeado pelo Presidente da República Membro da Ordem Nacional do Mérito Científico na categoria de Grã-Cruz. Na Universidade foi designado ou eleito membro e Presidente de inúmeras Comissões e Bancas, tendo inclusive sido eleito em lista sextupla para Reitor da Universidade. Casado há 60 anos, possui 4 filhos (Cigié - Taina - Ibaetê - Içara), 11 netos e 3 bisnetos. Praticou em sua juventude basquete tendo sido, em 1936, campeão da cidade de Porto Alegre pelo Clube Americano Universitário.

Homenagem ao Olavo

Sei porque ao pensar nesta homenagem, a primeira imagem que me veio a cabeça, é que tem pessoas que me lembram os pássaros. Suaves, doces, pousam nos lugares para trazer alegria, prazer e, despertam em nós, o que temos de melhor. Foi nisto que pensei, ao ser convidada pelo Rafael para que escrevesse algumas palavras que pudessem homenagear o Prof. Olavo.

Um dia, qual ave migratória fazendo o caminho inverso, ele chegou ao frio do Rio Grande para o XIII Congresso de Paleontologia.

Como neófita nas lides geológicas e petrolíferas puras, eu não o conhecia. Mas foi uma alegria só. Desde aí, marcou tão profundamente a sua presença em todos nós e, tenho certeza, em todos os do "meio ambiente" paleontológico, que nunca mais sequer pudemos imaginar, que ele não estivesse sempre conosco. Nem é preciso usar os "apitinhos" que ele nos deu para chama-lo.

Ele vem espontaneamente, como se aprochegam sempre estas alminhas aladas, quando as deixamos a vontade e a tratamos com o carinho merecido. Daí em diante, foi se fazendo tão presente, que seria o mesmo para nós, que sentar sobre uma árvore, e não ouvir seu canto.

Passem mil ou milhões de anos, sua presença será sempre um sopro de felicidade, sabedoria e competência.

Espero que "nosso" Olavo se sinta recompensado com esta pequena homenagem. Com a comparação tenho certeza que sim, porque conforme estas palavras foram correndo no papel, me convenci de que o sentimento de ve-lo como um pássaro, era mais e mais correto. Afinal, como paleontólogos, sabemos agora e mais que ninguém, que por trás das aves, estão os dinossauros, como por trás da doçura, está a força, a bravura e a têmpera indestrutível que sempre nos passou.

Receba estas palavras como um simples presente,

incapaz de retribuir a todos que já nos deste. Que sejamos sempre dignos de te ter ao nosso lado e que jamais te decepcionemos.

Tania Lindner Dutra

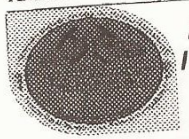
Nota da Comissão: O Prof. Olavo nasceu em 27.6.1931 em Ponta Grossa PR, em solo Devoniano. É casado com a Profa. Lenita, Bibliotecária do Museu Paranaense e possui três filhos, Silvia Helena, Dra. Em Física da Universidade Federal do Paraná, Denise Raquel, Odontóloga e Carlos Roberto, Geólogo doutorando em Geociências. Trabalhou na Companhia Petróleo Brasileiro S/A, no Distrito de Exploração do Sul, Ponta Grossa PR de 1955 a 1979. Foi Professor na Universidade Estadual de Ponta Grossa nos cursos de Geografia de 1955 a 1985 e na Universidade Federal do Paraná, no curso de Geografia durante o período de 1982 a 1996. Participou de inúmeros simpósios, congressos e similares, sempre levando sua eterna simpatia e amizade.

SCHEDULLE: SCIENTIFIC PROGRAM

Time	4.9 Monday	5.9 Thusday	6.9 Wednesday	7.9 Thursday	8.9 Friday
08:00	AMBER	HEXAPODA	SOUTH AMERICA	PALEOICHNOLOGY	COLLECTIONS OF
08:30	AMBER	HEXAPODA	PALEOENTOMOFAUNA	PALEOICHNOLOGY	MUSEUMS AND
09:00	AMBER	HEXAPODA		PALEOICHNOLOGY	LABORATORIES
09:30	AMBER	HEXAPODA	SOUTH AMERICA	PALEOICHNOLOGY	LABORATORY
09:30	AMBER	HEXAPODA	PALEOENTOMOFAUNA	PALEOICHNOLOGY	PRACTICES
10:00	BREAK	HEXAPODA	BREAK	PALEOICHNOLOGY	COMMERCE
10:10	BREAK	BREAK	BREAK	PALEOICHNOLOGY	LEGISLATION
10:20	BREAK	BREAK	BREAK	PALEOICHNOLOGY	TEACHING
10:30	BREAK	HEXAPODA	SOUTH AMERICA	BREAK	
10:40	AMBER	HEXAPODA	PALEOENTOMOFAUNA	BREAK	BREAK
11:00	AMBER	HEXAPODA	SOUTH AMERICA	PALEOICHNOLOGY	POSTER SECTION
11:30	AMBER	HEXAPODA	PALEOENTOMOFAUNA	PALEOICHNOLOGY	POSTER SECTION
12:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
14:00	CONCHOSTRACA	HEXAPODA	FAUNISTIC ASSOCIATION	PALEOICHNOLOGY	
14:30	CONCHOSTRACA	HEXAPODA	FAUNISTIC ASSOCIATION	PALEOICHNOLOGY	COURSE 4
15:00	CONCHOSTRACA	INTERACTIONS	OSTRACODA	PALEOICHNOLOGY	
15:30	CONCHOSTRACA	HEXAPODA/FLORA	OSTRACODA	PALEOICHNOLOGY	
16:00	CONCHOSTRACA	BREAK	OSTRACODA	BREAK	
16:10	CONCHOSTRACA	BREAK	BREAK	BREAK	
16:20	BREAK	BREAK	BREAK	BREAK	COURSE 4
16:30	BREAK	BREAK	BREAK	BREAK	
16:40	BREAK	BREAK	OSTRACODA	BREAK	
17:00	GENERAL ASSEMBLY	FEEDING BEHAVIOR	OSTRACODA	PALEOICHNOLOGY	
17:30	GENERAL ASSEMBLY	TAPHONOMY	OTHER CRUSTACEA	PALEOICHNOLOGY	COURSE 4
18:00		TAPHONOMY	OTHER CRUSTACEA		

GENERAL SCHEDULLE: PRE and POST SYMPOSIUM

30 to 1.9	2.9	3.9	4 to 7.9	8.9	9.9	10 to 13.9
8:00 to 12:00 Course 1 Dr. Labandeira	8:00 to 12:00 Course 2 Dr.Jarzembowski Part I	8:00 to 12:00 Course 2 Dr.Jarzembowski Part II	8:00 to12:00 Scientific Program	8:00 to12:00 Scientific Program	8:00 to 12:00 Course 5 Dr.Brauckmann Dr. Gröning	Field Trip
Lunch	Lunch	12:00 Official opening	Lunch	Lunch	Lunch	
14:00 to 18:00 Course 1 Dr. Labandeira	14:00 to 18:00 Course 3 Dr. Gorochov	13:00 Barbecue 16:00 Century's Football Match Gondwana Raptors X Laurasia dream team	8:00 to12:00 Scientific Program	14:00 to18:00 Course 4 Dr. Gorochov	8:00 to 12:00 Course 5 Dr.Brauckmann Dr. Gröning	Field Trip



I Simpósio Brasileiro de Paleoartropodologia
I Simpósio Sudamericano de Paleoartropodología
I International Meeting on Paleoarthropodology
Ribeirão Preto SP 3 a 8.9.2000

PROGRAM
COURSES

30, 31.8 e 1.9.2000.
Course: The fossil history of insects and their associations with other organisms: a review of the data, patterns, analyses, and theoretical questions.
Ministrant: Prof. Dr. Conrad Labandeira (Smithsonian Institute).
Idiom: English
Schedule: 8:00 to 12:00 and 14:00 to 18:00
Place: Amphitheater H Campus - USP

Saturday, 2.9.2000
Course: The Phanerozoic record of insects (Part I).
Ministrant: Prof. Dr. Ed Jarzembowski (Maidstone Museum, UK)
Schedule: 8:00 12:00
Idiom: English
Place: Amphitheater H Campus - USP

Course: About theoretical aspects of taxonomy.
Ministrant: Prof. Dr. Andrej Gorochov (St. Petersburg, Russia)
Schedule: 14:00 18:00
Idiom: English
Place: Amphitheater H Campus - USP

Sunday, 3.9.2000
Course: The Phanerozoic record of insects (Part II).
Ministrant: Prof. Dr. Ed Jarzembowski (Maidstone Museum, UK)
Schedule: 8:00-12:00
Idiom: English
Place: Amphitheater H Campus - USP

Friday, 8.9.2000
Course: About higher classification of Polyneoptera
Schedule: 14:00-18:00
Ministrant: Prof. Dr. Andrej Dmitri Gorochov (Zoological Institute, St. Petersburg)
Idiom: English
Place: to be confirmed

Saturday, 9.9.2000
Course: How to reconstruct fossils?
Ministrants: Prof. Dr. Carsten Braukmann and Prof. Dra. Elke Groening, Clausthal Institute
Schedule: 8:00 to 12:00 and 14:00-18:00
Idiom: English
Place: Centro Universitário Barão de Mauá

Thursday, 14.9.2000
Course: System and Phylogeny of Ephemeroptera
Ministrant: Prof. Dr. Nikita Kluge (Zoological Institute, St. Petersburg)
Idiom: English
Schedule: 8:00 to 12:00 and 14:00 to 18:00 (possibly extended to 60 hours)
Place: to be confirmed

Sunday, 3.9.2000
Secretary service (registration)
Local: Secretary installed in the Hotel Shelton Inn, local of the event.

12:00 **Official opening.**
Homage: Prof. Dr. Irajá Damiani Pinto
Prof. Olavo Soares
Commemorative stamp: Geology/Sustainable Development Series Hannover 2000

13:00 - **Confraternization Barbecue**

16:00 Century's Football Match:
GONDWANA RAPTORS X LAURASIA DREAM TEAM

Local: Chácara Bela Vista

CIENTIFIC PROGRAM

Monday, 4.9.2000 Morning

Amber

Chairman: Dr. Carlos Roberto Ferreira Brandão (MZUSP)
Idiom: English

Conferences
8:00 **WAGENSBERG, J.,** Amber pieces with inclusions and their museographical potential.
8:40 **BRANDÃO, C.R.F. & WAGENSBERG, J.**, Critera for a Taphonomy of Amber Inclusions.
9:20 **MARTINEZ-DELCLOS, X. M.; ARILLO, A.; ORTUÑO, V. M. & PEÑALVER, E.,** Paleoentomological inclusions in the Spanish Lower Cretaceous amber.
10:00 - BREAK
10:40 **MARTINEZ-DELCLOS, X. M.; BRIGGS, D. E. G. & PEÑALVER, E. A.**, Comparison between the taphonomy of insects in carbonate rocks and amber
11:20 **BRANDÃO, C.R.F. & WAGENSBERG, J.**, The extant and fossil West Indian ant faunas.
12:00 Lunch

Afternoon meeting

Conchostraca

Chairman: Dr. Ismar de Souza Carvalho (UFRJ)
Idiom: Portuguese or Spanish

Conference

14:00 **GALLEGO, O. F.,** Conchostracofauna del Paleozoico y Mesozoico: Estado Actual del conocimiento, Parte I: Argentina y Chile; Parte II: Sur de Brasil (Rio Grande del Sur) y Uruguay.
South American Paleozoic and Mesozoic Conchostracofauna : Actual state of the knowledge, Part I: Argentina and Chile; Part II: South Brazil (Rio Grande do Sul) and Uruguay.

14:40 **CARVALHO, I. S.**, Conchostracofauna Brasileira: Estado Atual do Conhecimento.
Brazilian conchostracofauna: Actual state of knowledge.

Lectures

15:20 **GALLEGO, O. F.**, Revisión de los conchóstracos Triásicos de la Argentina descriptos entre 1862 y 1995.
Review of the Argentinian Triassic Conchostraca described between 1862 and 1995.

15:40 **YAN-BIN, SHEN & GALLEGO, O. F. & ZAVATTIERI, A. M.**, A new conchostracan genus (Palaeolimnadiopseidae) from Triassic Potrerillos Formation, Argentina.

16:00 **GALLEGO, O. F. & PEREIRA, F.,** South-American first record of conchostracan body soft parts in the Middle-Late Triassic (Santa Maria Formation) from Southern Brazil.

16:20 BREAK

17:00 General Assembly of the Brazilian Paleoarthropodological Society and Brazilian Paleontological Society. Choice of the next meeting.

Thusday, 5.9.2000

Systematic and paleoecology of Arthropoda

Idiom: English

Morning meeting
Chairman: Dr. Carsten Brauckman (Clausthal, D)

Conference

8:00 **JARZEMBOWSKI, E. A.**, Phanerozoic record of insects.

Lectures

8:30 - **BRAUCKMANN, C.**, Biology and fate of Palaeodictyoptera

8:50- **GRÖNING, E.,** New reconstruction of selected late Paleozoic arthropods (Pterygote insects, arachnids and *Arthropleura*).

9:10 **WAPPLER, T.,** Orthopteroid insects from the Upper Triassic (Carnian)

Molteno Formation, Southern Africa

9:30 **GOROCHOV, A. V.**, Preliminary notes about the History of South American Ensifera (Orthoptera).

9:50 - **PETRULEVICIUS, J. F.,** First non-Australian record of pollen-feeding Phasmodines: a new Tettigoniid from the Late Paleocene of Argentina.

10:10 BREAK

10:40 **PETRULEVICIUS, J. F. & MARTINS-NETO, R.G.**, A Bittacid from Santa Formation, Lower Cretaceous of Brazil.

11:00 **KRZEMINSKI, W.,** Limoniidae (Diptera) from the Lower Cretaceous of Brazil in the collection of the Museo Cívico di Storia Naturale in Milano, Italy.

11:20 **POPOV, Y.,** A preliminary review of the Mesozoic Bugs.

12:00 Lunch

Afternoon meeting

Section Interactions arthropod/fauna/ flora, feeding behavior, taphonomy

Chairman: Dra. Tania Lindner Dutra (UNISINOS)
Idiom: English

Conferences

14:00 - **LABANDEIRA, C. C.,** The Fossil Associations of Arthropods with Other Organisms: Data Patterns, Analyses, and Theoretical Questions.

14:40 - **LOVISOLO, O. & RÖSLER, O.** Evolution and possible paleontology of viruses.

Lectures

15:10 - **JARZEMBOWSKI, E. A.**, Insects and bioerosion

16:30 - BREAK

17:00 **POLEGATTO, C. M. & ZAMBONI, J. C.**, Possible inferences about the feeding behavior and ecological pattern of fossil Ephemeroptera nymphs (Insecta)

17:20 **GHILARDI, R. P. & SIMÕES, M. G.,** Taphonomy and paleoautoecology of the Devonian Trilobites, Ponta Grossa Formation, Paraná Basin, Brazil

17:40 **MANCUSO, A. C. & GALLEGO, O. F.,** Primer Análisis Tafonómico de una Asociación Fósil de conchóstracos e insectos del Triásico Medio (Fm. Los Rastros) de la Argentina.
First taphonomic analysis of a fossil association of conchostracans and insects from Middle Triassic (Los Rastros Formation), Argentina.

18:00 - **PINTO, I. D. & IANNUZZI, R.,** Carboniferous-Permian boundary in South America Gondwana Strata: Paleobotanical versus Paleozoological ages.

Section: Theoretical aspects
Chairmain: Prof. Dr. Conrad C. Labandeira (Smithsonian Institute)

Idiom: English
Lectures
18:20 **GOROCHOV, A. V.**, On some theoretical aspects of taxonomy
18:40 **GOROCHOV, A. V.**, On the higher classification of Polyneoptera
19:00 **KLUGE, N. J.**, Nomenclature of veins of insect wings.
19:20 **KLUGE, N. J.**, Selected Problems in Phylogeny and general Systematic of Insects.
19:40 **KLUGE, N. J.**, Toward a Post-Linaean Systematics

Wednesday 6.9.2000

South American Symposia

Idiom: Portuguese or Spanish
Chairman: Prof. Rafael Gioia Martins-Neto (USP-RP)

Conferences
8:00 **PINTO, I.D.,** The South America Paleozoic Paleoeontomofauna.
8:30 **MARTINS-NETO, R.G.,**The Brazilian Mesozoic and Cenozoic Paleoentomofauna.
9:00 **MENDES, M.**, New Brazilian Cenozoic records and the potential of their outcrops.
9:30 **GALLEGO, O.**, The Mesozoic Insect fauna from Argentina: State of the knowledge.
10:00 BREAK
10:30 **PETRULEVICIUS, J. F.**, The South America Cenozoic Paleoentomofauna
11:00 **GENISE, J.**, Insect Paleoichnology in South America: Past and Present.
11:30 - Discussion
12:00 Lunch

Afternoon meeting
Chairman: Dr. Julian F. Petrulevicius (Museo de La Plata)

Lectures

14:00 **GALLEGO, O. & MARTINS-NETO, R. G.**, Relations of Triassic Conchostracans and insects faunas between Argentina and Laurasia
14:20 **MENDES, M. & PINTO, I. D.**, First Blattidae record (Insecta, Blattodea) from Fonseca Basin (Oligocene, Minas Gerais, Southeast Brazil.
14:40 **ANDRADE-MORRAYE, M. & ROCHA, O.**, Cladocera (Crustacea) e Chironomidae (Diptera) em sedimentos lacustres quaternários.

Cladocera (Crustacea) and Chironomidae (Diptera) in quaternary lacustrine sediments.

Ostracoda

Idiom: Portuguese or Spanish
Chairman: Dr. Eduardo Aldo Musacchio (APGSJ-UNPSJB, URCA)

Conference
15:00 **MUSACCHIO, E. A.,** Relaciones biogeográficas de los ostrácodes cretácicos de Patagonia.
Biogeographic relations of the Patagonian cretaceous ostracods
Lectures
15:30 **WÜRDIG, N. & PINTO, I. D.**, New data on limnic Mesozoic Ostracoda of Botucatu Formation, from São Paulo State, Brazil
15:50 - **GOBBO-RODRIGUES, S. R.; PETRI, S.; COIMBRA, J. C. & BERTINI, R. J.,** Bioestratigraphic correlations between Bauru, Neuquén and Congo Basins, using non-marine ostracods.
16:10 BREAK
16:40 **GOBBO-RODRIGUES, S. R.; PETRI, S.; COIMBRA, J. C. & BERTINI, R. J.**, *Alathacythere (?) roncana* Bertels 1968 (L 4766 Grekof, 1960)
17:00 **GOBBO-RODRIGUES, S. R.; PETRI, S.; COIMBRA, J. C. & BERTINI, R. J.**, Note on *Ilyocypris argentiniensis* Musacchio & Simeoni (1991).
17:20 **COIMBRA, J.C. ; CARREÑO, A. L. & DELICIO, M. P.,** Cretaceous Marine Ostracoda from the Potiguar Basin.

Other Crustacea and Arachnida

17:40 **PINTO, I. D.**, South America Paleozoic Arthropoda (Crustacea and Arachnida)
18:00 **MARTINS-NETO, R. G.**, The Brazilian Paleocarcinofauna (Mesozoic - Cenozoic).

Thursday, 7.9.2000
Workshop: Paleoichnology
Idiom: Portuguese or Spanish
Chairpersons: Dra. Renata Guimarães Netto (UNISINOS) & Dr. Jorge Genise (Museo Egidio Feruglio, Trelew)

Conferences
8:30 **NETTO, R. G.**, Paleoicnologia de artrópodes: o papel dos apêndices na exploração dos substratos aquáticos.
Arthropoda Paleoichnology: the role of the appendage in the aquatic substrate exploration.

9:00 **GENISE, J.**, The revolution of insect trace fossils.
9:30 **VERDE, M.**, Trazas fósiles de artrópodos en el Uruguay.
Arthropoda fossil tracks in Uruguay
10:00 **FERNANDES, A. C. S.**, A Paleoicnofauna Brasileira de Artrópodes: estado atual do conhecimento
The Brazilian Arthropod Paleoichnofauna: actual state of the knowledge.
10:30 BREAK
11:00 Discussion
12:00 Lunch

Afternoon meeting
Chairman: Dra. Renata Guimarães Netto (UNISINOS)

Conference
14:00 **GENISE, J. F.**, Insect Fossil Nests.

Lectures
14:30 **GENISE, J. F. & ENGEL, M. S.,** The Evolutionary History of Sweat Bees (Hymenoptera: Halictidae): Integration of Paleoentomology, Paleoichnology, and Phylogeny.
14:50 **GENISE, J. F.; ARCHANGELSKY, M. & CILLA, G.**, Possible Chironomid cases (Insecta: Diptera) from the Middle Triassic Los Rastros Formation (Ischigualasto-Villa Union Basin), Western Argentina.
15:00 **TOGNOLI, F. M. W. & NETTO, R. G.**, *Thalassinoides-Ophiomorpha*: opportunistic ichnofaunas and their significance in the Rio Bonito and Palermo Formation from the Paraná State, Permian of the Paraná Basin.
15:20 **GRAMINHA, C. A. & MELFI, A. J.,** Termitic activity and evolution of tropical soils. Case study around soil profiles under basic rocks in São Paulo State.
15:40 **NOGUEIRA, M. S. & NETTO, R. G.**, Icnofósseis da Formação Rio do Sul (Grupo Itararé, Bacia do Paraná) na Pedreira Itaú e Itauna, Santa Catarina, Brasil.
Ichnofossils from Rio do Sul Formation (Itarare Group, Paraná Basin) in the Itaú and Itauna quarry, Santa Catarina, Brazil.
16:00 BREAK
17:00 **NOGUEIRA, M. S. & NETTO, R. G.**, A presença de *Cruziana* nos sedimentos da Formação Rio do Sul (Grupo Itararé, Bacia do Paraná) na Pedreira Itaú e Itauna, Santa Catarina, Brasil.
The Cruziana presence in the Rio do Sul Formation sediments (Itararé Group, Paraná Basin) in the Itaú and Itaúna quarry, Santa Catarina, Brazil.
17:20 **GRANGEIRO, M. E. & NETTO, R. G.**, Escavações de crustáceos na Lagoa do Peixe, RS: um possível análogo moderno para a

icnofácies *Psilonichnus*.
Crustaceous excavation in Lagoa do Peixe, RS: a possible modern analogous for the Psilonichnus ichnofacies.

Friday, 8.9.2000
Section: Collections of arthropods in museums and laboratories
Fossil commerce and legislation
Teaching practice
Idiom: Portuguese or Spanish

Chairman : Prof. Dr. Oscar Rösler (CEMPÁLEO)

Lectures
8:00 **FERNANDES, A. C. S. & CARVALHO, I. S.**, A espoliação da paleoartropodofauna brasileira: um exemplo da Chapada do Araripe.
The spoliation of the Brazilian paleoarthropodofauna: an example of the Araripe Plateau
8:20 **DELÍCIO, M. P.; ANDRADE-MORRAYE, M. & MAGALHÃES, M. R.**, Coleções de artrópodes do Laboratório de Paleontologia da Universidade Federal de Ouro Preto.
Arthropod collections from the Laboratory of Paleontology of the Ouro Preto Federal University.
8:40 **ANDRADE-MORRAYE, M.; MOKROSS, K.; SOUZA e SILVA, C. R. & ALBUQUERQUE, A. L. S.**, Coleções de artrópodes do Museu de Paleontologia da Universidade Federal de São Carlos.
Arthropod collections from the Paleontology Museum of São Carlos Federal University.
9:00 **MENDES, M. & FERNANDES, A. M.**, O Museu de História Natural da UNIVALE.
The UNIVALE Natural History Museum.
9:20 **RÖSLER, O. & NEHLS, C.**, The emergent CENPÁLEO Fossil Collection.
9:40 **MORA, I. M., GODOI, V.M. BARBIERI M.R.,** O tempo, o registro e o LEC: uma solicitação da criança.
The time, the record and LEC: a solicitation of the child.
10:00 **PETRULEVICIUS, J. F.& MARTINS-NETO, R. G.,** Fossil insects conservation in Brazil and Argentina.
10:20 **GODOI, V.M. & MARTINS-NETO, R. G.**, Novas estratégias de Ensino em Paleontologia: o uso do CD ROM "Tópicos em Paleontologia"
New teaching strategy in Paleontology: the use of the CD ROM "Paleontology Topics"
10:40 BREAK

11:00 12:00

POSTER SECTION

1. WAPPLER, T., New Orthoptera and Grylloblattida (Insecta) from the Upper Triassic (Carnian) Karoo-System in Southern Africa.

2. CARVALHO, I. S. Conchostráceos da Bacia de Padre Marcos (Cretáceo Inferior), Estado do Piauí.

Conchostracans from Padre Marcos Basin (Lower Cretaceous), Piauí State.

3. COELHO. R. R.; MENDES, M. & MARTINS-NETO, R. G., The paleoentomofauna from the Fonseca Formation (Fonseca Basin) (Oligocene, Minas Gerais State, Brazil).

4. CARMO, D. A.; FAULHABER, D. A.; MAFFIZZONI, A. & TIBIRIÇA, L., Análise da estrutura populacional de *Cypridea africana* (Krömmelbein, 1965), Formação Coqueiro Seco (Aptiano Inferior), Bacia de Sergipe/Alagoas, NE Brasil.

Population structure analysis of Cypridea africana (Krömmelbein, 1965), Coqueiro Seco Formation (Lower Aptian), Sergipe/Alagoas Basin, Northeast Brazil.

5. MARTINS-NETO, R.G. & GALLEGO, O., Grosselytroidea from San Juan, Argentina

6. MARTINS-NETO, R.G. & GALLEGO, O., New Auchenorrhyncha from San Juan, Argentina.

7. COELHO, R. R. & MARTINS-NETO, R. G. & MENDES, M., First Cicadidae record (Insecta, Auchenorrhyncha) in the Brazilian Paleoentomofauna (Fonseca Basin, Oligocene of Minas Gerais State).

8. BERGUE, C. T., Tafonomia e distribuição dos Ostrácodes batiais do Quaternário da Bacia de Santos, Sudeste do Brasil.

Taphonomy and distribution of the batial ostracods from Santos Basin Quaternary, Southeast Brazil.

9. MARTINS-NETO, R. G., BERNARDES-DE-OLIVEIRA, M. E.; RÖSLER, O.; RICARDI-BRANCO, F.; WEINSCHULTZ, J & PERINOTTO, J. A. J., New Grylloblattida (Insecta) from the Parana Basin (Carboniferous, Southeast Brazil).

10. COIMBRA, J.C. ; CARREÑO, A. L. & DELICIO, M. P., Cretaceous Marine Ostracoda from the Potiguar Basin.

11. ZAMBONI, J. C., Contributions to the knowledge of the aquatic paleoentomofauna from Santana Formation (Lower Cretaceous, Northeast Brazil) with description of new taxa.

12. RODRIGUES, K. A. & IANNUZZI, R., Evolução das associações Arthropoda-Plantas terrestres do Paleozóico Superior da Bacia do Paraná: uma síntese.

Evolution of the Arthropoda/terrestrial plants from the Upper Paleozoic of the Paraná Basin: a synthesis.

13. NETTO, R. G. & CORD, J., Escavações de artrópodes: a contribuição

dos apêndices na evolução no ato de escavar.

Arthropod excavations: a contribution of the appendages in the evolution of the act of to excavate

14. MARTINS-NETO, R. G. & PETRULEVICIUS, J. F., New Caelifera (Insecta, Orthopteroidea) from the South America Mesozoic and Cenozoic sediments.

15. MARTINS-NETO, R.G., Review of the knowledge about Brazilian Fossil Decapoda with descriptions of new taxa.

16. MARTINS-NETO, R. G., Review of Isopoda from Brazilian deposits with description of new taxa.

17. **ZAVATTIERI, A. M. & GALLEGO, O.,** Yacimiento fosilífero de Agua de las Avispas y Puesto Miguez, Área Sur del Cerro Cacheuta (Provincia de Mendoza), Argentina.

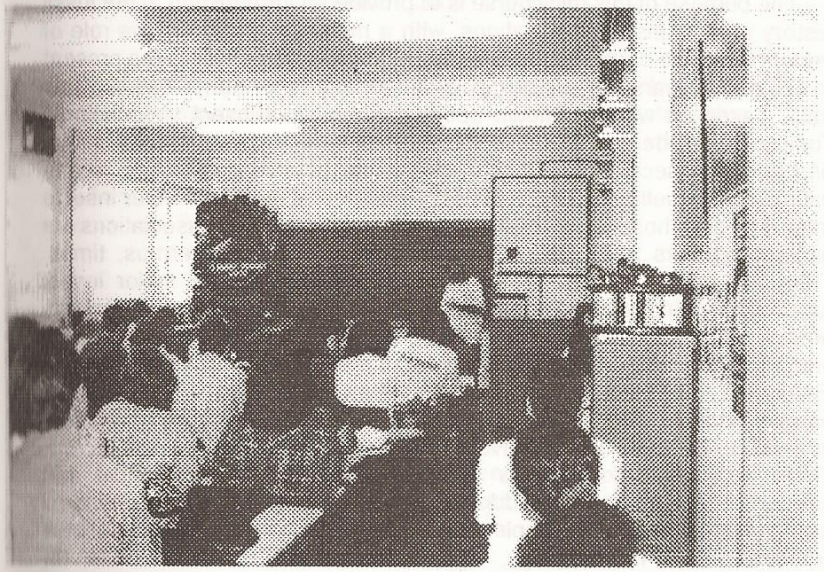
Outcrop of Agua de las Avispas and Puesto Miguez, South area from Cerro Cacheuta (Mendoza province) Argentina.

Sunday, 10.9.2000

7:00 Field Trip departure (Rio Claro - Tremembé) from the Hotel Shelton Inn

ABSTRACTS

COURSES



"...One can have no smaller or greater mastery than mastery of oneself..."

Leonardo da Vinci, 1476

THE FOSSIL ASSOCIATIONS OF ARTHROPODS WITH OTHER ORGANISMS: DATA, PATTERNS, ANALYSES, AND THEORETICAL QUESTIONS

DR. CONRAD C. LABANDEIRA
Smithsonian Institution
National Museum of Natural History
Department of Paleobiology

The purpose of this minicourse is to provide an introduction to the fossil history of plant-insect associations, with a minor emphasis on the role of vertebrates. The empirical fossil evidence, which extends from the present to 420 million years ago, will be discussed as well as an interpretation of this data, based on what is known about modern plant-insect associations. Topics will include how the associations between primitive vascular plants and ancient insects was launched during the Late Paleozoic, the role of extinction in reseting the clock of "associational" diversity, whether insects track their plant hosts at geological time scales, and if some associations are ancient leftovers from earlier Mesozoic, even preangiospermus, times. There will be discussion of the fossil histories of all the major insect functional feeding groups - external foliage feeding, piercing - and - sucking, boring, leaf mining, galling seed predation, surface fluid feeding, pollinivory, and aquatic feeding - as well as the fossil history of vertebrate herbivory. Finally, the role of modem hypotheses of plant-insect associations, namely parallel cladogenesis, sequential evolution, escape-and-radiate evolution, and diffuse evolution, will be investigated and applied to the fossil record. The major conclusion of this minicourse is that paleobiological and neobiological approaches of addressing the historical record of plant-insect associations are mutually supplementary. Both approaches provide the best combination of methodology, hypotheses and innovative ideas for understanding why the terrestrial realm is essentially a world of countless interactions between plants and insects.

OFFICIAL PROGRAM

Wednesday, August 30, 2000

Morning, 8:00 to 12:00

1. INTRODUCTION
2. WHY STUDY PLANT-ARTHROPOD ASSOCIATIONS OF THE PAST?

A. Associations and time

B. Theoretical issues of origin and evolution of associations

(1) How were animal-plant associations launched during the Paleozoic?
(2) Do current associations provide glimpses into the past?
(3) What is the role of extinction?
(4) Do animals track the environment and plants during geologic time?

C. Inverse uniformitarism: the past is the key to the present?

Afternoon, 2:00 to 6:00

3. THE GEOCHRONOLOGICAL CONTEXT

A. The geological time scale and important events

B. Terrestrialization of the planet

C. Taphonomic filters and fossil deposits

D. Environmental and biogeographic constraints

QUESTIONS, ANSWERS, AND GENERAL DISCUSSION

Thursday, August 31, 2000

Morning, 8:00 to 12:00

4. APPROACHES TOWARD THE STUDY OF PAST ASSOCIATIONS

A. When phylogeny matters: mapping ecological attributes onto clades

B. Nonphylogenetic data: measures of herbivore impact and specificity

C. Paleobiological approaches

(1) The fossil record of arthropod associations with plants

(a) Types of evidence
- (i.) Plant reproductive biology
- (ii.) Plant damage
- (iii.) Dispersed coprolites
- (iv.) Gut contents
- (v.) Mouthparts and feeding mechanisms

Afternoon, 2:00 to 6:00

(b) Functional feeding greoups
- (i) External foliage feeding
- (ii) Piercing-and-sucking
- (iii) Boring
- (iv) Leaf mining
- (v) Galling
- (vi) Seed predation
- (vii) Surface fluid feeding
- (viii) Pollination
- (ix) Aquatic feeding

(c) Dietary guilds

(d) Mouthpart classes

(e) Quantitative analyses

(f) Substrates for oviposition and shelter

QUESTIONS, ANSWERS, AND GENERAL DISCUSSUION

Friday, September 1, 2000

Morning, 8:00 to 12:00

(2) OPTIONAL: The fossil record of vertebrate associations with plants

(a) Late Paleozoic herbivores

(b) Dinosaurs and Mesozoic herbivory

(c) Cenozoi patterns of mammalian herbivory

(d) Quaternary case-studies

(i) Gomphoteres and Neotropical anachronisms
(ii) The dodo and the tambalacoque tree

D. Biological approaches
(1) Transfer ecology from extant descendants of fossil-bearing lineages
(2) Inferences about feeding from phylogenetic analyses of clades

Afternoon, 2:00 to 6:00

(3) Phylogenetic congruence of plant hosts and their insect herbivores

E. Complementary of both approaches
5. SUMMARY, AND CONCLUSIONS
QUESTIONS, ANSWERS, AND GENERAL DISCUSSION

SYSTEM AND PHYLOGENY OF EPHEMEROPTERA

DR. NIKITA. J. KLUGE

Department of Entomology, St-Petersburg State University.

Russia, 199034, St-Petersburg, Universitetskaya nab. 7.

Program of lecture

(1) Position of Ephemeroptera among insects: different points of view on the high-rank insect taxa Palaeoptera, Subulicornes and Metapterygota; arguments pro and contra holophyly of these taxa.

(2) Classification of Ephemeroptera with regard for extinct groups: Ephemeroptera in wide and narrow senses, i.e. Panephemeroptera Crampton 1928, Euephemeroptera Kluge 2000, and Euplectoptera Tillyard 1932.

(3) Revised general characteristic of Ephemeroptera. Concerning many characters discussed here, it is unclear if they belong to Euplectoptera only, or to Euephemeroptera in general, or even to Panephemeroptera in general, because many important details of structure are studied only for extant mayflies, all of which belong to Euplectoptera. Discussion on phylogenetic meaning of various characters of larvae, subimagos, imagos, and characters connected with transformation from one of these stages to another.

(4) Polarity of characters and a question which mayfly group is the most primitive.

(5) History of mayfly classification: endless movement from artificial toward phylogenetic classification. Steps of this way to be discussed: Linnaeus 1758 and Leach 1815; - Pictet 1843-1845; - Eaton 1883-1888; - McCafferty & Edmunds 1979; - Kluge 1989; - McCafferty 1991; - Kluge 1998; - possible future changes.

(6) Division of Euplectoptera to Posteritorna and Anteritorna: the idea by Edmunds & Traver 1954 and its new development.

(7) Division of Anteritorna to Tridentiseta and Bidentiseta. Possible paraphyly of Tridentiseta. "Siphlonuroidea" - a plesion of special interest; Holarctic and Amphinotic holophyletic groups constituting "Siphlonuroidea".

(8) Baetidae - the largest, the youngest and the most difficult group of mayflies. Baetidae in wide and narrow senses - Tetramerotarsata, Liberevenata and Turbanoculata. Africa as a probable motherland of

Turbanoculata; a problem with systematics of afrotropical baetids, and probable holophyly of Anteropatellata (a taxon including all non-African baetids). Nature of South American baetid fauna: coffee does not grow in Europe, and Baetis does not live in Brazil!

(9) The first group of Bidentiseta - Branchitergaliae. Division of Branchitergaliae to Heptagennota and Eusetisura. Heptageniidae in wide and narrow senses - Heptagennota, Pentamerotarsata and Radulapalpata; system and phylogeny of Radulapalpata (nothing interesting for South American hydrobiologists). Division of Eusetisura to Coloburiscus/fg1 (i.e. Coloburiscidae or Coloburiscinae), Isonychia/fg1 (i.e. Isonychiidae or Isonychiinae) and Oligoneuria/f2=g3. Classification of Oligoneuriidae: a sad story about world-wide family which type-genus is lost somewhere in Brazil.

(10) The second group of Bidentiseta - Furcatergaliae. Paradoxical phylogenetic ring instead of a tree. Preliminary division of Furcatergaliae to Pinnatitergaliae (= Ephemera/fg7), Caenotergaliae (i.e. Caenoidea or Caenidae s.l.), Ephemerella/fg1 (i.e. Ephemerelloidea or Ephemerellidae s.l.) and Leptophlebia/fg1 (i.e. Leptophlebiidae or Leptophlebioidea). Possible paraphyly of Pinnatitergaliae and their synapomorphies with Coenotergaliae and Ephemerella/fg1. Division of Coenotergaliae to Neoephemera/fg1 and Caenoptera (= Caenis/f2=Brachycercus/g2, or Caenidae s.str.). Division of Ephemerella/fg1 to Ephemerella/fg2 and Tricorythus/fg1: a new boundary makes the both groups holophyletic. Closing of the phylogenetic ring: synapomorphies of Caenoptera and Tricorythus/fg1. Melanemerella brasiliana Ulmer 1919 is the only living species of Furcatergaliae which is not determined more exactly.

(11) Special systematics of Pinnatitergaliae. Systematic position of Euthyplocia/fg1 (i.e. Euthyplociidae or Euthyplociinae). A taxon Fossoriae (= Ephemera/fg8): good burrowers have good burrowing fore legs, but the best burrowers have rudimentary fore legs. What can be recently called Ephemeridae: a holophyletic taxon Ephemera/fg9. Not a very new taxon Cryptoprosternata Kluge 2000 - volumetric (but not ranking) synonym of Palingenia Burmeister 1839 and Palingenines Albarda 1888. Phylogeny of Campsurus/fg1 (incl. Asthenopus) - the group of Cryptoprosternata abundant in South America.

(12) Leptophlebia/fg1 (i.e. Leptophlebiidae or Leptophlebioidea): holophyly of this taxon and discussion about its geological age. General system and phylogeny: relationships of the taxa Leptophlebia/fg2, Calliarcys, Habrophlebia/fg1 and Atalophlebia/fg1 (i.e. Atalophlebiinae sensu Peters 1980).

ABSTRACTS

ON THEORETICAL ASPECTS OF TAXONOMY.

DR. ANDREJ V. GOROCHOV
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S.Petersburg, 199034, Russia

PROGRAM

1. The natural classification - a myth or universal reality? [the discussion about possibility to build a certain natural classification or only numerous artificial ones; the attitudes of some main taxonomical schools to this problem]

2. The place of phylogenetic study in taxonomy. [the comparison of 2 main taxonomical schools using of real phylogenetic study for building of classification: "phylogenetic" and "evolutionary"; their advantages and defects]

3. The principles of economy and analogy in phylogenetics. [the role of these principles in scientific constructions; their interaction; the strong and weak sides of the methods of outgroup comparison and "voiting of characters"; the significance of cladogenetic and anagenetic components in phylogenetic study]

4. The integrated evolutionary hypothesis as a phylogenetic method. [the content of this method and its conformity with the basic hypothetico-deductive scientific method; the using of economy and analogy principles in biological reconstructions]

ON HIGHER CLASSIFICATION OF POLYNEOPTERA.

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PROGRAM

1. The origin of orthopteroids (the infraclass Polyneoptera (=Gryllones)) and their early evolution. [the hypothesis about morpho-ecological scenario of rise of main polyneopteran adaptations; the possible ways of differentiation of early orthopteroids; the enigmatic Palaeozoic groups]

2. The dictyopteran stock (the order (or superorder) Dictyoptera (=Blattida)). [the discussion about classification, phylogeny, and ecological evolution of the suborders (or orders) Mylacridina, Blattina, Mantina, and Termitina (=Isoptera); the difficulties of study of their higher taxonomy]

3. The orthopteran stock (the superorder Orthopteroidea (=Gryllidea). [the relations between the orders Titanoptera (= Mesotitanida), Phasmatoptera (=Phasmatida), and Orthoptera (= Gryllida); the classification, phylogeny and evolution of their higher taxa]

4. The dermapteran stock (the order (or superorder) Dermaptera (=Forficulida)). [the discussion about division of this order into 2 suborders (Protelytrina and Forficulina or Protocoleina and Forficulina); the classification, phylogeny, and evolution of its higher taxa]

5. The recent orders with unclear systematic position into Polyneoptera or into hemimetabolic Pterygota. [the discussion about position of the orders Grylloblattida, Plecoptera (=Perlida), Embioptera (=Embiida), and Zoraptera (=Zorotypida); the problems of their classification and phylogeny]

THE PHANEROZOIC RECORD OF INSECTS

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Insects (Superclass Hexapoda) are the most successful group of living terrestrial arthropods and the richness of their fossil record is only just beginning to be realized. Hexapods first appeared in the Early Devonian, post-dating the Cambrian "explosion" of marine arthropods by some 140 Ma. The earliest Hexapoda belong to primitively wingless taxa; however these "Apterygota"comprise less than 1% of all Hexapoda species. The appearance of winged insects (Pterygota) in the mid-Carboniferous appears to have been accompanied by the radiation of insects with complete metamorphosis (Holometabola). The number of insect orders present in this period was similar to that of the Cenozoic. The family diversity was, however, considerably lower. The family data suggest four major periods of origination in Phanerozoic, with peaks in the Permo-Carboniferous, Early Jurrassic, Early Cretaceous and Eocene. Unlike the Tertiary, the Palaeozoic and Cretaceous peaks are accompanied by considerable turnover of families; they are followed by reduced palaeodiversity in the Early Triassic and Late Cretaceous and Palaeocene. The former decline is too gradual to be linked with the rise of the angiospermous flowering plants. Insect generic data for the Phanerozoic reflect the pattern shown by families but not orders. In generic data for the Phanerozoic reflect the pattern shown by families but not orders. In general, Recent insect diversity as in Brazil may be explained by an overall trend towards low extinction and steady origination at a sub-ordinal level since the Palaeozoic. However, late Palaeozoic insects and the habitats in which they lived were very different from the late Cenozoic in which we live. Two late Palaeozoic fossil assemblages from Europe are considered in an attempt to dispel some myths and help cast some light on the evolving environment of early insects.
The record of Cretaceous insect life has increased dramatically in the last few decades with important contributions from both sides of the Atlantic. A diversity peak was reached in the Early Cretaceous, the biggest in the Phanerozoic prior to the Tertiary. The subsequent decline could be due to the rapid replacement of older floras by angiospermous flowering plants. This was followed by recovery and coevolution during the Tertiary. The Wealden Beds of southern England has yielded a unique and abundant Early Cretaceous insect fauna, concentrated by fluvial activity. The fourteen

orders present include representatives of freshwater and woodland habitats revealing a complex community living under a subtropical/warm temperature climate. More recent finds of amberised insects complement the traditional rock fossil record which includes ichno - and body fossils. The earliest Cretaceous Purbeck horizons and can be very abundant. The novel use of species accumulation curves suggests that there are 1400 fossil insect species alone in the type Purbeck of Dorset, UK, although this is probably an underestimate of true diversity. At ordinal level, the Purbeck insect fauna in much more like that of modern times than the late Palaeozoic although of intermediate age and lacking important Recent groups such as butterflies and moths (Lepidoptera) and social ants, bees and wasps (Hymenoptera). A low diversity aquatic insect data broadly supports the evidence for a "Mediterranean" climate for southern England during the Early Cretaceous.

The palaeodiversity of insects, plants and tetrapods has been recently interpreted as evidence of exponential growth in Phanerozoic terrestrial ecosystems in contrast to the marine realm. The evolution of insects as key players in the history of biodiversity is a major scientific and cultural challenge to our understanding and appreciation of the Earth's biosphere. The evidence from palaeoentomology is increasingly relevant to that mission.

RECONSTRUCTIONS OF PALEOZOIC ARTHROPODS AND FOSSIL VERTEBRATES

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PROGRAM

1. Gaining all data: Showing examples of the way of reconstruction from the fossil to the complete drawing: *Arthropleura, Prothelyphonus, Curculioides, Delitzschala, Dimetrodon.*

2. Which material is necessary for the drawing? Demonstrating all equipment which you need for a two-dimensional reconstruction. Paper, pencils, ink etc.

3. The technics of drawing: Exercises of different kinds and possibilities of making a natural scientific drawing: Line, shadow, perspective, black and white, colour.

4. Very useful: How to make fossil casts: an introduction to the art of reproduction of fossils.

5. Exercises of drawing at your own experience with a little help from us.

ABSTRACTS

AMBER

Martins-Neto Courtesy

"... uncertainties in defining species limits result from the state of preservation rather than the abundance of fossils... this line of argument does not apply to amber fossils, where we can be more optimist. Far more substantial results are to be expected from the analysis of the fossils..."

Schee, in Hennig, 1971

AMBER PIECES WITH INCLUSIONS AND THEIR MUSEOGRAPHICAL POTENTIAL

J. WAGENSBERG [1]

The clearest trend in modern science museums is based on the following principles: a) content focusses on real objects and on threefold interactivity: manual (hands on), mental (minds on) and cultural (heart on) b) the approach is interdisciplinary ("nature is not to blame for the curriculums established at schools and universities...") c) the priority aim is to stimulate and create scientific opinion (the visitor should have more questions on leaving the museum than on entering) d) the best way to tackle a good exhibition is with good research. The museum has assembled a collection of 500 items with which it has tried out several museographical alternatives. The talk analyzes the surprising suitability of this material in terms of the criteria stated.

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CRITERA FOR A TAPHONOMY OF AMBER INCLUSIONS

C. R. F. BRANDÃO [1]
J. WAGENSBERG [2]

Amber pieces may include isolated or several embedded specimens. The first question posed by these presumed associations is whether the relative positions of the included organisms have kept the original situation just before inclusion in resin, or that the specimens were dragged to the positions they display in the piece. We developed a series of simple experiments to test this question, using different light waves and biological criteria, which will be discussed and exemplified. This includes the observation and record of the shape of rigid and flexible body parts against grids. If the embedded organisms were trapped keeping their relative positions, it is possible to hypothetize on the actual associations the organisms mantained just before inclusion in resin.

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A COMPARISON BETWEEN THE TAPHONOMY OF INSECTS IN CARBONATE ROCKS AND AMBER

X. MARTÍNEZ-DELCLÒS[1]
D.E.G. BRIGGS[2]
E. PEÑALVER[3]

Taphonomy deals with the processes of incorporation of organic remains into sediments or other preservation media, such as amber, and the fate of these materials after burial. Some authors include the processes involved in the death of the organism within taphonomy. This period of time may be longer if the organism falls into water and is trapped by the surface tension, or shorter when it is engulfed by resins. Taphonomy is traditionally divided into: necrolysis the death and decomposition of an organism; biostratinomy the sedimentary history of the remains prior to burial; and diagenesis physical and chemical alterations within the sediment or resin.

Fossil insects are generally associated with other soft-bodied organisms, in Konservat-Lagerstätten. Their preservation implies decay inhibition (by anoxia, for example) and rapid burial in sediment, amber or peat, followed by diagenesis, which may involve alteration of organic materials and/or formation of authigenic minerals.

Necrolysis: In ***carbonate rocks*** evidence of the processes of death is rarely preserved, although some of them can be inferred: terrestrial insects fossilized in marine or lacustrine rocks, following drowning in the surface water, may have been scavenged by other insects or fishes. In contrast, evidence of the mode of death is frequently frozen in ***amber***. Insects are commonly entrapped by resin involuntarily; they may, for example, be blown onto it by wind, overwhelmed by resin which inundates their nests, or trapped at random by resin drops. The smaller ones in particular are asphyxiated, or die through starvation or predation; larger insects often escape, but may lose their legs, antennae, wings, etc., depending on the resin viscosity.

Biostratinomy: ***Carbonate rocks*** which preserve insects are formed in lakes or in shallow seas. Terrestrial insects drown in the surface water following transport by wind or water, or flight. Insects float after death until they penetrate the surface tension and sink to the bottom. Floating time varies greatly according to species. Insects with large wingspans, and very small ones (< 4 mm), commonly remain on the surface where disarticulation,

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fragmentation and decomposition take place. Preservation of these insects may be related to the development of microbial mats which inhibit sediment movement and prevent carcasses from floating. Insect carcasses penetrate the surface tension due to their weight, which is increased by the uptake of water and/or by colonization by algae or fungi, or as a result of physical influences such as waves, wind or rain. The carcass may be carried by currents as it sinks, but may also be suspended on a thermocline or halocline, reducing its fossilization potential. When the carcass reaches the bottom it may be affected by both biological and physical agents prior to burial. Anoxia inhibits scavengers, and physical damage is prevented where current activity is minimal. Biostratinomic processes in ***amber*** are short term, depending on the time taken for encapsulation in resin. The main effects are scavenging and predation by other organisms, soft-tissue dehydration, and internal decomposition. Resin and insect inclusions may be resedimented.

Diagenesis: After burial in sediment, or trapping in resin, both fossils and enclosing medium are subject to diagenesis. In ***carbonate rocks*** the cuticle is normally all that remains; the chitin-protein complex is decay-resistant. The original chemistry of the cuticle is usually transformed into a kerogen-like macromolecule, of aliphatic or aromatic composition. Traces of chitin and protein are only preserved in exceptional circumstances, and in rocks less than about 25 million years old. The most readily decayed soft-tissues are only preserved where they are replicated by early diagenetic minerals, mainly calcium phosphate or carbonate, but also pyrite, depending on sedimentological and geochemical factors. The types of tissue and morphological detail preserved in this way depend on the rate of decay *versus* mineralization. Precipitation of some authigenic minerals may be favoured by the development of microbial mats. Rapid formation of concretions may prevent the collapse of an insect carcass. The interior may then be infilled with calcite, but this normally does not preserve details of the soft-tissues. Insects may be preserved as a combination of both organic and mineralized remains. In ***amber*** autolysis and endogenous anaerobic bacteria normally destroy internal structures, and fossilisation is restricted to the cuticle of the entombed insect. The chitin and proteins of the cuticle undergo a similar diagenetic transformation in more ancient resins to that in carbonate rocks: alteration by polymerization into a more stable biopolymer.

PALEOENTOMOLOGICAL INCLUSIONS IN THE SPANISH LOWER CRETACEOUS AMBER

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V. M. ORTUÑO[3]
E. PEÑALVER[4]

A great number of Cretaceous localities with amber were discovered in Spain, during the XVIIIth century and the beginning of XXth. However, only since the last five years, Spain has become one of the most important countries to research Lower Cretaceous palaeobiological inclusions. Almost 50 localities with Cretaceous amber have been cited, although only four of them have yielded fossil inclusions: El Caleyu (Asturias), Peñacerrada (Basque Country), Moraza (Burgos) and Rubielos de Mora (Teruel). All these localities are Lower Cretaceous in age (Albian, aprox. 105 m.y. BP). Considering the sea-land palaeogeographic reconstruction for this time, the amber sites are located near the shoreline, associated to distributary channels on delta plains.

In the north of Spain, El Caleyu outcrops are located near Oviedo (Asturias) in the Ullaga Fm. (Upper Albian). The fossil content of this amber has been recently discovered and it is scarce, although some Hybotidae and Chironomidae dipterans, Scelionidae wasps and spiders have been found.

The best known Lower Cretaceous amber with inclusions is found in Peñacerrada (Álava, Basque Country) and Moraza (Treviño County, Burgos), in the Nograro Fm. (Lower Albian). We named these two outcrops Peñacerrada 2 and Peñacerrada 1, respectively. The majority of inclusions came from Peñacerrada 1 which has yielded more than 2000 inclusions, usually very small arthropods, mainly insects, but crustaceans and chelicerates as well. Among Hexapoda, the best represented orders are Diptera and Hymenoptera, but other eleven orders are present: Collembola, Thysanura, Orthoptera, Blattodea, Psocoptera, Thysanoptera, Hemiptera, Neuroptera, Trichoptera, Lepidoptera and Coleoptera. Among them, Psocoptera and Coleoptera are well represented. A new family of Psocoptera has been proposed, Archaeatropidae, to include *Archaeatropos alavensis.* More than 55% of all inclusions are dipterans, including Nematocera, Brachycera, and Cyclorrhapha. Nematocerans are represented by Limoniidae, Mycetophilidae, Keroplatidae, Sciaridae, Cecidomyiidae, Psychodidae, Phlebotomidae, Chironomidae, Scatopsidae, Anisopodidae, and Ceratopogonidae. Two new species belonging to the latter family have been recently described: *Protoculicoides*

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skalskii and *Archiaustroconops alavensis*. Brachicerans and cyclorrhaphans are represented by: Rhagionidae, Empidoidea (with a new genus and species: *Alavesia subiasi*), Lonchopteridae and Phoridae (including a new genus and species: *Euliphora grimaldii*). Hymenopterans represent the 24% of the specimens found. Only one specimen belongs to the Symphyta (Anaxyelidae), the rest are included in the Apocrita, mainly the Parasitica, with nine recorded families: Trigonalidae, Braconidae, Evaniidae, Orussidae, Serphitidae, Megaspilidae, Scelionidae, Stigmaphronidae, and "Mymarommatidae". Three recorded families belong to the Aculeata: Sphecidae, Bethylidae and Chrysididae. Specimens belonging to Orussidae and Evaniidae represent the oldest occurrences known for these two families, previously recorded from the Upper Cretaceous and Eocene respectively.

In the East of Spain we excavated recently the outcrop named Arroyo de la Pascueta, in Rubielos de Mora (Teruel). It belongs to the Utrillas Fm. (Albian). Up to day only eight insects are recognized, five hymenopterans - four Scelionidae and one Cretevaniidae-, one homopteran and two indeterminate.

THE EXTANT AND FOSSIL WEST INDIAN ANT FAUNAS

C. R. F. BRANDÃO [1]
J. WAGENSBERG[2]

Amber collections around the world, in special in Stuttgart, New York, Cambridge (USA) and Barcelona museums, include several thousands amber pieces, many with isolated or several embedded ant specimens. Ants are one of the most abundant insects in any Recent habitat and the comparison of Recent and fossil Dominican ant faunas indicates that in Dominican times, ants were similarly abundant in relation to other organisms. Wilson (1985) studied the evolution and extinction of the Hispaniola insular fauna, classifying the amber and living ant genera into six biogeographic categories, considering the presence or absence of the genera in the amber and the extent of their retreat since amber times. In every case the fossils are at least as different anatomically from modern species as the least different among the modern species are from each other, and were thus recognized as different species in relation to extant taxa, although they belong to recognizable species groups in contemporary New World fauna. We reanalyzed these lists, based on new information regarding both Recent and fossil faunas, reclassified the new information using the same criterion, arriving at slightly different results. We discuss the new picture induced by this reanalysis.

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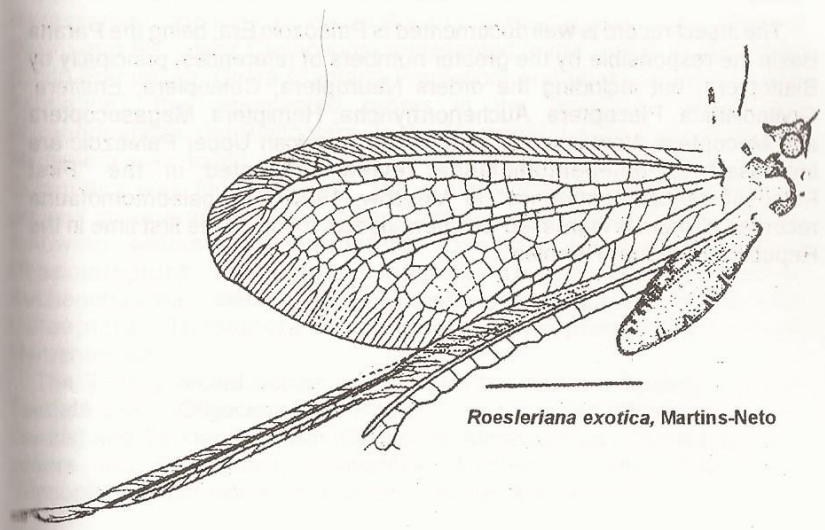
HEXAPODA



Roesleriana exotica, Martins-Neto

"...Establishment of the real diversity of the insects of part geologic epochs is therefore the most important task of paleoentomology for several decades to come..."

Rohdendorf, 1972

SOUTH AMERICAN PALEOENTOMOFAUNA - WORKSHOP

SOUTH AMERICA PALEOZOIC PALEOENTOMOFAUNA

I. D. PINTO[1]

The insect record is well documented is Paleozoic Era, being the Paraná Basin the responsible by the greater numbers of references, principally by Blattoptera, but including the orders Neuroptera, Coleoptera, Ensifera, Grylloblattida, Plecoptera, Auchenorrhyncha, Hemiptera, Megasecoptera and Mecoptera. New insects, from South American Upper Paleozoic are increased to paleoentomofauna review presented in the "First Paleoentological Conference" at Moscow, 1998. The paleontomofauna recorded till them is increased with new insects found by the first time in the Republic of Uruguay Permian.

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THE BRAZILIAN MESOZOIC AND CENOZOIC PALEOENTOFAUNA

R. G. MARTINS-NETO[1]

The Mesozoic Brazilian insect occurrences enclose the Triassic, represented in the Rio Grande do Sul and Santa Catarina States (Paraná Basin) and the Lower Cretaceous, represented in the States of Maranhão (Codó Formation), Ceará (Santana Formation) and Minas Gerais (Areado Formation), the represented orders in the Brazilian Triassic are Auchenorryncha and Blattoptera. In the Maranhão Lower Cretaceous just Hemiptera was found and in the Minas Gerais Lower Cretaceous just Coleoptera was found till now. The greater diversification, however, is present in the Araripe Basin (Lower Cretaceous, Northeast Brazil) with the following orders: Ephemeroptera, Odonata, Ensifera, Caelifera, Phasmatoptera, Blatloptera, Isoptera, Dermaptera, Hemiptera, Auchenorryncha, Coleorrhyncha, Neuroptera, Megaloptera, Raphidioptera, Coleoptera, Trichoptera, Lepidoptera, Mecoptera, Diptera and Hymenoptera.

The Tertiary record occurs just in small basins from Southeast Brazil: Taubaté Basin (Oligocene, São Paulo), Fonseca Basin (Oligocene, Minas Gerais) and Gandarella Basin (Oligocene, Minas Gerais). The represented orders are Blattoptera, Hemiptera, Auchenorrhyncha, Coleoptera, Trichoptera, Lepidoptera, Diptera, Isoptera and Hymenoptera.

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NEW BRAZILIAN CENOZOIC RECORDS AND THE POTENTIAL OF THEIR OUTCROPS

M. MENDES[1]

The Brazilian paleoentomological research have been centred in the Paleozoic and Mesozoic deposits, because are abundants and well preserved, specially the Araripe Basin ones. Alltrough little known two importants Cenozoic deposits are increasing the knowledge about the Oligocene record: Taubaté Basin (São Paulo State) and Fonseca Basin (Minas Gerais State). The continued research in the Fonseca Basin reveals that insect diversification in this locality in greater than thinked and the potential of his outcrops will be usefull to future comparisons about the real diversity of the Brazilian Cenozoic insects.

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LA FAUNA DE INSECTOS MESOZOICOS DE LA ARGENTINA: ESTADO ACTUAL DE CONOCIMIENTO

The Mesozoic Insect Fauna from Argentina: State of the Knowledge

O. F. GALLEGO[1]
R. G. MARTINS NETO[2]

La presencia de insectos fósiles en el registro mesozoico de la Argentina es conocida desde principios de este siglo, a partir de los aportes de Wieland. Si bien, existen una docena de aportes en donde se describe y cita su presencia en distintas localidades y niveles estratigráficos. Esta es una de las ramas de la paleontología argentina que ha sido bastante descuidada en los últimos decenios. En realidad, esta situación se debe más al hecho de la falta de una búsqueda y observación detallada, que a su potencial de fosilización o a su escaso o nulo registro en los sedimentos mesozoicos continentales de la Argentina.

El objetivo de este trabajo es presentar un panorama actualizado de los conocimientos existentes acerca de las faunas mesozoicas de insectos de la Argentina, con la finalidad llamar la atención, acerca de la necesidad e importancia de intensificar la búsqueda y colección de nuevos materiales en el ámbito de la Argentina.

En particular, los conocimientos sobre la fauna de insectos triásicos sufrió un empuje fundamental con los recientes hallazgos y trabajos publicados por los autores que ampliaron sustancialmente los taxones conocidos para las Formaciones Potrerillos y Los Rastros (Triásico Medio a Superior).

Hasta 1991, se conocían solo siete especies de insectos triásicos, actualmente esta cifra ascendió a más de quince especies nuevas, pertenecientes a siete géneros y su número continúa aumentando a medida que se estudian nuevos materiales coleccionados.

Las faunas de insectos jurásicos y cretácicos son practicamente desconocidas, en particular la primera que con los recientes hallazgos de los autores se conoció su presencia en el jurásico de América del Sur con tres familias de coleópteros.

La fauna cretácica cuenta con algunas especies descriptas, y se mencionan los hallazgos de signos de la actividad de insectos (galerias y cavernas) en troncos silicificados y frutos, asignados a la actividad de larvas de coleópteros; hasta ahora solo se han descripto tres especies de insectos, dos hemípteros y un blattario.

La importancia de su estudio radica, principalmente, en ampliar el

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conocimiento ya existente con relación a la composición de estas faunas, que brindará información y permitirá conocer la estructura y los cambios sufridos por las mismas en el Gondwana y su comparación con otras faunas, ya conocidas, tanto del hemisferio norte como del hemisferio sur.

ABSTRACTS

CENOZOIC INSECTS FROM ARGENTINA

J. F. PETRULEVICIUS[1]

A review of the information on Argentina Cenozoic insects is presented. Fourty one species of Paleogene insects were named from different regions and formations. Among the Hymenoptera, Siricinae wasps are present in the Paleocene-Eocene of Patagonia. This taxon has at the present time an Holarctic distribution. Two species of Myrmeciinae ants are present in the Eocene-early Oligocene of Patagonia, together with aquatic and terrestrial insects preserved. The Myrmeciinae have at the present an Australian distribution, having in the past a wider geographical range. Other 38 species come from late Paleocene from the Northwest of the country. Thirty seven species of Orthoptera, Dermaptera, Homoptera, Heteroptera, Trichoptera and Coleoptera were named by Cockerell in the second and third decade of the century. Most of these 'species' could not be considered at present knowledge as taxa, because the specimens are fragmentary and lack the synapomorphic characters to compare them with the related species. Since 1993, new findings were carried out by the author in these insect layers. Thus far, representatives of six orders and several families have been found, including Blattodea, Odonata, Mecoptera, Neuroptera, Diptera, Hymenoptera, Tettigoniidae and Lygaeidae. Among these insects, it is worth noting the presence of Palaeomacromiidae, an extinct taxa of Libelluloid dragonflies. From the Pleistocene it is important to take into account the discovery of traces assignable to pupae of Calliphoridae in association with an articulated skeleton of Carnivora from the "Ensenadense", and an insect assemblage from 24,000 BP. The only migratory Locust found at present in Argentina (*Schistocerca cancellata paranensis*) was recovered from an Holocene archaeological site in the Northwest of the country.

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INSECT PALEOICHNOLOGY IN SOUTH AMERICA: PAST AND PRESENT

J. F. GENISE [1]

Insect trace fossils are commonly represented by nests and pupal chambers in paleosols and by borings in plant remains. Less common are insect borings in bones and coprolites and locomotion traces and larval cases produced under subaquatic conditions and preserved in sedimentary rocks. Our present knowledge of one of the most common insect traces, fossil nests in paleosols, began and mostly developed in South America until recent years. In 1900, the Spanish physician Rivas mentioned for the first time an insect fossil nest from the Asencio Formation (Late Cretaceous-Early Tertiary) of Uruguay. With the exceptions of papers by Schutze in 1907 and by Brown in 1934, 1935 and 1941, most contributions of the first half of the century, published by Frenguelli, Roselli, Bruet, and Sauer, dealt with South American material. In 1930, Frenguelli mentioned *"nidos fósiles de véspidos"* (actually fossil bee cells) from the Tertiary of Uruguay. Later, in a series of papers from 1938 to 1946, Frenguelli described for the first time fossil brood masses of dung beetles and redescribed fossil bee cells, from the Tertiary of Patagonia and Uruguay. In 1938 and 1987, Roselli, an Uruguayan paleontologist, described twelve types of hymeopteran and coleopteran nests from the most diversified, abundant, and well-preserved association of insect fossil nests in paleosols yet studied from anywhere in the world: the Asencio Formation association. It occurs in stacked paleosols that extend for kilometers in western Uruguay. The preservation of the trace fossils has been favored by complex diagenetic processes in which impregnation with iron, silica, and carbonate have allowed the conservation of the most delicate traces and a long repertoire of micromorphological details. The pioneering work of Roselli, who correctly described and named many insect fossil nests, and deposited the types in the collection of the Museo de Nueva Palmira, encouraged recent studies that resulted in the discovery of new kinds of nests. Roselli was considered "the father of insect ichnology" in a recent paper. In 1950, Bruet described fossil brood masses of dung beetles from the Pleistocene of Ecuador and in 1956, Sauer named them *Coprinisphaera ecuadorensis*, which is still the available ichnotaxon to include similar traces described until now. More recently, in 1982, the Argentinian Laza described from the Miocene of La Pampa province, the

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first fossil ant nest known. In addition, that paper, together with Bown's on fossil termite nests from Egypt published in the same year, were the first to drive paleoecological and paleoclimatological inferences from fossil insect nests, beginning the modern age in insect ichnology. South America played an important role in the past in the development of this discipline and probably this long history of research is the responsible for the large amount of available information on South American insect trace fossils in paleosols, which exceeds the available data for other regions. At present, intensive research on this subject is mostly undertaken in Argentina and Uruguay. For instance, field research conducted recently in Patagonia yielded important results: the finding of Cretaceous fossil bee nests and coleopteran pupal chambers. These new discoveries constitute one of the oldest evidence of bees in the fossil record, and the third known record of bees of Cretaceous age. In addition, both traces are, together with other similar two described from United States and Mongolia respectively, the only insect trace fossils known from paleosols of Cretaceous age. Nevertheless, it is worthwhile to remark that the potential of the South American outcrops, even those of the most studied southernmost areas, such as Patagonia, is scarcely exploited. The history of insect trace fossils in plant remains is not so developed in South America as that of traces in paleosols. However, traces in petrified wood from the Jurassic of Patagonia were described during 30s-40s, a decade in which descriptions of these trace fossils flourished again after a long gap since the first ones had appeared, during the last part of the 19th century. Along with the recent interest that some paleobotanists and paleoentomologists demonstrated for these traces, several new insect traces in wood and fruits were described from Argentina, but still, most paleobotanical collections and outcrops remain unstudied from the ichnological viewpoint.

SYSTEMATIC AND PALEOECOLOGY

BIOLOGY AND FATE OF THE PALAEODICTYOPTERA

C. BRAUCKMANN[1]

The Palaeodictyoptera GOLDENBERG, 1877 are recently defined as Palaeoptera closely related to Megasecoptera + Diaphanopterodea + Permothemistida. They are of moderate to very large size (up to a wingspread of estimated 56 cm in the homoiopterid *Mazothairos enormis* KUKALOVÁ-PECK & RICHARDSON, 1983). They had three pairs of wings: the prothoracic wings were short and often rather strongly sclerotized, whereas the mesothoracic and metathoracic wings were of usual proportions. Unlike most modern insect groups, they could not fold their wings back across the abdomen when resting. The head was hypognathous and bore a highly domed clypeus (= clypeal sucking pump) as well as a pair of leg-like maxillary palps. Prominent mouth-parts formed a beak-like rostrum consisting of 5 stylets. It was used for piercing and sucking plant juices and spores. This suggests that the nymphs were rather terrestrial than aquatic. The abdomen ended in a pair of extremely long cerci (similar to some recent Ephemeroptera). Females had a long ovipositor with sharp valves, often with serrated edges which probably were used for boring egg-sheltering holes in plants; males show typical claspers. The wings are strongly corrugated and contain all main veins which usually do not coalesce and arise independently. The areas between the veins show a delicate, irregular network (= archedictyon) or true crossveins, often also a combination of both. Mesothoracic and metathoracic wings are usually of similar length and venation but can differ in shape: In this case the metathoracic wings are broader and more triangular and have a well developed broad fan-like anal area. The recently studied completely preserved specimens of *Homoioptera vorhallensis* BRAUCKMANN & KOCH, 1982 show an extreme variation in the wing venation. Many Palaeodictyoptera show distinct colour patterns on the wings that consist of light spots or bands. The larvae are known from some specimens described for example as *Rochdalia parkeri* H. WOODWARD, 1913. Later nymphal instars are characterized by the typical „nymphal bend" in mesothoracic and metathoracic wings.

The Palaeodictyoptera consist of about 17-21 families with about 71-86 genera (+ 42 genera of uncertain familiar assignment). The oldest known

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species is the recently described spilapterid *Delitzschala bitterfeldensis* BRAUCKMANN & SCHNEIDER, 1996 from the now latest Lower Carboniferous of the Bitterfeld/Delitzsch area in Germany, most probably now the oldest known pterygote insect at all. Previously the Palaeodictyoptera usually were believed to have become extinct during the late Permian, but quite recently while restudying some Triassic specimens Guenter BECHLY and the present author came to the conclusion that *Thuringopteryx gimmi* KUHN, 1937 from a Middle Bunter section in the Saalfeld area in Thuringia could belong rather to the Palaeodictyoptera than to the Protodonata as previously thought. This assumption is confirmed by the primitive, palaeodictyopteran-like venation without any coalescences, braces or crossings and the rather regular crossveins.

NEW RECONSTRUCTIONS OF SELECTED LATE PALAEOZOIC ARTHROPODS (PTERYGOTE INSECTS, ARACHNIDS AND *ARTHROPLEURA*)

ELKE GRÖNING[1]
CARSTEN BRAUCKMANN[1]

During the last years the knowledge of the exact morphology of some well preserved fossil palaeozoic arthropods is grown to such a level that it is possible to draw well based reconstructions of the living habitus of these special species. We have started a project of this matter with the aim to offer reconstructions of these animals which can be used for example for popular scientific books as well as for exhibitions in museums.
The steps for this special work are as follows:
1 Gaining and compilation of all data of the species in question: measurements, proportions, knowledge of their palecology, locomotion (and flight in pterygote insects), nutrition, sexual behaviour etc.
2 Preparing experimental sketches of the specimen in different views.
3 For the final drawing it is necessary to have a look at the closest related recent taxa to decide the final posture of the fossil specimen, the shadows, the environment and to choose the most appropriate colour.

The presented selected arthropods are listed here as follows:

1 Insecta: Palaeodictyoptera: *Homoioptera vorhallensis* BRAUCKMANN & KOCH, 1982 (Namurian B; Germany); *Delitzschala bitterfeldensis* BRAUCKMANN & SCHNEIDER, 1996 (one of the oldest known pterygote insects, uppermost Lower Carboniferous; Germany);
2 Insecta: Odonatoptera: *Namurotypus sippeli* BRAUCKMANN & ZESSIN, 1989 (Namurian B; Germany); *Erasipteroides valentini* (BRAUCKMANN, 1985) (Namurian B; Germany);
3 Arachnida: Uropygi: *Geralinura naufraga* (BRAUCKMANN & KOCH, 1983) (Namurian B; Germany);
4 Arachnida: Ricinulei: *Curculionides adompha* BRAUCKMANN, 1987 (Namurian B; Germany);
5 *Arthropleura* JORDAN, 1854 (the greatest known terrestrial arthropod genus; late Carboniferous).

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NEW GRYLLOBLATTIDA (INSECTA) FROM THE PARANÁ BASIN (CARBONIFEROUS, SOUTHEAST BRAZIL)[1]

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The Paleozoic insect record in the Brazilian paleoentomofauna, apart of these which came from the Irati Formation, are still extremely scarce, and just found in three punctual localities: Monte Mor, São Paulo State, Cerquilho, São Paulo State and Mafra, Santa Catarina State, all they from Paraná Basin (Carboniferous). Insects of the Order Grylloblattida are by the first time recorded in the Brazilian deposits, represented in the Carboniferous and Permian Russian deposits. The Brazilian material consist of isolated fore wings, relatively well preserved, representing three new genus of three new specimens and, at least, two distinct families, marking the older record of insects in the Brazian paleoentomofauna.

[1] Contribuição ao Projeto Temático Fapesp 97/03639-8, "Levantamento da composição e sucessão paleofloristica do Neocarbonífero - Eopermiano (Grupo Tubarão) no Estado de São Paulo
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NEW ORTHOPTERA AND GRYLLOBLATTIDA (INSECTA) FROM THE UPPER TRIASSIC (CARNIAN) KAROO-SYSTEM IN SOUTHERN AFRICA

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Insects are the most abundant and successful terrestrial animals and, with about one million known species, account some three-quarter of all the described species of animals. They occupy almost every terrestrial and freshwater habitat from the poles to the equator. Only the sea has proved a major barrier to colonization by insects. Recently Southern Africa has a particularly rich and varied insect fauna with 26 orders, 576 families and about 80.000 species recorded. Nevertheless especially fossil insects have received much less attention in respect of the development of their diversity than many other fossil group. This observation is fully justified and holds as much for the Triassic as for other geological periods. In terms of sampling intensity, taxonomic cover and ecological analysis the Gondwana Triassic insects are distinctly less well known than the megafloras and terapods. The recorded faunas derive virtually exclusively from South Africa and Australia (a single bug has been described from South America); and from just two levels: the Anisian/Ladinian bountary and the Lower Carnian.

Current statements about the occurrence of Triassic insects are mostly base on discoveries in the Northern hemisphere. The Lacustrine/riverine deposits of the upper Triassic (carnian) Molteno Formation are apparently by far the richest fossil bearing lagerstaette which yield up to date more than 3.000, however mostley undescribed specimens of fossil insects. To date only 6 formal taxonomic papers covering a small part of the paleoentomofauna of the Molteno Formation have been published.

The more than 20.000 species in the order Orthoptera have a worldwide distribution but are mot diverse in the tropics. The first fossil Orthoptera appear in the upper Carboniferous with the first Ensifera appearing in the Permian and the first Caelifera in the Triassic. The Two groups are usually considered suborders of the Orthoptera.

The Orthoptera include the following taxa: *Hagla contorta* Riek, 1974, *Zeunerophlebia margueeritae* n. sp., *Dordrechtia robusta* Riek, 1976*, *Dordrechtia aasvoelbergensis* n. sp., *Gryllacrimima johnski* n. sp, and *Lutheria dewetii* n. g. n. sp..

In The Molteno sediments the order Grylloblattida is represented only by the Geinitziidae. The family include the following taxa: *Fletchitzia picturara*

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Riek, 1979, *F. kapokkraalensis* n. sp. and *F. aleda* n. sp..

A comparison with other Triassic insect taphocoenoses (e.g. Australia and Asia) on the species level is not possible. The insect fauna of the Molteno Formation seems to be rather endemic or the basic floral communities are too different. On family and genus level the taphocoenoses are quite comparable.

ORTHOPTEROID INSECTS FROM THE UPPER TRIASSIC (CARNIAN) MOLTENO FORMATION, SOUTHERN AFRICA

T. WAPPLER[1]

The lacustrine/riverine deposits of the Upper Triassic (Carnian) Molteno Formation, southern Africa, contain a very diverse flora (megaplants) and fauna (insects). Except for fossil fish there are no vertebrates. A review of the orthopteran insects, reveals 56 specimens (most with counterparts) of which 38 specimens have been determined to order level. Their disarticulation wings dominate the remains indicate transport on the water surface, because there are no definite hints on vertebrate/insect associations.

The orthopterous palaeoentomofauna consists 9 species that are distributed among the orders Orthoptera and Grylloblattida. One family, one subfamily and genus are established for the Upper Triassic from Africa for the first time.

The first occurrence of *Zeunerophlebia margueritae* n. sp. of the subfamily Voliopinae in the fossil record is reported from outside of Asia (Central Asia). The family Proparagryllacrididae is represented by two genera. The genus *Gryllacrimima* is recorded in Africa for the first time. *Gryllacrimima johnski* n. sp. is the youngest representative in Gondwana sediments. Up till now *Gryllacrimima* was known only from the Lower Triassic of Asia. *Lutheria dewetii* gen. et sp. nov. broadens the geographical distribution of the family Xenopteridae previously limited to Asia (Central Asia) and Australia to the African continent. Geiniziidae are so far known from Europe, Asia (Central Asia, China, Japan) and South Africa. The stratigraphical range of this family extends from the Middle Triassic up to the end of the uppermost Lower Jurassic the South African remains are the oldest representatives.

The rich palaeoentomofauna of the Molteno Formation shows a great diversification following the latest Permian mass extinction. But this is less apparent in the Orthoptera and Grylloblattida which remain similar to their Late Paleozoic representatives.

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FIRST RECORD OF GROSSELYTROPTERA (INSECTA) IN THE LOS RASTROS FORMATION (TRIASSIC, ARGENTINA)

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O. F. GALLEGO[2]

The present paper describes new fossil insect taxa from the Los Rastros Formation, La Rioja Province of Argentina, dated as late Middle Triassic to early Late Triassic. A new genus and new species are proposed for the first South America record of the Order Grosselytroidea.

This new genus and single specimen belongs to the Family Uskatelytridae Martynova, known from Kuznet Basin, and consist of an isolated fore wing of 8 mm long, well preserved.

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PRELIMINARY NOTES ABOUT THE HISTORY OF SOUTH AMERICAN ENSIFERA (ORTHOPTERA)

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The identification of fossil insects, represented mainly by their wings, is rather difficult problem, especially in relation to the Caenozoic fossils of South America, as they must be very peculiar (because of its long isolation) and superficially similar to the unrelated groups of Old World (because of convergence). This work is the attempt to give the preliminary orientation for the determination of systematic position of new (mainly Caenozoic) fossils of Ensifera.

Palaeozoic and Early Mesozoic South American Ensifera are almost unknown. The most early rich fauna of Mesozoic Ensifera is described by R. G. Martins-Neto from Lower Cretaceous of Brazil. This fauna is very similar to the Early Cretaceous faunas of Ensifera from England and Siberia-Mongolia (the most fossils are included in the same subfamilies and sometimes, possibly, in the same genera), but in Brazil - Grylloidea dominate and Hagloidea are very rare, in Siberia-Mongolia - the frequency of these taxa is reversed, and in England - the intermediate condition has place. The Late Cretaceous Ensifera are unknown for South America and badly known in the other regions, but it is very possible that these faunas were also rather similar in South America and Old World.

The hypothesis about Caenozoic history of Ensifera is based on the recent material. The first (ancient) stage of this history must be characterized by the presence of (1) remains of a few Cretaceous groups of Ensifera and (2) primitive representatives of some recent groups of subfamilies (sometimes these groups are considered to be families) which have the originally endemial (for South America) subfamilies (in Tettigonioidea and Stenopelmatoidea) or subfamilies and tribes (in Grylloidea). These groups are "Pseudophyllidae" (with originally endemial Polyancistrinae, Pterochrozinae, and Pleminiinae *sensu* Gorochov), "Tettigoniidae" (Listroscelidinae and, possibly, Apteropedetinae), "Cratomelidae" (Cratomelinae, Leiomelinae), "Anostostomatidae"="Mimnermidae" (Lutosinae and, possibly, Glaphyrosomatinae), the group including Gryllotalpidae without primitive Cretaceous forms (originally endemial Scapteriscini), "Podoscirtidae" (a few originally endemial tribes), "Eneopteridae" (Hemigryllinae), and

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"Phalangopsidae", new group (with several endemial tribes). The presence of other groups of subfamilies in first stage of Caenozoic history of Ensifera is problematic or scarcely probable.

Second stage of this history may be characterized by the primitive forms of some recent subfamilies and (in Grylloidea) also tribes with the originally endemial (for South America) genera or groups of genera, sometimes (in Tettigonioidea) also tribes; third stage - mainly by the genera with endemial species (for example: numerous South American species of Gryllus - the genus of not American origin). The originally not endemial (for studied region) species are not of vital importance in the recent natural landscapes of South America, and their wide areas is result of more or less recent expansion.

NEW AUCHENORRHYNCHA (INSECTA, HEMIPTEROIDEA) FROM THE LOS RASTROS FORMATION (TRIASSIC, ARGENTINA).

R. G. MARTINS-NETO[1]
O. F. GALLEGO[2]

New material collected from the Los Rastros Formation (La Rioja Province, Argentina) dated as late Middle Triassic to early Late Triassic, revealed new taxa of the families Dismorphoptilidae, Scytinopteridae and Prosbolidae, the former two new for these outcrops, demostrating that the Auchenorrhyncha fauna was more diversed that thinked in this region during the Triassic times.

New specimens of the anteriorly described species *Dysmorphoptiloides acostai* Martins-Neto & Gallego and *Argentinocicada magna* Martins-Neto & Gallego contributes with complementary morphological aspects unknown in the respective holotypes and two new genera and two new species are described.

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ABSTRACTS

REVIEW OF SOME HIGH TAXONOMICAL CATEGORIES, NOMENCLATURAL PROBLEMS, AND COMPLEMENTS OF THE BRAZILIAN PALEOENTOMOFAUNA (MESOZOIC AND CENOZOIC), WITH DESCRIPTIONS OF NEW TAXA

R. G. MARTINS-NETO[1]

This paper objectives a review of some Brazilian fossil insects distributed in deposits from Mesozoic and Cenozoic. *Cretaceosimulium araripensi* Vulcano (Diptera - Lower Cretaceous, Araripe Basin)is treated here as *nomina nuda*. The taxa *Cretaceimellittomoides cearensis* Vulcano & Pereira (Coleoptera Lower Cretaceous, Araripe Basin), *Saucrolus silvai* Santos (Coleoptera Lower Cretaceous, Sanfranciscana Basin), and *Bouretia elegans* Martins-Neto (Ensifera, Lower Cretaceous, Araripe Basin) are treated as valid names. *Caririderoma pilosa* Martins-Neto (Lower Cretaceous, Araripe Basin), is removed from Dermaptera to Coleoptera Staphylinidae. The taxon *Cordulagomphus santanaensis* Carle & Wighton, described as a gomphid larva (Odonata) was removed to Dermaptera (Bechly, 1998). However this species not belongs to any of the known Dermaptera described for the Araripe sediments, being proposed here a new genus and a new combination for this taxon. and complementary notes on the morphology of *Pseudonymphes zambonii* Martins-Neto (Neuroptera, Lower Cretaceous, Araripe Basin) are also furnished here. Finally are described here a new species for the genus *Saucrolus* (Coleoptera, Sanfransiscana Basin), a new genus and new species of Coleoptera from Fonseca Basin (Oligocene, Minas Gerais), and a new genus and new species of Diptera from Aiuroca Basin (Oligocene, Minas Gerais).

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CONTRIBUTION TO THE KNOWLEDGE OF THE AQUATIC PALEOENTOMOFAUNA FROM SANTANA FORMATION (CRATO MEMBER, LOWER CRETACEOUS, NORTHEAST BRAZIL) WITH DESCRIPTION OF NEW TAXA.

J. C. ZAMBONI[1,2]

Althought a hundred of know insect species from Santana Formation (Lower Cretaceous, Northeast Brazil) rather terrestrial some groups remain undescribed or little know like is the case of the orders Coleoptera , Heteroptera, Phasmatoptera, Mecoptera and Megaloptera. The Knowledge of this aquatic paleoentomofauna is enlarged here with the description of a new genus and two new species of Ephemeroptera, a new genus and species of Odonata and new taxa of Hemiptera (Gerridae, Corixidae and Belostomatidae) recently collected. Additionaly the taxon *Conan barbarica* Martins-Neto, 1998, after study, is removed of Coleoptera, as firstly interpreted, to Odonata and this peculiar giant nymph is compared with the others published nymphs of the same deposits.

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NEW CAELIFERA (INSECTA, ORTHOPTEROIDEA) FROM THE SOUTH AMERICA MESOZOIC AND CENOZOIC SEDIMENTS

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J. F. PETRULEVICIUS [2]

Mesozoic Caelifera fauna is restricted to the Lower Cretaceous of Northeast Brazil (Santana Formation) having been described twelve species, mainly of the Family Locustopsidae. A survey of rather endemic families as Bouretidae Martins-Neto, Araripelocustidae Martins-Neto as well as recent families as Tridactilydae have representatives in the Brazilian Cretaceous. New finds revealed a peculiar group of eumastacoid-like grasshoppers having M vein two-branched, **Cu** vein unbranched, posterior tibia with two small apical spurs and tarsal posterior having in the first article two apical teeth and a basal tubercle (as in true eumastacids). Two new genus and four new species are described here. By the other side, Cenozoic record of Caelifera is still very poor in the South America paleoentomofauna with small number of occurrences. Recently new Caelifera fragments was collected from the Argentinian Paleogene (Maiz Gordo Formation) and presented here.

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FIRST NON-AUSTRALIAN RECORD OF POLLEN-FEEDING PHASMODINES: A NEW TETTIGONIID FROM THE LATE PALEOCENE OF ARGENTINA

J. F. PETRULEVICIUS [1]

Extant Phasmodinae are endemic from Australia. Recent discoveries on the late Paleocene of north-western Argentina could give us the first fossil representative of the taxon. On this way, presence of Phasmodines wold go back at least to the Late Cretaceous, When Australia and South America were both connected by Antarctica in Gondwanic times. Phasmodinae seems to be the sister group of Meconematinae (Gorochov, 1988), and their unique discovered synapomorphy (Stridulatory veins merging at base like a horseshoe) is present in one of the studied specimns. Phasmodinae include five genera: *Zaprochilus, Anthophiloptera, Windbalea, Kawanaphila and Phasmodes*. The main synapomorphy of living species of the taxon is the long and triangular pronathous head (Gorochov, 1995). This character is not preserved in the studied specimen; however the latter shares with the winged species a short ScA ending at a costal lobe (convergently present in the genus *Clonia*, Saginae), which is considered as a synapomorphy. Representatives of Phasmodinae have a unique feeding habitat among living Tettigoniidae: *Phasmodes* species feed on the entire flower and the genera on pollen and nectar. It is quite possible that the latest genera may be involved in pollination (Rentz, 1993). Phasmodinae species have specialized mouth parts and alimentary tracts adapted for the floral feeding specialization. On other hand, pollinivory on *Classopollis* has been found in ancestors of Tettigonioidea (*Aboilus;* Krassilov *et al.*, 1997) in the Jurassic of Kazakhstan, whereas it worth noting the presence of this pollen genus in the environment of the studied specimen (Petrulevicius, 1996). If phylogenetic hypothesis proposed by Gorochov (1995) is correct, pollinivory of the Phasmodinae could be a derived feature. Otherwise, 'non pollinivory' has to be acquired at least three times in the taxon phylogenesis, what is more improbable. If we question whether this fossil species could eat pollen and, of course, have the specialized state characters related, the answer could be given after a phylogenetic hypothesis be done, and the situation of the fossil species respect to living species be determined. If we think in the case that the fossil taxon is the sister group of all species of Phasmodinae (what could be the more probable), and pollinivory is a derived attribute, the probability for the event is 0.5 and do not allow any prospective for the inference of unknown characters and attributes (Nel, 1997).

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THE PALEOENTOMOFAUNA FROM THE FONSECA FORMATION (FONSECA BASIN) (OLIGOCENE, MINAS GERAIS STATE, BRAZIL)[1]

R. R. COELHO[2]
M. MENDES [3]
R. G. MARTINS-NETO [4]

The objective of this study is present the fossil insect record of the Fonceca Basin (Tertiary, Oligocene) Minas Gerais State. The material originates from micastrata of the Fonceca formation, localizad in the vicinity of Vila da Fonseca, Alvinópolis, MG.

Work carried out in June 1999 with material collected from the region, showed the presence of Coleoptera, Blattidae, Hemiptera, Hymenoptera and Auchenorryncha , preserved from carbonized imprints. The study of the paleoentomofauna of Fonseca is of great importance since it shows a high concentration of fossils, drawing attention to the considerable potential of the outcrop when compared whit the Brazilian Tertiary formations.

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FIRST BLATTIDAE RECORD (INSECTA, BLATTODEA) FROM FONSECA BASIN (OLIGOCENE, MINAS GERAIS, SOUTHEAST BRAZIL)[1]

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I. D. PINTO[3]

The recent fossil insects survey found in the Fonseca Basin show us the high degree of potential importance in the whole context of the Brazilian paleoentomofauna.

A new genus and new species of a cockroach (Blattidae) is described for the Fonseca Basin representing the first record for the South America Oligocene.

The specimen is represented by an isolated left tegmen which came from the micaceous shales level of the Fonseca Formations. The diagnostic morphological aspects examined agree with the stant family Blattidae and reveals be a new genus and species.

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FIRST CICADIDAE RECORD (INSECTA, AUCHENORRHYNCHA) IN THE BRAZILIAN PALEOENTOMOFAUNA (FONSECA BASIN, OLIGOCENE OF MINAS GERAIS STATE)[1]

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The Fonseca Basin is placed at the "Quadrilátero Ferrífero" near Fonseca Village, Alvinópolís municipality, Minas Gerais State, Southeast Brazil. The Fonseca Formation sediments consist mainly of betuminous shalles of Oligocene age. From these sediments was found an isolated forewing of a Cidadidae (Auchenorrhyncha) marking the first Brazilian record of the group.

The preliminary observation reveals that all of the available morphological aspects are very similar of recent Brazilian representatives.

However this specimen is completely different of all known fossil cicads, justifying the proposes of a new species for it.

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A BITTACID FROM SANTANA FORMATION, LOWER CRETACEOUS OF BRAZIL

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Bittacidae is a small family of insects including about 34 genera, 55 % of them being only known as fossils, mainly from the Mesozoic. South American fossil record was restricted hitherto to Maiz Gordo Formation (late Paleocene) from Argentina, with specimens related to *Thyridates* and indeterminate genera. Entomofauna of Santana Formation is charismatic and consequently well known, and much of its diversity is regrettably housed at amateur collectors and foreign countries. Among thousands of specimens recovered from this formation, one Bittacid was recognized. A private collector acquired the rare specimen and since then, the unique possibility to study the insect was from a drawing made with camera lucida. Fossil insects morphology is known to be of difficult interpretation. Majority of researchers prefer to make photos and drawings of their studied specimens, and it is well known that different interpretations of the same specimen could provide different drawings. On this way, at the moment, rather than the specimen itself, our object of study is actually the drawing of the specimen. On this way, no one could contrast the fossil to its interpretation, which is the scientific method foundation. Taking this into account, the specimen study is an approach and could not be considered as conclusive until we could contrast it to the fossil. It is imperative, in accord with ethical rules and National Laws (e.g. Law No. 4146/1942), that specimens under this condition be stored at Public State collections to make their study more refutable. The Bittacid was drawn with four fragmentary wings, incomplete body and four legs. Hind legs have elongated tarsus, indicating specialization to prey. Fore wing has a deep sag RA under pterostigma, with one drawn crossvein in forewing and none in hindwing (later condition could be an artefact). Following Novokschonov (1993) phylogenetic analysis, the presence of deep sag is a synapomophic state character of *Asiobittacus, Scharabittacus*, *Sibirobittacus*, *Probittacus*, *Cretobittacus*, *Prohylobittacus*, *Palaeobittacus* and recent genera except *Orobittacus* and *Anabittacus*. However, phylogenetic relationships with these taxa are difficult to establish because of the fragmentary of the specimen. On other hand, the specimen has two discovered autapomorphies, i.e. two crossveins at half course between CuA and CuP,

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and a crossvein between RP and MP, which justify the erection of a new genus.

Anyway, meanwhile this specimen is not stored in a Brazilian Public State collection, it is not possible to publish the new species for legal and ethical reasons.

LIMONIIDAE (DIPTERA) FROM THE LOWER CRETACEOUS OF BRAZIL IN THE COLLECTION OF THE MUSEO CIVICO DI STORIA NATURALE IN MILANO, ITALY.

W. KRZEMINSK[1]

Fossil Limoniidae were already recorded from the Santana Formation (Grimaldi 1990, Ribeiro and Martins-Neto 1999). In the collection of Museo Civico di Storia Naturale in Milano (Italy) there are representatives of three new species of Limoniidae, of the extinct subfamily Eotipulinae known from Jurassic and Cretaceous of Europe and Asia.

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A PRELIMINARY REVIEW OF MESOZOIC BUGS (HEMIPTERA, HETEROPTERA)

Y. A. POPOV[1]

Fossils of true bugs or Heteroptera have been recorded in deposits of all continents (except Antarctica). The oldest bug fossils are known only from the Late Triassic. The earliest Heteropterans are mainly represented by water nepomorphan Corixoidea, Nepoidea, Naucoroidea, and Belostomatoidea from the Upper Triassic deposits of Australia, North America, China, England, Kazakhstan, and Ukraine. The earliest extinct terrestrial lygaeoid Pentatomomorpha (Pachymeridiidae) is recorded from the Late British Triassic.

A rapid spreading of Heteroptera started at the beginning of Jurassic-Liassic of Western Europe (water Belostomatidae and Corixidae amphibious Gerromorpha, Littoral Archegocimicidae and Ochteridae, terrestrial Cimicomorpha and Pentatomomorpha) and of Asia (Central Asia and China; Corixidae, Shurabellidae). It is significant that diverse nepomorphan water bugs are widespread in Laurasian deposits of the Early Jurassic, which are represented by extant families, except corixoid Shurabellidae.

In the Middle and Late Jurassic true bugs diverged into many families, some of them being extinct, e.g. water pleoid Scaphocoridae terrestrial pentanomoid Mesopentacoridae from the Upper Jurassic deposits of Kazakhstan.

The Early Cretaceous Hemiptera are quite similar with the Later Jurassic assemblages which are known mainly from Eurasia and South America (most often in Brazil). The transition from Jurassic to Cretaceous assemblages was accompanied by the appearance of such families as Hydrometridae, Tingidae, Reduviidae, Aradidae, which wee still very rare, or disappearance of some high-ranking taxa (especially subfamilies). Some terrestrial groups of bugs became abundant, e.g. Archegocimicidae or Pachymeridiidae and in some cases Cydnidae. At the same time cimicomorphans plant bugs (Miridae) which were quite numerous in Late Jurassic have not yet been recorded anywhere in Early Cretaceous. The Miridae are found only in the Upper Cretaceous deposits of North Siberia, the Taimyr Peninsula and Magadan region). Aquatic bugs are also abundant in the Upper Jurassic and Lower Cretaceous periods, mainly represented by Corixidae (mostly Velocorixinae), Naucoridae, Notonecridae and Belostomatidae). The Upper Cretaceous period represents one of the biggest gaps in the history of Heteroptera.

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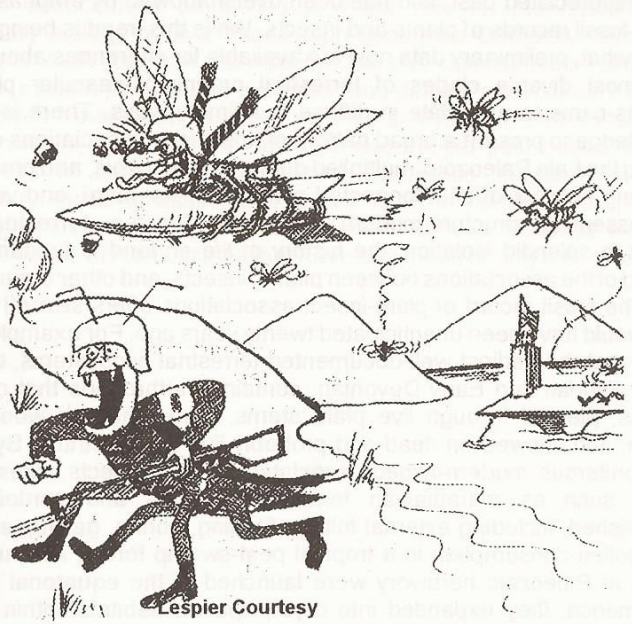
TERRESTRIAL ARTHROPOD INVASION: ASSOCIATIONS AND CONSEQUENCE FEEDING BEHAVIOR TAPHONOMY



Lespier Courtesy

"No other phylum of animals has colonized the land as successfully as arthropods.

By any measure of dominance - species diversity, biomass, trophic integration into ecosystems- arthopodes contribute fundamentally to land ecossystem structure, togther with terrestrial vascular plants and, to a lesser degree vertebrates".

Labandeira & Beall, 1990

THE FOSSIL ASSOCIATIONS OF ARTHROPODS WITH OTHER ORGANISMS: DATA, PATTERNS, ANALYSES, AND THEORETICAL QUESTIONS

C. C. LABANDEIRA[1]

The study of plant-insect associations in the fossil record has had an underappreciated past, and has been overshadowed by emphases on the body-fossil records of plants and insects. While this trend is being reversed somewhat, preliminary data now are available for inferences about how the two most diverse clades of terrestrial organisms-vascular plants and insects-came to associate in diffuse to intimate ways. There is sufficient knowledge to present a broad pattern of how these associations originated during the Late Paleozoic, multiplied during the Mesozoic, and produced the dizzying network of interconnected plants, insects, fungi, and vertebrates that essentially structure modern ecosystems. Since no terrestrial species exists in splendid isolation, the history of life on land is fundamentally a record of the associations between plants, insects, and other organisms.

The fossil record of plant-insect associations offers several surprises that would have been unanticipated twenty years ago. For example, we now know that the earliest well-documented terrestrial ecosystems, during the latest Silurian and Early Devonian, contained arthropods that consumed spores, pierced through live plant stems, bored through woody fungal tissue, and chewed on dead and probably live plant detritus. By the Late Carboniferous, modern-aspect associations among insects, mites and plant hosts such as marattialean ferns, seed ferns and cordaites were established, including external foliage feeding, boring, galling, and spore- and pollen consumption in a tropical peat-swamp forest. Although varied types of Paleozoic herbivory were launched in the equatorial forests of Euramerica, they expanded into dryer, riparian habitats within mineralic substrates of the Early Permian, during which particular seed-fern taxa and plant organs were preferentially consumed, including gigantopterid foliage, peltasperm pollen, and glossopterid wood. These associations, but not the plant hosts and insect herbivores, survived into the drier-adapted floras of the Triassic, amid communities dominated by ferns, conifers, gnetophytes, and advanced seed-fern lineages. By the Jurassic/Cretaceous boundary many modern phytophagous clades, including weevils, tanglevein flies, and holometabolous leaf-miners were in existence, as consumers of various advanced seed plants, predating the radiation of the angiosperms. With the

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ecological expansion of angiosperms later during the mid-Cretaceous, these basic interactions became more abundant as more numerous clades of phytophagous insects ecologically partitioned a greater number of angiospermous hosts, probably resulting in greater speciosity. Vertebrates, especially dinosaurs, also participated in this increased subdivision of food resources by major modifications in dentition, jaw musculature, and digestive processing of high-fiber food.

Biologic approaches toward reconstructing plant host and insect herbivore associations have had a major role in understanding the evolutionary biology of host colonization during the Cenozoic. Four basic hypotheses exist for such association: parallel cladogenesis, sequential evolution, escape-and-radiate evolution, and diffuse "coevolution". Each of these modes have examples from modern analyses of extant plants and their herbivores, and they are extended into deeper past based on fossil occurrences of both plant and insect associates. Regardless of the evolutionary mode of association, many intricate relationships between plants and insects are deep and ancient, and have survived within an extensive nexus of relationships that have originated during the more recent past.

INSECTS AND BIOEROSION

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The fossil record of insects includes trace fossils resulting from their boring, burrowing, piercing, leaf-biting and leaf-mining activities, excrement resulting from some of this, and body fossils of likely and actual trace-makers. Insects have been significant visitors to and consumers of plants for over 300 million years and recent evidence from Europe will be reviewed.

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EVOLUTION AND POSSIBLE PALAEONTOLOGY OF VIRUSES

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This contribution has the objective to present an updated review of viruses evolution pointing out some palaeontologic perspectives.

The phyla in which the viruses have reached the bigger diffusion are vertebrates, plants, bacteria and arthropods . So far few viruses have been reported in most of the lower animals and plants. Molecular biology investigations have found possible common origin of some very different viruses. Homologous sequences in non-structural proteins of plants and animals viruses belonging to several families of positive-sense, single-stranded RNA viruses have been discovered during the last 15 years. These homologies, together with similarities in the expression strategies, lead to the supposition that some plant viruses should have common ancestors with some viruses of animals. These ancestors should have had some very stable genes, preserved until now, mainly the ones regarding proteases, helicases and RNA-dependent RNA polymerases. It is difficult to connect such data with the time needed for virus evolution during long periods, mainly because evolution of viruses is bound to several different factors. Most of the virus groups are "phylogenetically contained" because they infect restricted groups of related hosts, and this can be an evidence of their ancient origins. These ancestor viruses could have been present in the Meso-Proterozoic Era, before the division of the vegetal from the animal kingdom. But the main evolution of plant and animal viruses could have happened in the period of the bigger differentiation and coevolution among plants, arthropods and vertebrates. At present no specific virus is known to cause diseases in both vertebrates and plants, but that could have been possible in the past, as discussed in this paper.

Palaeontology may help in confirming hypothesis on the origin and evolution of some viruses. If it is unlikely that virus particles could be detected in fossil material, it could be possible to find prints of virus infection because some cellular structures bound to virus infections can be much larger than the virus particles, and easily recognisable.

Since several different type of viruses are present in Archaebacteria, Eubacteria, and Cyanobacteria, we may suppose that prokaryotes have been important during Precambrian time for the origin and the first evolution

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of viruses, and that asexual cell division and aquatic environments favoured virus propagation and evolution. Prokaryotes are infected nowadays, and probably also in the remote past, predominantly by complex double-stranded DNA viruses, some enveloped, other non-enveloped. But they are infected also by ssDNA, dsRNA and ssRNA viruses, on the whole a large diversity and complexity. It is assumed that chimerae must have been important in the evolution of the phages, but at least some should be of very old origin. Investigations of infected prokaryotes showed important cell structures associated to infection, such as virogenic stroma, and also big amount of virus particles that could be recognised in well preserved fossil material. Characeae and Chlorellaceae algal viruses are also analysed in this perspective.

The Angiosperms diversified mainly during the Cretaceous. During the Jurassic began the pollination by insects, that became widespread during the Cretaceous. The diffusion of plant virus diseases through the pollen, and mainly through some insect vectors (Homoptera), could have started in those periods. Thus, investigations on fossil pollen and fossil insects could discover pollen deformation and histological alterations in insect, caused by virus infection.

Potyviridae are the biggest plant virus family that infect Angiosperms. Probably it is an old family because of molecular affinities with animal Picornaviridae, occurrence of vectors of different type, and existence of interviral recombination. Palaeontology could help understanding if this is true. Some suggestions are here presented.

The origin and evolution of some dsRNA viruses is also of great interest. Partiviridae infect fungi and plants, Totiviridae infect fungi and protozoa. The rather big diffusion of dsRNA viruses in fungi, the absence of natural vectors and their intracellular transmission during cell division only, sporogenesis and cell fusion led to suppose that their evolution happened in one of the first periods of fungi evolution. Palaeontological studies are possible mainly for mycovirus that produce in the infected cells distinctive inclusions. Reoviridae infect plants and animals, both vertebrates and invertebrates. Neoplastic tissues and tubular structures caused in Gramineae by plant Reoviridae, and also in their Delphacid vectors, could be recognised in fossil material.

Molecular palaeontology could be used in the case of DNA viruses present in well preserved fossil tissues with the techniques of amplifying ancient DNA with universal reaction primers. Probably the more suitable material for investigation of viral palaeontology, specially regarding to Arthropods, is that included in amber or similar material derived from vegetal

resins. Good preservation could be given also by volcanic ashes, carbon deposits and pits. For example, chloroplast DNA sequences have been found in Magnolia sp. fossilised in Miocene volcanic ash.

Finally, attention should be given to the materials fossilised during the mass extinction of the end of Permian. They could be checked with the techniques that can revel the presence of cellular alterations bound to virus infections to evaluate their role in that important episode.

EVOLUÇÃO DAS ASSOCIAÇÕES ARTROPODA-PLANTAS TERRESTRES DO PALEOZÓICO SUPERIOR DA BACIA DO PARANÁ: UMA SÍNTESE.

Evolution of the Arthropoda terrestrial plants from the Upper Paleozoic of the Paraná Basin: a synthesis.

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O presente trabalho apresenta uma síntese dos grupos de artrópodes e vegetais terrestres que habitaram áreas da Bacia do Paraná durante o Neopaleozóico (intervalo Neo Carbonífero tardio - Neo Permiano). Analisam-se a sucessão estratigráfica das faunas, a paleoecologia de artrópodes e vegetais terrestres e as possíveis interações ecológicas existentes entre eles. A partir disto, estabelecem-se padrões gerais da evolução dessas associações através do tempo. O principal objetivo é reunir os dados e as interpretações disponíveis a fim de criar um arcabouço para futuros trabalhos em paleoecologia das interações artrópode-planta.

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CARBONIFEROUS-PERMIAN BOUNDARY IN SOUTH AMERICA GONDWANA STRATA: PALEOBOTANICAL VERSUS PALEOZOOLOGICAL AGES

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R. IANNUZZI[1]

The present paper examines the classical age divergences reached between terrestrial floral and fauna assemblages in South American Paleozoic deposits. Because these divergences, for many years the age of certain Argentinian and Brazilian lithostratigraphical units, i.e. Bajo de Veliz Formation and upper part of Itararé Group, was matter of debate. Our study further substantiates this earlier discussion by presenting new paleobotanical data from Gondwana and extra-Gondwana basins. The valid age of these units based on their fossiliferous contents is revised.

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POSSIBLE INFERENCE ABOUT THE FEEDING BEHAVIOUR AND ECOLOGICAL PATTERNS OF FOSSIL EPHEMEROPTERA NYMPHS (INSECTA).

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J. C. ZAMBONI[2]

The fossil Ephemeroptera nymphs mouth-parts often not leave records. However, a conclusion about alimentary behaviour, basically referring to (1) the principal strategy of food obtention and (2) predominant food, can be done with basis on analysis of yours head pattern, and body's pattern too with data about paleoenvironment using another paleofauna components. Much more of the conventional analysis and habits of the extincts arthropods, the proposition of this work offers this basis to inferences: (1) hipognathous and prognathous of head, (2) yours proportion in relationship of the rest of body, (3) the interaction between patterns of mouth-parts and head patterns, the constancy of this relationship and (4) alimentary tendencies of this actuals families in one filogenetic board. This work intend show that only one image of paleoenvironment isn't is enough to the konwledge about mouth-parts and fossil's diet, that can be enrich with the informations about head morphology. We used here fossils of the Santana Formation (Lower Cretaceous, Northeast Brazil) and illustrations of species descriptions too, and the deduction about mouth-parts is based mainly in maxillas and maxillary and labials palps of the actual species. The Hexagenitidae nymphs, hipognathous, would be of general type collectors, but with possibility of mouth-parts with structures to scraping or fragmentation, in the case of heads more sphericals and largers like *Cratogenites corradinae*, *Paleobaetodes costalimai* and *Paleobaetodes britoi*, while *Protoligoneuria limai*, with more oval head, would be more basic type of collector. In Siphlonuridae, *Siphgondwanus occidentalis*, hipognathous, would be typically collector. In Oligoneuriidae, the nymphs of *Cratoligoneuriella leonardii* e *Colocrus indivicum* obey the actual pattern of the family, highly specialized in filtration, and the last, with more enlarge head, can would have mouth-parts more advanced and complex. As for Leptophlebiidae possibles suggestions can't be done, because these fossils is not clear to family identification. To lentic environment Hexagenitidae very well represented, and Siphlonuridae, are perfectly accepteds like collectors, and the variation to complementals strategies can be supported by more shallow waters, g. e. coast lands, with backlog of alocton material and micro-particled food, g. e. unicellular algas depending

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of that material. The lotics environment due, at least in the lakes neighbourhood admitting the existence of Oligoneuriidae and Leptophlebiidae, although very little represented, permit in fact one interpretation more evident and safe because of the nymphs restriction

PRIMER ANÁLISIS TAFONÓMICO DE UNA ASOCIACIÓN FÓSIL DE CONCHÓSTRACOS E INSECTOS DEL TRIÁSICO MEDIO (FM. LOS RASTROS) DE LA ARGENTINA

First taphonomic analysis of a fossil association of conchostracans and insects from Middle Triassic (Los Rastros Formation), Argentina

A. C. MANCUSO [1]
O. F. GALLEGO [2]

Este trabajo comprende parte de los resultados logrados en el trabajo de tesis de licenciatura del primer autor (ACM) en el que se realizó el análisis tafonómico de la asociación fósil continental del Triásico medio de la cuenca de Ischigualasto - Villa Unión en La Rioja.

La secuencia litoestratigráfica estudiada recibe la denominación de Formacíon Los Rastros, en ella se reconocen cinco ciclos lacustres-deltaicos determinados por un fuerte control climático sobre esta secuencia.

El contenido paleontológico, además de insetos y conchóstracos, comprende restos de vertebrados (peces) y plantas fósiles.

Los insectos hallados son todos terrestres y representan organismos que vivían en los alrededores del lago y fueron arrastrados por el viento hacia el mismo. De los cinco ciclos fluvio-lacustres identificados los insectos se hallan presentes sólo en tres de ellos, su ausencia estaría relacionada al diferente potencial de fosilización de los restos con respecto a la variables físico-químicas del ambiente (ej. reducción de condiciones anóxicas).

Los conchóstracos presentan tanto formas autóctonas como alóctonas, las segundas son las que se encuentran fragmentadas y en mal estado de preservación.

Tanto los insectos como los conchóstracos se encuentran restringidos sólo a las facies de fondo del lago.

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TAPHONOMY AND PALEOAUTOECOLOGY OF THE DEVONIAN TRILOBITES, PONTA GROSSA FORMATION, PARANÁ BASIN, BRAZIL

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Trilobites (homalonotids and calmoniids) are common macroinveterbates in sediments of the Devonian sequence, Ponta Grossa Formation (?Lochkovian-Frasnian), Apucarana Sub-basin, Paraná Basin. For this project 80 specimens (~52% homalonotids and 48% calmoniids) were collected in Pragian sediments of the basal portion (Jaguariaíva Member or Sequence "B" of the recent Bergamaschi's Sequence Stratigraphy scheme) of the Ponta Grossa Formation cropping-out at Jaguariaíva region, Paraná State. Trilobites come from two neighboring outcrops: (1) the Jaguariaíva-Arapoti railroad (km 2.7 and km 3.4-3.5) and (2) Jaguariaíva-Arapoti highway (km 3.2) cuts. 90 meters of shales and siltstones with centimetric ferruginous concretions, deeply bioturbated, locally represent the examined succession of the Ponta Grossa Formation. These were deposited in platformal or shallow water conditions, in a muddy epeiric sea, punctuated by storm events. Obrution beds present in these deposits, including clusters of epifaunal articulate brachiopods and conulariids preserved in life position, indicates that, in some intervals, sedimentation occurred near or below of the storm wave base. Each sampled outcrop was divided into 5 cm intervals and detailed surveyed for taphonomic as well as macrofaunal and sedimentologic data. Homalonotid trilobites (*Burmeisteria notica*) and calmoniids trilobites, (*Paracalmonia* ? sp) are randomly distributed and disperse in the sediments. Thick and laterally persistent beds formed exclusively by trilobite remains, or even true "trilobite shell-beds" are unknown in the studied interval. Specimens of *Burmeisteria notica* are mainly represented by moult remains, displaying several modes of preservation, ranging from completely disarticulated (97.6%, n=40) to intact moult remains (2.4%, n=1). Most disarticulated trilobites consist of thoracic segments (29.3%, n=12), thoracopygidium (26.8%, n=11), pygidia (14.6%, n=6), sclerites (14.6%, n=6) and cephala (12.2%, n=5). Some thoracopygidium remains are partially detached in the middle portion of the thoracic segment. On the other hand, intact exuviae are rare (2.4%, n=1) and represented by an enrolled remain showing a partially fused cephala that is twisted in relation to the body axis. Specimens of *Paracalmonia* ? sp are also mainly represented by disarticulated moult remains. These are constituted by thoracic segments (33.3%, n=13), thoracopygidium (18.0%, n=7), pygidia

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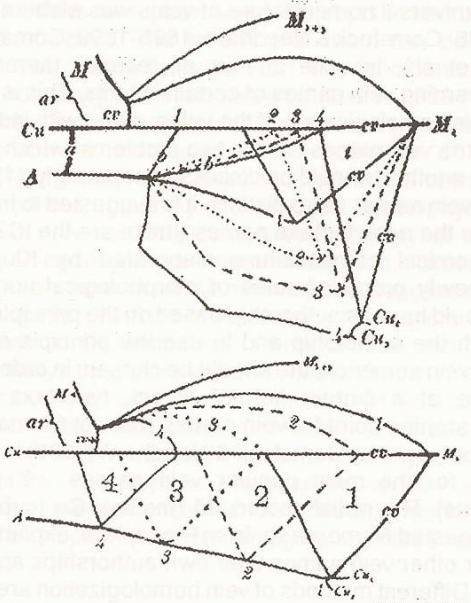
(12.8%, n=5), sclerites (28.2%, n=11), cephala (5.1%, n=2), and cephala and thorax (2.6%, n=1). The high proportion of moults indicates that *Burmeisteria notica* and *Paracalmonia* ? sp are represented by mortal remains. Its association with high bioturbated sediments indicates that their preservation was mainly mediated by the macrofaunal bioturbation. On the other hand, preservation of thoracopygidium and partially intact exuviae was enhanced by events (storms) of rapid burial. In addition, some structures, such as the hypostome were not observed in association with the cephalic remains in any specimen of the examined collection. As long known, this structure is intrinsically related to feeding habit in trilobites. Because in the organic particle feeder trilobites the hypostome is detached of the cephalic doublure, this structure is not preserved in organic connection. The absence of hypostome in the examined specimens is compatible with a organic particle feeding habit inferred to these organisms.

GENERAL SYSTEMATIC THEORETICAL ASPECTS OF: TAXONOMY PHYLOGENY



CONSTOCK & NEEDHAM, 1898

"... If I coulde live more twenty years and could work, how I will have of modify the ORIGIN, and how the opinions about all will had of be modifyed! Well this is a begining and this is something..."

Darwin's letter to Joseph Hooker, 1869

NOMENCLATURE OF VEINS ON INSECT WINGS

N. J. KLUGE[1]

In entomology, and especially in paleoentomology, wing venation is intensively used for purposes of systematics and phylogenetic reconstructions. A universal nomenclature of veins was elaborated far ago (Redtenbacher, 1886; Comstock & Needham, 1898-1899; Comstock, 1918; Snodgrass, 1935; et al.). In spite of this, till recently there are many disagreenents concerning vein names of certain insects. This is connected either with difficulty in homologization of the veins, either with indistinctness in the definitions of the vein names. These two problems (which are closely connected one with another) should be discussed separately. (1) In order to make definitions of vein names more distinct, it is suggested to introduce for them rules similar to the rules for taxa names (these are the ICZN or wider rules of zootaxonomical nomenclature elaborated by Kluge, 1999). According to the newly proposed rules of morphological nomenclature, each vein name should have its authorship based on the principle of priority; in order to establish the authorship and to use the principle of priority, a starting point of the vein nomenclature should be chosen; in order to fix each artificial vein name at a certain natural object, type-taxa should be designated. As the starting point for vein names (but not for morphological terms in general), the paper by Comstock & Needham (1898) is suggested. As the type-taxon for the most popular vein names - C (costa), Sc (subcosta), R (radius), Rs (radial sector), M (media), Cu (cubitus) and A (anal veins) - is suggested *Nemoura* sp. from Plecoptera; explanation of this choice is given. For other vein names their own authorships and type-taxa are designated. (2) Different methods of vein homologization are discussed. It seems that the only veins homologous for all insects are C, Sc and PR (= R-R1, = R-RA). In Neoptera two constant wing fields are present: pre-claval (with veins Rs, M and Cu) and claval (with veins Pcu and V); in Palaeoptera there are no fields homologous to the pre-claval and claval ones. Palaeoptera have constant alternating concave and convexe veins (RP, MA, MP, CuA, CuP, AA, AP) which are not homologous to any veins of Neoptera.

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SELECTED PROBLEMS IN PHYLOGENY AND GENERAL SYSTEMATICS OF INSECTS

N. J. KLUGE[1]

Work on the book "Insect systematics" (which first volume is published, and the second volume concerning Neoptera is in preparing) induced me to make a wide comparison of characters which are regarded to have importance in systematics of higher insect taxa, and to reexamine a number of them. This allows to support some concepts in insect phylogeny, and to disprove some others. The following of them can be discussed now. A holophyly of Polygnatha Latreille 1821 (= Mandibulata Snodgrass 1935) instead of a holophyly of Ceratophora Lankester 1888 (= Uniramia Manton 1977) and a new look to mandibular structure. Groundplan of Hexapoda and that of Amyocerata, particularly initial structure of abdomen and its appendages - tergaliae, caudaliae, and derivatives of limbs. A holophyly of Triplura instead of a holophyly of Dicondylia. A holophyly of Metapterygota versus a holophyly of Subulicornes. A holophyly of Neoptera versus a holophyly of Scarabaeones sensu Rasnitsyn. Systematic position of Embioptera and a new taxon Vannoneoptera suggested for Polyneoptera without Embioptera. Possible relationship of Notoptera and Dermatoptera, and phylogeny of Dermatoptera. *Permopsocus* and *Lophioneura* as a common holophyletic group, which is not ancestral for Copeognatha and Thysanoptera. Not a very new idea: division of Rhynchota to Phytadelga Dumeril 1806 and Hemelytrata Fallen 1814 instead of its division to Homoptera auct. and Heteroptera Latreille 1810. Specification for diagnosis of Oligoneoptera. Holophyly of Panorpoidea *sensu* Handlirsch is still not argued (being at the same time not disproved); a name Panzygothoraca is proposed for a holophyletic taxon uniting Panorpoidea *sensu* Handlirsch and Hymenoptera.

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TOWARD A POST-LINAEAN SYSTEMATICS

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The main problem of phylogenetic investigation, is an abundance of information. In the XVIII century, C. Linneaus suggested an excellent method of account of biological information, which allowed him to put characteristics of all natural objects into three small volumes of his "Systema Naturae". This method allowed his followers to add a lot of new taxa and to elaborate a modern evolutionary theory; because of their activity, after 250 years of exploitation, the Linnaean method becomes not enough for modern purposes. A newly elaborated method of account allows to give all interesting characters and a discussion on them in a shortest form, and makes easy their search in a long text. This principle is used by the author in the second edition of his book "Insect systematics", which first volume is recently published in Russian and second (and the last) volume is in preparing, and in a manuscript "Revision of supra-species taxa of Ephemeroptera", which in future will be also prepared for publication (now being available by Internet). Non-typificated names of higher taxa represent a special problem, as they are not regulated by ICZN, thus being differently used by different authors; to bring them in order, there are elaborated new rules of volumetric nomenclature. In order to avoid artificial absolute ranks (such as genus, family, order et al.) and useless discussion on them, names of genus-group regulated by the ICZN are used according to a newly elaborated hierarchical nomenclature (which usage does not contradict to the ICZN). Extinct taxa produce a special difficulty because having incomplete characteristics, they can not be integrated to a classification built for recent animals. In order to avoid this problem, in some cases a double hierarchy is used; the new principles of non-ranking nomenclature allow to supply with names all taxa in such complicate classification.

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ON THE HIGHER CLASSIFICATION OF POLYNEOPTERA

A. V. GOROCHOV'

The origin of orthopteroids (the Infraclass Polyneoptera) was possibly connected with the transition of some early Pterygota from the open mode of life on plants to the using of plant rubbish on soil for the protection from predators, mainly Carboniferous dragonflies. This transition must be accompanied by the partial elytrization of fore (upper) wings and the concentration of main flight functions in hind (lower) wings. It led to the widening hind wings and the arising of their fan-like folding. The subsequent evolution of the early Polyneoptera was presented by the different variants of specializations within this adaptive zone.

First variant is the further adaptation to the life among very loose soil covering (with large fissures). This variant allowed first representatives of dictyopteran stock (the order or superorder Dictyoptera) to preserve the more or less primitive appearance, but with increase of mobility (lengthening of coxae of legs). This stock originally was represented by 1 suborder (or order) Mylacridina, but in Mesozoic this taxon gives 3 branches (suborders or orders): the central and maybe paraphyletic branch with reduced ovipositor - Blattina, 2 specialized branches (possibly derivative from primitive Blattina) - Mantina and Termitina (=Isoptera).

Second variant is the partial return to more or less open mode of life. This way was probably passed by the early representatives of the orthopteran stock (the superorder Orthopteroidea). The most morphologically primitive true Orthopteroidea are the specialized Triassic *Mantis*-like predators from the order Titanoptera. The unknown Carboniferous, cockroach-like representatives of this order may be the possible ancestors for all Orthopteroidea. The some Carboniferous Polyneoptera with indistinct systematic position (Geraridae, Protophasmatidae) are very similar to the late Titanoptera, but they were probably adapted to other kinds of open mode of life on plants. The orders Phasmatoptera and Orthoptera are possible descendants of Titanoptera. They have one possible synapomorphy, but Orthoptera are characterized by the distinct autapomorphy (position of nymphal wings reversed) and can not be ancestral group for Phasmatoptera contrary to the opinion of some previous scientists.

Third variant of specialization led to the arising of the dermapteran stock

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to the life among dense soil covering (with only small fissures) which is accompanied by the more strong elytrization of fore wings and the general narrowing of body. This stock originally was presented by one suborder (Protocoleina or Protelytrina) which was ancestral for second one (Forficulina). The positions of the orders Gryloblattida, Plecoptera, Embioptera, Zoraptera, and several Palaeozoic groups are less unclear or quite unclear. Grylloblattida and Plecoptera are the true Polyneoptera which sometimes united in the separate superorder, but the monophyly of this taxon is rather problematic. Their ecological history is not very clear too. Zoraptera are united by the different authors with Polyneoptera or Paraneoptera, but sometimes with some very primitive Palaeozoic Pterygota. The inclusion of other above-mentioned groups into Polyneoptera is more probable, but insufficiently substantiated.

ON SOME THEORETICAL ASPECTS OF TAXONOMY

A. V. GOROCHOV[1]

The taxonomists who try to build a certain Natural classification usually look for the ways of construction of classification with the maximal prognostic powerty. One of these ways supposes to use the phylogenetic scheme as the true Natural classification (phylogenetic taxonomy), second way consists of the calculations of numbers of similarities and distinctions (numerical taxonomy), and third way is the more or less intuitive measuring of value of qualitative distinctions (evolutionary taxonomy).

First way does not lead to the classification with the maximal prognostic powerty as the similar forms from the bases of different branches of phylogenetic tree must be separated from each other and united with the very different forms from the final parts of these branches. Second way is little perspective also as for the approach to the Natural classification it is necessary to analize enormous number of characters. The problem of third way is its undisguised subjective nature. But it is possible this problem at present is minimal for the construction of Natural classification in comparison with the defects of other ways as third way allows to use the phylogenetic and numerical studies (and other methods), and both previous ways in reality also grounded on subjective appreciations: the subjective selection of characters for numerical taxonomy and the intuitive appreciations of phylogenetic significance of characters for the cladistics.

The representatives of some cladistic schools consider that using of some "logical" principles (principles of parsimony and outgroup comparison) allows to give the objective base for the phylogenetic reconstruction. They postulate that these principles follow from the phylosophical principle of economy. But the most favourite principle of parsimony is not in conformity with the logic of economy principle as the latter principle is possible for using only in case of the absence of any contradictory facts. We can not reject these facts only because of their minority in comparison with the number of not contradictory facts (many cladists make this logically incorrect procedure - "voiting of characters"), but we can remove these contradictions with help of the method of analogy (for example if we know that the analogous facts are of no importance in other related taxa). The using of analogy method inevitably lead the subjective anagenetic component in the phylogenetic study. The presence of subjective (intuitive) elements in taxonomy is not

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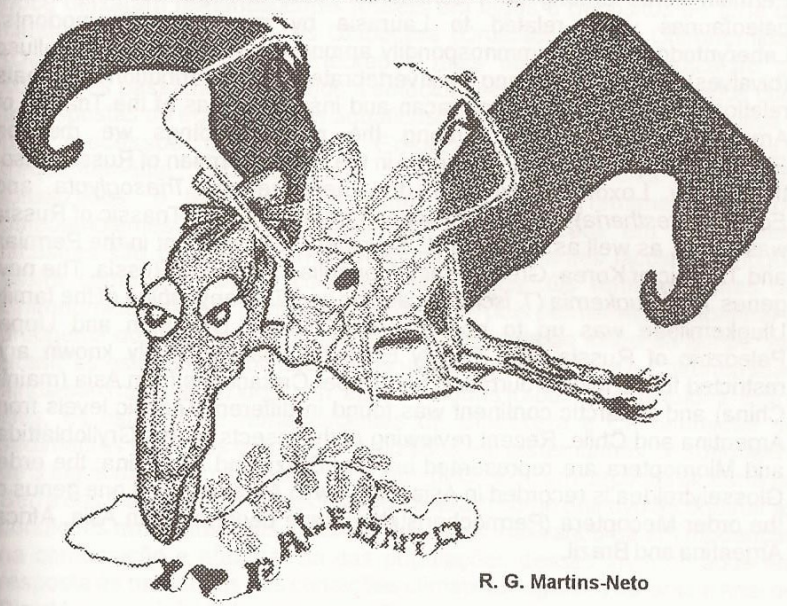
defect in taxonomical work, but it is the evidence of insufficiency of our knowledge and methodology when investigating of the complex systems.

The using of ostensibly simple, but logically incorrect, "objective" methods lead the taxonomists aside from the quest of real ways of objectivization of our science.

FAUNISTIC ASSOCIATIONS



R. G. Martins-Neto

"... Do you believe life after death or fossilization is all that we can wait?..."

RELATIONS OF TRIASSIC CONCHOSTRACANS AND INSECTS FAUNAS BETWEEN ARGENTINA AND LAURASIA

O. F. GALLEGO[1]
R. G. MARTINS

Many authors have treated relationships of fossil and faunas between Gondwana and Laurasia since the last century. In Argentina, paleobotanical studies supplied abundant information mainly relating Carboniferous and Permian floras among both continents. Also, in Argentina and Brazil, paleofaunas were related to Laurasia by means of Dicynodonts, Laberyntodonts and Temmnospondily among the vertebrate and mollusc (bivalves) and insects among the invertebrates. This contribution only treats relationship between conchostracan and insects faunas of the Triassic of Argentina and Laurasia. Among the recent findings we mention *Endolimnadiopsis*, a genus recorded in the Upper Permian of Russia. Also, the family Loxomegaglyptidae (the new genera *Triasoglypta* and *Eoparaleptestheria*) originally described from the Lower Triassic of Russia was found, as well as *Lograpta (L. zavattieri)*, also present in the Permian and Triassic of Korea, Great Britain, Mongolia, China and Russia. The new genus *Triasulugkemia* (*T. ischichucaensis* and *T. shenyanbini*) of the family Ulugkemiidae was up to now restricted to the Devonian and Upper Paleozoic of Russia. The Family Eosestheriidae originally known and restricted to the Middle Jurrassic and Upper Cretaceous from Asia (mainly China) and Antarctic continent was found in different Triassic levels from Argentina and Chile. Recent reviewing of the insects orders Grylloblattida, and Miomoptera are represented in Asia, Brazil and Argentina; the order Glosselytroidea is recorded in Asia and now in Argentina and one genus of the order Mecoptera (Permochoristidae) have been found in Asia, Africa, Argentina and Brazil.

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CLADOCERA (CRUSTACEA) E CHIRONOMIDAE (DIPTERA) EM SEDIMENTOS LACUSTRES QUATERNÁRIOS.

Cladocera (Crustacea) and Chironomidae (Diptera) in Quaternary lacustrine sediments.

M. ANDRADE-MORRAYE[1]
O. ROCHA[2]

Representantes de quase todos os grupos de invertebrados de água doce deixaram remanescentes fósseis em lagos e depósitos de turfa do Quaternário. No entanto, os Cladocera (Crustacea) e os Chironomidae (Diptera) têm sido os invertebrados mais utilizados na indicação de condições passadas, auxiliando a solucionar problemas relacionados com as respostas de ecossistemas aquáticos às mudanças externas no clima e nos processos limnológicos. Embora os remanescentes sejam freqüentemente tratados como "fósseis", de fato eles não estão fossilizados, o termo simplesmente implica em "remanescentes de paleoambientes". Os remanescentes de Cladocera em sedimentos lacustres são utilizados como evidência de ambientes lacustres antigos assim como para testar conceitos ecológicos. Os remanescentes de Chironomidae são de particular importância, pois permitem acompanhar a ontogenia dos lagos e determinar o grau de trofia ao longo do tempo. No Brasil, os estudos paleolimnológicos utilizando Cladocera e Chironomidae ainda são muito reduzidos, com apenas alguns trabalhos concluídos. Entre eles, os estudos de remanescentes de Cladocera e Chironomidae de sedimentos lacustres que foram realizados em testemunhos de sondagem de 3 lagos na região do Médio Rio Doce (MG) e de um depósito lacustre na Serra dos Carajás (PA). Estes estudos tiveram como objetivo reconstruir as condições ambientais dos sistemas lacustres, baseando-se em mudanças na composição e abundância das populações desses invertebrados em resposta às mudanças nas condições climáticas vigentes durante o final do Pleistoceno e início do Holoceno. De acordo com os resultados obtidos para os lagos do Médio Rio Doce foi possível relacionar um aumento do número total de remanescentes com o progressivo aumento no nível de água dos lagos e, através da razão entre os Cladocera planctônicos e litorais (P/L), foi possível relacionar a expansão dos habitats litorâneos com o aumento no nível do lago, ocorrido há 4.200 anos AP para os lagos do Médio Rio Doce. Em Carajás, os remanescentes Cladocera e Chironomidae não foram encontrados nos sedimentos entre 60.000 a 8.000 anos AP, sugerindo que o ambiente não foi favorável ao desenvolvimento ou preservação dessas populações. Entre 8.000 e 2.950 anos, houve um

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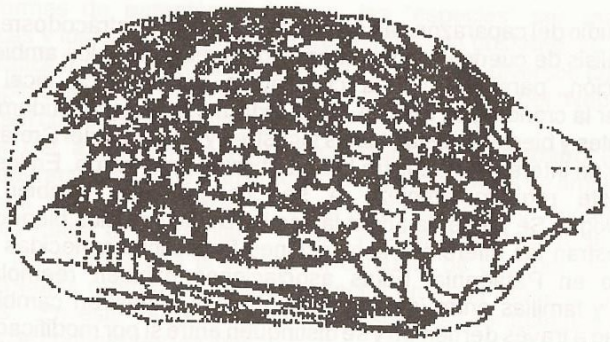
aumento do nível do lago, com um conjunto de remanescentes caracterizando condições oligotróficas. Nos últimos 2.950 anos AP, ocorreram três fases de mudanças no nível de água do lago. A primeira fase de maior número de remanescentes e maior nível de água foi interrompida por um de período de baixa densidade de remanescentes (não datado), interpretada como uma diminuição nível d´água e relacionado com um breve período de seca do Holoceno daquela região. Após esta fase seca, ocorreu o desenvolvimento de diversas espécies de Cladocera e Chironomidae, com um ambiente rico em vegetação aquática, com baixa concentração de oxigênio e relativamente eutrofizado.

OSTRACODA



Semicytherura bertisae **Coimbra, Carreñ & Michelli, 1999**
J. C. Coimbra Courtesy

"A potty tale? It is usually thought that the first ostracod to be illustrated was in Henry Baker's book EMPLOYMENT FOR THE MICROSCOPE (published in 1753). But this may not be the case. Recently a Pueblo pot was found, made by Mogollon people who lived in the Mimbres Valley area of New Mexico about 850-1000 years ago. On it pictures of "water bugs" that look like ostracods. Is this the oldest picture of an ostracod that lives in fresh waters of Central America and grows to about three millimetres in length.

Ian Wilkinson

J. C. Coimbra's Colaboration

RELACIONES BIOGEOGRÁFICAS DE LOS OSTRÁCODOS CRETÁCICOS NO MARINOS DE PATAGONIA

Biogeographic relations of the Patagonian Cretaceous ostracodes

E. A. MUSACCHIO

El estudio del caparazón calcáreo fosilizado de los ostrácodosresulta útil en el análisis de cuencas sedimentarias para reconstruir los ambientes de depositación, para ensayar la correlación estratigráfica local y para aproximar la cronológica relativa. En el extremo meridional sudamericano, las potentes y bien expuestas facies lacustres y palustres del Cretácico han aportado un interesante registro bioestratigráfico del grupo. En los últimos años, este registro empieza a ser comprendido también en su paleobiología. Se presenta ahora la secuencia de cambios biogeográficos que muestran las diferentes asociaciones faunísticas conocidas hasta el momento en Patagonia. Estas asociaciones exhiben reemplazos de géneros y familias entre las diferentes épocas, muestran cambios en la diversidad a través del tiempo y se distinguen entre sí por modificaciones en el diseño de la distribución geográfica de algunas especies que las caracterizan.

En esta exposición se relacionan los cambios biogeográficos ocurridos en correspondencia con la evolución geológico-fisiográfica, sobre la que se dispone de buena información. El registro fósil disponible no permite, todavía, indagar la posible responsabilidad de factores evolutivos "endógenos" (no geológico-ambientales) ligados a la naturaleza paleobiológica de los grupos intervinientes. Durante el Cretácico es posible distinguir las asociaciones relacionadas con bolsones, o facies de "*rift* " del "Neocomiano" (= Cretácico temprano), de aquellas presentes en el estadio de "*post-rift*", hacia el inicio del Cretácico medio. Dentro del Cretácico tardío, los depósitos del tipo "*sag*" siguen mostrando relativa uniformidad y gran extensión areal; próximas al orógeno andino, las facies molásicas se disponen en fajas longitudinales, ampliamente extendidas.

A continuación se presentan los casos conocidos para el Jurásico Medio, el Cretácico y el Terciario más antiguo, totalizando cinco estadios sucesivos de relaciones biogeográficas. Estos diseños se contrastan con los datos disponibles para los carófitos asociados (algas verdes no marinas) y con aquellos que muestran los ostrácodos marinos para la misma región.

Pandemismo durante el Jurásico Medio (J2). Las faunas mejor

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conocidas del Jurásico en Patagonia muestran especies y géneros compartidos con asociaciones del Hemisferio norte (Asia y Europa).

Endemismo en el Cretácico temprano (K1). Las diferentes asociaciones "neocomianas" muestran una proporción dominante de "especies" que parecen estar solamente en Patagonia. Un ejemplo es el caso *Cypridea*, un taxón característico aunque no exclusivo del Cretácico Inferior. La paleobiología de este taxón no está todavía bien comprendida; parece incluir formas de parentesco dudoso, las "especies" son mayormente endémicas y los clones podrían ser frecuentes. No obstante, su aplicación estratigráfica ha sido particularmente provechosa en diversos continentes; un ejemplo destacado es el de las cuencas productivas del "Neocomiano", del margen continental brasileño.

Ruptura del aislamiento geográfico durante el Aptiano (K2). Esta ruptura aparece vinculada a un proceso de epeirogénesis de amplio alcance continental (= *uplift*, *upward*), cuyo inicio se puede documentar en Patagonia hacia el Barremiano Tardío y cuya culminación se da en el Aptiano. No se descarta la presencia conjunta de otro tipo de actividad tectónica (fajas orogénicas, transcurrencia) en otras regiones geológicas próximas. En este intervalo aparecen "especies" compartidas con otras regiones de continentes vecinos.

Intercambio faunístico en diferentes momentos del Cretácico tardío (K3). Este intercambio está mejor representado por un abundante y diversificado registro de Ilyocyprididae y Limnocytheridae (*sensu lato*) en diversas entidades biogeográficas sudamericanas.

Disminución de la diversidad en el paso del Cretácico al Terciario (K/T). No parece producirse aquí un recambio faunístico; antes bien una disminución en la diversidad. No obstante, el intercambio biogeográfico se mantiene.

NEW DATA ON LIMNIC MESOZOIC OSTRACODA OF BOTUCATU FORMATION, FROM SÃO PAULO STATE, BRAZIL.

N. WÜRDIG
I. D. PINTO[1]

New studies of the sample with Mesozoic ostracodes described by Almeida (1950) Botucatu Formation at Rio Claro, São Paulo State show the existence of other species. The analyses of the species already described determined that *Pachecoia acuminata* is an young instar of *P. rodriguesi*. The new genus *Almeidacypris* was erected for *Candonopsis* Almeida, 1950 which was preoccupied by *Candonopsis vavra*, 1891. New species and new genera from those samples are registered and they point out to a fresh - water environment, probably of temporary water bodies.

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NOTE ON *Ilyocypris argentiniensis* MUSACCHIO & SIMEONI (1991)

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Recent works allow to establish correlations among limnic ostracodes from three basins, two South American (Neuquén and Bauru) and one African (Congo) during the Upper Cretaceous.

Previous works had registered the presence of *Ilyocypris argentiniensis*, described initially for the Neuquén Basin (Argentina), in the Bauru Basin (Brazil). In this contribution, through bibliographical revisions, it is enlarged the area of occurrence of this species.

In Brazil, the Upper Cretaceous sedimentary sequence, constituted mainly by sandstones, deposited after an event of basaltic magmatism, has been object of new subdivision attempts. Recent works propose the division of these sediments in two basins (Bauru and Caiuá).

The Bauru Basin is the most important, under a paleobiological perspective, and it comprises sediments which can be divided in Araçatuba, Adamantina, Uberaba and Marília formations.

This contribution proposes to work with two localities: 1) about 10 km Southern of Marília City, Araçatuba Formation, São Paulo State; 2) Partezan Quarry, Marília sandstones, near Ponte Alta town, Minas Gerais State.

In Neuquén Basin occur many charophytes and limnic ostracodes, and this assemblage is mentioned in many works. The age considered for these deposits is reliable, because its continental sediments are intercalated with marine ones presenting very well-known salt-water microfossils.

This situation allows to establish accurate ages for the charophytes and limnic ostracodes. Neuquén Basin also stands out for having an important paleovertebrate fauna, including dinosaur remains.

The Kwango Series represents the Upper Cretaceous non-marine succession, rich in palinomorphs, ostracodes and freshwater fishes, covering wide areas of Western and Southern Congo and probably extends to Northern. Their beds rest directly either upon basement or sedimentary rocks, which have been attributed to Lualaba Series.

When accomplishing a bibliographical revision of Campanian / Maastrichtian ostracodes associations, there was found a clade originally described in 1960, by Grekoff, under the code K 3099. It was proposed to

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series Kwango 5, from Congo Basin. Description, picture and outline are the same to *Ilyocypris argentiniensis* Musacchio & Simeoni, 1991.

It is considered here that K 3099 Grekoff, 1960 and *Ilyocypris argentiniensis* Musacchio & Simeoni, 1991 constitute the same species.

Therefore the Argentinean taxon should be used to the specimens named in 1960, by Grekoff, under the code K 3099.

With this synonymy the area of occurrence of *Ilyocypris argentiniensis* is enlarged. Described initially for the Loncoche Formation in El Zampal, Neuquén Basin, it is cited to Bauru Group, and by synonymy it is now considered its occurrence in Congo Basin.

The description for *Ilyocypris argentiniensis* Musacchio & Simeoni, 1991 is more complete than that presented by Grekoff for the ostracode K 3099. Therefore, the first one should be used.

Acknowledgements to FAPESP 96 / 07090 - 8 Project for permission to examine samples collected in Partezan Quarry.

Alathacythere (?) RONCANA BERTELS 1968 (L 4766 GREKOF, 1960)

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Bauru Group is an important geological unity of Southeastern Brazil. This unit has the most important paleovertebrate fauna in Brazil and one of the most important in South America.

Some microfossils, including ostracodes, have been collected in Bauru Group geological unities, since 50 's decade.

In Neuquén Basin have been collected many limnic ostracodes and charophytes of Upper Cretaceous. The continental formations of this basin are intercalated with marine ingressions with very rich faunas of salt-water microfossils.

This situation allows to establish accurate ages for the limnic ostracodes and charophytes. The Neuquén Basin also stands out for having an important paleovertebrate fauna, including dinosaur remains.

The Kwango Series represents an Upper Cretaceous non-marine succession, rich in palinomorphs, ostracodes and freshwater fishes, and this stratigraphic sequence covers wide areas of Western and Southern Congo, probably extending to Northern. The beds rest either directly upon basement or sedimentary rocks which have been attributed to Lualaba Series.

Recent studies permit extend paleogeographical distribution of the ostracode *Alathacythere (?) roncana* to Bauru and Congo basins. This taxon had been previously described from the Upper Cretaceous of Allen Formation, situated in the localities of Huantrai - Co, Fortín General Rocca and the area near Lago Pellegrini, Neuquén Basin of Argentina.

Allen Formation was deposited in lacustrine paleoenvironment, and its age is Lower Maastrichtian.

The same taxon were recognized in Congo Basin, with the informal name Ostracode L 4766 Grekof, 1960, in Kwango Series (Upper Cretaceous). This information is based on bibliographical material.

The presence of this ostracode in Bauru Group is noticed here for the first time, and its occurrence is until now restricted to Serra da Galga Member of Marília Formation from Western Minas Gerais State. The age for this unity, based on others ostracodes, is probably Upper Maastrichtian.

The presence of these taxa in Bauru Group is chronologically important,

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because reinforce a Maastrichtian age to Marília Formation. They could also establish an interesting isocronism, and possibilities of chronocorrelation, with some stratigrafic levels from Kwango Series, Congo Basin.

Acknowledgements to FAPESP 96 / 07090 - 8 Project for permission to examine samples collected in Partezan Quarry.

BIOESTRATIGRAPHIC CORRELATIONS BETWEEN BAURU, NEUQUÉN AND CONGO BASINS, USING NON-MARINE OSTRACODES

S. R. GOBBO-RODRIGUES [1]
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J. C. COIMBRA [3]
R. J. BERTINI [4]

Bauru Group occurs in parts of São Paulo, Minas Gerais, Goiás, Mato Grosso do Sul and Paraná states. The age of the deposits is Late Cretaceous. Several works have cited limnic ostracodes collected in their strata, but generally without complete identification.

The Neuquén Basin belongs to lacustrine Argentinean Senonian, including Anacleto, Coli - Toro and equivalent formations. It represents an important subaqueous event.

The Neuquén Group finishes sedimentation of that basin, and their geological units are known as "Dinosaur Beds". These strata provide very well preserved microfossil assemblages, of Late Cretaceous age.

The Upper Cretaceous non-marine succession of Congo Basin was named Kwango Series, which presents two stages, Inzia and Nsele. It covers wide areas of Southwestern Congo and probably extends to Northern portion of the country.

Upper Cretaceous beds of Congo Basin rest upon basement or rocks which have been attributed to Lualaba Series. These units are rich in palinomorphs, ostracodes and freshwater fish remains, and the age of this assemblage is Late Cretaceous.

This contribution compares Bauru Group limnic ostracode assemblages with other ones.

The result is the possiblity of a clear chronocorrelation between Bauru, Neuquén and Congo basins.

The samples, used in this investigation, were taken from four different outcrops of Bauru Group: 1) Southwest of Santo Anastácio City and 2) south of Presidente Prudente City (both Southwestern São Paulo State); 3) south of Marília City, margin of Peixe River (Southern São Paulo State); 4) Partezan Quarry, West of Ponte Alta City (Western Minas Gerais State).

Localities 1 and 3 belong to Adamantina Formation, locality 2 to Araçatuba limestones, and number 4 to Marília sandstones.

Argentina and Brazil have the following species in common: *Ilyocypris wichmanmi*, *Ilyocypris riograndensis*, *Allenocytheridea lobulata*, *Wolburgiopsis neocretacea*, *Wolburgiopsis vicinalis*.

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The species *Ilyocypris argentiniensis* and *Alatacythere? roncana* are commom to these three basins (Congo, Neuquén and Bauru).

K 530b; K 4761; (?) Dolerocypris kinkoensis and *(?) Darwinula kwangoensis* occur in Congo and Bauru basins.

Until now *Ilyocypris bertinii* Gobbo - Rodrigues & Petri, 2000 is endemic to Bauru Group.

The Argentinean beds are well dated and it allows an interesting chronocorrelation between Neuquén, Bauru and Congo basins. The age considered here is Campanian/Maastrichtian.

Inside Bauru Basin it is possible to recognize some differences: Araçatuba and Adamantina formations are Campanian/Maastrichtian in age and Marília Formation from, Minas Gerais State, is Maastrichtian.

Acknowledgements to FAPESP 96 / 07090 - 8 Project for permission to examine samples collected from Partezan Quarry.

ABSTRACTS

THE CRETACEOUS MARINE OSTRACODES FROM THE POTIGUAR BASIN (NORTHEASTERN BRAZIL) AND THEIR APPLICATIONS TO THE BIOSTRATIGRAPHICAL AND PALAEOENVIRONMENTAL ANALYSIS

J. C. COIMBRA [1,2]
A. L. CARREÑO [3]
M. P. DELICIO [4]

Ostracodes from the Cretaceous Açú and Jandaíra formations from the Potiguar basin, in the east of the Rio Grande do Norte State, Brazil, were taxonomically, biostratigraphically and paleogeographically studied. One hundred and seventy samples were analysed from five boreholes recovered by PETROBRAS (Petróleo Brasileiro S/A) in an area that comprises 60,000 km^2 (Lat 4°10'-5°50'S and Long. 35°00'-38°20'W) including a marine portion from where the boreholes came. This area evolved from a rift centre in the Lower Cretaceous to a continental passive marginal basin between the Upper Cretaceous and the Tertiary. The litostratigraphic sequence at the Potiguar basin, is approximately 11,500 m thick and rests unconformably over a Pre-Cambrian basement. It is constituted by a thick package of Neocomian to Holocene rocks, and is tectonically affected by three regional erosive unconformities as well as by Mesozoic and Tertiary basic volcanism. In spite of the scarcity and sparsely occurrence of ostracodes throughout the boreholes, a Cenomanian to at least lower Turonian *Veenia glabella* and a Turonian to Campanian *Cytherella gambiensis* interval zones were defined. A characteristic outer neritic assemblage, during Cenomanian to Turonian, it is interpreted as deposited under sluggish circulation conditions; while in the Turonian to Campanian interval the reinstallation of the bottom water conditions is inferred. With few exceptions, the studied ostracodes have shown a restricted biogeographical distribution.

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ANÁLISE DA ESTRUTURA POPULACIONAL DE *Cypridea africana* (KRÖMMELBEIN, 1965), FORMAÇÃO COQUEIRO SECO (APTIANO INFERIOR), BACIA DE SERGIPE/ALAGOAS, NE

Population structure analysis of Cypridea africana (krömmelbein, 1965), Coqueiro Seco Formation (Lower Aptian), Sergipe/Alagoas basin, Northeast Brazil.

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A. MAFFIZZONI[2,3]
L. TIBIRIÇA[1]

Os ostracodes são microcrustáceos dotados de uma carapaça bivalvada, e como outros artrópodes, realizam em torno de sete ecdises até alcançar o estágio adulto. As carapaças destes microcrustáceos, geralmente, apresentam uma grande abundância em sedimentos e rochas sedimentares depositadas em ambientes subaquáticos, por isso, são muito utilizados para análises paleoambientais. O presente trabalho apresenta inferências sobre a autoctonia e aloctonia de carapaças e de valvas de *Cypridea africana* (Krömmelbein, 1965), uma espécie de ostracode não-marinho proveniente da Formação Coqueiro Seco (Aptiano Inferior), bacia Sergipe/Alagoas. Estas inferências são baseadas na análise da estrutura populacional desta espécie, visando uma avaliação dos processos que porventura tiveram influência na concentração e fossilização do material ora estudado. Os resultados preliminares da análise de 43,29 gramas de amostra preparada, revelam a presença de 2520 carapaças e valvas de *Cypridea africana*. Neste total encontram-se 7 estágios ontogenéticos o que indica uma fossilização autóctone e uma possível mortandade em massa.

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TAFONOMIA E DISTRIBUIÇÃO DOS OSTRACODES BATIAIS DO QUATERNÁRIO DA BACIA DE SANTOS, SUDESTE DO BRASIL

Taphonomy and distribution of the batial ostracodes from Santos Basin Quaternary, Southeast Brazil.

C. T. BERGUE[1]

Foi realizado o estudo das comunidades de ostracodes da porção superior do talude da bacia de Santos. As duas primeiras amostras, correspondentes ao limite Pleistoceno/Holoceno, de três testemunhos perfurados pela PETROBRÁS (Petróleo Brasileiro S. A.) nas profundidades de 384m, 627m e 1129m, foram analisadas quanto a sua ostracofauna. Esta região do talude caracteriza-se pelo aporte de material sedimentar proveniente da plataforma continental, transportado pelas correntes de turbidez e por escorregamento. A partir de dados da ocorrência de espécies de ostracodes na plataforma continental brasileira, da estrutura populacional (razão adultos:juvenis) e do grau de preservação das carapaças, foram excluídas das tafocenoses as espécies alóctones e propostas assembléias típicas para cada batimetria. Além disso, levou-se em consideração na definição das assembléias propostas, o papel desempenhado pelas massas d'água Central do atlântico Sul e água Antártida Intermediária (AAIW), observando-se as características físicas das mesmas, tais como salinidade e temperatura, na definição das assembléias propostas, constituindo-se estes no primeiro trabalho sobre a sistemática e ecologia destes microcrustáceos em região batial na margem continental brasileira.

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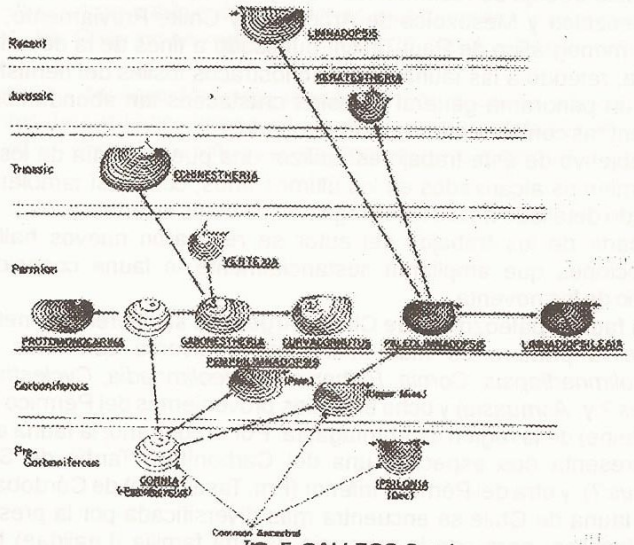
CONCHOSTRACA



O. F. GALLEGO Courtesy

CONCHOSTRACOFAUNA SUDAMERICANA DEL PALEOZOICO Y MESOZOICO: ESTADO ACTUAL DEL CONOCIMIENTO. PARTE I: ARGENTINA Y CHILE

South American Paleozoic and Mesozoic Conchostracofauna: Actual state of the knowledge. Part I Argentina and Chile.

O. F. GALLEGO

En este trabajo se resumen las citas y descripciones de conchóstracos del Paleozoico y Mesozoico de Argentina y Chile. Previamente, solo un trabajo monográfico de Paul Tasch, publicado a fines de la década de los ochenta, referido a las faunas de conchóstracos fósiles del hemisferio sur, brindó un panorama general de estos crustáceos tan abundantes en las sedimentitas continentales de todo el mundo.

El objetivo de este trabajo es realizar una puesta al día de los nuevos conocimientos alcanzados en los últimos años, como así también brindar un listado detallado de todos los registros de estos invertebrados.

A partir de los trabajos del autor se realizaron nuevos hallazgos y descripciones que ampliaron sustancialmente la fauna conocida hasta principio de los noventa.

Las faunas paleozoicas de Chile y Argentina se diferencian netamente, ya que la primera es más abundante y diversa con siete géneros (*Palaeolimnadiopsis, Cornia, Estheriina, Paleolimnadia, Cyclestherioides, Cyzicus* ? y *Asmussia*) y ocho especies provenientes del Pérmico Superior (Fm. Peine) de la región de Antofagasta. Por el contrario, la fauna argentina solo presenta dos especies; una del Carbonífero Tardío de San Juan (*Cyzicus* ?) y otra del Pérmico Inferior (Fm. Tasa Cuna) de Córdoba (*Leaia*).

La fauna de Chile se encuentra más diversificada por la presencia de cinco familias, pero con la ausencia de una familia (Leaiidae) típica del paleozoico, que sí se halla presente en el Paleozoico de Argentina (Fm. Tasa Cuna, Pérmico Inferior).

La fauna mesozoica de Argentina es sumamente abundante, debido a los trabajos más intensos de exploración y a la amplia extensión de los sedimentos y cuencas de este período con relación a la fauna chilena.

En Chile se registra solo la presencia de tres géneros (*Liograpta*, *Menucoestheria* y *Asmussia*) y cuatro especies en el Triásico Inferior ? y Medio a Superior (Estratos de La Coipa y Fms. La Ternera, Pichidangui ? y Profeta ?, respectivamente) de las regiones de Antofagasta, Atacama y Coquimbo. *Liograpta* y *Menucoestheria* se encuentran presentes en el Triásico de la Argentina.

La fauna del Triásico Medio a Superior de Argentina proviene principalmente de la región de Cuyo y cuenta con veintisiete especies,

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distribuidas en ocho géneros y seis familias; diecisiete de estas especies pertenecen a las familias Euestheriidae y Loxomegaglyptidae.

La fauna jurásica de Argentina (Jurásico Inferior y Medio) proviene de las formaciones Roca Blanca, Cañadón Asfalto y La Matilde, localizadas en la Patagonia Argentina, y consta de trece especies de las cuales siete pertenecen a la Familia Fushunograptidae (Lioestheridos) y cinco especies pertenecen a la Familia Euestheriidae. En general esta fauna deberá ser revisada en el futuro y aún existen muchos especímenes y colecciones no estudiadas. En Chile no se registran faunas de conchóstracos jurásicos y cretácicos.

El Cretácico de Argentina solo registra la presencia de dos especies, provenientes del Cretácico Inferior de San Luís (Afrograptidae ?) y Neuquén (Euestheriidae) (Fms. Lagarcito y La Amarga, respectivamente).

CONCHOSTRACOFAUNA SUDAMERICANA DEL PALEOZOICO Y MESOZOICO: ESTADO ACTUAL DEL CONOCIMIENTO. PARTE II: SUR DE BRASIL (RIO GRANDE DEL SUR) Y URUGUAY

South American Paleozoic and Mesozoic Conchostracofauna: Part II: South Brazil (Rio Grande do Sul State) and Uruguay.

O. F. GALLEGO [1]

En la presente contribución se mencionan y comentan las citas y descripciones de conchóstracos del Paleozoico y Mesozoico del Sur de Brasil (Estado de Río Grande del Sur) y de Uruguay, con la finalidad de brindar una puesta al día sobre los nuevos conocimientos alcanzados en los últimos años, como así también elaborar un listado de los registros previos de estas faunas.

Los estudios de conchóstracos fósiles de Brasil, en general son numerosos y provienen de mediados del siglo veinte; en particular para el Estado de Río Grande del Sur no son muy numerosos y proceden de mediados de los cincuenta y de comienzos de los setenta. Fueron compilados por Paul Tasch hacia finales de los ochenta y por el autor de este trabajo a mediado de los noventa.

La fauna de conchóstracos del Sur de Brasil proviene exclusivamente de la Formación Santa María (Triásico Medio a Superior) en el Estado de Rio Grande del Sur. A pesar de los recientes estudios de esta fauna, existen muchas dudas en cuanto a su composición faunística. Según los estudios del autor de esta comunicación esta formación registra la presencia de siete especies, distribuidas en cuatro géneros y cuatro familias. Los estudios previos mencionan la presencia de por lo menos veintidós especies muchas de las cuales deberán ser revisadas en el futuro.

La fauna de conchóstracos de Uruguay, si bien presenta nuevos registros estos son menos numerosos y provienen de distintos periodos geológicos. En el Paleozoico se registra en el Pérmico Superior (Formación Yaguarí) la presencia de un representante de la Familia Cizicidae ? (Euestheriidae). En el Mesozoico se registra la presencia de conchóstracos en el Triásico Superior (Formación Tacuarembó) con ejemplares de la Familia Lioestheriidae ? (o Flia. Afrograptidae) y en el Cretácico Inferior (Formación Miguez) donde se identificaron especímenes pertenecientes a la Familias Euestheriidae y Paleolimnadiopseidae.

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CONCHOSTRACOFAUNA BRASILEIRA: ESTADO ATUAL DO CONHECIMENTO.

Brazilian conchostracofauna: actual state of knowledge.

I. S. CARVALHO [1]

As conchostracofaunas encontradas nas bacias cretácicas do Brasil compreendem espécies características do contexto gondwanico. As similaridades, das faunas sul-americanas e africanas possibilitam o uso bioestratigrafico para as sucessões sedimentares do Cretáceo Inferior, bem como a análise dos ecossistemas continentais. São discutidas as variações morfológicas das espécies encontradas no Nordeste do Brasil e o contexto paleoambiental em que se inserem.

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REVISIÓN DE LOS CONCHÓSTRACOS TRIÁSICOS DE LA ARGENTINA DESCRIPTOS ENTRE 1862 Y 1995

Review of the Argentinian Triassic Conchostraca described between 1862 and 1995.

O. F. GALLEGO [1]

La presencia de conchóstracos en el Triásico de la Argentina es conocida desde mediados del siglo diecinueve, cuando Rupert T. Jones describió *Estheria forbesii* para los niveles bituminosos de la localidad de Paramillos de Uspallata (Mendoza), donde los había coleccionado años antes el explorador David Forbes. En 1995 se publicó una redescripción de esta especie, que es la última referida a los conchóstracos triásicos de la Argentina, realizada por Horacio H. Camacho.

Si bien, son conocidos ya desde esa época, los trabajos descriptivos son escasos y en su mayoría son sólo citas y menciones de su presencia en las sedimentitas continentales triásicas de la Argentina. Entre 1862 y 1948 se describieron sólo ocho especies.

El objetivo de este trabajo es realizar un análisis y revisión de todos los taxones descriptos hasta el año 1995 y brindar algunos comentarios sobre la validez de algunos de ellos. Es importante destacar que la mayoría de los taxones descriptos en este período no han sido nuevamente hallados con motivo de los recientes trabajos del autor, y como fruto de las compilaciones realizadas para su trabajo de tesis. Por otra parte, es importante también destacar que buena parte del material mencionado y en especial los descriptos a mediados de los cuarenta y cincuenta por Carlos Rusconi se hallan extraviados, mientras que los tipos de otros se hallan fuera de la Argentina o peor aún no se designaron tipos y no se publicaron los repositorios donde se depositaron.

En esta contribución de analizan y mencionan las especies citadas y/o descriptas en sus trabajos por Rupert Jones, Hans Geinitz, Philippi, Federico Kurtz, Carlos Rusconi y Horacio Camacho. Además, se presentan comentarios realizados por otros autores como P. Raymond, T. Kobayashi y P. Tasch con respecto a los taxones descriptos por los autores nombrados en primer término.

Las especies analizadas en este trabajo son las siguientes: *Estheria forbesii*, *Euestheria forbesii* Jones o *Euestheria forbesi* Jones, *E. mangaliensis* Jones, *E. mendocina* Philippi, *Pseudoestheria contorta* Rusconi, *P. leonense* Rusconi, *P. minoprioi* Rusconi, *Euestheria striolatissima* Rusconi, *Aluta challaense* Rusconi.

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A NEW CONCHOSTRACAN GENUS (FAMILY PALAEOLIMNADIOPSEIDAE) FROM TRIASSIC POTRERILLOS FORMATION, ARGENTINA

S. YAN.-BIN [1]
O. GALLEGO [2]
A. M. ZAVATTIERI [3]

Several conchostracan samples were collected from the upper Middle Triassic to lower Upper Triassic Potrerillos Formation on the "El Mastil" hill, El Challao, Mendoza State, Argentina. The conchostracan fossils occur in a light gray siltstone that was weathered and are associated with a few fish scales on the same slab of the rocks.

The new genus, *Challaolimnadiopsis*, is characterized by the growth lines recurved on the postero-dorsal margin of the valve; two nodes separated by one fine ridge on the umbonal region, and the ornamentation with median-large polygonal reticulation on the growth bands in the anterior and middle parts of the valve which gradually transited into radial lines in the ventral and posterior parts. Based on the recurvate growth lines it should be attributed to Family Palaeolimnadiopseidae. However, this new taxa seems to be similar to vertexineans, especially to *Bipemphigus* in terms of the presence of the nodes and ridge on the umbo. The type of ornamentation of the new genus is very close to those of eosestherids which are widely distributed in Late Jurassic and Early Cretaceous in Eastern Asia. According to the recurvate growth lines and ornamentation the new genus is approached to *Junggarolimnadiopsis*, which came from the Middle Triassic in Junggar and Turpan basins in Xinjiang Autonomous, NW China, and to *Eosolimnadiopsis* from Early Jurassic in China, but both of later have no nodes and ridges on the umbonal region.

The family Paleolimnadiopseidae first appeared in the Early Devonian, as in the world, reached their development acme in the Permian, rose again in the Triassic and Early Jurassic, and declined in the Cretaceous. Three living species are only distributed in Australia. In South America this kind of conchostracans have been found in Brazil (Permian-Cretaceous), Chile (Permian), Bolivia (Permian-Triassic), Uruguay (Cretaceous) and Argentina (Triassic). So the finding of the new taxa is of important significance for understanding the geographical distribution and relationship between paleolimnadiopsids and vertexids.

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SOUTH-AMERICAN FIRST RECORD OF CONCHOSTRACAN BODY SOFT PARTS IN THE MIDDLE-LATE TRIASSIC (SANTA MARIA FORMATION) FROM SOUTHERN BRAZIL

O. F. GALLEGO [1]
F. PEREIRA[2]

The present paper describes the first record of conchostracan body soft parts in the Santa Maria Formation, dated as Middle to Late Triassic, from the Rio Grande do Sul State in Southern Brazil. The presence of conchostracan in the fossil record was documented by impressions and moulds of the chitinous and bivalve carapace, but there are few cases in the paleontological record that were founded soft parts preserved in association with valves impressions. These specimens were reported from different stratigraphical (Carboniferous to Cretaceous) and paleogeographical (Great Britain, France, Germany and China) sources. They were preserved appendages, claspers, antennas, telson, internal anatomical parts, mouth parts and eggs. The new material, still under study, shows the presence of appendages and probably some segments of the second antennas.

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CONCHOSTRÁCEOS DA BACIA DE PADRE MARCOS (CRETÁCEO INFERIOR), ESTADO DO PIAUÍ

Conchostracans from Padre Marcos Basin (Lower Creceous), Piauí State.

I. S. CARVALHO[1]

A bacia de Padre Marcos é uma área sedimentar situada no extremo oeste do sistema de bacias riflte do Vale do Cariri. Localiza-se no município de Padre Marcos, Oeste do estado do Piauí, dispondo-se entre as bacias do Parnaíba e Araripe. Não existe proposições formais de termos litoestratigráficos para abranger as rochas da Bacia de Padre Marcos. Conglomerados polimíticos e arenitos grossos ocorrem próximo às bordas falhadas e em direção às regiões mais internas arenitos finos, argilosos e coloração cinza - esverdeada, intercalados com siltitos e folhelhos de igual coloração são as litologias dominantes. Nos folhelhos acinzentados ocorre uma conchostracofauna indicativa dos andares Rio da Serra e Aratu. Foram reconhecidas as espécies *Cyzicus brauni* e *Cyzicus pricei*, as quais também são freqüentes em bacias adjacentes de mesma idade, tais como Sousa, Uraúna, Iguatu, Mangueira, Malha Vermelha, Rio Nazaré, Mirandiba e São José do Belmonte. Estas espécies de conchostráceos são abundantes e amplamente distribuídas em toda a região Nordeste do Brasil, havendo formas análogas em bacias africanas. *Cyzicus brauni* é amplamente distribuída em todas as áreas sedimentares da Província Borborema. Desde a Bacia de Jatobá, na região mais a sul, até as bacias de Iguatu e Rio Nazaré ao norte, é encontrada em profusão. Sua área de dispersão deve, contudo, ser bem mais ampla, pois possuem grande similaridade com espécies da África do Sul, Angola e Zaire (Bacia do Congo), tais como *Cyzicus anomala*, *Cyzicus kitariensis* e *Cyzicus anchietae*. De maneira menos marcante, os espécimens de *Cyzicus pricei* são encontrados em várias das bacias interiores. Ocorrem nas bacias de Uiraúna, Malha Vermelha e Mirandiba, indicando, porém, uma área de dispersão quase tão ampla quanto a de *Cyzicus brauni*. Além disso, também estão presentes na Bacia do Jatobá e são muito semelhantes às espécies *Cyzicus sambaensis* e *Cyzicus kasiensis* da Bacia do Congo. Os conchostráceos da Bacia de Padre Marcos ocorrem em um contexto paleoambiental de lagos efêmeros, estando associados com ostracodes, microgastrópodes e fragmentos vegetais.

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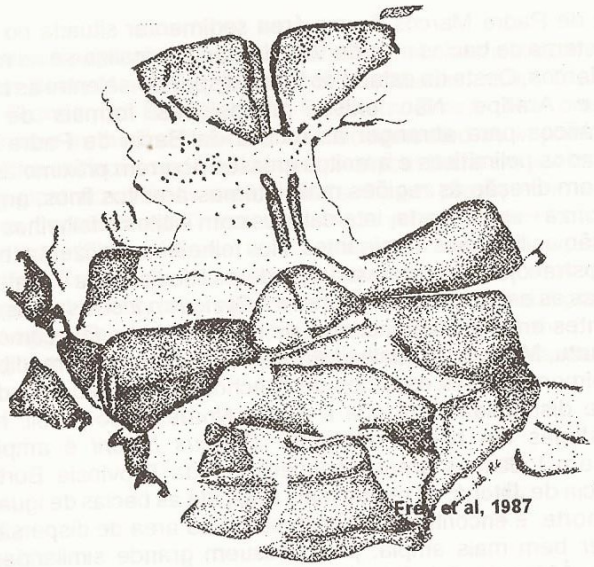
OTHER CRUSTACEA: DECAPODA ISOPODA



Frey et al, 1987

Paleoxanthopsis cretacea **Beurlen, redraw by Martins-Neto**

"Difficulty was experiencied in the preparation of some of the decapods owing to the fragile and fractured condition of the test..."

Ball, 1960

REVIEW OF THE KNOWLEDGE ABOUT BRAZILIAN FOSSIL DECAPODA WITH DESCRIPTION OF NEW TAXA

R. G. MARTINS-NETO [1]

Decapoda are well represented in Brazilian deposits with several described species, mainly from Cenozoic. Mesozoic decapods are known from Riachuelo Formation (Lower Cretaceous, Sergipe), Santana Formation (Lower Cretaceous, Ceará), Itamaracá Formation (Lower Cretaceous, Pernambuco), Beberibe Formation (Upper Cretaceous, Pernambuco) and Gramame Formation (Upper Cretacous, Pernambuco). Cenozoic Decapoda was found in Maria Farinha Formation (Paleocene, Pernambuco), Cícero Dantas Formation (Eocene/Oligocene, Bahia), Pirabas Formation (Miocene, Pará), and finally Taubaté Formation (Oligocene, São Paulo). This paper reviews some taxa and proposes three new genera, four new species, and three new combinations.

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REVIEW OF ISOPODA FROM BRAZILIAN DEPOSITS WITH DESCRIPTION OF NEW TAXA

R. G. MARTINS-NETO [1]

Fossil isopods are very rare in the Brazilian deposits with only five named species. From the Tatuí Formation (Permian, Southeast Brazil) Mezzalira & Martins-Neto (1992) describes the species *Pseudopalaega granulifera, P. microcelata, Protourda tupiensis* and *P.? circunscriptia*, probably the older isopod (the group is relatively abundant during Mesozoic and Cenozoic in several worldwide localities). Cretaceous deposits containing isopods was found in the Açú arenites, Apodi Group (Upper Cretaceous, Northeast Brazil) with a single species *Unusuropode castroi*, Duarte & Santos, 1962. Vicalvi et al. (1989) notices a peculiar unnamed arthropod from Irati Formation (Permian, Southern Brazil), collected of outcrops in Rio Grande do Sul, tentatively interpreted as isopod. Material very similar was collected in São Paulo outcrops. Despite the age differences, the figured specimens are similar to *Unusuropode* Duarte & Santos having fused pleonites (Sphaeromidae?), however not visible in the photographs. This material probably represents a new genus and species of Isopoda Sphaeromimidae. The knowledge about the Brazilian isopodfauna is enlarged with the description here of a new species of the genus *Pseudopalaega* Mezzalira & Martins-Neto, from Irati Formation (outcrop of São Paulo) and a new species of the genus *Palaega* Woodward, from Tremembé Formation (Oligocene, São Paulo).

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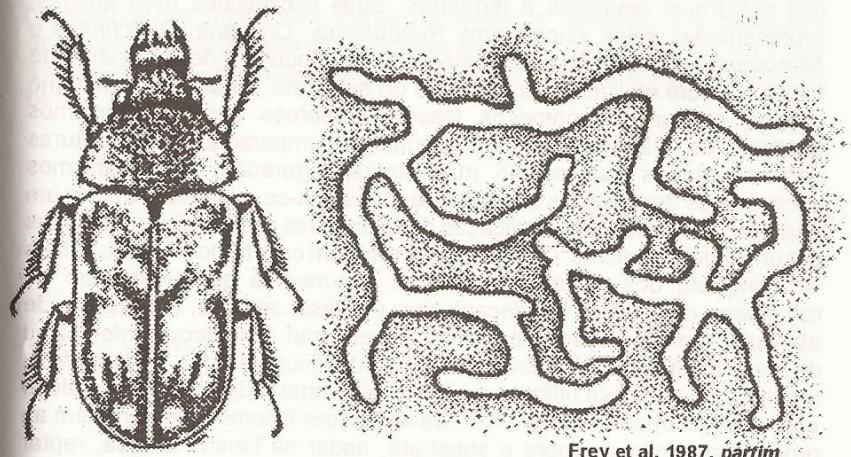
PALEOICHNOLOGY



Frey et al, 1987, *partim*

"...the specimen has been examined by members of the departments of Paleontology, Mammalogy, Ichthyology, Lower Invertebrates and Comparative Anatomy. Satisfactory explanation as to the nature of the organism allied to the prints has bem elicited and all would be interested in any suggestion that may be forth coming..."

Vokes, 1938

PALEOICNOLOGIA DE ARTRÓPODES: O PAPEL DOS APÊNDICES NA EXPLORAÇÃO DOS SUBSTRATOS AQUÁTICOS.

Arthropoda Paleoichnology: the role of the appendages in the aquatic substrate exploration.

R. G. NETTO[1]
J. CORD[1]

Desde o Cambriano, os artrópodes se fizeram presentes na colonização dos substratos aquáticos e terrestres. Suas escavações mais antigas, representadas pelos icnogêneros *Rusophycus, Cruziana, Diplichnites* e *Monomorphichnus*, atribuídos à atividade de repouso e deslocamento de trilobitas sobre ou ligeiramente dentro do substrato, datam do Cambriano inferior, apesar dos primeiros fósseis corpóreos destes organismos datarem do Cambriano médio. Quando comparadas as estruturas contemporâneas, ou mesmo mais antigas, geradas por organismos escavadores desprovidos de apêndices, observa-se que estes tiveram um papel fundamental na diversificação do padrão das escavações produzidas por um dado organismo. Os apêndices tornaram os artrópodes mais hábeis na conquista dos distintos ambientes, na medida que permitiram ao organismo diversificar os mecanismos de deslocamento, de captura de alimentos, de respiração e de orientação sensorial. O deslocamento deixou de ser rastejante, por movimentos ondulatórios ou por peristaltismo, mecanismo de que se utiliza a maioria dos invertebrados menos evoluídos para escavar dentro do substrato. Os apêndices locomotores permitem ao organismo caminhar sobre o substrato, nadar na lâmina d´água, reptar junto ao fundo e, em alguns casos, saltar. Assim, os artrópodes passam a ser mais ágeis que os demais organismos, tanto como predadores quanto como fugitivos de situações indesejáveis. Quando desenvolvidas junto a substratos finos e plásticos, em ambientes de moderada a baixa energia, tais atividades deixam um conjunto de marcas distintas, que podem ter sido geradas por um mesmo animal, refletindo diferentes situações comportamentais. As novas habilidades trazidas pelos apêndices locomotores e a presença de apêndices especializados para a captura de alimentos junto à abertura bucal, ajudaram também a diversificar os hábitos alimentares. A predação tornou-se mais eficiente, reduzindo a dependência do organismo do alimento depositado junto ao substrato ou em suspensão na lâmina d´água e permitindo a exploração da superfície de forma mais direta e menos arriscada. Assim, alguns grupos de crustáceos passaram a escavar grandes e complexos sistemas de galerias, representadas no registro fóssil pelos clássicos icnogêneros *Ophiomorpha*,

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Thalassinoides e *Gyrolithes*. Estes sistemas representam moradia permanente a semi-permanente, comunitária ou individual de predadores, facultativos ou não, e podem ser escavados tanto em substratos moles como em substratos firmes. Além de facilitar o processo de escavação, os apêndices assumem papel importante na estruturação das galerias que, em substratos pouco estáveis ou coesos, têm suas paredes edificadas pela agregação de pelotas de sedimento areno-pelítico e muco, produzidas pelo próprio animal. A associação do sistema branquial a alguns apêndices locomotores, nos artrópodes aquáticos, garantiu maior autonomia respiratória aos indivíduos e, consequentemente, favoreceu à especiação e diversificação dos grupos de artrópodes aquáticos, que são, hoje, junto com os anelídeos e moluscos, os principais escavadores e exploradores do bento.

A PALEOICNOFAUNA BRASILEIRA DE ARTRÓPODES: ESTADO ATUAL DE SEU CONHECIMENTO

The Brazilian Arthropod Paleoichnofauna: actual state of the knowledge.

A. C. S. FERNANDES[1]

Registros de icnofósseis atribuídos à atividade de artrópodes, conhecidos a partir do Cambriano, têm sido divulgados na literatura geológica internacional, auxiliando, sobremaneira, a compreensão da evolução dos artrópodes em geral. No Brasil, os registros mais antigos parecem pertencer aos sedimentos das bacias do Camaquã e Santa Bárbara, no Estado do Rio Grande do Sul, com icnogêneros como *Cruziana*, *Diplocraterion* e *Rusophycus*, assinalando desse modo a presença de artrópodes marinhos no Vendiano/Cambriano brasileiro. Sem registros icnológicos conhecidos no Ordoviciano, a paleoicnofauna brasileira de artrópodes marinhos inicia sua maior representatividade a partir do Siluriano pois, com a maior distribuição de mares epicontinentais, a paleoartropodofauna parece ter sofrido um aumento considerável. Auxiliam, assim, nas interpretações paleoambientais das unidades silurianas e devonianas das bacias paleozóicas com a definição de icnofácies e, inclusive, na determinação de suas idades. Neste último caso, prováveis crustáceos poderiam ter originado escavações conhecidas como *Arthrophycus*, inferindo uma idade eossiluriana para os sedimentos das formações Trombetas e Vila Maria, presentes respectivamente nas bacias do Amazonas e do Paraná. Os trilobitas, representantes mais comuns dos artrópodes no Devoniano brasileiro, produziram pistas e escavações identificadas pelos icnogêneros *Cruziana* e *Rusophycus*, normalmente atribuídos a esses animais. Icnogêneros como *Teichichnus*, presente na Formação Vila Maria, e *Bifungites*, este presente em formações devonianas das bacias do Paraná e do Parnaíba, também demonstram a atividade de outros artrópodes marinhos, usualmente crustáceos. A partir do Carbonífero, sedimentos marginais marinhos, particularmente os da Bacia do Paraná, registram a presença de icnogêneros como *Isopodichnus*, *Teichichnus* e *Thalassinoides*, revelando uma atividade relativamente constante de crustáceos no Permo-Carbonífero. *Craticulichnum*, interpretado como icnito de repouso de um provável merostomado limesaspídeo, atestaria as incursões ocasionais desse grupo de artrópodes nas lagunas pretéritas de baixa circulação das águas permo-carboníferas da bacia. Nas áreas emersas então existentes, pistas de crustáceos

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lacustres como os notostráceos, identificadas pelos icnogêneros *Isopodichnus* e *Diplichnites*, distribuem-se em diversos níveis nos sedimentos rítmicos do Grupo Itararé, em Itu, Estado de São Paulo. Artrópodes marinhos mesozóicos também deixaram seu registro icnológico: crustáceos decápodes produziram túneis (*Thalassinoides*) e escavações espiraladas (*Gyrolithes*) e verticais (*Ophiomorpha*), finalmente preservados nos sedimentos calcários das bacias costeiras do Nordeste. Nos continentes, insetos, possivelmente pertencentes a um grupo extinto de coleópteros de hábito necrófago, perfuravam ossos de répteis sinapsídeos preservados nos sedimentos triássicos da Bacia do Paraná; nesta mesma bacia, coleópteros deixaram pistas nos seus arenitos jurocretácicos, e outros artrópodes produziram escavações assemelhadas a *Celliforma*, verticais e dotadas de uma câmara arredondada na base, em suas camadas cretácicas. Escavações verticais, provavelmente resultantes das atividades de insetos ou aracnídeos, encontram-se também presentes nos sedimentos depositados nas margens de antigos rios e lagos das atuais bacias interiores do Nordeste. Registros icnológicos terciários também atestam a presença de crustáceos calianassídeos em depósitos marinhos, e de insetos e/ou aracnídeos em depósitos continentais.

THE REVOLUTION OF INSECT TRACE FOSSILS

J. F. GENISE [1]

The history of ichnology can be traced back up to the 19th century, when the first trace fossils from marine rocks and the first vertebrate footprints were described. However, it is not until the last three decades that continental ichnology actually began to develop as a mature discipline, contributing significantly to our knowledge and interpretation of the past ecosystems and the evolutionary history of different groups of animals. Invertebrate trace fossils in continental sequences are as diverse, abundant and complex as those found in marine settings, however they have been ignored in most publications on ichnology up to the recent years. Important papers dealing with trace fossils produced under subaquatic conditions, in continental bodies of water, have been incorporated to the theoretical framework of ichnology since the 70s, whereas, trace fossils (mostly of insects) produced in terrestrial environments (paleosols) and their paleoecological significance have been sistematically studied since the 80s. Insect trace fossils produced in hard substrates as petrified plant remains were considered since the 90s. In the last years, continental ichnologists have been producing a large amount of information, which in part does not map onto some of the traditional concepts, principles and classifications of ichnology, mostly based upon marine traces. Some of the ichnological principles, as well as, ethological, ichnofacial, and morphological classifications of traces, among others, need a sound discussion and revision under the light of the new continental information. For instance, two ichnological principles state that the same individual or species can produce different traces when displaying different behaviors and conversely, that different trace-makers may produce identical structures when behaving similarly. These principles, very useful for many simple traces produced under subaquatic conditions, conduced to the belief that trace fossils cannot be attributed to any particular taxa. Thus, reducing the usefulness of this discipline for reconstructing the evolutionary history of organisms. In contrast, insect complex nests pose the opposite situation, they are commonly used as taxonomic characters as useful as morphological features. Consequently, insect fossil nests that share important architectonic characters with extant ones can be attributed to the

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trace-makers. If not, it will be necessary to appeal to a more highly improbable hypothesis: the existence of a taxon of extinct trace-makers, unknown from the body-fossil record and behaviorally convergent with an extant group of insects. In other words, the same nest is always produced by the same taxon of insects and vice versa, which would result in a new ichnological principle. Some traditional classifications of trace fossils also require new categories to place insect nests. The ethological classification was recently modified to incorporate a new category, calichnia, to include trace fossils produced by adults constructing structures for the development their offspring, the basic pattern of insect nests. The morphological classification recognizes impressions, burrows and borings as the major groups of traces. It lacks a category to include constructions, which are the most common insect trace fossils. Finally, one of the most paradigmatic models in ichnology, the ichnofacial model, which was developed for the marine realm, includes all the continental trace-fossil associations in a single ichnofacies, which more recently was divided in two distinct ones. It is not until this year that a new model is proposed in which are considered the different associations of insect trace fossils in paleosols. These examples are not the only ones. Until recent years insect trace fossils were considered to be "in the distant edges of ichnology", however, with the new information that is published day after day they are moving fast to the center of the ichnological scenario.

TRAZAS FÓSILES DE ARTRÓPODOS EN EL URUGUAY.

Arthropoda fossil tracks in Uruguay.

M. VERDE.[1]

El registro fósil icnológico del Uruguay es muy rico en lo que se refiere a trazas de invertebrados, tanto en icnodiversidad como en la distribución de los materiales en rocas de diversas edades que abarcan casi toda la columna que representa el Fanerozoico y parte del Precámbrico Tardío. Las trazas fósiles reconocidas fehacientemente como producidas por artrópodos en este país tienen un registro bastante más restringido. De los depósitos paleozoicos sólo se conocen hasta el momento citas puntuales sobre materiales fragmentarios de *Cruziana* isp. en la Fm. Cordobés (Devónico), y *Cruziana problematica* en la Fm. San Gregorio (Pérmico Inf.).

No se han encontrado hasta el momento trazas fósiles de artrópodos en unidades de Edad Mesozoica en Uruguay.

Los nidos fósiles de insectos son por lejos las trazas de artópodos más diversas y abundantes en el registro fósil uruguayo. Ellas están presentes en rocas de edades comprendidas entre el Cretácico Terminal-Paleoceno y Pleistoceno Superior. Los paleosuelos de Edad Paleocena formados sobre las Formaciones Mercedes y Asencio (ambas de Edad Cretácica) poseen abundantes nidos fósiles de insectos. Los paleosuelos calcáreos que se apoyan sobre la Fm. Mercedes poseen una asociación de trazas integrada por *Celliforma* ispp., nidos de abejas y capullos indeterminados. Más ricos aún son los paleosuelos generados sobre la Fm. Asencio, en los cuales se han hallado los icnogéneros *Coprinishpaera*, *Martinezichnus*, *Madinaichnus*, *Teisseirei*, *Uruguay*, *Rebuffoichnus*, *Fontanai*, *Celliforma*, *Microicoichnus*, *Monesichnus*, *Palmiraichnus*, *Elipsoideichnus*, nidos de halíctidos y termiteros tipo *Krausichnus*. Estas asociaciones corresponden a escarabajos coprófagos e himenópteros habitantes de espacios abiertos o con poca vegetación arbórea tales como las praderas.

El Oligoceno, representado en Uruguay por la Fm. Fray Bentos posee asociaciones de *Celliforma* y capullos indeterminados. Otros registros para esta formación posiblemente correspondan a ?*Monesichnus*.

Las trazas fósiles de insectos también se encuentran en dos formaciones de Edad Pleistocena Superior, la Fm. Dolores y la Fm. Sopas. En la primera se han hallado restos de madera de depósitos fluviales, posiblemente *Prosopis* sp., con indicios de actividad de larvas de

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coleópteros xilófagos. En la segunda son muy frecuentes los paleosuelos con *Coprinisphaera*.

Por otra parte, los depósitos marinos de Edad Mioceno Medio-Superior, correspondientes a la Fm. Camacho poseen abundantes trazas de crustáceos anomuros tales como *Ophiomorpha nodosa* y *Thalassinoides* isp.

A modo de conclusión, puede decirse que las trazas de insectos son las más diversas y abundantes numéricamente en Uruguay, estando su registro confinado al Terciario y Cuaternario. Otras trazas de artrópodos son menos diversas y de abundacia numérica menor.

INSECT FOSSIL NESTS

J. F. GENISE [1]

The diversity and abundance of insect fossil nests in paleosols and their importance in sedimentologic and paleontological studies is a consequence (direct or indirect) of the complex nesting behavior of these invertebrates. Insects are capable of nesting successfully in the most sterile substrates. This colonizing capacity turns the insect fossil nests into one of the best indicators of the presence of paleosols, even in their primary stages of development. In addition, the great diversification of insects was accompanied, in many groups, by an equivalent diverseness of behaviors and thus, of traces. Apart from the colonizing capacity and diversification of behavior, which are facts that can explain *per se* the diversity and abundance of insect fossil nests in paleosols, their condition of nests is also fundamental to explain their abundance, diversity and also, their importance in sedimentologic and paleontological studies. Insect nests are structures excavated and/or constructed by the adults for breeding their larvae, which in many cases are more or less immobile, and confined to chambers that are provisioned with different kinds of organic matter, such as pollen, nectar, dung, other insects or plant material. Excessive moisture produces the decay of provisions, which are commonly attacked by fungi, whereas insufficient moisture produces the dehydration of larvae, which are not protected by a water-resistant cuticle like adults. Consequently, insect nests and their chambers should be located at very specific sites to allow the successful development of larvae. On a species scale, the location depends on the distribution of the trace maker, which in turn is a response to climate and vegetation. This relationship has been exploited successfully to obtain paleoclimatic, paleogeographic and paleoecologic inferences from insect fossil nests. On an individual scale, each adult selects where to construct nests and chambers based upon soil texture and moisture, plant cover and other parameters, and this fact has been recently used to draw paleopedologic inferences. In addition, the requirement of oxygen and controlled moisture inside cells restrict nests to well aerated sediments and thus, fossil insect nests are good indicators of the subaerial exposure of the deposits bearing them. Other mechanism that insects utilize to protect their larvae and provisions is the construction of walls or linings in their nests.

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Consequences of this fact are also very important: the macro and micromorphology of these constructions are as "fingerprints", which allows the precise identification of the trace makers. The possibility of attributing these traces to particular taxa, is in turn, the responsible of the important paleoentomological significance that the insect fossil nests have acquired recently. They can complete and extend backwards the fossil record of insects, which is mostly based on body fossils. They have a higher preservational potential than the soft-bodied larvae that they protect and in contrast to insects themselves, they are mostly preserved in situ. The use of different kinds of organic matter (secretions, fecal pellets, plant material) to construct walls and linings give to the insect fossil nests this high preservational potential. Nests are stronger and more resistant than the surrounding soil, and the decay of organic matter provides a suitable geochemical environment for the concentration of salts and oxyhydrates, which increase their consolidation and preservation. This fact explains the preferential abundance of nests of bees, dung-beetles and termites in paleosols. These nests are not merely excavated, but constructed, at least in part. Fossil bee nests are included in the ichnogenera *Celliforma*, *Uruguay*, *Rosellichnus, Ellipsoideichnus, Palmiraichnus* and two new ones. Fossil brood masses of dung-beetles belong to the ichnogenera *Coprinisphaera, Fontanai, Monesichnus, Scaphichnium* and *Eatonichnus*. Fossil termite nests are included in *Termitichnus, Fleaglellius, Vondrichnus, Krausichnus, Archeoentomichnus* and *Tacuruichnus*. Fossil ant nests belong to *Attaichnus* and *Parowanichnus*. There are still other ichnotaxa which represent different insect fossil nests, among others: *Celliforma favosites* is a polistine comb, *Masrichnus isawii* is possibly a wasp underground nest and *Chubutolithes gaimanensis* a mud nest of a pompilid wasp.

THE EVOLUTIONARY HISTORY OF SWEAT BEES (HYMENOPTERA: HALICTIDAE): INTEGRATION OF PALEOENTOMOLOGY, PALEOICHNOLOGY, AND PHYLOGENY

J. F. GENISE [1]
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Only exceptionally, paleoentomological papers reviewing the fossil record of different groups of insects consider paleoichnological evidence. However, the paleoichnological record of those insects having more preservable and distinct nests, such as bees, termites, and dung-beetles is at least as important as the record of their body fossils. For example, two of the three oldest evidences of bees are nests and the record of bees from the Southern Hemisphere, where no bodies fossils are presently known, is based exclusively on brood cells and nests. In this context, the Halictinae (sweat bees) has a relatively more complete fossil record, based both on bodies and traces, than most other non-apine bees. Moreover, the range of social behavior exhibited by halictine bees has encouraged important studies of the evolution of nest architecture, thereby providing a sound basis for the integration of trace fossils, as physical evidence for behavioral evolution, into a phylogenetic scenario. Classical studies consider that the most primitive type of nest for the subfamily is that having non-clustered cells connected to the main burrow by means of well-developed lateral tunnels. However, the oldest evidences for these bees are two nests from the Late Cenomanian of U.S.A. and from the Campanian-Maastrichtian of Argentina respectively, which can be attributed to the Halictina and show derived features, such as cells connected to the burrow by means of short necks or laterals. This evidence suggests that either these are the most primitive type of nests for the subfamily or that by the Cenomanian some halictines had already acquired derived nest architectural features and also implying that the subfamily is potentially much older. Fossil Halictini are known only from the Eocene-Oligocene of USA and in Eocene Baltic amber and thus the fossil nests are the only data to assess the presence of this tribe, since the Late Cretaceous, in the Southern Hemisphere. Similarly, in the Paleocene the only evidence for the subfamily comes from fossil brood cells that, in one instance, can be attributed to the Augochlorini and in the other possibly to the Agapostemonini. Phylogenetic analysis shows that cell clusters are the most primitive nest construction for Augochlorini and paleoichnological evidence supports the conclusion that they were already present in the Paleocene of South America, the region where this tribe likely

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originated and where it is today most diverse. In contrast, body fossils of Augochlorini are known only from the Oligocene-Miocene of Central America. There are no body fossils of the Agapostemonini while no trace fossils exist for Caenohalictini (although one body fossil of a caenohalictine is known from Miocene amber of the West Indies). Since the Oligocene, evidence of fossil sweat bee brood cells and bodies are more frequent, being recorded from Oligocene and Miocene deposits of North America, Europe and Africa where traces constitute the only evidence for this subfamily, and body fossils (both compression and amber inclusions) from the Dominican Republic, North America, and Europe. This review shows that considering only the body fossil record, our knowledge of the geological history of sweat bees would be restricted to post-Paleocene data coming exclusively from a few localities in the Northern Hemisphere; whereas the integration of fossil nests and brood cells significantly improves our understanding: they provide the oldest known records for the group, the only records from the Southern Hemisphere, and they help to assign minimum ages to important behavioral innovations acquired by this subfamily along its long evolutionary history as indicated by phylogenetic analyses.

POSSIBLE CHIRONOMID CASES (INSECTA: DIPTERA) FROM THE MIDDLE TRIASSIC LOS RASTROS FORMATION (ISCHIGUALASTO-VILLA UNION BASIN), WESTERN ARGENTINA

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It is reported herein the occurrence of possible chironomid cases from the Middle Triassic Los Rastros Formation (Ischigualasto-Villa Unión Basin), Western Argentina. These trace fossils are cylindrical to oval-shaped structures, preserved as convex epichnia, somewhat depressed in cross-section, tapering or rounded at both ends and ranging from 1.4 cm to 1.7 cm in length and from 0.4 cm to 0.6 cm in diameter. In some cases, these individual traces are extended to form short tubes up to 8.5 cm in length, which may join with others to give a branched structure. Cases lay horizontally in different directions. They are associated with ripple marks and other trace fossils, such as *Helminthopsis* isp.. Sedimentological evidence indicates that the Los Rastros Formation was mostly deposited in a shallow lacustrine delta. Structures like those described herein are commonly constructed with mud and salivary secretions by benthic larvae of Trichoptera and Chironomidae (Diptera). However the former has been ruled out since the representatives of this order that live in lentic habitats, spin cases of very different shape to those described herein and never extend them. Chironomidae is one of the most widespread and diverse families of Diptera. Its members live in a wide variety of fresh-water, marine and terrestrial settings, from Antarctica to the Arctic. Most chironomid larvae are detritivorous and inhabit continental lentic and lotic bodies of water as free-living organisms or as benthic forms inside burrows or cases. The extension of the fossil cases recorded herein is similar to that exhibited by the larvae of the tribe Tanytarsini and is related to the feeding activities, the larvae keep enlarging the tubes while feeding on the bottom. With increasing densities of larvae, individual tubes coalesce to form branched patterns as those recorded herein. These enlarged and coalescent tubes are common in shallow and poorly oxygenated bodies of water. Accordingly, the distribution and orientation of these fossil cases are random, suggesting that they were built in stagnant water. .Being the chironomids good indicators of oxygenation, salinity, acidity and temperature of water, further observations on these fossil cases will yield more precise information on the paleoenvironmental conditions of the Los Rastros Formation. The oldest body fossils of chironomids came from the Cretaceous of North America and

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Asia. In addition, possible chironomid fossil burrows were recorded from the Jurassic of Siberia and from the Tertiary of Spain. The morphology of these fossil burrows includes straight, short, meniscate burrows and U-shaped structures from different environments. Ichnologically the chironomid burrows are frequently mentioned as one of the most common traces in fresh-water environments. In contrast, chironomid fossil cases have been recorded only once, until now, from the Pleistocene of France. Phylogenetic analyses indicate that the most primitive Chironomidae would have inhabited cool water springs and streams in mountain ranges covered by temperate forests. The occurrence of cases in the Los Rastros Formation suggests that either the primitive Chironomidae lived under the conditions described herein or that the family arose before the Middle Triassic.

ICNOFÓSSEIS DA FORMAÇÃO RIO DO SUL (GRUPO ITARARÉ, BACIA DO PARANÁ) NA PEDREIRA ITAÚ E ITAUNA, SANTA CATARINA, BRASIL

Ichnofossils from Rio do Sul Formation (Itararé Group, Parana Basin) in the Itaú and Itauna quarry, Santa Catarina State, Brasil.

M. S. NOGUEIRA[1]
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A Pedreira Itaú e Itauna está localizada no quilômetro 161 da estrada BR 470 (bairro Bracatinga), município de Trombudo Central, Estado de Santa Catarina. Sua extensão é de, aproximadamente, 3850 m^2, de onde são extraídas lajes para as mais diversas utilidades, tais como pisos, pedras de alicerce e brita, entre outras. A área é muito rica em bioturbações, preservadas no topo e base das lajes, cuja granulometria varia de argila até areia fina, ocorrendo de forma cíclica. A análise da icnofauna presente nestas rochas sedimentares permitiu reconhecer a ocorrência dos icnogêneros *Umfolozia*, *Diplichnites*, *Rusophycus*, *Kouphicnium*, *Diplopodichnus*, *Helminthoidichnites* e *Cruziana*, este último menos freqüente em de cada nível deposicional, além de traços de repouso sem identificação icnotaxonômica. À exceção de *Diplopodichnus* e *Helminthoidichnites*, que são atribuídos à atividade de pastagem de organismos, os demais icnogêneros caracterizam estruturas de locomoção e descanso geradas pela atividade de artrópodes. As estruturas registradas são diminutas e as morfologias não apresentam grande variação lateral e/ou vertical ao longo dos quase 20 metros de perfil, permitindo reconhecer duas suítes principais: uma dominada por pistas/escavações superficiais de artrópodes de hábito predominantemente *Repichnia*, e outra dominada por *Helminthoidichnites*, de hábito *Pascichnia*. A suíte de traços fósseis e sua inserção na sucessão sedimentar permitem reconhecer a ocorrência de intercalações de suítes de ambientes mais restritos com suítes de ambiente marinho. Ambas as suítes são representadas por traços de deslocamento produzidos por artrópodes aquáticos. A sucessão sedimentar ao longo da pedreira, permite verificar a ação de correntes trativas, demonstrando a atuação de marés neste ambiente representada por pacotes cíclicos de pouca espessura.

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A PRESENÇA DE *Cruziana* NOS SEDIMENTOS DA FORMAÇÃO RIO DO SUL (GRUPO ITARARÉ, BACIA DO PARANÁ) NA PREDREIRA ITAÚ E ITAUNA, SANTA CATARINA, BRASIL

The Cruziana presence in the Rio do Sul Formation sediments (Itararé Group, Parana Basin) in the Itaú and Itauna quarry, Santa Catarina State, Brasil.

M. S. NOGUEIRA[1]
R. G. NETTO[2]

De todos os icnogêneros apresentados no levantamento do perfil na Pedreira Itaú e Itauna, o icnogênero *Cruziana* mostrou-se de ocorrência praticamente constante em toda a extensão do perfil. As estruturas registradas como *Cruziana* apresentam tamanho bastante reduzidos neste local. De um modo geral, podem ser descritos como sendo estruturas muito bem definidas nos sedimentos, podendo, entretanto, serem obliteradas, em alguns trechos, pelo próprio sedimento hospedeiro. A largura da escavação oscila entre 1-2 mm, apresentando sulco central bem marcado, que separa dois lobos com estrias transverso-oblíquas traçadas por segmentos bisseriais, onde a cada milímetro se observa dois pares de segmentos. Os padrões das escavações indicam que as formas de *Cruziana* refletem deslocamento do animal produtor de um ponto para outro, podendo-se observar em alguns pontos de confluência, com maior densidade de estruturas. A análise do conjunto da icnofauna e dos sedimentos estudados permite avaliar que os produtores de *Cruziana* foram os primeiros organismos a ocupar os substratos que os contêm, ocorrendo, de um modo geral, associados a *Diplichnites* e *Umfolozia*.

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ESCAVAÇÕES DE CRUSTÁCEOS NA LAGOA DO PEIXE, RS: UM POSSÍVEL ANÁLOGO MODERNO PARA A ICNOFÁCIES *Psilonichnus.*

Crustaceous excavation in Lagoa do Peixe, RS: a possible modern analogous for the Psilonichnus ichnofacies.

M. E. GRANGEIRO[1]
R. G. NETTO[2]

A icnofácies *Psilonichnus* caracteriza as escavações realizadas por crustáceos decápodos em depósitos arenosos inconsolidados da zona de ***backshore***. Demarcando o limite entre o ambiente marinho e o terrestre, as escavações formam galerias em forma de "Y " e, subordinadamente, em forma de "J " ou "U", com paredes delineadas por lama e cimentadas por muco. Seu principal representante é o icnogênero *Psilonichnus*, produzido por caranguejos escavadores de zonas marginais, acima do limite da maré alta. Entretanto, pistas epiestratais de outros grupos de artrópodos, além de escavações, pistas, pegadas e trilhas de vertebrados podem estar presentes. Apesar de ser melhor evidenciada em depósitos quaternários, possui registro mais antigo, datando do Jurássico inferior. Galerias em J e em Y são observadas nas margens da Lagoa do Peixe (Mostardas, RS) e correspondem a escavações de crustáceos decápodes *(Chalinectes* sp. e *Uca* sp.), reunidos em populações de alto número de indivíduos, estabelecidas nos substratos arenosos marginais. A similaridade do padrão de estruturas orgânicas registradas junto à Lagoa do Peixe e as condições ambientais favoráveis permitem estabelecer uma comparação entre o contexto neoicnológico da Lagoa e o da Icnofácies *Psilonichnus*, favorecendo a análise do primeiro como modelo análogo do segundo. A Lagoa do Peixe apresenta-se, pois, como um importante laboratório para ensaios *in situ* e, dentro desta perspectiva, avalia-se que a análise do conjunto de fatores físico-químicos atuantes no meio e dos parâmetros condicionantes da distribuição orgânica atual serão importantes ferramentas para ampliar a compreensão do contexto da Icnofácies *Psilonichnus*, ainda pouco estudada.

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ABSTRACTS

TERMITIC ACTIVITY AND EVOLUTION OF TROPICAL SOILS. CASE STUDY AROUND SOIL PROFILES UNDER BASIC ROCKS IN SÃO PAULO STATE. (auxílio FAPESP).

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Termites are social insects from the Isoptera order which have existed since Early Cretaceous and dominate tropical soil fauna component in terms of diversity, density and biomass. Analyzing size, density and diversity of termite mounds it is not difficult to surmise that many areas of tropical land have reworked soil at the thousand years ago which promoted considerable alteration of textural, chemical, mineralogical, organic and stratigraphic soil properties. Particularly, in the old "lateritic caps" landscapes, which cover a large extension in tropical lands, cumulative effects should be taken into account. A termite compilation pointed out approximately 290 living species, distributed into 4 families and 68 genera. we observed that 34 genera of those present a direct relationship with soil, as substrate for nest building, as food source or both. Their principal effects on soils are caused by building behavior related with burrowing channels and chambers and building nests (epigeic, endogeic, arboreal or stumps). For building behavior the methods adopted by a wide variety of termites are similar and very efficient. Termite workers are single responsible for this activity and the tools are: their mandibles (strongly quitinized) able to dilacerate and comminute wood and soil material and the hypopharynx and cibarium used to mould pasty material and regurgitated as a pasty roll or pellet, on shapes ovoidal or cylindrical, range of 0.2 to 2mm in diameter and 0.2 to 3mm in length. These pellets are elementar building units. Several places in São Paulo State, under basic rocks (basalts, diabases) covers (weathering and oxisols profiles) were investigated in order to recognize and to describe pedological features and structures which indicate a termitofauna action as soil evolution agents (actual or past). In the field investigation were done in profiles on the top or in the intermediate downhill (absence of colluvium). In the lab were used steromicroscope and SEM (scanning electron microscope) observations. The mainly structures recognized in all profiles were:Abandoned endogeic nests along soil profiles (1,5 to 2 m depth);Intense microagreggation (on esferoidal and elipsoidal shapes, ranging from 10 to 800m in length and 10 to 600m width) trough soil profiles (Bw horizons) and inside discontinuites and plates on weathering rocks; Dense (2 to 3 /cm^2) circular pedotubules (from 0,2 to 1mm in diameter), circular to ellipsoidal chambers (from 0,5 to 2,5 cm

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in diameter), open or infililling as dense or loose, complete with ovoidal, esferoidal, fragmental or bacillo-cilinder pellets. Living endogeic termite activity on soil rock limit associated with ovoidal pellets.All profiles investigated shown a large presence of typical termitic structures and features that confirms the main role of soil termitofauna to the evolution and interactions rock-soil formation. Many authors showed this role to soil formation process at least since Holocene periods (confirmed by radiocarbon data), associated with paleoclimatic changes (dry-wet periods) and by the role of soil artropodofauna (termites, ants, earthworms).

ABSTRACTS

Thalassinoides-Ophiomorpha: OPPORTUNISTIC ICHNOFAUNAS AND THEIR SIGNIFICANCE IN THE RIO BONITO AND PALERMO FORMATION FROM THE PARANÁ STATE, PERMIAN OF THE PARANÁ BASIN

F. M. W. TOGNOLI [1,2]
R. G. NETTO [3]

Ophiomorpha and *Thalassinoides* result of the action of crustacean trace makers related to Callianassidae and Thalassinidae families (Crustacea, Decapoda), being very common in the sedimentary record. The Rio Bonito and Palermo formations are constituted by several types of rocks like argilite, shale, siltstone, sandstone, limestone and conglomerates, generated by different processes acting in continental, transitional and marine environments. The ecologic parameters of these environments control the distribution of the excavators (trace makers) and, consequently, the products of this activity. Thus, callianassids and thalassinids occupy the zone between foreshore and upper offshore and their record are structures like *Ophiomorpha* and *Thalassinoides*. The occurrence of *Thalassinoides* as an opportunistic ichnofauna is limited in siltous deposits of the Rio Bonito formation and is characterized by horizontal rounded features without lined walls and either sandy or carbonatic fill. It marks the *Glossifungites* ichnofacies and represents a depositional hiatus among sedimentary events due a regression. *Ophiomorpha* records two distinct situations as opportunistic ichnofauna. In both cases it shows a built wall cemented with mucus, whose function is sustain the structure. This built wall indicates the high energy of the environment where it was generated. In *Glossifungites* ichnofacies, *Ophiomorpha* occurs crossing bioturbated heterolitic deposits containing horizontal laminations and ichnofabrics of *Skolithos*, *Asterosoma, Paleophycus, Planolites, Teichichnus* and *Chondrites*. *Ophiomorpha* has maximal diameter of 2,5 centimeters and are considered of typically opportunistic colonization. In this case, the presence of *Ophiomorpha* indicates a fast regression where the deposits of shoreface were exumed and recolonized firstly by opportunist organisms in foreshore-upper shoreface context. Another occurrence of *Ophiomorpha* is in well sorted quartz sandy cycles in the top of Palermo formation, over the maximum flooding surface. It is associated with elements of *Skolithos* ichnofacies like *Skolithos*, *Planolites, Teichichnus* and rare *Chondrites*, being the medium diameter of 0,5 centimeter. The environment interpreted is lower shoreface with frequent occurrences of storm deposits with hummocky cross stratifications, where predominates the ichnofabric of *Ophiomorpha* and *Skolithos*. The oppotunist ichnofauna in the Rio Bonito and Palermo formations install after drastic environment changes, usually regressions and storms, either in marine conditions (*Skolithos* ichnofacies) or colonizing firmgrounds (*Glossifungites* ichnofacies).

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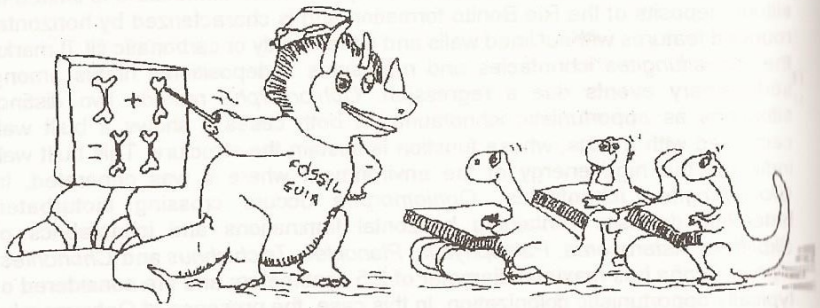
MUSEUM AND LABORATORY COLLECTION TEACHING PRACTICE FOSSIL COMMERCE



R. G. Martins-Neto Courtesy

"... the fossiliferous deposits belong to the nation..."

from the Decreto-Lei 4146, 1942

Getulio Vargas

NEW RECONSTRUCTIONS OF SELECTED LATE PALAEOZOIC ARTHROPODS (PTERYGOTE INSECTS, ARACHNIDS AND Arthropleura)

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C. BRAUCKMANN[1]

During the last years the knowledge of the exact morphology of some well preserved fossil palaeozoic arthropods is grown to such a level that it is possible to draw well based reconstructions of the living habitus of these special species. We have started a project of this matter with the aim to offer reconstructions of these animals which can be used for example for popular scientific books as well as for exhibitions in museums.

The steps for this special work are as follows:

1. Gaining and compilation of all data of the species in question: measurements, proportions, knowledge of their palecology, locomotion (and flight in pterygote insects), nutrition, sexual behaviour etc.
2. Preparing experimental sketches of the specimen in different views.
3. For the final drawing it is necessary to have a look at the closest related recent taxa to decide the final posture of the fossil specimen, the shadows, the environment and to choose the most appropriate colour.

The presented selected arthropods are listed here as follows:

1. Insecta: Palaeodictyoptera: *Homoioptera vorhallensis* BRAUCKMANN & KOCH, 1982 (Namurian B; Germany); *Delitzschala bitterfeldensis* BRAUCKMANN & SCHNEIDER, 1996 (one of the oldest known pterygote insects, uppermost Lower Carboniferous; Germany);
2. Insecta: Odonatoptera: *Namurotypus sippeli* BRAUCKMANN & ZESSIN, 1989 (Namurian B; Germany); *Erasipteroides valentini* (BRAUCKMANN, 1985) (Namurian B; Germany);
3. Arachnida: Uropygi: *Geralinura naufraga* (BRAUCKMANN & KOCH, 1983) (Namurian B; Germany);
4. Arachnida: Ricinulei: *Curculionides adompha* BRAUCKMANN, 1987 (Namurian B; Germany);
5. *Arthropleura* JORDAN, 1854 (the greatest known terrestrial arthropod genus; late Carboniferous).

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COLEÇÕES DE ARTRÓPODES DO LABORATÓRIO DE PALEONTOLOGIA DA UNIVERSIDADE FEDERAL DE OURO PRETO

Arthopod Collections from the Laboratory of Paleontology of the Ouro Preto Federal University

M. P. DELÍCIO[1]
M. ANDRADE-MORRAYE[2]
M. R. MAGALHÃES[1,3]

O Laboratório de Paleontologia da Universidade Federal de Ouro Preto conta com um acervo diverso e numeroso de fósseis de artrópodes, que vem sendo colecionados durante os vários anos de existência da Escola de Minas e cuja coleção têm sido essencialmente utilizada durante as aulas práticas do curso de Paleontologia. Os fósseis de artrópodes pertencem a diversas eras e períodos. Do Paleozóico existem na coleção fósseis de Trilobita tais como *Burmeisteria* sp, *Mecochirus engincinus* (Solnhofen), *Phacops* sp.(Devoniano, EUA), *Phacops latiformis* (Devoniano, Gerolstein Eifel), *Phacops brasiliensis* Clark (Devoniano, Rio Urubu-Amazonas), *Phacops feocundus* (Siluriano Superior, Bohemia), *Calymene blumenbachi* (Siluriano Superior,Dudley) *Calymene diademata* (Siluriano Superior,Bohemia), *Calymene blemembachi*, *Calymene aragoi* (Siluriano,Dudley); *Calymene blumembachi* (Devoniano Médio, Eifel); *Proetus cuvieri* (Siluriano Superior, Dudley); *Proetus latifrons* (Carbonífero, Dinatien), *Phillipsia pygidium* (Carbonífero,Tournay-Bélgica), *Phillipsia gemmulifera* (Ordoviciano) *Schiste* a *Asaphus* (Ordoviciano); *Schiste* e *Calymene* (Devoniano, Fm. Ponta Grossa-Paraná); *Dalmanites accola* Clark (Siluriano Superior, Bohemia); *Dalmanites socialis* (Devoniano, Fm Ponta Grossa-Paraná); *Dalmanites accola* (Devoniano, Fm. Ponta Grossa-Paraná); *Homolonotus noticus* Clark (Siluriano, May, Calvados e Devoniano, Fm. Ponta Grossa-Paraná); *Homolonotus brogniarti* (Devoniano, Fm. Ponta Grossa-Paraná), *Calmonia signifer* Clark (Devoniano, Fm. Ponta Grossa-Paraná); *Calmonia signifer*; *Cryphoeus australis*, Devoniano, Fm. Ponta Grossa-Paraná) *Cryphoeus australis* Clark (Devoniano, Fm. Ponta Grossa-Paraná), *C. hirsuta* (Siluriano Inferior, Bohemia); *Ellipsocephalus hofi* (Siluriano Inferior, Bohemia); *Encrinurus punctatus* (Siluriano Superior, Dudley); *Asaphus nobilis* (Ordoviciano), *Harpes venulosos* (Siluriano Superior, Bohemia), *Illeanus giganteus* (Siluriano Médio, Angers); *Arethusina konincki* (Siluriano Superior, Bohemia); *Paradoxides bohemicus* (Cambriano Médio; Bohemia), alguns exemplares do Devoniano do Marrocos, várias concreções da Bolívia e outras estruturas como pigídio e região cefálica (Siluriano). Entre os Insecta, a coleção conta com representantes de Odonata (Cretáceo), Blattoptera e Ensifera (Chapada do Araripe, Fm. Santana - Membro Crato). Ocorrem

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também Conchostraca (Cretáceo, Bacia do Araripe e do G. Bauru, Bacia do Paraná), apêndice articulado de crustáceo (Cretáceo). Miriapoda (sem cronologia) e ainda *Balanus tintinnabulum* (Plioceno, Vsalle d'Angorra) e *Balanus* sp. (Senoniano), *Mecochirus engincinus* (Solnhofen, Alemanha).

COLEÇÕES DE ARTRÓPODES DO MUSEU DE PALEONTOLOGIA DA UNIVERSIDADE FEDERAL DE SÃO CARLOS

Arthropod collections from the Museum of Paleontology of the São Carlos Federal University

M. ANDRADE-MORRAYE[1]
K. MOKROSS[2]
C. R. SOUZA e SILVA[2]
A. L. S. ALBUQUERQUE[2]

O museu de Paleontologia da Universidade Federal de São Carlos vem sendo reestruturado nos últimos anos, com o intuito de auxiliar no ensino das ciências naturais como a biologia e a geologia, e permitir um entendimento tanto da evolução da história da Terra como da evolução dos organismos nas diferentes Eras Geológicas. Essa reestruturação vem acontecendo no sentido de ampliar a coleção de fósseis e elaborar um espaço adequado para visitação. Atualmente a coleção é composta por 80 fósseis de invertebrados, 59 fósseis de peixes, 81 fósseis de mamíferos, 217 fósseis de répteis e 10 fósseis de vegetais.

Dentre os Arthropoda destacam-se vários fósseis de Crustacea do Permiano, dentre eles *Clarkekaris* (Fm. Irati), *Pygaspis* (Fm. Irati/Fm. Corumbataí) *Liocaris* (Fm. Irati). Os principais fósseis de Insecta são exemplares de Ephemeroptera e Auchenorrhyncha (Chapada do Araripe, Fm. Santana - Membro Crato).

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O MUSEU DE HISTÓRIA NATURAL DA UNIVALE

The UNIVALE Museum of Natural Hystory

M. MENDES[1,2]
A. M.FERNANDES[3]

O Museu de História Natural da UNIVALE foi criado a quatro anos a partir de uma doação de uma coleção particular. O seu acervo consta a história principalmente da fauna regional, mantidos através de várias técnicas de conservação.

Um dos ambientes do Museu encontra-se a coleção paleontológica onde destaca-se o acervo paleoentomológico das bacias do Araripe e de Fonseca. Integrado ao Museu a Coleção de Tipos é aberta somente a pesquisadores cadastrados.

A permuta do material em duplicata com outros Museus é uma prática comum que vem sendo utilizado divulgando, assim, a fauna endêmica.

A coleção é visitada por alunos de todos os níveis, que são acompanhados sempre por um monitor. Também a pesquisa (Graduação e Pós-Graduação) está presente na rotina do Museu, contando com apoio de instituição de fomento (FAPEMIG).

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THE EMERGENT CENPÁLEO FOSSIL COLLECTION

O. RÖSLER[1]
C. A. NEHLS[1]

CENPÁLEO is a new Paleontological Center born in April of 1997 as part of the Contestado University in Mafra, Santa Catarina state, southern Brazil. Now its headquarters are situated not only in Mafra, but also in Rio Negro in the state of Parana. These cities are surrounded by hundreds of paleontological sites, many of them among the most important records of the west Gondwana Siluro-Devonian to Permo-Triassic biological and environmental succession. Thus, the CENPÁLEO main research line deals with this succession, which is also reflected in its fossil collection as well as in its museum (Museu da Terra e da Vida).

As an emergent institution the CENPÁLEO fossil collection is not yet a large one but new specimens are very quickly coming in. The best represented groups are the permo-carboniferous palaeoniscid fishes, ichnofossils, and marine invertebrates, as well as Permian plants of different groups of the *Glossopteris* flora.

So far conchostracans and insects are the few fossil arthropods in this collection, but research projects under way are going to increase it in number and variety.

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NOVAS ESTRATÉGIAS DE ENSINO EM PALEONTOLOGIA: O USO DO CD ROM "TÓPICOS EM PALEONTOLOGIA".

New teaching strategy in Paleontology: the use of the CD ROM "Topics on Paleontology"

V. M. GODOI [1 2]
R. G. MARTINS-NETO[1]

Apesar da maior flexibilidade dos currículos trazida pela LDB o ensino de Paleontologia no que se refere ao Ensino Médio e Fundamental ainda se apresenta deficiente. Os principais problemas se encontram no material didático utilizado como suporte pelos professores e na má formação dos profissionais do ensino.

Uma análise dos livros de Ciências e Biologia recomendados pelo MEC e voltados para o Ensino Fundamental e Médio encontramos deficiências, e não só quanto ao ensino de Paleontologia. Faltando assim uma cisão sistemática e abordagem epistemológica, tornando o conhecimento científico descritivo, árido e desarticulado, contendo somente os exemplos mais clássicos, e sem qualquer citação sobre o patrimônio fossilífero nacional.

Atualmente a gama de informação disponível nos mais diversos campos tornou-se tão vasta, que nem mesmo um especialista na sua área possui o domínio completo. O que aliado a falta de formação profissional adequada resulta na abordagem deste assunto muitas vezes como curiosidades sem o aprofundamento necessário para a correta compreensão do tema.

É correto afirmar que o ensino de paleontologia nem sempre é uma tarefa fácil, uma vez que o assunto abordado não é palpável para a maioria dos alunos, quer seja pela escala de tempo ou pela falta de materiais nacionais que demonstrem isso de maneira prática e com exemplos nacionais. Foi pensando nestas dificuldades que os pesquisadores do Laboratório de Paleontologia da Faculdade de Filosofia Ciências e Letras de Ribeirão Preto USP, decidiram transformar uma apostila de Paleontologia em um CD ROM.

A escolha do CD ROM é devida às inúmeras potencialidades de exploração que este tipo de mídia se apresenta, uma vez que além dos textos escritos, fotos e desenhos, como em um livro, este recurso ainda oferece a possibilidade da inserção de filmes, trilhas de áudio e "slide show", tornando assim a apresentação do seu conteúdo mais dinâmica e atrativa tanto para alunos do ensino superior quanto para alunos do ensino básico ou fundamental.

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Este CD ROM demonstrou ser uma grande ferramenta pois além auxiliar o aluno no entendimento e na visualização dos diversos tópicos da Paleontologia, é a única obra do gênero que aborda exemplos nacionais com fotos de afloramentos e museus de todo o Brasil bem como uma vasta bibliografia, a qual nem sempre é encontrada em outras obras do gênero.

Uma vez colocado a prova o CD ROM demonstrou ter toda a versatilidade em classe como previsto inicialmente. Estudantes da graduação o utilizam como fonte de referências durante as aulas e verificamos que mesmo aqueles alunos que não possuem base para a compreensão do conteúdo (como alunos do ensino básico ou fundamental) acabam utilizando-o devido a sua interface gráfica de fácil visualização.

O TEMPO, O REGISTRO E O LEC: UMA SOLICITAÇÃO DA CRIANÇA.

The time, the record and LEC: a solicitation of the child.

I. M. MORA [1]
V. M. GODOI [2]
M. R. BARBIERI [1]

O Laboratório de Ensino de Ciências (LEC) tem como principal atividade a formação de professores na área de ciências e biologia, incluindo a formação continuada de professores da rede pública.

Um aspecto importante é a questão da Geociências que já foi amplamente enfatizada no curso de História Natural, e no entanto, na década de 60 com o novo currículo para Ciências Biológicas, tem o seu espaço reduzido, valorizando assim a "Biologia Laboratorial". Essa redução atinge até mesmo o livro didático onde o tema Geociências desaparece quase por completo, limitado a pequenas notas a título de curiosidade.

Atualmente com a política de preservação ambiental, a visão do macro ambiente volta a ocupar lugar de destaque no ensino, que no entanto, não encontra a correspondente fundamentação para os programas de formação e a literatura de apoio aos professores.

Em uma proposta de insistir na importância da Geociências, o LEC inclui em seus cursos exposições e palestras, reativas ao tema "Meio Ambiente" para trazer a tona as questões relacionadas a origem, transformações, tempo e espaço, contidas naquele campo de estudos e fundamentá-las em programas de Ciências do Ensino Fundamental.

Como ferramentas, são utilizados recursos e materiais de apoio elaborados e organizados no próprio LEC, com a participação de professores, pesquisadores, técnicos, graduandos e bolsistas das mais diversos setores, em especial Geociências e Paleontologia. A participação do LEC é a de interseccionar os conceitos trazidos pelos estudiosos conferí-los com a literatura, para atender aos objetivos dos programas para alunos e professores da escola fundamental e média.

O acervo do LEC contém elementos resultantes dessas atividade, entre eles o filme "Aspectos Geológicos da Bacia do Rio Pardo", coleção de solos da região de Ribeirão Preto, monografia de professores da rede pública, coleção de artrópodes fixados e fósseis, além das "Folhas Avulsas" que registram momentos efetivos de aprendizagem. Surge assim o efeito caleidoscópio onde a cada trabalho, o todo adquire novas formas a partir da interação com o público, passando a enriquecer o material do acervo.

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Inclui ainda o material escrito, pasta com os dados contidos nas anotações realizadas por professores e bolsistas, curiosidades dos alunos e professores quando das explicações sobre as origens e as evidências das origens, além das pastas relatório confeccionadas pelos alunos de graduação. Também constatação que os programas e materiais de apoio às escolas não atendem aos interesses manifestos espontaneamente pelo público que frequenta o LEC.

Consta do programa das atividades de visita ao LEC, excursão ao Laboratório de Paleontologia , tentando assim suprir a falta de conhecimento na área de geociências, como leva à dificuldade no tema "Tempo Geológico" que foge a compreensão do aluno devido a amplitude das eras e da escala de tempo utilizadas nestes conceitos.

ABSTRACTS

A ESPOLIAÇÃO DA PALEOARTROPODOFAUNA BRASILEIRA: UM EXEMPLO DA CHAPADA DO ARARIPE

The spoliation of the Brazilian paleoarthropodfauna: an exemple of the Araripe Plateau.

A. C. S. FERNANDES[1]
I. S. CARVALHO[2]

A negociação de exemplares zoológicos, botânicos e mesmo fósseis com diversas finalidades, principalmente medicinais, remonta a vários séculos. Já a comercialização com fins científicos, constituindo coleções particulares e oficiais, é bem mais recente. No Brasil, por exemplo, a venda de coleções eram anunciadas no Jornal do Comércio desde o século XIX. Mais recentemente, anúncios semelhantes mas destinados ao comércio de fósseis podem ser encontrados em revistas e periódicos de divulgação científica, bem como em *sites* na Internet, bastando para o interessado na aquisição ser portador de um cartão de crédito. Mas daí a tornar público o comércio de fósseis, valorizando a atuação dos comerciantes, em um periódico científico, pode-se considerar uma grande ousadia. É o que ocorreu com a paleofauna de odonatas do Membro Crato da Formação Santana (Bacia do Araripe, Cretáceo), estudada e descrita por Bechly (1998, *Stuttgarter Beitr. Naturk.*, Ser. B, Stuttgart, (264):1-66). De acordo com o referido autor, o material analisado corresponde a 317 espécimens pertencentes a uma coleção particular de propriedade de Michael Schwickert (Sulzbachtal, Alemanha), um exemplar do American Museum of Natural History e 33 espécimens citados na literatura. Das seis novas espécies descritas, o material tipo (holótipos e parátipos), bem como muitos outros exemplares, foram depositados em coleções de museus estrangeiros (American Museum of Natural History, Nova Iorque, Estados Unidos; Muséum Nationale d'Histoire Naturelle, Paris, França; Staalisches Museum für Naturkunde, Stuttgart e Senckenberg Museum, Frankfurt, Alemanha; e National Science Museum, Tóquio e Museum of Kitakyushu, Japão) mas muitos outros permanecem em coleções particulares. Lamentavelmente, nenhum dos tipos ou qualquer outro exemplar foi depositado em coleções oficiais brasileiras, de acordo com o estabelecido na Portaria nº 55 de 14/03/1990 do Ministério da Ciência e Tecnologia. A história dos referidos exemplares, bem como de muitos outros de fósseis, é sempre a mesma: após serem retirados ilegalmente do país, não mais retornam, vindo posteriormente a constituir parte dos acervos de instituições estrangeiras, com uma perda cultural e científica de valor inestimável para o Brasil.

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FOSSIL INSECTS CONSERVATION IN BRAZIL AND ARGENTINA

J. F. PETRULEVICIUS[1]
R. G. MARTINS-NETO[2]

In Brazil and Argentina we have similar legislation about fossil patrimony conservation. Both countries coincide in that paleontological sites and fossils are property of the State. On this way, exportation and private collections are illegal and punishable, even prison being contemplated. In order to explore paleontological sites, a Government authorisation is needed. In Brazil, fossil insects are protected by National Law No. 4146 of 1942; subsequently, Statute No. 72312 of 1973 promulgated the prohibition of fossil exportation. Argentinean law concerning the protection of fossils (insects) and paleontological sites is National Law No. 9080 of 1913 and Law No. 17711 of the Civil Code. Concerning activities related to scientific research, the Argentinean Palaeontological Association approved in 1982, a series of ethical norms for palaeontological studies on Argentinean material by foreign and local people. Under such set of rules, fossils have to be deposited in State Museum repositories. In addition, there is a growing interest since recent years, by the public opinion, to the observance of these rules in order to improve the protection of palaeontological sites and remains.

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YACIMIENTO FOSILÍFERO DE AGUA DE LAS AVISPAS Y PUESTO MIGUEZ, ÁREA SUR DEL CERRO CACHEUTA (PROVINCIA DE MENDOZA), ARGENTINA

Outcrop of Agua de las Avispas and Puesto Miguez, South area from Cerro Cacheuta (Mendoza Province) Argentina.

A. M. ZAVATTIERI[1]
O. GALLEGO[2]

En las laderas sur y oeste del Cerro Cacheuta, ubicado a unos 45 km al SO de la ciudad de Mendoza, están expuestas unidades sedimentarias pertenecientes al Triásico, cuyas edades abarcan los 225 a 220 Millones de años. Dichas sedimentitas triásicas integran una amplia faja de afloramientos que se adosan a los faldeos sur y occidental del mencionado cerro y a ambos lados de la nueva Ruta Internacional Nº 7. Desde el punto de vista litoestratigráfico, se identifican en el área las Formaciones Potrerillos, Cacheuta y Río Blanco. Las dos primeras unidades han brindado, en esta zona, gran cantidad de fósiles animales y vegetales, constituyendo uno de los yacimientos fosilíferos más importantes de Mendoza y de la Argentina, por la variedad y diversidad de grupos de organismos que vivieron y que han sido preservados excepcionalmente en esta secuencia. Dicho yacimiento constituye un referente único en el país para los científicos e investigadores dedicados a las ciencias geológicas y cuyo descubrimiento data de fines del siglo pasado. Numerosos son los antecedentes históricos y bibliográficos que hacen referencia a las secuencias triásicas aflorantes, en particular, en la zona sur del cerro Cacheuta. Los primeros geólogos y paleontólogos europeos que trabajaron en Argentina estudiaron fósiles provenientes de este afloramiento y sus características geológicas. Así, debemos remontarnos a fines del siglo pasado y sólo a modo de ejemplo citar a Stelzner, por entonces profesor de la Universidad de Córdoba, quien publicó en Berlín en el año 1885 una extensa obra que abordaba, en forma general, aspectos referidos a la Geología y Paleontología de la Argentina. Es aquí donde hace referencia a "importantes depósitos de asfalto y manantiales de petróleo", que afloran en el faldeo sur del "cerro Cacheuta". De estos afloramientos habían colecciones de las plantas fósiles que ya había estudiado Geinitz, cuyos resultados fueron publicados en el año 1876 en Alemania. En 1886, Zuber es contratado por la Compañía Mendocina de Petróleo para realizar un estudio geológico que sirviera de base para la exploración petrolífera en el área sur del cerro Cacheuta. Las plantas fósiles recolectadas en la "formación Petrolífera" fueron enviadas a Europa para ser estudiadas por el Dr. Szajnocha, catedrático de la Universidad de Cracovia y los resultados

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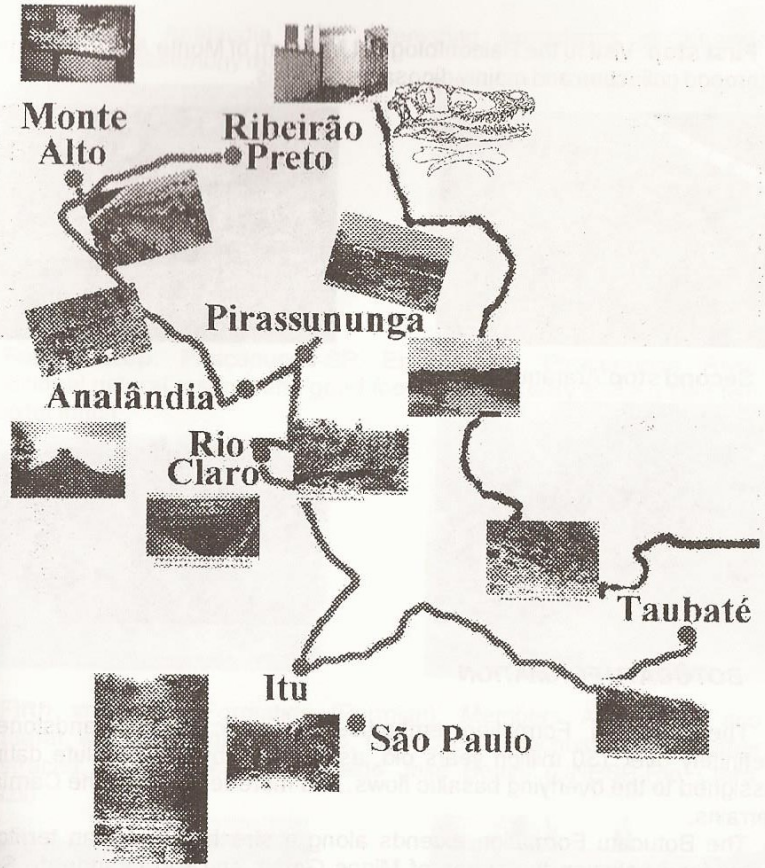
de este estudio fueron publicados en los Anales de la Academia Imperial de Ciencias de Viena en 1889. Federico Kurtz eminente paleobotánico alemán entre 1884 y 1920 publicó el estudio de importantes asociaciones de megafósiles vegetales procedentes de este y de otros afloramientos de Argentina. Stappenbeck (1910) (uno de los mas importantes geólogos de principios de siglo, sobre cuyos estudios se basó gran parte de la geología de la Argentina que hoy se conoce) describió con mayor detalle a la "Formación Petrolífera" de Cacheuta, a los que luego se sumaron los estudios geológicos de Du Toit (1927), Trüempy y Lhez (1937), Borrello (1942) y numerosos trabajos posteriores que sería difícil de enumerar. El reconocimiento científico nacional e internacional se debe a que de estos estratos proceden importantes asociaciones fósiles de: vegetales, invertebrados (insectos y artrópodos de agua dulce), restos de vertebrados como peces, anfibios primitivos y microorganismos de gran valor científico. Hoy, empresas mineras privadas muelen en sus establecimientos los restos de organismos extinguidos antes mencionados y muchos otros que posiblemente aún no han sido descubiertos de este excepcional yacimiento fosilífero, que a la naturaleza le costó millones de años preservar y cuya importancia ha sido solo advertida y valorada por científicos extranjeros y por numerosos investigadores del país, cuyo trabajo la sociedad ignora. Lo expresado más arriba pretende remarcar muy brevemente- la importancia de preservar este patrimonio científico, histórico y cultural de la Provincia de Mendoza y de la Argentina.

FIELD TRIP

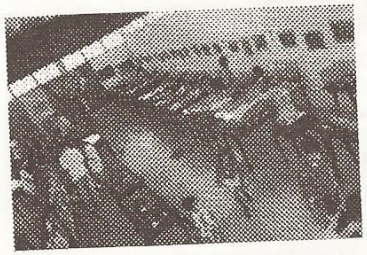


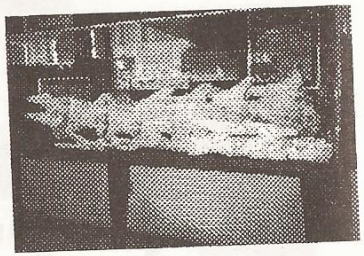
It is with great satisfaction that we present to the scientific community the official field trip, joining the former excursions to Irati outcrops (Permic) and Tremembe outcrops (Oligocene). You are cordially invited to attend and participate in this special event.

10.9.2000

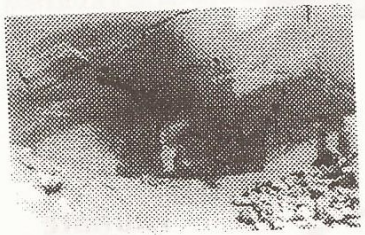
7:00 Departure from the Hotel

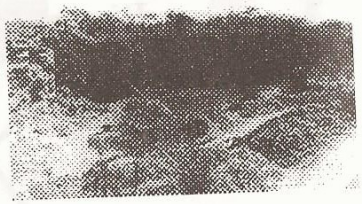
First stop: Visit to the Paleontological Museum of Monte Alto SP. Some arthropod collection and mainly dinosaurs remains.





Second stop:Araraquara





BOTUCATU FORMATION

The Botucatu Formation embodies Mesozoic eolian sandstones, definitely over 130 million years old, as revealed by the absolute dating assigned to the overlying basaltic flows, and more recent than the Carnian terrains.

The Botucatu Formation extends along a strech of Brazilian territory comprised between the states of Minas Gerais and Rio Grande do Sul, appearing also in the states of Mato Grosso and Goiás, on the opposite side of the Paraná Basin. It constitutes, in general, a clearly visible morphological step due to its relative competence. In the sate of São Paulo the formation presents thicknesses ranging from 60 to 100 m.

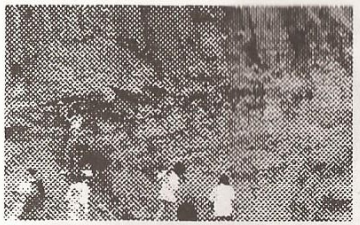
The sand desert from which the mentioned sandstones originated

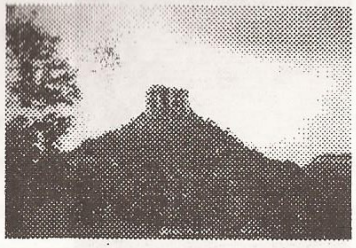
covered a surface estimated in at least 1,300,000 square Km constituting the largest know fossil desert in the world.

Two close-standing quarries will be visited. São Bento, where flagstone extraction has almost been dicontinued, and Corpedras, much bigger in size and more interesting, not only for its abundant ichnological material, but also for the sedimentological characteristics verified.

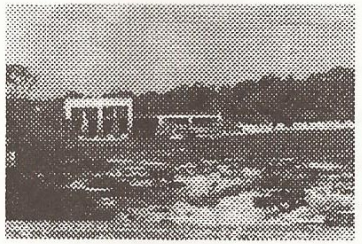
(extracted from Leonardi, 1980)

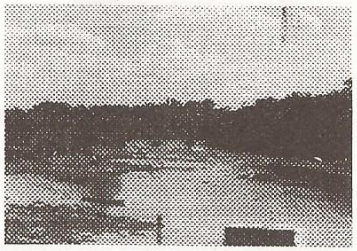
Third stop: Analandia SP, interesting expositions of Jurassic sandstone and testimony mount.



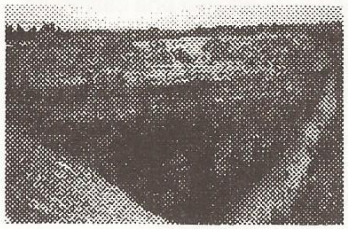


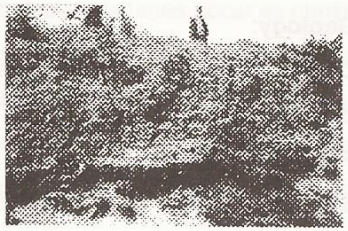
Fourth stop: Piraçununga-SP, Emas Falls, Piraçununga River. Traditional natural reserve and good food (the speciality is the grilled fish. Stop for lunch.





Fifth stop: Irati Formation (Permian), Members Assistência and Taquaral, with collection of Insects, Ostracoda, Conchostraca and other Custracea, co-ordinated by Reinaldo José Bertini (UNESP-Rio Claro, Brazil).

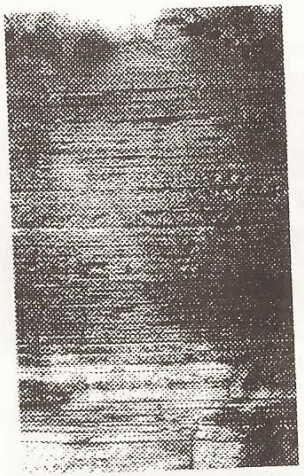


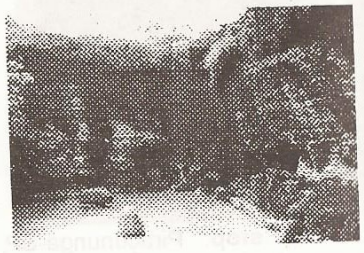


Sixth stop: Itu-SP, for an overnight stay.

11.9.2000

8:00 Visit to the Varvite Park, Itu, containing classic ritmites deposition of Carboniferous Age.





Taubate-SP, for an overnight stay.

12.9.2000

Stop Seventh (Coordinated by Dr. Lilian P. Bergqvist (UFRJ))

Santa Fé Farm, now belonging to the Sociedade Extrativa Santa Fé, Estrada do Padre Eterno s/n, Tremembé city, São Paulo State.

Geology:

Cicles of shales and bituminous shales with fossils (see the geological column).

Fossils:

Shales: sponges, ostracods, decapods, isopods, insects (Lepidoptera,

Diptera, Trichoptera, Coleoptera, Hymenoptera, Auchenorrhyncha, Heteroptera and Blattoptera), trace fossils, turtle, crocodiles, birds, mammals (Chiroptera), tetrapode coprolite, angiosperms.

Green clays: mollusks, ostracods, fishes, turtles, crocodiles, birds, mammals (Notoungulata, Astrapotheria, Marsupialia, Rodentia, Edentata).

Return to Ribeirão Preto.

TAUBATÉ BASIN (Bergqvist courtesy)

The Taubaté Basin, as long as Resende, São Paulo, Volta Redonda and Itaboraí Basins, are part of the Continental Rift of Southern Brazil. The origin and evolution of the rift system has been associated with the opening of the Atlantic Ocean, but intraplate tectonic processes were important as well (Riccomini *et al.*, 1987). It is located at the Northeastern part of São Paulo state, covering an area of 2.400 km^2. It is an asymmetrical basin, having 173 km large, 20 km width and 0.8-0.9 km deep, with a more pronounced subsidence at the Northern boundary. It is filled with continental sediments of Cenozoic age, named as Resende, Tremembé and São Paulo Formations (Taubaté Group) (*sic* Ricomini, 1989). The Pindamonhangaba Formation rests unconformably over the Group. The most important and most fossiliferous, for the sake of this field trip, is the Tremembé Formation.

The Tremembé formation, the large unit of the Taubaté basin, is composed of green massive clay, shales, bituminous shales, siltites, dolomites and caliche. The bituminous shales some times occur as ritmites with levels rich in fossil fishes, arthropods and plants. All vertebrate groups are present in the green clays, specially mammals. These facies are suggestive of a lacustrine environment, distal to an alluvial system. Debris flows from high areas deposited coarse clasts at the proximal areas and

transported the thinner grains to the lake. Suspensions lobes with climbing ripples or ritmites finely laminated were developed close to the lake boundary. Mud cracks are suggestive of very shallow waters that evaporated periodically.

The age of Tremembé Formation has been always controversial. Fossil birds recovered from the green clay suggests an early Miocene age (Alvarenga, 1990), but palinomorphs dated it as Oligocene. Fossil mammals and crocodiles are suggestive of a late Oligocene age (Bergqvist & Ribeiro, 1999).

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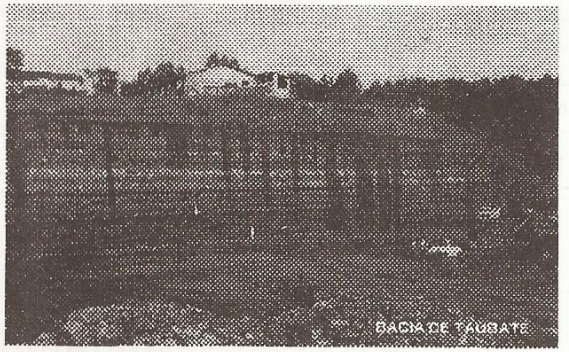
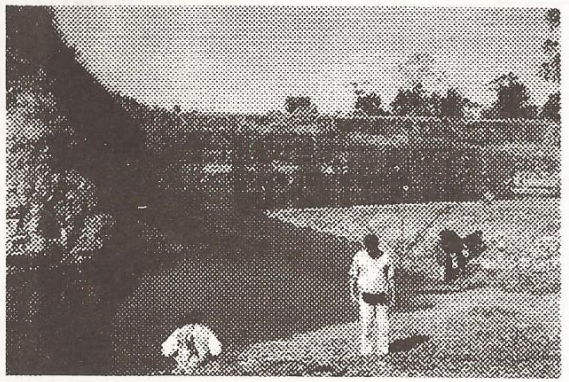
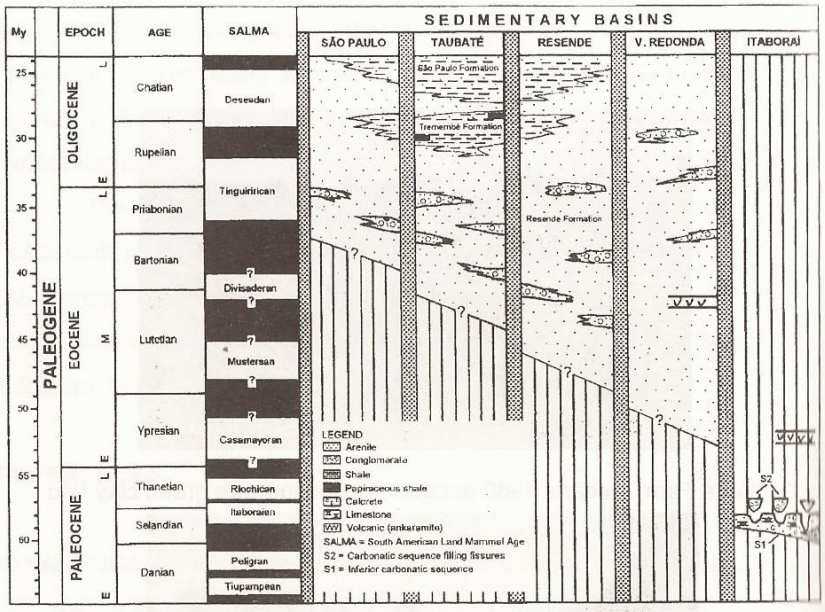


Santa Fé Farm outcrop, 1980 decade. Arrows indicate green clay bed.



Santa Fé Farm outcrop,



Medeiros & Bergqvist Courtesy

ABSTRACTS

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GENERAL INDEX

INSTITUTIONS PARTICIPANTS

AGA - Associación Geológica Argentina, Argentina
AGL - Acta Geológica Leopoldensia, RS, Brazil
AMNH - American Museum of Natural History, USA
BM - Centro Universitário Barão de Mauá, SP, Brazil
BRS - Biogeochemistry Research Centre, University of Bristol, UK
CECLIMAR - Centros de Estudos Costeiros, Limnológicos e Marinhos, RS, Brazil
CISJV - Colegio Informatico San Juan de Vera, Argentina
CPCA - Centro de Pesquisas da Chapada do Araripe, CE, Brazil
DNPM - Departamento Nacional da Produção Mineral, Brazil
ECT - Empresa Brasileira de Correios e Telégrafos, Brazil
FAPESP - Fundação de Amparo a Pesquisa do Estado de São Paulo, Brazil
FFCLRP - Faculdade de Filosofia Ciências e Letras, USP, Brazil
FIOCRUZ - Fundação Instituto Oswaldo Cruz, Brazil
IFA - Instituto di Fitovirologia Applicata del Consiglio Nacionalle delle Ricerche, Torino, Italy
IGPTUC - Institut für Geologie und Paläontologie, Technische universität Clausthal, Germany
ISEZ - Institut Systematic Evolution Zwierzat, Polony
ISP - Instituto Privado San Benito, Argentina
LEC - Laboratório de Ensino de Ciências, USP, Brazil
MACN - Museo Argentino de Ciencias Naturales, Argentina
MCFLC - Museo de la Ciencia de la Fundació la Caixa, Barcelona, Spain
MEGANEURA - Paleontological Newsletter, European Scientif Foundation
MLP - Museo de la Plata, Argentina
MM - Maidstone Museum, UK
MN - Museu Nacional, RJ, Brazil
MPEF - Museo Paleontologico Egidio Feruglio, Argentina
MZUSP - Museu de Zoologia da USP, Brazil
NIGP - Nanjing Institute of Geology and Paleontology, China
RAS - Russian Academy of Sciences, Russia
REP - Revista Española de Paleontología, Spain
SBE - Sociedade Brasileira de Entomologia, Brazil
SBP - Sociedade Brasileira de Paleontologia, Brazil
SBPr - Sociedade Brasileira de Paleoartropodologia, Brazil
SEA - Sociedad Entomológica Argentina, Argentina
SEP - Sociedad Española de Paleontología, Spain
SI - Smithsonian Institution, Washington, USA
UA - Universitat de Alcalá, Spain
UB - Universitat de Barcelona, Spain

UC - Universitat Complutense, Spain
UERJ - Universidade Estadual do Rio de Janeiro, Brazil
UFOP - Universidade Federal de Ouro Preto, MG, Brazil
UFRGS - Universidade Federal do Rio Grande do Sul, RS, Brazil
UFRJ - Universidade Federal do Rio de Janeiro, Brazil
UFSC - Universidade Federal de São Carlos, SP, Brazil
UNAM - Iniversidad Nacional Autonoma de México, Mexico
UnB - Universidade de Brasilia, Brazil
UNBA - Universidad Nacional de Buenos Aires, Argentina
UnC - Universidade do Contestado, SC, Brazil
UNESP - Universidade Estadual Paulista, SP, Brazil
UnG - Universidade de Guarulhos, SP, Brazil
UNICAMP - Universidade de Campinas, SP, Brazil
UNISINOS - Universidade do Vale do Rio dos Sinos, RS, Brazil
UNIVALE - Universidade do Vale do Paraíba, MG, Brazil
UR - Universidad de la República, Uruguay
URCA - Universidade Regional do Cariri, CE, Brazil
URG - Universidade de Rio Grande, RS, Brazil
USP - Universidade de São Paulo, Brazil
UV - Universitat de Valencia, Spain
ZI - Zoological institute, St. Ptersburg, Russia

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