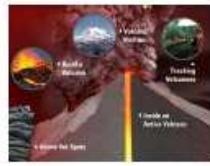


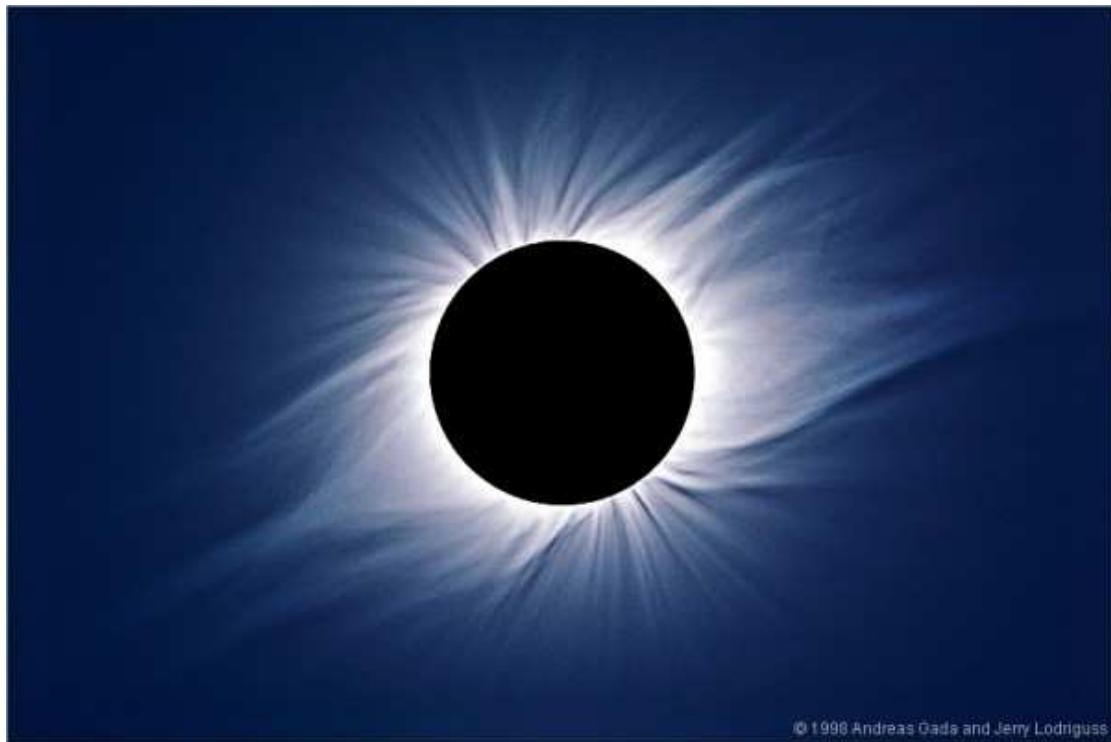
# GEOBRAZIL

<http://www.geobrasil.net>



Fotos tiradas do site da Nasa

## IMAGEM DA SEMANA



© 1998 Andreas Gada and Jerry Lodriguss

Eclipse Solar

[http://www.greenstyle.it/gallerie/eclissi-di-sole-foto?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=Newsletter%3A+GreenStyle&utm\\_content=2012-05-21+Eclissi+di+sole%2C+foto](http://www.greenstyle.it/gallerie/eclissi-di-sole-foto?utm_source=newsletter&utm_medium=email&utm_campaign=Newsletter%3A+GreenStyle&utm_content=2012-05-21+Eclissi+di+sole%2C+foto)

## DICAS DA SEMANA

**Portal de Petrografia**

**Ambientalmente correto**

**ÍNDICE DE NOTÍCIAS**

**JORNAL DA CIENCIA**

**Edição 4504 - Notícias de C&T - Serviço da SBPC**

**Edição 4502 - Notícias de C&T - Serviço da SBPC**

**Edição 4501 - Notícias de C&T - Serviço da SBPC**

**AMBIENTE BRASIL**

**SCIENCE**

**EARTH PAGES**

\*\*\*As pessoas interessadas em receber nossa newsletter via mail, podem escrever para [revistadegeologia@yahoo.com.br](mailto:revistadegeologia@yahoo.com.br) pedindo sua adesão.

## DICAS DA SEMANA

### Portal de Petrografia

[http://www.petrographypedia.com/pedia/Main\\_Page](http://www.petrographypedia.com/pedia/Main_Page)

### Ambientalmente correto

Uma animação pra lá de bonita, o escritor francês Jean Giono (nascido em 30/03/1895), autor da linda história do homem que semeava natureza e amor :)

<http://www.youtube.com/watch?v=Klx8UBMRrMA>

## ÍNDICE DE NOTÍCIAS

### JORNAL DA CIENCIA

#### Edição 4504 - Notícias de C&T - Serviço da SBPC

1. SBPC em Chapadinha: Aleixo defende racionalidade no veto do Código Florestal
2. Corte no Ministério da Ciência e equívocos, artigo de Rogério de Cerqueira Leite
3. Novos secretários tomam posse no MCTI
4. IEN comemora 50 anos
5. Presidente da AEB classifica a consolidação do sistema espacial como sua principal meta
6. Greve das universidades federais continua
7. Estados e municípios pedem mudança em regra de reajuste do piso dos professores
8. Comitê do Ciência sem Fronteiras faz primeira reunião
9. Brasil integra o Conselho Global de Pesquisa
10. A cortina de fumaça da "desindustrialização", artigo de Alexandre de Freitas Barbosa
11. Geógrafo produz atlas do trabalho escravo
12. O positivismo e o fundamentalismo de mercado de Julian Simon e dos céticos do clima, artigo de José Eustáquio Diniz Alves
13. Brasileiro vê indícios de um novo planeta no Sistema Solar
14. Primeiro homem a pisar na Lua quebra o silêncio
15. Consolidação e renovação marcam 50 anos da Fapesp
16. Aniversário da Fiocruz: 25 de maio
17. Programas interinstitucionais Probral e Unibral recebem propostas bilaterais
18. Última fase da Olimpíada de Biologia acontece no fim de semana
19. CPTEC/Inpe promove curso de meteorologia para jornalistas

#### Edição 4502 - Notícias de C&T - Serviço da SBPC

1. Senado discute criação de Código Nacional de Ciência e Tecnologia
2. Consecti e Confap vão discutir Plano de C,T&I para Região Norte
3. Apelo público dos ex-ministros
4. Ministro Raupp se reúne com representantes de unidades de pesquisa
5. Governo quer criar política para exploração de terras raras
6. Índice de abandono escolar é três vezes maior no 6º ano do ensino fundamental
7. Grupo apresenta propostas para a melhoria da Educação Científica no estado da Bahia
8. Brasil sediará órgão da ONU para meio ambiente, antecipa Carlos Minc
9. Exposição do Museu da Vida quer provocar discussão sobre desenvolvimento sustentável
10. Abraps lança Agenda Mínima para a Rio+20
11. Carlinhos Cachoeira, royalties e a seca do Nordeste, artigo de Frederico Romão
12. Projeto do Icict / Fiocruz acompanha as cheias em Manaus
13. Equívocos sobre distribuição de médicos, artigo de Adib Jatene
14. Guerra do amianto chega às universidades
15. Dez anos da restauração da independência de Timor-Leste, artigo de Valdir Lamim-Guedes e Carlos Gontijo Rosa
16. Bolívia adota tecnologia de monitoramento do Inpe
17. Tubarão sedia Seminário Nacional de Inovação
18. Propriedade Intelectual na era digital é tema de seminário
19. Entrevista: pesquisadora Lena Vania fala sobre divulgação científica

#### Edição 4501 - Notícias de C&T - Serviço da SBPC

1. Chapadinha recebe Reunião Regional da SBPC
2. SBPC e ABC pedem vetos a novo Código Florestal
3. Comissão do CNPq que analisará fraudes em pesquisas científicas investiga primeiras denúncias
4. Abipti entrega carta de reivindicações ao ministro da C,T&I
5. Capes e CNPq reajustam quatro modalidades de bolsas
6. Professor tem salário mais baixo do País
7. Cotas raciais - quem ganha, quem perde? Artigo de José Goldemberg
8. Proposta de política de tecnologia para as micro e pequenas empresas busca apoio no governo, Consecti e Conif
9. Sobre a Comissão da Verdade, artigo de Celso Lafer
10. Rio+20: ONU lista 56 recomendações para um mundo sustentável
11. Bom da Rio+20 é a sociedade, dizem especialistas
12. O Código e as florestas plantadas, artigo de Roberto Rodrigues
13. Tema em discussão - Energia nuclear e meio ambiente

14. Medicina à distância
15. Cientificamente Comprovado - Verdade ou Mito? O que há de verdade em alguns produtos e terapias alternativos
16. "Projeto Piloto Por que GESITI? - Panorama, Tendências e Perspectivas em Saúde"
17. Alunos brasileiros são premiados na maior feira de ciências do mundo
18. Ciência é novo tema de concurso do Festival do Minuto
19. Fucapi promove a exposição 30 anos de inovação na Amazônia

## **AMBIENTE BRASIL**

### **Relatório diz que países deveriam fazer mais contra aquecimento global**

Preocupação é com o nível de emissões de CO<sub>2</sub>. Texto é assinado por ONG, consultoria e instituto de pesquisas.

### **Emissões globais de CO<sub>2</sub> batem recorde em 2011, diz AIE**

A queima do carvão representou 45% do total das emissões no ano passado, seguido pela queima do petróleo (35%) e do gás natural (20%).

### **Produção de 1 kg carne no Brasil produz tanto CO<sub>2</sub> como 1,6 mil km de carro**

Segundo especialistas da Áustria e Holanda, a produção de alimentos vegetais é a menos nociva para o meio ambiente.

### **Três de junho, Dia da Educação Ambiental**

A proposta de data tem como referência a abertura da Conferência das Nações Unidas para o Meio Ambiente e o Desenvolvimento, ocorrida no Rio de Janeiro em 1992, conhecida como Rio-92.

### **Petrobras confirma descoberta de nova reserva de petróleo no pré-sal da Bacia de Campos**

Estima-se que o bloco BM-C-33, localizado no sul da bacia, tenha volumes recuperáveis de 700 milhões de barris de petróleo de boa qualidade e 545 milhões de barris de óleo equivalente de gás natural.

### **Dilma reúne líderes nesta sexta para explicar vetos ao Código Florestal**

A ministra de Relações Institucionais, Ideli Salvatti, diz que a 'reação da opinião pública confirmou a tese' do Planalto. Senadores já apresentaram novo projeto para compensar cortes.

### **China se defende de acusações de que bloqueia discussões sobre o clima**

Para China, Estados Unidos, União Europeia e Japão querem aproveitar novo processo para "sair do sistema juridicamente vinculante.

### **Terra do Meio sob proteção**

MMA, governo paraense e União Européia estão investindo 10,8 milhões de euros em área de 10,4 milhões de hectares na região amazônica. Projeto melhorará também qualidade de vida dos moradores.

### **Seca no Rio Grande do Norte pode se agravar com fim do período estimado para chover**

O alerta é da Defesa Civil do estado, que contabiliza perdas entre agricultores e pecuaristas devido à falta de água.

### **Animais morrem de fome e sede em Joia, no noroeste do RS**

Pecuarista teve de recorrer a rações para alimentar os animais e gastou mais de R\$ 3 mil.

### **Prazo para vacinação contra a febre aftosa é prorrogado no RS**

Pedido foi feito em função de problemas na distribuição das vacinas. Data limite para vacinação do rebanho foi adiada para 8 de junho.

### **Ban Ki-moon pede que líderes mundiais apoiem Rio+20**

O secretário-geral da ONU pediu que os líderes superem os interesses nacionais e aproveitem "a oportunidade de uma geração".

### **ONG entrega a Dilma 2 milhões de assinaturas contra Código Florestal**

Grupo pede veto ao texto, que trata de preservação em propriedades rurais. Dilma tem até esta sexta-feira (25) para sancionar ou vetar o texto.

### **Governo prorroga em uma semana campanha de vacinação contra gripe**

Aplicação de doses acabaria nesta sexta; meta não foi atingida. Até esta quinta-feira, 15,8 milhões de pessoas já foram imunizadas.

### **Congresso em defesa do extrativismo**

Agenda da Frente Parlamentar Mista em Defesa das Populações Extrativistas será voltada a projetos e políticas públicas de promoção ao

desenvolvimento de comunidades que vivem da exploração da biodiversidade.

#### **Borboleta rara se beneficia das mudanças climáticas**

População de espécie da Grã-Bretanha aumentou após mudar de planta hospedeira, por conta do aquecimento global.

#### **Agricultura familiar recebe apoio**

O Programa de Educação Ambiental e Agricultura Familiar tem como objetivos gerais contribuir para o desenvolvimento rural sustentável; promover a agroecologia e as práticas produtivas sustentáveis, entre outros.

#### **Greenpeace suspende protesto e deixa navio no Maranhão**

A embarcação deveria ter aportado em Itaqui na semana passada, quando seria carregada com uma carga de 31 mil toneladas de ferro gusa, produto cuja cadeia de produção os ativistas afirmam provocar desmatamento na Amazônia.

#### **ONU pede mais discussões sobre proteção dos oceanos na Rio+20**

Secretário-geral da ONU afirmou que ecossistemas marinhos precisam de ajuda, no Dia Mundial da Biodiversidade

#### **Brasileiro não cobra poder público por serviços de saneamento, diz ONG**

Pesquisa mostra que população está mais conscientizada sobre o tema. Levantamento foi feito com 1.088 pessoas de 22 cidades do país.

#### **Chico Bento pede à presidente 'Dirma' que vete o Código Florestal**

Ilustrações do cartunista Maurício de Sousa foram divulgadas nesta terça. Presidente Dilma Rousseff tem até a próxima sexta para aprovar ou vetar lei.

#### **Custo da transposição do São Francisco quase dobrou por causa de custos ambientais e reajustes nos contratos**

Quando o Programa de Aceleração do Crescimento foi lançado, em 2007, o custo total da obra de transposição do Rio São Francisco estava estimado em R\$ 4,8 bilhões e a previsão era de que o Eixo Leste fosse concluído até junho de 2010 e o Eixo Norte, em dezembro de 2012.

#### **Evolução na estrutura da pena explica cor azulada de arara, diz estudo**

Matiz lápis-lazuli tem relação com a queratina que forma a pena. Estrutura esponjosa dispersa luz em uma rede 3D de hastas que cria a cor.

#### **Cientistas encontram melanina em fóssil de 160 milhões de anos**

Pigmento foi encontrado também em lula gigante 'moderna'. Descoberta sugere que escape do pigmento não muda com evolução.

#### **Primeiro foquete privado decola rumo à Estação Espacial Internacional**

'Falcon 9' leva cápsula 'Dragon' com carga para ISS. Lançamento é o primeiro que envolve voo comercial à estação.

#### **Cientistas propõem usar genética para determinar origem do pescado**

A medida ajudaria o combate à pesca ilegal.

#### **Estudo com insetos mostra que iluminação urbana afeta ecossistema**

Pesquisa na Grã Bretanha mostrou que luzes urbanas influenciam tamanho de populações de algumas espécies de insetos.

#### **Peixe-robô que detecta poluição mais rápido é testado no mar**

Pesquisadores europeus criaram nova tecnologia para encontrar poluentes. Robô também pode ter versão para limpeza de vazamentos de petróleo.

#### **Um terço dos medicamentos de malária é falso, sugere estudo**

Cientistas alertam que comprimidos falsos ou de baixa qualidade geram variedades da doença resistentes a tratamentos.

#### **Macaco de 'alta classe' se recupera mais rápido de doenças, diz estudo**

Babuínos 'classe A' estão menos predispostos a ter doenças e lesões. Diferença associa macacos 'mais favorecidos' a imunidade mais elevada.

#### **Hospital da USP inaugura novo centro para pesquisas com animais**

Nova estrutura é considerada de última geração. Aparelho chamado Micro-PET-SPECT-CT é usado para estudar câncer.

## **Bebê golfinho é salvo por equipe de resgate na Flórida/EUA**

Golfinho recém-nascido estava preso em área de manguezal. Mamífero pesava menos de 15 kg e está sendo alimentado em parque.

## **Rio de Janeiro confirma 22 mortes por dengue**

Desse total, 19 pacientes são do município do Rio de Janeiro e três da região metropolitana.

## **Fundo financeiro Unidades de Conservação**

Programa Arpa recebe prêmio nos Estados Unidos. MMA cria fundo para financiar projetos nas áreas de conservação e seleciona os primeiros investimentos.

## **Seca castiga Rio Grande do Norte e afeta 500 mil pessoas na área rural**

Moradores de várias localidades do Semiárido dependem de carros-pipa contratados pelo Exército para ter água potável, usada para beber e cozinhar.

## **Governo peruano diz que morte de 900 golfinhos foi por causas naturais**

ONG de defesa da fauna marinha afirma que mortalidade foi resultado de atividade petroleira.

## **Noruega diz que Indonésia não atingirá meta de corte de emissões**

A Indonésia impôs uma moratória de dois anos sobre o desmatamento das florestas, em maio passado, no âmbito de um acordo climático no valor de US\$ 1 bilhão com a Noruega para reduzir as emissões provenientes do desmatamento, apesar da resistência de alguns departamentos governamentais e das empresas de recursos que procuram crescer no arquipélago.

## **Dia da biodiversidade alerta sobre situação dos oceanos**

O Dia Internacional da Diversidade Biológica é celebrada nesta terça-feira.

## **Evento paralelo à Rio+20 vai propor soluções para aquecimento global**

"Rio Clima" será realizado entre os dias 13 e 21 de junho. Objetivo é simular acordo internacional para controlar emissão de gases.

## **Estudo: consumo humano de água também aumenta nível dos oceanos**

O uso maciço de recursos hídricos em nosso planeta tem sido responsável por grande parte da alta do nível dos oceanos constatado ao longo das últimas décadas.

## **Metano preso há milênios está escapando com derretimento do Ártico, diz pesquisa**

Cientistas do Alasca dizem ter encontrado milhares de pontos onde o gás, que estava retido pelo gelo, está vazando, com potencial impacto às mudanças climáticas.

## **Ibama finaliza plano de retirada de madeira de Belo Monte**

Objetivo é evitar comércio ilegal de madeira da Amazônia. Usina hidrelétrica é uma das principais obras do governo federal.

## **AL e Caribe discutem uso do mercúrio**

Ao todo, representantes de 24 países da América Latina e da região do Caribe se reunirão com o objetivo de discutir e definir posicionamentos a respeito do assunto.

## **Obras no Maracanã ameaçam 'aldeia indígena' no coração do Rio**

Indígenas ocupam há seis anos um prédio que já serviu como Museu do Índio ao lado do estádio.

## **Cientistas encontram nova espécie de sapo em floresta da Malásia**

Anfíbio foi visto na região de Bornéu, ilha com rica biodiversidade. Sapo mede entre 4 e 5 centímetros e emite som estridente.

## **Novo telescópio solar é inaugurado na Espanha**

Projeto alemão foi construído nas Ilhas Canárias. Gregor, como é chamado, estudará processos que ocorrem no Sol.

## **Número de mortos por dengue no Rio sobe para 19, mas há queda de novos casos**

Desde o início do ano, já foram registrados 76.140 confirmações da doença na cidade do Rio de Janeiro.

## **Líder do PV diz que falta ambiente político para Congresso derrubar possível veto ao Código Florestal**

Para Sarney Filho, a mobilização social deve influenciar os parlamentares a não mexerem no texto que virá da Presidência.

### **Chimpanzé cria estratégias para enganar visitantes em zoológico**

Santino, um chimpanzé que se tornou famoso em 2009 por polir e preparar cuidadosamente a cada manhã as pedras que depois jogava contra os visitantes do zoológico sueco no qual vive, se superou e se tornou um mestre do engano.

### **Acusados de assassinato de líder indígena na Raposa Serra do Sol são absolvidos**

O Tribunal Regional Federal de Roraima absolveu, por falta de provas, os três acusados pelo assassinato do líder macuxi Aldo da Silva Mota, morto a tiros em janeiro de 2003.

### **Pesquisadores do clima dizem ter resolvido mistério da elevação do mar**

Extração de águas subterrâneas explicariam parte do aumento dos níveis. Causas da elevação do nível do oceano ainda não são totalmente conhecidas.

### **Incêndio atinge área vizinha ao Memorial Quilombo dos Palmares em Alagoas**

De acordo com a Fundação Palmares, que administra o memorial, o fogo não chegou ao interior do parque, na região da Serra da Barriga, no município de União dos Palmares.

### **Fóssil de dinossauro é vendido por US\$ 1 milhão nos EUA**

Trata-se do esqueleto de um Tyrannosaurus bataar medindo 2,4 metros de altura e 7,3 metros de comprimento.

### **Brasil sediará órgão da ONU para meio ambiente, antecipa Carlos Minc**

Segundo o secretário estadual do Ambiente, Carlos Minc, a iniciativa deve ser anunciada pela presidente Dilma Rousseff em 5 de junho, Dia do Mundial do Meio Ambiente, às vésperas da Rio+20. O órgão deve ser instalado na cidade do Rio de Janeiro.

### **MT concentra 82% do desmate nas terras indígenas da Amazônia Legal**

Ong atribuiu alta na devastação a demora nas regularizações fundiárias. Ibama admite que tem dificuldade para identificar desmatadores da floresta.

### **Minc garante: 'Dilma terá coragem de vetar o Código Florestal'**

"A presidente Dilma teve coragem de enfrentar os juros extorsivos, de instalar a Comissão da Verdade, de criar a Lei de Acesso à Informação, e ela terá coragem também de vetar o que uma eventual maioria ruralista aprovou, descaracterizando toda nossa legislação protetora das florestas e dos ecossistemas."

### **Nível do Rio Negro se aproxima dos 30 metros e enchente afeta agora 77 mil famílias**

Segundo a Defesa Civil do Amazonas, 49 municípios declararam estado de emergência devido às enchentes, enquanto três declararam estado de calamidade.

### **Muitos cruzamentos entre cães impedem traçar genética das raças**

Mistura feitas em centenas de anos 'desligou' raças de ancestrais. Pesquisadores cruzaram dados de 1.375 cães de 35 raças.

### **Empresas correm para aprovar projetos no mercado de carbono**

Primeiro período de vigência do Protocolo de Kyoto vai até dezembro. Burocracia pode atrapalhar andamento de iniciativas brasileiras.

### **ONU lista 56 recomendações para um mundo sustentável**

O documento, elaborado por 22 especialistas ao longo de um ano e meio, traz sugestões mais ousadas do que aquelas que devem ser acordadas na Rio+20, a conferência da ONU sobre o tema que ocorre em junho na cidade.

### **Técnicas usadas no campo ajudam a reduzir o aquecimento global**

Plantio direto sequestra 17 milhões de toneladas de carbono por ano. Número compensa emissões de gases de efeito estufa de SP, RJ e MG.

### **Tremor de 5,9 graus no norte da Itália deixa mortos e feridos**

Ao menos 6 pessoas morreram e dezenas ficaram feridas, diz Defesa Civil. Tremor de 5,9 graus de magnitude foi sentido em várias regiões da Itália.

### **Forte de tremor de terra é sentido em Montes Claros; não houve vítimas**

De acordo com o Observatório Sismológico da Universidade de Brasília (UnB), a intensidade do tremor ficou entre 3,8 e 4,2 graus na escala Richter.

## **Encontrados no México restos de mamute de até 15 mil anos de idade**

Os restos, entre os quais se destacam duas presas, um fragmento de crânio e outros dois elementos ainda não identificados, foram achados no município de Huimilpan.

## **Ato em SP pede veto presidencial a novo Código Florestal**

Manifestantes se reuniram no Parque Ibirapuera neste domingo. Ato #VetaTudoDilma é organizado pela Fundação Mata Atlântica.

## **Estiagem afeta abastecimento de água potável em áreas rurais de 40 municípios gaúchos**

Cidades que mais sofrem com a estiagem são Erechim, Fontoura Xavier, Barros Cassal, Hulha Negra, Candiota e São Luiz Gonzaga.

## **Desrespeito ao ciclista e falta de bicicletários desestimulam o uso de bicicletas no Rio**

Os organizadores da Rio+20 prometem disponibilizar bicicletários e bicicletas para os participantes circularem entre os locais do evento.

## **Museu Goeldi, no Pará, lança Censo da Biodiversidade da Amazônia**

A lista inclui dados como nome científico, família e, em alguns casos, a categoria de ameaça de extinção de cada espécie.

## **Funai recorrerá de decisão que barrou aumento de terra indígena em MT**

Terra Menkù está localizada em Brasnorte, no interior do estado. Revisão territorial pode fazer TI ganhar mais 100 mil hectares.

## **Floresta fossilizada oferece indícios sobre mudanças climáticas**

Pesquisadores se embrenham entre mina de carvão de Springfield, nos EUA, para estudar registros de uma paisagem pré-histórica.

## **Impacto de asteroide ainda lidera teoria sobre extinção dos dinossauros**

Pesquisadores avaliam se animais já estavam entrando em declínio antes de asteroide se chocar com a Terra.

## **Criação de peixes em represas de hidrelétricas é alternativa de renda para ribeirinhos e operários**

A barragem de rios para instalação de usinas hidrelétricas causa diversos tipos de impacto sociais e ambientais.

## **Perto do prazo, Dilma intensifica reuniões sobre Código Florestal**

Às vésperas do prazo final para a sanção ou veto do Código Florestal, a presidente Dilma Rousseff reuniu-se neste sábado por cerca de cinco horas com um grupo de ministros no Palácio da Alvorada.

## **'Não é um fracasso', diz presidente da SpaceX sobre lançamento abortado**

Falcon 9 não foi ao espaço por problema de pressão elevada em motor. Nova tentativa de lançar foguete deve acontecer em 22 de maio.

## **Maioria dos micro-ondas é jogada fora por estética e polui, diz estudo**

No levantamento, 85% dos aparelhos achados no lixo teriam conserto. Lixo eletrônico soma entre 20 milhões e 50 milhões de toneladas por ano.

## **Governo estuda criar estrutura para cuidar do desenvolvimento sustentável**

Após defender a criação, no âmbito das Nações Unidas, de um conselho de desenvolvimento sustentável para integrar as questões sociais, econômicas e ambientais, a ministra do Meio Ambiente, Izabella Teixeira, foi questionada sobre por que o país não criava um ministério do desenvolvimento sustentável para unir esses pilares também em âmbito nacional.

## **MT tem 6 cidades entre as que mais desmataram em abril, aponta Imazon**

Mato Grosso concentrou 71% do desmate na Amazônia Legal brasileira. Foram destruídos 50 km<sup>2</sup> de floresta, de acordo com o Imazon.

## **Telescópio Kepler dá pistas sobre impacto de explosão solar sobre a Terra**

Equipamento mostra as chances de emissão eletromagnética varrer camada de ozônio.

## **Censo vai mapear todas as espécies da Amazônia**

O Censo da Biodiversidade por enquanto agrupa apenas uma lista de mais de 3.000 espécies de animais, de mamíferos a aranhas, todos eles nativos do Pará.

## **Eclipse solar será visto na China, Japão e EUA**

Neste fim de semana, Lua vai ofuscar a maior parte do Sol, deixando visível apenas um anel de luz.

## **Espécie de tartaruga marinha nada diferente no Pacífico e no Atlântico**

Estilos de nado da tartaruga-de-couro influem na sua alimentação. Espécie está ameaçada de extinção.

## **Protesto do Greenpeace em navio no MA completa cinco dias**

Os ativistas escalam a âncora da embarcação e permanecem presos à estrutura desde segunda-feira (14) para protestar contra o desmatamento, o trabalho escravo e a invasão de terra indígenas.

## **Órgãos divergem sobre presença de vírus da dengue tipo 4 na Paraíba**

Boletim divulgado pelo Ministério da Saúde aponta casos no estado. Secretaria de Saúde diz que registrou apenas casos dos tipos 1 e 2.

## **Projeto BR-163 é avaliado**

Avaliar as atividades desenvolvidas pelas organizações parceiras do Projeto BR 163 "Floresta, Desenvolvimento e Participação nos municípios paraenses de Santarém e Itaituba foi o objetivo da missão de monitoramento realizada pelo consultor da União Europeia, Simone Arzeni, nos dias 15 e 16 de maio.

## **Primeira nave privada parte em viagem à estação espacial neste sábado**

Missão é um teste de acoplamento ao complexo orbital. Se tudo der certo, voo inicia nova era de exploração espacial.

## **Comunidades tradicionais e índios debatem Rio+20**

O encontro faz parte de uma série que envolve ainda outros setores: trabalhadores, ONGs ambientalistas, setor privado, comunidade acadêmica e movimentos sociais.

## **Seca: prejuízos superam os R\$ 52 milhões em Alagoas**

Além de Alagoas, a seca atinge a Bahia e Pernambuco.

## **Feira de ciências nos EUA premia 7 alunos brasileiros de ensino médio**

Trabalhos foram elogiados por empresas e universidades americanas. Feira teve 1.500 participantes de 70 países.

## **PF fecha lixão a céu aberto no Rio de Janeiro**

A operação faz parte do Programa Lixão Zero da Secretaria de Estado do Ambiente, cuja meta é acabar com todos os lixões a céu aberto no Rio de Janeiro até 2014, transferindo o destino final dos resíduos para aterros sanitários.

## **Ausências não diminuem importância da Rio+20, diz embaixador brasileiro**

André Corrêa do Lago confirmou presença de cem chefes de Estado. ONU lançou relatório no Rio de Janeiro sobre desenvolvimento sustentável.

## **Governo quer incentivar produção e consumo de produtos orgânicos no país**

O governo prepara uma política nacional de agroecologia e produção orgânica para ampliar para 300 mil, até 2014, o número de famílias envolvidas na produção de produtos agroecológicos.

## **14 / 05 / 2012 Pesquisa confirma que aumento de CO<sub>2</sub> inicia aquecimento**

Caiu um dos últimos bastiões dos que argumentam que a queima de combustíveis fósseis não aquece a Terra.

## **16 / 05 / 2012 População e consumismo ameacam o planeta, alerta estudo do WWF**

Quanto maior a pegada ecológica, maior é consumo de recursos naturais. Ranking aponta o Qatar com a maior pegada; ONG aponta Brasil como 56º.

## **18 / 05 / 2012 Técnica permite fazer tijolos a partir de lixo orgânico em Araraquara/SP**

Tijolos orgânicos podem ser até 50% mais baratos que os convencionais. Produção sustentável pode servir de alternativa para o lixo doméstico.

## **15 / 05 / 2012 Economistas sugerem formas mais baratas de salvar o mundo**

Equipe pede mudanças nas prioridades globais e propõe mais pesquisas para tornar produção de alimentos mais eficiente.

## **17 / 05 / 2012 Menos de um quarto dos brasileiros sabe o que é a Rio+20, diz pesquisa**

Estudo feito em oito países entrevistou 8 mil pessoas sobre sustentabilidade. Interesse sobre a conferência da ONU é ainda mais baixo em outras nações.

## **17 / 05 / 2012 Com participação de astronauta, relatório mostra que 'pegada' do Brasil supera a da China e a da Índia**

Pegada ecológica é a quantidade de hectares necessária para suprir as necessidades de consumo de cada ser humano versus a capacidade de regeneração da Terra.

## **18 / 05 / 2012 Itamaraty divulga nomes que vão participar de 'Diálogos' na Rio+20**

Lista parcial tem 78 nomes de especialistas que vão discutir dez temas. Diálogos para o Desenvolvimento Sustentável ocorrem de 16 a 19 de junho.

## **16 / 05 / 2012 Estudo: cães podem ter feito homem moderno superar Neandertal**

O pesquisador Pat Shipman afirma que as vantagens de um cão domesticado foram tão fundamentais para a evolução do homem que o fez 'derrotar' as espécies primatas competidoras.

## **14 / 05 / 2012 Lei florestal ganha apoio de ruralistas na internet**

Em reação à campanha ambientalista "Veta, Dilma", o movimento "Não Veta, Dilma", com perfil no Twitter e site ([www.naovetadilma.com](http://www.naovetadilma.com)), começou a divulgar e-mails na última quarta-feira.

## **15 / 05 / 2012 Enterrar CO2 no mar pode ser alternativa para reduzir poluição**

Uma quantidade entre 80 kg e 800 kg de CO2 vai ser bombeada diariamente no leito do mar pelos próximos 30 dias de testes, que contarão com a presença de uma equipe de cientistas japoneses.

## **15 / 05 / 2012 Mendes Ribeiro diz que artigos do Código Florestal sobre recomposição de APPs estão inadequados**

O ministro da Agricultura, Mendes Ribeiro Filho, disse na segunda-feira (14) que o governo está examinando "exaustivamente" o texto do novo Código Florestal Brasileiro para tomar a decisão de vetá-lo totalmente ou parcialmente.

## **16 / 05 / 2012 Estudo recomenda governo aumentar limite às margens de rio**

A ANA sugere que os limites de recuperação de floresta em beira de rios pequenos sejam ampliados.

## **16 / 05 / 2012 Rio+20: com Ronaldo e Bündchen, ONU pede participação da sociedade**

Com o nome "Eu Sou Nós", a versão local da campanha global The Future We Want (O Futuro que Queremos) incentiva a população a participar das discussões sobre o meio ambiente e buscar o pensamento coletivo enviando textos, fotos ou vídeos através da internet.

## **15 / 05 / 2012 ONU lança campanha de discussão global na internet para Rio+20**

Ação convida população a compartilhar ideias para um futuro melhor. ONU também lançou agenda que visa reunir eventos da conferência.

## **14 / 05 / 2012 Cooperativa de reciclagem gera renda de R\$ 1,5 mil para 90 trabalhadores na Grande São Paulo**

A Cooperativa de Catadores Autônomos de Materiais Recicláveis da Vila Esperança foi criada há seis anos por 40 pessoas, em Santana de Parnaíba, após a prefeitura fechar o lixão da cidade.

## **14 / 05 / 2012 Representantes da Cúpula dos Povos criticam 'economia verde' no Rio**

Grupo reunido no Centro diz rejeitar mercantilização da natureza. 'População precisa despertar para o ecocídio', afirma boliviano.

## **18 / 05 / 2012 Agência de águas recomenda faixa mínima de 30 metros de vegetação nas margens de rios**

A faixa de vegetação nas margens dos rios brasileiros tem que ser de, no mínimo, 30 metros, e o governo terá que criar políticas para reduzir os prejuízos dos agricultores, principalmente de pequenas propriedades, com a recuperação dessas áreas.

## **18 / 05 / 2012 Secretários de Meio Ambiente propõem taxar empresas poluidoras**

Secretários de Meio Ambiente de 21 capitais divulgaram na quinta-feira (17) a Carta Rio pela Sustentabilidade, sugerindo a criação de fundos financeiros baseados na taxação de produtos e serviços não sustentáveis.

## **17 / 05 / 2012 Brigitte Bardot propõe ser presa no lugar do Paul Watson**

Atriz francesa afirmou estar escandalizada com prisão do fundador da ONG Sea Shepherd.

## **15 / 05 / 2012 Partes do Monte Fuji podem desmoronar se falha se deslocar**

Cientistas da Universidade de Tóquio afirmam que falha seria capaz de produzir terremoto de 7 graus de magnitude.

## **17 / 05 / 2012 Chance de limitar aumento de temperatura está acabando, diz AIE**

Cientistas afirmam que aumento superior a 2 graus Celsius poderá resultar em clima instável, onde extremos climáticos são comuns.

## **18 / 05 / 2012 Governo nomeia funcionário do Meio Ambiente como presidente do Ibama**

Curt Trennepohl foi exonerado do cargo para tratamento de saúde. Assume Volney Zanardi Junior, que trabalhava em departamento do MMA.

## **14 / 05 / 2012 Japão enfrentará "extinção populacional" em mil anos**

Os cientistas da cidade de Sendai afirmaram que a quantidade de crianças e adolescentes até 14 anos, que são agora 16,6 milhões, está encolhendo a uma taxa de uma a cada cem segundos.

## **17 / 05 / 2012 Mudança climática pode vir rápido demais para alguns mamíferos**

Estudo analisou capacidade de espécies para se deslocar a outro habitat. Primatas estão entre os mais afetados, apontam pesquisadores.

## **16 / 05 / 2012 Cientistas criam método para medir emissões de dióxido de carbono**

Pesquisadores de Utah detectaram alterações entre o dia e a noite. Objetivo é conseguir prever padrões de CO<sub>2</sub> concentrados no ar.

## **17 / 05 / 2012 Em junho, Vênus transita em frente ao Sol pela última vez até 2117**

Vênus, o segundo planeta do Sistema Solar em ordem de distância do Sol e o terceiro menor, transitará diante do astro rei entre 5 e 6 de junho.

## **14 / 05 / 2012 Brasil quer acordo para manejo da vida marinha**

O Brasil quer que a Rio+20 termine com um acordo para a regulamentação da exploração da biodiversidade dos oceanos.

## **17 / 05 / 2012 Brasil vai defender criação de novo índice para medir desenvolvimento mundial durante a Rio+20**

Segundo Karen Suassuna, diretora de Mudanças Climáticas do Ministério do Meio Ambiente, as métricas utilizadas hoje, como o Produto Interno Bruto e o Índice de Desenvolvimento Social, não traduzem mais a realidade dos países.

## **15 / 05 / 2012 Países começam nova rodada de negociações climáticas na Alemanha**

Chefe da ONU para o clima pede discurso mais concreto sobre o tema. É o primeiro encontro desde a COP 17, realizada na África do Sul.

## **15 / 05 / 2012 Greenpeace liga desmatamento no Brasil a produção de carros nos EUA**

Produção de ferro-gusa utilizaria carvão extraído ilegalmente da Amazônia. Siderúrgicas do PA e MA venderiam matéria-prima do aço para montadoras.

## **SCIENCE**

Precambrian sedimentary basins of India: an appraisal of their petroleum potential

Prem Shanker Ojha  
Geological Society, London, Special Publications. published 23 May  
2012, 10.1144/SP366.11  
<http://sp.lyellcollection.org/cgi/content/abstract/SP366.11v1?ct=ct>

Zircon Trace Element and O-Hf Isotope Analyses of Mineralized Intrusions from El Teniente Ore Deposit, Chilean Andes: Constraints on the Source and Magmatic Evolution of Porphyry Cu-Mo Related Magmas

M. Munoz, R. Charrier, C. M. Fanning, V. Maksaev, and K. Deckart  
J. Petrology. 2012; 53(6): p. 1091-1122  
<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1091?ct=ct>

Magma Evolution in the Primitive, Intra-oceanic Tonga Arc: Petrogenesis of Basaltic Andesites at Tofua Volcano

J. T. Caulfield, S. P. Turner, I. E. M. Smith, L. B. Cooper, and G. A. Jenner  
J. Petrology. 2012; 53(6): p. 1197-1230  
<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1197?ct=ct>

Magma Evolution in the Primitive, Intra-oceanic Tonga Arc: Petrogenesis of Basaltic Andesites at Tofua Volcano

J. T. Caulfield, S. P. Turner, I. E. M. Smith, L. B. Cooper, and G. A. Jenner  
J. Petrology. 2012; 53(6): p. 1197-1230  
<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1197?ct=ct>

A Chill Sequence to the Bushveld Complex: Insight into the First Stage of

Emplacement and Implications for the Parental Magmas

Allan H. Wilson

J. Petrology. 2012; 53(6): p. 1123-1168

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1123?ct=ct>

Hornblende Chemistry in Meta- and Diatexites and its Retention in the Source of Leucogranites: an Example from the Karakoram Shear Zone, NW India

Henning Reichardt and Roberto F. Weinberg

J. Petrology. 2012; 53(6): p. 1287-1318

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1287?ct=ct>

The Origin of Garnets in Andesitic Rocks from the Northland Arc, New Zealand, and their Implication for Sub-arc Processes

P. Bach, I. E. M. Smith, and J. G. Malpas

J. Petrology. 2012; 53(6): p. 1169-1195

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1169?ct=ct>

The Origin of Garnets in Andesitic Rocks from the Northland Arc, New Zealand, and their Implication for Sub-arc Processes

P. Bach, I. E. M. Smith, and J. G. Malpas

J. Petrology. 2012; 53(6): p. 1169-1195

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1169?ct=ct>

Undergraduate teaching and learning in physical geography

Terence Day

Progress in Physical Geography. 2012; 36(3): p. 305-332

<http://ppg.sagepub.com/cgi/content/abstract/36/3/305?ct=ct>

On the Recycling of Amphibole-rich Ultramafic Intrusive Rocks in the Arc Crust: Evidence from Shikanoshima Island (Kyushu, Japan)

M. Tiepolo, A. Langone, T. Morishita, and M. Yuhara

J. Petrology. 2012; 53(6): p. 1255-1285

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1255?ct=ct>

On the Recycling of Amphibole-rich Ultramafic Intrusive Rocks in the Arc

Crust: Evidence from Shikanoshima Island (Kyushu, Japan)

M. Tiepolo, A. Langone, T. Morishita, and M. Yuhara

J. Petrology. 2012; 53(6): p. 1255-1285

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1255?ct=ct>

Magma Evolution in the Primitive, Intra-oceanic Tonga Arc: Rapid Petrogenesis of Dacites at Fonualei Volcano

Simon Turner, John Caulfield, Tracy Rushmer, Michael Turner, Shane

Cronin, Ian Smith, and Heather Handley

J. Petrology. 2012; 53(6): p. 1231-1253

<http://petrology.oxfordjournals.org/cgi/content/abstract/53/6/1231?ct=ct>

Effects of climate change on mass movements in mountain environments

Markus Stoffel and Christian Huggel

Progress in Physical Geography. 2012; 36(3): p. 421-439

<http://ppg.sagepub.com/cgi/content/abstract/36/3/421?ct=ct>

Being Critical in Marketing Studies: The Imperative of Macro Perspectives

Nikhilesh Dholakia

Journal of Macromarketing. 2012; 32(2): p. 220-225

<http://jmk.sagepub.com/cgi/content/abstract/32/2/220?ct=ct>

Washburn AL (1956) Classification of patterned ground and review of suggested origins. Geological Society of America Bulletin 67(7): 823-865.

Carol F. Sawyer

Progress in Physical Geography. 2012; 36(3): p. 440-448

<http://ppg.sagepub.com/cgi/reprint/36/3/440?ct=ct>

Why might they be giants? Towards an understanding of polar gigantism

Amy L. Moran and H. Arthur Woods

J. Exp. Biol. 2012; 215(12): p. 1995-2002

<http://jeb.biologists.org/cgi/content/abstract/215/12/1995?ct=ct>

Research resource review: River Discharge to the Coastal Ocean: A Global Synthesis

Philip N. Owens

Progress in Physical Geography. 2012; 36(3): p. 449-450

<http://ppg.sagepub.com/cgi/reprint/36/3/449?ct=ct>

Out of the Neotropics: Late Cretaceous colonization of Australasia by American arthropods

Prashant P. Sharma and Gonzalo Giribet

Proc R Soc B. published 23 May 2012, 10.1098/rspb.2012.0675

<http://rspb.royalsocietypublishing.org/cgi/content/abstract/rspb.2012.0675v1?ct=ct>

New insights into the morphology and sedimentary processes along the western slope of Great Bahama Bank

T. Mulder, E. Ducassou, G.P. Eberli, V. Hanquiez, E. Gonthier, P.

Kindler, M. Principaud, F. Fournier, P. Leonide, I. Billeaud, B.

Marsset, J.J.G. Reijmer, C. Bondu, R. Joussiaume, and M. Pakiades

Geology. published 23 May 2012, 10.1130/G32972.1

<http://geology.gsapubs.org/cgi/content/abstract/G32972.1v1?ct=ct>

Testing models of dental development in the earliest bony vertebrates, Andreolepis and Lophosteus

John A. Cunningham, Martin Rucklin, Henning Blom, Hector Botella, and

Philip C. J. Donoghue

Biol Lett. published 23 May 2012, 10.1098/rsbl.2012.0357

<http://rsbl.royalsocietypublishing.org/cgi/content/abstract/rsbl.2012.0357v1?ct=ct>

Tidal signatures in an intracratonic playa lake

R. Bruce Ainsworth, Stephen T. Hasiotis, Kathryn J. Amos, Carmen B.E.

Krapf, Tobias H.D. Payenberg, Marianne L. Sandstrom, Boyan K.

Vakarelov, and Simon C. Lang

Geology. published 23 May 2012, 10.1130/G32993.1

<http://geology.gsapubs.org/cgi/content/abstract/G32993.1v1?ct=ct>

P-wave velocity differences between surface-derived and core samples from the Sulu ultrahigh-pressure terrane: Implications for in situ velocities at great depths

Shengsi Sun, Shaocheng Ji, Qian Wang, Matthew Salisbury, and Hartmut Kern

Geology. published 23 May 2012, 10.1130/G33045.1

<http://geology.gsapubs.org/cgi/content/abstract/G33045.1v1?ct=ct>

Green rust formation controls nutrient availability in a ferruginous water column

Asfaw Zegeye, Steeve Bonneville, Liane G. Benning, Arne Sturm, David A. Fowle, CarriAyne Jones, Donald E. Canfield, Christian Ruby, Lachlan C.

MacLean, Sulung Nomosatryo, Sean A. Crowe, and Simon W. Poulton

Geology. published 23 May 2012, 10.1130/G32959.1

<http://geology.gsapubs.org/cgi/content/abstract/G32959.1v1?ct=ct>

The tectonic significance of dikes of irregular fold-like shape

Elena Druguet, Lina M. Castano, Dyanna M. Czeck, Peter J. Hudleston, and Jordi Carreras

Geology. published 23 May 2012, 10.1130/G32960.1

<http://geology.gsapubs.org/cgi/content/abstract/G32960.1v1?ct=ct>

A Middle Jurassic abelisaurid from Patagonia and the early diversification of theropod dinosaurs

Diego Pol and Oliver W. M. Rauhut

Proc R Soc B. published 23 May 2012, 10.1098/rspb.2012.0660

<http://rspb.royalsocietypublishing.org/cgi/content/abstract/rspb.2012.0660v1?ct=ct>

Half a century of decadal symposia by NAFO and ICES

Pentti Malkki

ICES J. Mar. Sci. published 18 May 2012, 10.1093/icesjms/fss078

<http://icesjms.oxfordjournals.org/cgi/content/abstract/fss078v1?ct=ct>

The geochronology of volcanic and plutonic rocks at the Questa caldera:

Constraints on the origin of caldera-related silicic magmas

Matthew J. Zimmerer and William C. McIntosh

Geological Society of America Bulletin. published 18 May 2012,

10.1130/B30544.1

<http://gsabulletin.gsapubs.org/cgi/content/abstract/B30544.1v1?ct=ct>

Structure, geochemistry, and tectonic evolution of trench-distal backarc oceanic crust in the western Norwegian Caledonides, Solund-Stavfjord ophiolite (Norway)

Harald Furnes, Yildirim Dilek, and Rolf Birger Pedersen

Geological Society of America Bulletin. published 18 May 2012,

10.1130/B30561.1

<http://gsabulletin.gsapubs.org/cgi/content/abstract/B30561.1v1?ct=ct>

Geomorphologic evidence for the late Pliocene onset of hyperaridity in the Atacama Desert

Ronald Amundson, William Dietrich, Dino Bellugi, Stephanie Ewing, Kunihiko Nishiizumi, Guillermo Chong, Justine Owen, Robert Finkel, Arjun Heimsath, Brian Stewart, and Marc Caffee  
Geological Society of America Bulletin. published 18 May 2012, 10.1130/B30445.1

<http://gsabulletin.gsapubs.org/cgi/content/abstract/B30445.1v1?ct=ct>

P Segall

Geophysics. Understanding earthquakes.  
Science 11 May 2012 336(6082): p. 676.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582249>

S Barbot, N Lapusta, and JP Avouac

Under the hood of the earthquake machine: toward predictive modeling of the seismic cycle.  
Science 11 May 2012 336(6082): p. 707.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582259>

M Stibal, J Baelum, WE Holben, SR Sorensen, A Jensen, and CS Jacobsen

Microbial degradation of 2,4-dichlorophenoxyacetic acid on the Greenland ice sheet.  
Appl Environ Microbiol 11 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582066>

LY Liu, JZ Wang, GL Wei, YF Guan, and EY Zeng

Polycyclic aromatic hydrocarbons (PAHs) in continental shelf sediment of China: Implications for anthropogenic influences on coastal marine environment.

Environ Pollut 8 May 2012 167C: p. 155.  
<http://highwire.stanford.edu/cgi/medline/pmid;22575096>

MC De Sanctis, E Ammannito, MT Capria, F Tosi, F Capaccioni, F Zambon, F Carraro, S Fonte, A Frigeri, R Jaumann, G Magni, S Marchi, TB McCord, LA McFadden, HY McSween, DW Mittlefehldt, A Nathues, E Palomba, CM Pieters, CA Raymond, CT Russell, MJ Toplis, and D Turrini

Spectroscopic characterization of mineralogy and its diversity across Vesta.  
Science 11 May 2012 336(6082): p. 697.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582257>

J Wang, X Feng, CW Anderson, Y Xing, and L Shang

Remediation of mercury contaminated sites - A review.  
J Hazard Mater 21 Apr 2012.

<http://highwire.stanford.edu/cgi/medline/pmid;22579459>

S Liu, GG Ying, LJ Zhou, RQ Zhang, ZF Chen, and HJ Lai

Steroids in a typical swine farm and their release into the environment.  
Water Res 11 Apr 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22591816>

T Chen and MX Yang

[Gemology characterization and identification of beryllium diffused, heated and untreated bicolor sapphires from Changde City, China].  
Guang Pu Xue Yu Guang Pu Fen Xi 1 Mar 2012 32(3): p. 651.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582625>

MC De Sanctis, E Ammannito, MT Capria, F Tosi, F Capaccioni, F Zambon, F Carraro, S Fonte, A Frigeri, R Jaumann, G Magni, S Marchi, TB McCord, LA McFadden, HY McSween, DW Mittlefehldt, A Nathues, E Palomba, CM Pieters, CA Raymond, CT Russell, MJ Toplis, and D Turrini

Spectroscopic characterization of mineralogy and its diversity across Vesta.  
Science 11 May 2012 336(6082): p. 697.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582257>

CT Russell, CA Raymond, A Coradini, HY McSween, MT Zuber, A Nathues, MC De Sanctis, R Jaumann, AS Konopliv, F Preusker, SW Asmar, RS Park, R Gaskell, HU Keller, S Mottola, T Roatsch, JE Scully, DE Smith, P Tricarico, MJ Toplis, UR Christensen, WC Feldman, DJ Lawrence, TJ McCoy, TH Prettyman, RC

Reedy, ME Sykes, and TN Titus  
Dawn at Vesta: testing the protoplanetary paradigm.  
Science 11 May 2012 336(6082): p. 684.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582253>

D Loomis, JM Dement, L Elliott, D Richardson, ED Kuempel, and L Stayner  
Increased lung cancer mortality among chrysotile asbestos textile workers is more strongly associated with exposure to long thin fibres.  
Occup Environ Med 12 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22581965>

S Marchi, HY McSween, DP O'Brien, P Schenk, MC De Sanctis, R Gaskell, R Jaumann, S Mottola, F Preusker, CA Raymond, T Roatsch, and CT Russell  
The violent collisional history of asteroid 4 Vesta.  
Science 11 May 2012 336(6082): p. 690.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582255>

W Barzilay  
[The development of Rein van Bemmelen (1904-1983) undation theory: forty years of Dutch geology].  
Studium (Rotterdam) 1 Jan 2009 2(1): p. 4.  
<http://highwire.stanford.edu/cgi/medline/pmid;22586775>

R Jaumann, DA Williams, DL Buczkowski, RA Yingst, F Preusker, H Hiesinger, N Schmedemann, T Kneissl, JB Vincent, DT Blewett, BJ Buratti, U Carsenty, BW Denevi, MC De Sanctis, WB Garry, HU Keller, E Kersten, K Krohn, JY Li, S Marchi, KD Matz, TB McCord, HY McSween, SC Mest, DW Mittlefehldt, S Mottola, A Nathues, G Neukum, DP O'Brien, CM Pieters, TH Prettyman, CA Raymond, T Roatsch, CT Russell, P Schenk, BE Schmidt, F Scholten, K Stephan, MV Sykes, P Tricarico, R Wagner, MT Zuber, and H Sierks  
Vesta's shape and morphology.  
Science 11 May 2012 336(6082): p. 687.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582254>

P Schenk, DP O'Brien, S Marchi, R Gaskell, F Preusker, T Roatsch, R Jaumann, D Buczkowski, T McCord, HY McSween, D Williams, A Yingst, C Raymond, and C Russell  
The geologically recent giant impact basins at Vesta's south pole.  
Science 11 May 2012 336(6082): p. 694.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582256>

GC Jones, RP van Hille, and ST Harrison  
Reactive oxygen species generated in the presence of fine pyrite particles and its implication in thermophilic mineral bioleaching.  
Appl Microbiol Biotechnol 16 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22584431>

C Napoli, V Crudele, A Soricelli, M Al-Omran, N Vitale, T Infante, and FP Mancini  
Primary prevention of atherosclerosis: a clinical challenge for the reversal of epigenetic mechanisms?  
Circulation 15 May 2012 125(19): p. 2363.  
<http://highwire.stanford.edu/cgi/medline/pmid;22586291>

Abstracts of the 7th World Research Congress of the European Association for Palliative Care (EAPC).  
Palliat Med 1 Jun 2012 26(4): p. 384.  
<http://highwire.stanford.edu/cgi/medline/pmid;22585597>

E Kelepertzis, A Argyraki, E Valakos, and E Daftsis  
Distribution and Accumulation of Metals in Tadpoles Inhabiting the Metalliferous Streams of Eastern Chalkidiki, Northeast Greece.  
Arch Environ Contam Toxicol 17 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22592350>

M Sinan Ozeren  
Crust-mantle mechanical coupling in Eastern Mediterranean and Eastern Turkey.  
Proc Natl Acad Sci U S A 16 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22592788>

M Hvistendahl

Paleobotany. Primeval land rises from the ashes.  
Science 11 May 2012 336(6082): p. 662.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582238>

MM Martel, M Nikolas, K Jernigan, K Friderici, and JT Nigg  
Diversity in Pathways to Common Childhood Disruptive Behavior  
Disorders.  
J Abnorm Child Psychol 15 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22584505>

M Hvistendahl  
Paleobotany. Primeval land rises from the ashes.  
Science 11 May 2012 336(6082): p. 662.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582238>

JC Murphy  
Marine Invasions by Non-Sea Snakes, with Thoughts on  
Terrestrial-Aquatic-Marine Transitions.  
Integr Comp Biol 10 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22576813>

X Bonnet  
Long-term Field Study of Sea Kraits in New Caledonia: Fundamental  
Issues and Conservation.  
Integr Comp Biol 10 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22576814>

M Wilding, M Guthrie, S Kohara, CL Bull, J Akola, and MG Tucker  
The structure of MgO-SiO<sub>2</sub> glasses at elevated pressure.  
J Phys Condens Matter 6 Jun 2012 24(22): p. 225403.  
<http://highwire.stanford.edu/cgi/medline/pmid;22580970>

CT Russell, CA Raymond, A Coradini, HY McSween, MT Zuber, A Nathues, MC De  
Sanctis, R Jaumann, AS Konopliv, F Preusker, SW Asmar, RS Park, R Gaskell,  
HU Keller, S Mottola, T Roatsch, JE Scully, DE Smith, P Tricarico, MJ  
Toplis, UR Christensen, WC Feldman, DJ Lawrence, TJ McCoy, TH Prettyman, RC  
Reedy, ME Sykes, and TN Titus  
Dawn at Vesta: testing the protoplanetary paradigm.  
Science 11 May 2012 336(6082): p. 684.  
<http://highwire.stanford.edu/cgi/medline/pmid;22582253>

K Gurevicius, A Lipponen, and H Tanila  
Increased Cortical and Thalamic Excitability in Freely Moving  
APPswe/PS1dE9 Mice Modeling Epileptic Activity Associated with  
Alzheimer's Disease.  
Cereb Cortex 10 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22581851>

PJ Krug, D Gordon, and MR Romero  
Seasonal Polyphenism in Larval Type: Rearing Environment Influences  
the Development Mode Expressed by Adults in the Sea Slug *Alderia*  
*willowi*.  
Integr Comp Biol 10 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22576812>

NL Adams, JP Campanale, and KR Foltz  
Proteomic Responses of Sea Urchin Embryos to Stressful Ultraviolet  
Radiation.  
Integr Comp Biol 10 May 2012.  
<http://highwire.stanford.edu/cgi/medline/pmid;22576820>

Direct chemical evidence for eumelanin pigment from the Jurassic period  
Keely Glass, Shosuke Ito, Philip R. Wilby, Takayuki Sota, Atsushi  
Nakamura, C. Russell Bowers, Jakob Vinther, Suryendu Dutta, Roger  
Summons, Derek E. G. Briggs, Kazumasa Wakamatsu, and John D. Simon  
PNAS. published 21 May 2012, 10.1073/pnas.1118448109  
<http://www.pnas.org/cgi/content/abstract/1118448109v1?ct=ct>

Arthur C. Clarke and the Limitations of the Ocean as a Frontier  
Helen M. Rozwadowski  
Environmental History. published 21 May 2012, 10.1093/envhis/ems046  
<http://envhis.oxfordjournals.org/cgi/content/abstract/ems046v1?ct=ct>

Transmission electron microscopy investigation of colloids and particles

from landfill leachates

Marek Matura, Vojtech Ettler, and Mariana Klementova  
Waste Management Research. 2012; 30(5): p. 530-541  
<http://wmr.sagepub.com/cgi/content/abstract/30/5/530?ct=ct>

Sulfur in Magmas and Melts: Its Importance for Natural and Technical Processes

Stephen Barnes  
Economic Geology. 2012; 107(4): p. 737  
<http://economicgeology.org/cgi/content/extract/107/4/737?ct=ct>

Proceedings, Great Basin Evolution and Metallogeny: Geological Society of Nevada 2010 Symposium

Robert D. Thomas, Jr.  
Economic Geology. 2012; 107(4): p. 738-739  
<http://economicgeology.org/cgi/content/extract/107/4/738?ct=ct>

A Democracy of Facts: Natural History in the Early Republic

Susan Scott Parrish  
Journal of American History. 2012; 99(1): p. 293-294  
<http://jah.oxfordjournals.org/cgi/content/full/99/1/293?ct=ct>

The Physical Hydrogeology of Ore Deposits

S. E. Ingebritsen and M. S. Appold  
Economic Geology. 2012; 107(4): p. 559-584  
<http://economicgeology.org/cgi/content/abstract/107/4/559?ct=ct>

PETROGRAPHY, CHEMISTRY, AND NEAR-INFRARED MICROTHERMOMETRY OF INDIUM-BEARING SPHALERITE FROM THE TOYOHASHI POLYMETALLIC DEPOSIT, JAPAN

Toru Shimizu and Yuichi Morishita  
Economic Geology. 2012; 107(4): p. 723-735  
<http://economicgeology.org/cgi/content/abstract/107/4/723?ct=ct>

Petrology, Geochemistry, and Stable Isotope Studies of the Chehelkureh Cu-Zn-Pb Deposit, Zahedan, Iran

Mohammad Maanijou, Iraj Rasa, and David R. Lentz  
Economic Geology. 2012; 107(4): p. 683-712  
<http://economicgeology.org/cgi/content/abstract/107/4/683?ct=ct>

Insights into the Liquid Bismuth Collector Model Through Analysis of the Bi-Au Stormont Skarn Prospect, Northwest Tasmania

Amy B.D. Cockerton and Andrew G. Tomkins  
Economic Geology. 2012; 107(4): p. 667-682  
<http://economicgeology.org/cgi/content/abstract/107/4/667?ct=ct>

Crustally Contaminated Komatiite: Primary Source of the Chromitites and Marginal, Lower, and Critical Zone Magmas in a Staging Chamber Beneath the Bushveld Complex

H. V. Eales and G. Costin  
Economic Geology. 2012; 107(4): p. 645-665  
<http://economicgeology.org/cgi/content/abstract/107/4/645?ct=ct>

Geochemical Evolution of the Banded Iron Formation-Hosted High-Grade Iron Ore System in the Koolyanobbing Greenstone Belt, Western Australia

Thomas Angerer, Steffen G. Hagemann, and Leonid V. Danyushevsky  
Economic Geology. 2012; 107(4): p. 599-644  
<http://economicgeology.org/cgi/content/abstract/107/4/599?ct=ct>

AN Re-Os DATE FOR MOLYBDENITE-BEARING QUARTZ VEIN MINERALIZATION WITHIN THE KANGERLUSSUAQ ALKALINE COMPLEX, EAST GREENLAND: IMPLICATIONS FOR THE TIMING OF REGIONAL METALLOGENESIS

D. A. Holwell, D. Selby, A. J. Boyce, J. A. Gilbertson, and T. Abraham-James  
Economic Geology. 2012; 107(4): p. 713-722  
<http://economicgeology.org/cgi/content/abstract/107/4/713?ct=ct>

## INTERESTING PAPERS IN OTHER JOURNALS

Economic Geology. 2012; 107(4): p. 741-743  
<http://economicgeology.org/cgi/reprint/107/4/741?ct=ct>

Targeting Iron Ore in Banded Iron Formations Using ASTER Data: Weld Range Greenstone Belt, Yilgarn Craton, Western Australia

Paul Duuring, Steffen G. Hagemann, Yulia Novikova, Tom Cudahy, and

Carsten Laukamp  
Economic Geology. 2012; 107(4): p. 585-597  
<http://economicgeology.org/cgi/content/abstract/107/4/585?ct=ct>

Transforming Siberia along the Laurussian margin  
James W. Sears  
Geology. 2012; 40(6): p. 535-538  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/535?ct=ct>

Early Cambrian metazoans in fluvial environments, evidence of the non-marine Cambrian radiation: COMMENT  
Neil S. Davies and Martin R. Gibling  
Geology. 2012; 40(6): p. e270 Open Access  
<http://geology.gsapubs.org/cgi/content/full/40/6/e270?ct=ct>

Fluid-mineral reactions and trace metal mobilization in an exhumed natural CO<sub>2</sub> reservoir, Green River, Utah  
Max Wigley, Niko Kampman, Benoit Dubacq, and Mike Bickle  
Geology. 2012; 40(6): p. 555-558  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/555?ct=ct>

Large-scale liquid immiscibility at the top of the Bushveld Complex, South Africa  
J.A. VanTongeren and E.A. Mathez  
Geology. 2012; 40(6): p. 491-494  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/491?ct=ct>

Lower crustal H<sub>2</sub>O controls on the formation of adakitic melts  
G.F. Zellmer, Y. Iizuka, M. Miyoshi, Y. Tamura, and Y. Tatsumi  
Geology. 2012; 40(6): p. 487-490  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/487?ct=ct>

Survival of a submarine canyon during long-term outbuilding of a continental margin  
David Amblas, T.P. Gerber, B. De Mol, R. Urgeles, D. Garcia-Castellanos, M. Canals, L.F. Pratson, N. Robb, and Jason Canning  
Geology. 2012; 40(6): p. 543-546  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/543?ct=ct>

A summertime rainy season in the Arctic forests of the Eocene  
Brian A. Schubert, A. Hope Jahren, Jaelyn J. Eberle, Leonel S.L. Sternberg, and David A. Eberth  
Geology. 2012; 40(6): p. 523-526  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/523?ct=ct>

Storm and fair-weather wave base: A relevant distinction?  
Shanan E. Peters and Dylan P. Loss  
Geology. 2012; 40(6): p. 511-514  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/511?ct=ct>

Substantial biologically mediated phosphorus depletion from the surface of a Middle Cambrian paleosol  
L.B. Horodyskyj, T.S. White, and L.R. Kump  
Geology. 2012; 40(6): p. 503-506  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/503?ct=ct>

Methane seeps as ammonite habitats in the U.S. Western Interior Seaway revealed by isotopic analyses of well-preserved shell material  
Neil H. Landman, J. Kirk Cochran, Neal L. Larson, Jamie Brezina, Matthew P. Garb, and Peter J. Harries  
Geology. 2012; 40(6): p. 507-510  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/507?ct=ct>

Oxygen isotopic evidence for Late Triassic monsoonal upwelling in the northwestern Tethys  
M. Rigo, J.A. Trotter, N. Preto, and I.S. Williams  
Geology. 2012; 40(6): p. 515-518  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/515?ct=ct>

ERRATUM: World's largest extrusive body of sand?  
Helge Loseth, Nuno Rodrigues, and Peter R. Cobbold  
Geology. 2012; 40(6): p. 562  
<http://geology.gsapubs.org/cgi/content/full/40/6/562?ct=ct>

Going nano: A new step toward understanding the processes governing freshwater ooid formation

Muriel Paclot, Daniel Ariztegui, David Wacey, Matt R. Kilburn, Claire Rollion-Bard, Redha Farah, and Crisogono Vasconcelos  
Geology. 2012; 40(6): p. 547-550  
<http://geology.gsapubs.org/cgi/content/abstract/40/6/547?ct=ct>

A Geological Excursion Guide to the North-West Highlands of Scotland

Scottish Journal of Geology. 2012; 48(1): p. 73-b-76-b  
<http://sjg.lyellcollection.org/cgi/content/extract/48/1/73-b?ct=ct>

Introducing Palaeontology: A Guide to Ancient Life

Scottish Journal of Geology. 2012; 48(1): p. 73-a-76-a  
<http://sjg.lyellcollection.org/cgi/content/extract/48/1/73-a?ct=ct>

Continental Tectonics and Mountain Building: The Legacy of Peach and Horne

Scottish Journal of Geology. 2012; 48(1): p. 73-76  
<http://sjg.lyellcollection.org/cgi/content/extract/48/1/73?ct=ct>

A hydrothermal seep on the Costa Rica margin: middle ground in a continuum of reducing ecosystems

Lisa A. Levin, Victoria J. Orphan, Greg W. Rouse, Anthony E. Rathburn, William Ussler, III, Geoffrey S. Cook, Shana K. Goffredi, Elena M. Perez, Anders Waren, Benjamin M. Grupe, Grayson Chadwick, and Bruce Strickrott  
Proc R Soc B. 2012; 279(1738): p. 2580-2588  
<http://rspb.royalsocietypublishing.org/cgi/content/abstract/279/1738/2580?ct=ct>

O' mother where wert thou? Maternal strategies in the southern elephant seal: a stable isotope investigation

Matthieu Authier, Anne-Cecile Dragon, Pierre Richard, Yves Cherel, and Christophe Guinet  
Proc R Soc B. 2012; 279(1738): p. 2681-2690  
<http://rspb.royalsocietypublishing.org/cgi/content/abstract/279/1738/2681?ct=ct>

Ni ENRICHMENT AND STABILITY OF AI-FREE GARNIERITE SOLID-SOLUTIONS: A THERMODYNAMIC APPROACH

S. Gali, J. M. Soler, J. A. Proenza, J. F. Lewis, J. Cama, and E. Tauler  
Clays and Clay Minerals. 2012; 60(2): p. 121-135  
<http://ccm.geoscienceworld.org/cgi/content/abstract/60/2/121?ct=ct>

TRITIUM CONTENT OF CLAY MINERALS

Thomas M. Marston, W. T. Parry, John R. Bowman, and D. Kip Solomon  
Clays and Clay Minerals. 2012; 60(2): p. 186-199  
<http://ccm.geoscienceworld.org/cgi/content/abstract/60/2/186?ct=ct>

Direction-Specific Interactions Control Crystal Growth by Oriented Attachment

Dongsheng Li, Michael H. Nielsen, Jonathan R. I. Lee, Cathrine Frandsen, Jillian F. Banfield, and James J. De Yoreo  
Science. 2012; 336(6084): p. 1014-1018  
<http://www.sciencemag.org/cgi/content/abstract/336/6084/1014?ct=ct>

The Staffa Lava Formation: graben-related volcanism, associated sedimentation and landscape character during the early development of the Palaeogene Mull Lava Field, NW Scotland

Ian T. Williamson and Brian R. Bell  
Scottish Journal of Geology. 2012; 48(1): p. 1-46  
<http://sjg.lyellcollection.org/cgi/content/abstract/48/1/1?ct=ct>

Origin of vein-graphite derived from metamorphic fluids in Moine (Glenfinnan Group) rocks, NW Scotland

A. J. Wright, N. J. F. Blamey, J. Concliffe, A. Costanzo, and J. Parnell  
Scottish Journal of Geology. 2012; 48(1): p. 47-59  
<http://sjg.lyellcollection.org/cgi/content/abstract/48/1/47?ct=ct>

THE EFFECT OF SMECTITE ON THE CORROSION OF IRON METAL

Barbara A. Balko, Stephanie A. Bosse, Anne E. Cade, Elise F. Jones-Landry, James E. Amonette, and John L. Daschbach  
Clays and Clay Minerals. 2012; 60(2): p. 136-152

<http://ccm.geoscienceworld.org/cgi/content/abstract/60/2/136?ct=ct>

Hesperian Age for Western Medusae Fossae Formation, Mars

James R. Zimbelman and Stephen P. Scheidt

Science. published 24 May 2012, 10.1126/science.1221094

<http://www.sciencemag.org/cgi/content/abstract/science.1221094v1?ct=ct>

A Reduced Organic Carbon Component in Martian Basalts

A. Steele, F. M. McCubbin, M. Fries, L. Kater, N. Z. Boctor, M. L.

Fogel, P. G. Conrad, M. Glamocilja, M. Spencer, A. L. Morrow, M. R.

Hammond, R. N. Zare, E. P. Vicenzi, S. Siljeström, R. Bowden, C. D. K.

Herd, B. O. Mysen, S. B. Shirey, H. E. F. Amundsen, A. H. Treiman, E.

S. Bullock, and A. J. T. Jull

Science. published 24 May 2012, 10.1126/science.1220715

<http://www.sciencemag.org/cgi/content/abstract/science.1220715v1?ct=ct>

Speciation in the cardioceratinid ammonites of the Costicardia Subzone

(Cordatum Zone) of the Oxfordian of Skye

J. K. Wright

Scottish Journal of Geology. 2012; 48(1): p. 61-72

<http://sjg.lyellcollection.org/cgi/content/abstract/48/1/61?ct=ct>

Deleterious Reactions of Aggregate With Alkalies in Concrete

Maarten A.T.M. Broekmans

Reviews in Mineralogy and Geochemistry. 2012; 74(1): p. 279-364

<http://rimq.geoscienceworld.org/cgi/content/full/74/1/279?ct=ct>

Supplementary Cementitious Materials

Ruben Snellings, Gilles Mertens, and Jan Elsen

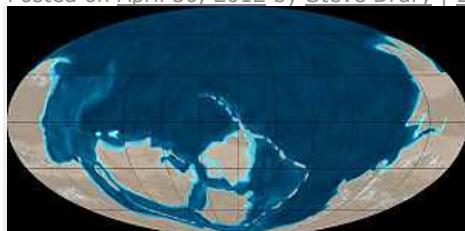
Reviews in Mineralogy and Geochemistry. 2012; 74(1): p. 211-278

<http://rimq.geoscienceworld.org/cgi/content/full/74/1/211?ct=ct>

## EARTH PAGES

### [Origin of the arms race](#)

Posted on April 30, 2012 by Steve Drury | [Leave a comment](#)



Global paleogeographic reconstruction of the Earth in the early Cambrian period 540 million years ago. (credit:Ron Blakey, Northern Arizona University)

Palaeontologists generally agree on one broad aspect of animal evolution: the central role of predation versus defence in animal diversification to occupy different ecological niches. Indeed that co-relation has to an extent been responsible for the diversification of potentially habitable niches themselves. Armour and arms form a dialectic within the animal world, but one that only rose to dominate when hard materials became an integral part of animal morphology, allowing some to bite, gnaw or rasp and others to develop shelly or horny skeletons. The [Kingdom Animalia](#) within the domain of the eukaryotes – organisms based on cells that bear a nucleus – is united by one life style, that of feeding directly or indirectly on other living things. They are heterotrophs unable to generate energy and tissue through the fundamental harnessing of chemistry and physics to use the inorganic world directly, as do autotrophs. One of the earliest discoveries about the history of animals was that fossils in the widely accepted meaning of the word appeared suddenly in the geological record, earlier rocks containing virtually no tangible signs of life: fossils explode in numbers from the start of the Cambrian Period at 542 Ma. Subsequently, geologists did discover imprints of clearly quite complicated organisms in rocks a few tens of million years older than the start of the Cambrian. But these were flaccid, bag like creatures that recent research has shown to rely on filtering microorganisms from water or directly absorbing organic matter through their skin.



An animal from the late Precambrian (Photo credit: Wikipedia)

Another feature of sediments of the oldest Cambrian is that in many parts of the world they rest with or=profound unconformity on deformed older rocks of Precambrian age. Throughout Britain the lowest Cambrian rocks are almost pure quartz sandstones that rest upon older more complex rocks ranging from only a few tens of million years older than 542 Ma to some of the oldest rocks in Europe, the Lewisian complex dating back 3 billion years. Many of the hills of North West Scotland have a gleaming white cap of Lower Cambrian quartzite above what has been termed the Great Unconformity where it occurs in Arizona's Grand Canyon. Sedimentary sequences that continuously record the Precambrian to Cambrian transition and the biological explosion at the juncture are rare. But they show two curious features in sediments that immediately predate those bearing recognisable fossils: a complete lack of evidence for burrowing and millimetre-scale shell-like bodies made of calcium phosphate and carbonate, which are thought to have adorned the skins of otherwise unprotected animals.



Creatures from the Cambrian Period (credit: Wikipedia)

Calcium, while a very common element is one of the most dangerous to life. Traces are essential for the signalling that goes on in cell metabolism, and too little snuffs out those vital processes. Yet too much – still a very low concentration in cell cytoplasm – results in the growth of minute mineral crystals within cells, also spelling cell death. This results from the limited solubility of calcium in water, compared with those of other common metals. At an early stage in evolution cells developed means of restricting the admission of calcium ions and efficient means of expelling excess amounts of calcium. The ubiquitous occurrence of Ca-rich marine limestones throughout the geological record bears witness to two things: the abundance of calcium ions in seawater; a closer look reveals that a great many limestones, going back some 3.5 billion years show traces of biomineralisation that helped form the limey sediments. In the second case, the calcium carbonate in most Precambrian limestones was secreted by photosynthetic blue-green bacteria in minutely thin layers, probably in the form of a slimy film excreted to avoid calcium toxicity. Palaeontologists have long suspected that the earliest skeletal materials formed by animals evolved from the need to excrete biomineralised films by turning a metabolic necessity into functional and integral parts of their body plans: arms and armour. Yet limestones are not rare signs of the presence of a dissolved calcium threat, so why the sudden adoption of waste products in this way?

A fairly old hypothesis is that calcium in seawater must have risen above a threshold that posed toxic threat to all living things and excretion had to increase to maintain the balance, perhaps matched with increasing sizes of animals in the late Precambrian. Only recently has support been found for this suggested evolutionary trigger, initially from analysis of brines trapped in crystalline materials within sediments, such as salt (NaCl). But the very presence of such halite in a sediment is a universally accepted sign of evaporation increasing ionic concentrations in isolated seawater lagoons, whereas a general increase in marine calcium would be needed to present sufficient chemical stress that the whole of animal evolution would require a step-change for survival. It turns out that support for the hypothesis stems from two isotopic systems most usually associated with dating the formation and weathering of continental crust: those of strontium and neodymium. The global record of ratios of  $^{87}\text{Sr}/^{86}\text{Sr}$  and  $^{143}\text{Nd}/^{144}\text{Nd}$  show unusually large changes in the run-up to the Cambrian Period, the first rising to the highest level recorded in geological history and the second reaching a historic nadir during the Cambrian. This anti-correlation signifies the greatest chemical weathering of older continental crust in the [history of the Earth](#) (Peters, S. & Gaines, R.R. 2012. Formation of the 'Great Unconformity' as a trigger for the Cambrian explosion. *Nature*, v. **484**, p. 363-366). Not only would this have poured dissolved ions, including those of calcium, into the oceans and raised their concentrations in seawater, but vast areas of the continents would have been eroded to form huge coastal plains, ripe for marine inundation. The last is exactly what the near-universal unconformity at the base of the Cambrian signifies. Presaging this long drawn-out grinding of continents to their gums had been a protracted bout of continental assembly to form the [Rodinia](#) supercontinent around 1000 Ma through collision and mountain building. Then Rodinia broke apart, its fragments being driven by plate tectonics to reassemble, along with vast chains of new crust formed in volcanic island arcs, by yet more orogenesis: tectonically high-energy times matched by the processes of denudation on land. A nice example of planetary interconnectedness on the largest scale with the greatest conceivable consequences, for we vertebrates anyhow. This comes as a great comfort to me in the twilight of my career, since in 1999 I stuck out my neck with a similar concept in *Stepping Stones* only to meet a suitably stony silence.

#### Related articles

- [Missing rocks may explain why life started playing shell games](#)(arstechnica.com)
- [560 Million Year Old Animal](#) (weeklyworldnews.com)
- [The Great Unconformity](#) (quantumtunnel.wordpress.com)

#### [→ Leave a comment](#)

Posted in [Geobiology, palaeontology, and evolution](#)

Tagged [Cambrian explosion](#), [Great Unconformity](#), [History of the Earth](#)

#### [\*\*Large-animal extinction in Australia linked to human hunters\*\*](#)

Posted on April 13, 2012 by Steve Drury | [Leave a comment](#)



Artist's impression of a giant Australian wombat (Diprotodon) (credit: Wikipedia)

In North America, between 13 and 11.5 ka, around 30 species of large herbivorous mammals became extinct. Much the same occurred in Australia around 45 ka. Both cases roughly coincided with the entry of anatomically modern humans, where neither they nor earlier

hominids had lived earlier. Such extinctions are not apparent in the Pleistocene records of Africa or Eurasia. An obvious implication is that initial human colonisation and a collapse of local megafaunas are somehow connected, perhaps even that highly efficient early hunting bands slaughtered and ate their way through both continents. But other possibilities can not be ruled out, including coincidences between colonisation and climate or ecosystem change. As many as thirteen different hypotheses await resolution, one that inevitably makes headline news repeatedly: that both the early Clovis culture and North American megafaunas met their end around the same time as the start of the Younger Dryas millennial cold snap because a meteorite exploded above North America (<http://earth-pages.co.uk/2009/03/01/comet-slew-large-mammals-of-the-americas/>). One problem in assessing the various ideas is accurately dating the actual extinctions, partly because terrestrial environments rarely undergo the continual sedimentation that builds up easily interpreted stratigraphic sequences. Another is that it is not easy to prove, say, that all giant kangaroos died in a short period of time because of the poor record of preservation of skeletons on land. A cautionary take concerns the demise of the woolly mammoth that roamed the frigid deserts of northern Eurasia and definitely was hunted by both modern humans and Neanderthals. It was eventually discovered that herds still survived on Wrangell Island until the second millennium BC. There is a need for a proxy that charts indirectly the fate of megafaunas plus accurate estimates of the timing of human colonisation. In North America there is a candidate for the first criterion: traces of a fungus (*Sporormiella* – see *Fungal clue to fate of North American megafauna* in *EPN* of January 2010) that exclusively lives in the dung of large herbivores. Fungal spores get everywhere, being wind-dispersed, and in NE US lake cores they fell abruptly at about 13.7 ka. *Sporormiella* needs to pass through the gut of herbivores to complete its life cycle.



Aboriginal Rock Art, Kakadu National Park, Australia (Photo credit: Wikipedia)

The same genus of fungus breaks down dung in Australia. Measuring spore content in sediment on the floor of a Queensland lake shows the same abrupt decline in abundance at between 43 to 39 ka before present (Rule, S. et al. 2012. The aftermath of a megafaunal extinction: ecosystem transformation in Pleistocene Australia. *Science*, v. **335**, p. 1483-1486). Moreover, the fungal collapse is accompanied by a marked increase in fine-grained charcoal – a sign of widespread fires – and is followed by a steady increase in pollen of scrub vegetation at the expense of that of tropical rain forest trees. The shifts do not correlate with any Southern Hemisphere climatic proxy for cooling and drying that might have caused ecosystem collapse. That still does not mark out newly arrived humans as the culprits, as the early archaeological record of Australia, as in North America, is sparse and only estimated to have started at around 45 ka. Yet this is quite strong circumstantial evidence. The 20 or more animals – marsupials, birds and reptiles – with a mass more than 40 kg that formerly inhabited the continent would probably have been ‘naive’ as regards newly arrived, organised, well-armed and clever new predators, as would those of North America and much later in New Zealand, and would have been ‘easy prey’. Incidentally, faunas of both Africa and Eurasia are extremely wary of humans, possibly as a result of a far longer period of encounters with human hunter-gatherers. In Australia’s case, the use of deliberate fire clearing to improve visibility of game may have had a major role, although it is equally likely that the demise of large herbivores would have left large amounts of leaf litter and dry grasses to combust naturally. Yet the Earth as a whole around 40 ka was slowly cooling and drying towards the last glacial maximum around 20 ka, so human influence may merely have pushed the megafauna towards extinction, such is the fragility of Australia’s ecosystems.

#### Related articles

- [Butchered sloth bone lends more evidence to early North American settlement \(canada.com\)](#)
- [Demise of large animals caused by both man and climate change\(yubanet.com\)](#)
- [Cave yields marsupial fossil haul \(bbc.co.uk\)](#)
- [Australia extinctions due to Man \(bbc.co.uk\)](#)

[→ Leave a comment](#)

Posted in [Anthropology and Geoarchaeology](#)

Tagged [australia](#), [extinction](#), [megafauna](#)

### **A cuddly tyrannosaur**

Posted on April 11, 2012 by Steve Drury | [Leave a comment](#)



Feathered dinosaur Deinonychus (Photo credit: Aaron Gustafson)

Feathered and fluffy [dinosaurs](#) in the families that may have led to birds have become almost commonplace, thanks to wonderful preservation in some Chinese Mesozoic sedimentary rocks (see <http://earth-pages.co.uk/2003/03/01/flying-feathers/>) and what has become a cottage industry for local people, under professional direction. Most have been small theropods in the [Coelurosauria](#) taxonomic branch that span the Jurassic and [Cretaceous](#) Periods. The famous Lower Cretaceous [Liaoning](#)lagerstätte in NE China recently yielded something truly awesome: three well-preserved specimens of a [feathered dinosaur](#) almost as large as the giant [tyrannosaurs](#) of the Late Cretaceous (i.e. > 1 tonne in life) (Xu, X. et al. 2012. A gigantic feathered dinosaur from the Lower Cretaceous of China. *Nature*, v. **484**. P. 92-95). In fact *Yutyrannus huali* ('beautiful feathered tyrant') is a member of the same subgroup as the Upper Cretaceous *T. rex* and was clearly a top predator in its day. Equally fortuitous is that the three specimens comprise one with a living body weight of about 1.4 t, the other two being between 500 and 600 kg. Various differences between the largest and the two smaller individuals suggest that this find represents two generations, the largest perhaps 8 years older than the two smaller ones. All three preserve densely packed filaments suggesting that they were fluffy rather than truly feathered. So why the difference from its probably scaly relative [tyrannosaurs](#) from about 50 Ma later?

Around 125 Ma global climate was considerably cooler than the Late Cretaceous greenhouse world, Liaoning probably having mean annual air temperatures around 10°C compared with 18°C late in the Period. *Yutyrannus huali* and some of its contemporary theropods probably evolved high TOG insulation to ensure all-season sprightliness. It is also possible that a display function was also involved, as seems to have been the case for other dinosaurs.

### **Related articles**

- [One-Ton Feathered Dinosaur Found: Fluffy and Fierce\(news.nationalgeographic.com\)](#)
- <http://earth-pages.co.uk/2011/07/28/feathers-will-fly-archaeopteryx-relegated/>

[→ Leave a comment](#)

Posted in [Geobiology, palaeontology, and evolution](#)

Tagged [Coelurosauria](#), [Cretaceous](#), [Feathered dinosaur](#)

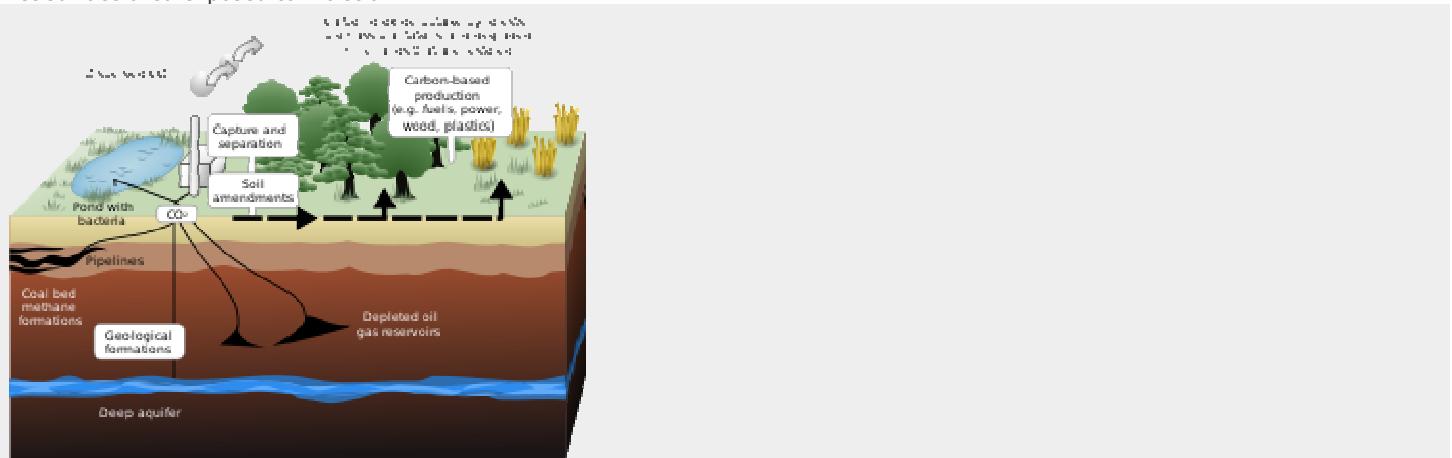
### **Possible snags and boons for CO<sub>2</sub> disposal**

Posted on April 10, 2012 by Steve Drury | [Leave a comment](#)



Asbestos mine tailings at Thetford in Quebec, Canada. (Photo credit: Wikipedia)

Not many people would like to visit a waste heap at [an asbestos](#) mine. That is not because waste heaps are generally boring but all forms of asbestos are carcinogens when inhaled. Encountering pits in the tailings that emits puffs of warm air would cause health and safety alarm bells to ring. Yet that is exactly what has attracted researchers to the huge asbestos mining complex at Thetford in Quebec, Canada: the air leaving the vents can be extremely depleted in carbon dioxide (Pronost, J. and 10 others 2012. CO<sub>2</sub>-depleted warm air venting from chrysotile milling waste ([Thetford Mines](#), Canada): Evidence for in-situ carbon capture and storage. *Geology*, v. **40**, p. 275-278). More precisely, the depletion – down to less than 10 parts per million (ppm) compared with normal atmospheric levels of 385 ppm – occurs in winter, when the puffing pits emit warm air far above the frigid air temperatures encountered in winter Quebec. The chrysotile must be reacting with groundwater and CO<sub>2</sub>, and is therefore a potential means of using near-surface natural materials for carbon capture and storage (CCS). The end product is an innocuous carbonate – Mg<sub>5</sub>(OH)<sub>2</sub>(CO<sub>3</sub>)<sub>4</sub>·4H<sub>2</sub>O – and dissolved silica. Quite a find, it might seem, as the reaction is exothermic too: CCS plus geothermal energy plus safe decomposition of a major environmental hazard. In fact any magnesium-rich silicates are likely to undergo the same carbonation reaction, especially if ground-up to increase the net surface area exposed to moist air.



scheme for carbon sequestration and storage at a coal-fired power plant. Rendering by LeJean Hardin and Jamie Payne. Source: [http://www.ornl.gov/info/ornlreview/v33\\_2\\_00/research.htm](http://www.ornl.gov/info/ornlreview/v33_2_00/research.htm)

The parent asbestos rock at Thetford is a metamorphic derivative from mantle ultramafic rocks in an ophiolite, and the asbestos insulation business, both for extremely hazardous blue (crocidolite) and less dangerous white (chrysotile) asbestos has been hugely profitable since the 19<sup>th</sup> century. Consequently, wherever there are altered ophiolites, generally in collision-zone orogenic belts, asbestos has been exposed either naturally or through mining and processing. There are many related cancer 'hot spots' in populous mining areas of Canada, India, the Alps and southern Africa, and in dry climates even natural exposures pose considerable risk. Could these blighted areas take on a new role in lessening the chance of global warming? About 30 billion tonnes of CO<sub>2</sub> are emitted by burning fossil fuels each year. To keep pace, at the current atmospheric concentration of CO<sub>2</sub>, some 75 trillion tonnes of air would have to react annually with about 100 billion tonnes of magnesian silicate, making this form of CCS the largest industry on the planet (<http://www.newscientist.com/article/mg21428593.800-stripping-co2-from-air-requires-largest-industry-ever.html>).

Another factor tempering somewhat forced optimism for CCS as a way of having our fossil fuel cake and eating it is that direct injection of greenhouse gases into deep storage may have an unforeseen down-side. Deep drilling and injection of fluids may trigger earthquakes. The alarm raised by small yet disturbing seismicity accompanying sites for shale-gas development by 'fracking'

(<http://earth-pages.co.uk/2011/11/04/fracking-check-list/> and <http://earth-pages.co.uk/2011/10/14/britain-to-be-comprehensively-fracked/>) has died down to some extent following detailed analysis of small earthquakes around drilling sites. It turns out that they are triggered not by the drilling itself but the subsurface disposal of the large amounts of fluids that have to be passed through the oil shales to make the tight rock permeable to gas (Kerr, R.A. 2012 Learning how to NOT make earthquakes. *Science*, v. 23p. 1436-1437). Safe subsurface disposal requires injection wells penetrating 1 to 3 km below the surface, often below the cover of sedimentary strata and into crystalline basement. Such hard rocks store elastic strain induced by burial and tectonics, and release it when lubricated by fluids, especially if they contain dormant faults. Once impermeable rock can thus be hydrofractured in the same manner as 'fracked' gas-prone shales and old, often unsuspected faults reactivate: a catastrophic prospect for injected CO<sub>2</sub>. In sedimentary sequences, drilling CCS wells into porous rocks capped by impermeable ones – the scenario for 'safe' gas storage – could also induce 'fracking' of the sealing rocks and thereby causing leakage (see also <http://www.newscientist.com/article/dn21633-fracking-could-foil-carbon-capture-plans.html>).

#### Related articles

- [Bill Chameides: Carbon Capture and Storage: A Fresh Look at Storage and Other Issues](#) (huffingtonpost.com)

→ [Leave a comment](#)

Posted in [Environmental geology and geohazards](#)

Tagged [Asbestos](#), [Carbon capture and storage](#), [CCS](#), [Fracking](#)

#### Feet of the ancients

Posted on April 4, 2012 by Steve Drury | [Leave a comment](#)



Cast of footprints, probably of Au. afarensis, from the famous trackway of Laetoli in Tanzania (Photo credit: GIRLintheCAFE)

Much of what palaeoanthropologists have surmised about the evolution of humans and their [hominin](#) forebears has come from fossils of their heads. Crania, jaws and teeth can reveal a lot about human ancestors and related species, and inevitably smart modern humans would dearly like to know how brainy and clever they were and when possible intellectual changes, such as the acquisition of language, might have taken place. But only the rest of the body gives us clues about what they did and potentially might have done. If, like Darwin, and following his lead Frederick Engels (<http://www.marxists.org/archive/marx/works/1876/part-played-labour/index.htm>), we believe that the single most important development was adopting an upright gait and thereby freeing the hands to manipulate the world, then fossil hands and feet are of very high importance. Yet they are among the most fragile appendages consisting of a great many separate bones, each being small enough to be transported by flowing water once soft tissues decay and a corpse falls apart. And they are easily bitten off by scavengers. Heads are a lot bigger, heavier and robust, and being round and smooth, quite difficult for, say, a hyena or porcupine to gnaw. Moreover, disaggregated hominin foot and hand bones are not easy to recognise in fossiliferous sediments, especially if they have been scattered far and wide: the big prize being heads jaws and teeth, professional hominin hunters become expert at spotting them, but not necessarily the other 80% of skeletons.



Artists reconstruction of female *Ardipithecus ramidus* (Photo credit: Mike Licht, NotionsCapital.com)

So, the discovery of hominin hands or feet is a rare cause for celebration. A new partial foot has turned up in the hominin 'bran-tub' that is the Afar depression of NE Ethiopia (Haile-Selassie, Y. et al. 2012). A new hominin foot from Ethiopia shows multiple Pliocene bipedal adaptations. *Nature*, v. 483, p. 565-569) and has caused quite a stir. It is significantly different from the few other feet known from the hominin record. Moreover, it adds a sixth design to those already known, leaving out those of chimps, taken as likely to be similar to those of our shared common ancestor, *Homo sapien*, Neanderthals and *H. erectus* whose feet are much the same. While being easily distinguished from the feet of *Homo* species, those of australopithecines are sufficiently like them in basic morphology to suggest that *Au. africanus* and *sediba* both walked the savannas as upright as we do. But one of the earlier hominins, *Ardipithecus ramidus*, also from Afar but dated at more than 4 Ma, has provided an almost complete foot whose geometry, including a spayed-out, short big toe capable of grasping, almost certainly indicates that the creature was equally at home in trees as it was on the ground. *Ardipithecus* walked upright, but probably could not run as its gait placed the side of the foot on the ground, much like a chimpanzee, instead of proceeding heel-to-toe as we do (Lieberman, D.E. 2012. Those feet in ancient times. *Nature*, v. 483, p. 550-551). The new find seems similar, although better adapted for upright walking. Yet no other body parts have been found so it has not been assigned to a species, though it almost certainly represents a new one. The excitement concerns its age, which at 3.4 Ma is within the time range of *Australopithecus afarensis*, a family of which left the famous trackway at Laetoli in Tanzania whose foot prints strongly suggest full adaptation to human-like gait: walking, running and abandonment of partially habitual life in the trees.

It seems therefore that the multiplicity of co-existing hominins from 2 million years ago to very recently existed much further back in their evolutionary history. That raises several possibilities, among which is the possibility of repeated evolution of bipedality, hinted at by some similarities to the feet of modern gorillas in that of the newly found foot. Another implication is that simply being able to walk upright did not lead quickly to a tool-making ability because the earliest stone tools capable of cutting through meat, skin and sinew did not arise until 2.6 Ma. Like fossils of feet, those of hominin hands are extremely rare. The first crucial evidence of a hand with potential to manipulate objects delicately and with purpose is around 2 Ma, with the astonishingly well preserved hand of a young *Au. sediba* unearthed in South Africa (<http://earth-pages.co.uk/2011/10/12/another-candidate-for-earliest-direct-human-ancestor/>).

Frustratingly, the 2.6 Ma tools are not associated with fossil hominins, and the *Au. sediba* skeletons had no tools.

#### Related articles

- [Burtele foot indicates Lucy not alone](#) (eurekalert.org)
- [Primitive Human Ancestor Shared Lucy's World](#)(news.sciencemag.org)

#### → [Leave a comment](#)

Posted in [Anthropology and Geoarchaeology](#)

Tagged [Ardipithecus](#), [Australopithecus afarensis](#), [Bipedalism](#), [Hominin feet](#), [Laetoli](#)

## **Charting the growth of continental crust**

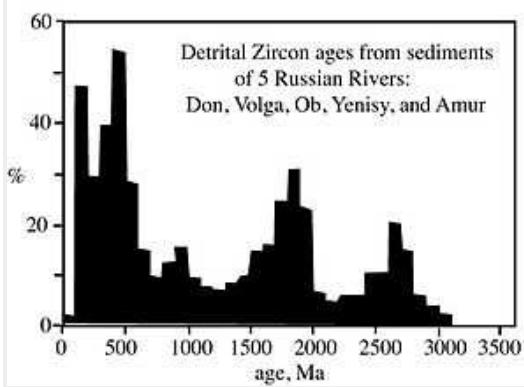
Posted on March 30, 2012 by Steve Drury | 1 Comment



Archaean gneisses from West Greenland (Photo credit: Wikipedia)

When continents first appeared; the pace at which they grew; the tectonic and magmatic processes responsible for continental crust, and whether or not crustal material is consumed by the mantle to any great extent have been tough issues for geologists and geochemists to ponder on for the last four decades. Clearly, continental material was rare if not absent in the earliest days of the solid Earth, otherwise Hadean crust should have been found by now. Despite the hints at some differentiated, high silica rocks that may have hosted >4 billion-year old zircon crystals from much younger sediments, the oldest tangible crust – the Acasta Gneiss of northern Canada – just breaks the 4 Ga barrier: half a billion years short of the known age of the Earth (<http://earth-pages.co.uk/2008/11/01/at-last-4-0-ga-barrier-broken/>). Radiometric ages for crustal rocks steadily accumulated following what was in the early 1970s the astonishing discovery by Stephen Moorbat and colleagues at Oxford University and the Geological Survey of Greenland of a 3.8 billion year age for gneisses from West Greenland. For a while it seemed as if there had been great pulses that formed new crust, such as one between 2.8 and 2.5 Ga (the Neoarchaean) separated by quieter episodes. Yet dividing genuinely new material coming from the mantle from older crust that later thermal and tectonic events had reworked and remelted required – and still does – lengthy and expensive radiometric analysis of rock samples with different original complements of radioactive isotopes.

One approach to dating has been to separate tiny grains of zircon from igneous and metamorphic rocks and date them using the U-Pb method as a route to the age at which the rock formed, but that too was slow and costly. Yet zircons, being among the most intransigent of Earth materials, end up in younger sedimentary rocks after their parents have been weathered and eroded. It was an investigation of what earlier history a sediment's zircons might yield that lead to the discovery of grains almost as old as the Earth itself (<http://earth-pages.co.uk/2011/12/21/mistaken-conclusions-from-earths-oldest-materials/> <http://earth-pages.co.uk/2005/05/01/zircon-and-the-quest-for-life%20%99s-origin/>). That approach is beginning to pay dividends as regards resolving crustal history as a whole. Almost 7000 detrital zircon grains separated from sediments have been precisely dated using lead and hafnium isotopes. Using the age distribution alone suggests that the bulk of continental crust formed in the Precambrian, between 3 and 1 Ga ago, at a faster rate than it formed during the Phanerozoic. However, that assumes that a zircon's radiometric age signifies the time of separation from the mantle of the magmas from which the grain crystallised. Yet other dating methods have shown that zircon-bearing magmas also form when old crust is remelted, and so it is important to find a means of distinguishing zircons from entirely new blocks of crust and those which result from crustal reworking. It turns out that zircons from mantle-derived crust have different oxygen isotope compositions from those which crystallised from remelted crust.



An example of ages of detrital zircons from sediments, in this case from five Russian rivers (credit: Wikipedia)

Bruno Dhuime and colleagues from St. Andrew's and Bristol universities in the UK measures hafnium model ages and  $\delta^{18}\text{O}$  values in a sample of almost 1400 detrital zircons collected across the world from sediments of different ages (Dhuime, B. et al. 2012. A change in the geodynamics of continental growth 3 billion years ago. *Science*, v. 335, p. 1334-1336). Plotting  $\delta^{18}\text{O}$  against Hf model age reveals two things: there are more zircons from reworked crust than from mantle-derived materials; plotting the proportion of new crust ages to those of reworked crust form 100 Ma intervals through geological time reveals dramatic changes in the relative amounts of 'mantle-new' crust being produced. Before 3 Ga about three quarters of all continental crust emerged directly from the mantle. Instead of the period from 3 to 1 Ga being one of massive growth in the volume of the crust, apparently the production rate of new crust fell to about a fifth of all crust in each 100 Ma time span by around 2 Ga and then rose to reach almost 100% in the Mesozoic and Cenozoic. This suggests that the late Archaean and most of the Proterozoic were characterised by repeated reworking of earlier crust, perhaps associated with the repeated formation and break-up of supercontinents by collision orogeny and then tectonic break up and continental drift.

Dhuine and colleagues then use the record of varying new crust proportions to 'correct' the much larger database of detrital zircon ages. What emerges is a well-defined pattern in the rate of crustal growth through time. In the Hadean and early Archaean the net growth of the continents was  $3.0 \text{ km}^3 \text{ yr}^{-1}$ , whereas throughout later time this suddenly fell to and remained at  $0.8 \text{ km}^3 \text{ yr}^{-1}$ . Their explanation is that the Earth only came to be dominated by plate tectonic processes mainly driven by slab-pull at subduction zones after 3 Ga. Subduction not only produces mantle-derived magmas but inevitably allows continents to drift and collide, thereby leading to massive deformation and thermal reworking of older crust in orogenic belts and an apparent peak in zircon ages. The greater rate of new crust generation before 3 Ga may therefore have been due to other tectonic processes than the familiar dominance of subduction. Yet, since there is convincing evidence for subduction in a few ancient crustal blocks, such as west Greenland and around Hudson's Bay in NE Canada, plate tectonics must have existed but was overwhelmed perhaps by processes more directly linked to mantle plumes.

## Related articles

- [Earth's first continents oozed from its crust](#) (msnbc.msn.com)
- [A new theory on the formation of the oldest continents](#) (eurekalert.org)

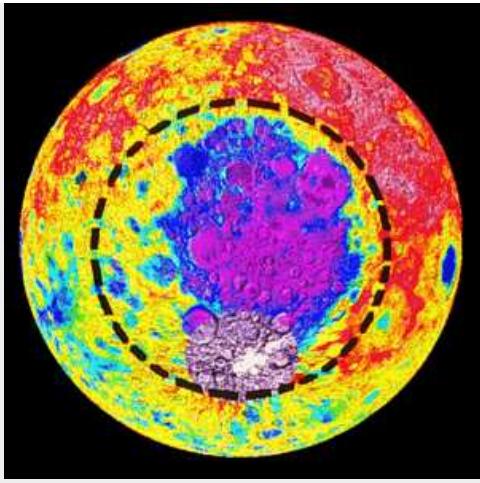
## [→ 1 Comment](#)

Posted in [Tectonics](#)

Tagged [Archean](#), [continental growth](#), [Hadean](#), [Proterozoic](#), [Radiometric dating](#)

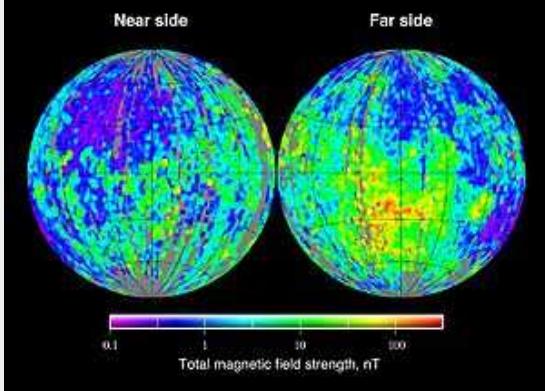
## [Two smoking barrels on the Moon](#)

Posted on March 21, 2012 by Steve Drury | [1 Comment](#)



Elevation map of the South Pole-Aitken basin on the Moon, from the NASA/SDIO probe Clementine mission. magenta and blue show the lowest elevation rising through a rainbow spectrum to red, the highest elevations

The South Pole and the farside of the [Moon](#) contain, at 2500 km across and 13 km deep, the largest impact structure in the Solar System: the South Pole-Aitken (SPA) basin. Being partly camouflaged by many later craters up to several 100 km across, typical of the lunar far side and the [lunar highlands](#) in general, the SPA basin formed early in the Moon's cratering history, and is unlike the mare basins of the near side that are filled with basalt lavas. The light colour of the lunar highlands into which the SPA basin was excavated signifies that they are dominated by almost pure feldspar in the form of anorthosite rock. These anorthosites are prime evidence for the former melting of much if not all of the Moon at the time of its formation: low-density feldspar with a very high melting point could only have accumulated with the degree of purity of anorthosite if early-formed crystals floated to the top of the magma ocean.



Total magnetic field strength at the surface of the Moon from the NASA Lunar Prospector mission

The other feature of feldspars is that they are among the least magnetic of minerals, so it came as a surprise that the northern rim of the SPA basin is studded with positive [magnetic anomalies](#) (Wieczorek, M.A. et al. 2012. An impactor origin for lunar magnetic anomalies. *Science*, v. **335**, p. 1212-1215). Lunar samples returned by the Apollo Programme are consistently lacking in all but the weakest [remanent magnetism](#), suggesting that the Moon either never had a magnetic field or if it did the field was extremely weak. Even if it did once have a magnetic field, the anomaly patterns are small with high amplitude and reminiscent of a target hit by a shotgun blast. Similar anomalies are scattered on the near side.

The SPA basin is elliptical, suggesting that the projectile responsible for it struck at an oblique angle. The far-side magnetic anomalies cluster exactly where impact modelling would suggest for debris displaced by impact from a northward travelling body. The interpretation arrived at by Mark Wieczorek of the Parisian Institut de Physique du Globe and colleagues from MIT and Harvard University in the US is that the anomalies mark landing sites for large fragments of an easily magnetised, iron-rich asteroid that excavated the basin. Moreover, the same impact might explain magnetic anomalies much further from the basin, on the lunar near side. The remaining mystery is how fragments of the impactor came to be magnetised. The impact would have ensured their being heated well above the temperature of the [Curie point](#) at which even the most magnetically susceptible materials lose their magnetisation. The

most likely possibility is that the fragments attained their magnetised state at a time when the moon did have a core-generated magnetic field, albeit weak.

#### Related articles

- [Moon's magnetic material may have come from an asteroid](#)(latimes.com)
- [NASA video guide to the Moon](http://lunarscience.nasa.gov/articles/video-a-tour-of-the-moon/) – <http://lunarscience.nasa.gov/articles/video-a-tour-of-the-moon/>
- [NASA video of lunar evolution](http://lunarscience.nasa.gov/articles/video-evolution-of-the-moon/) – <http://lunarscience.nasa.gov/articles/video-evolution-of-the-moon/>

#### → [1 Comment](#)

Posted in [Planetary, extraterrestrial geology, and meteoritics](#)

Tagged [asteroid impact](#), [Magnetic anomaly](#), [Moon](#), [South Pole-Aitken](#)

#### **[Denisovans scooped?](#)**

Posted on [March 20, 2012](#) by [Steve Drury](#) | [1 Comment](#)

In late 2010 it emerged from genomic studies of a finger bone from Denisova Cave in eastern Siberia that a probably archaic human group had shared genes with ancestors of some modern humans who colonised West Pacific islands around 45 Ka ago, well before the last glacial maximum. Melanesians, including people living in Papua-New Guinea have DNA that contains on average around 6% contributed from fertile interbreeding with [Denisovans](#). This ancient groups are suggested by comparative studies of their and Neanderthal mitochondrial DNA to have split from them as long as a million years ago. Now it seems possible that much more complete fossils of Denisovans may have been discovered in China (Curnoe, D. And 16 others 2012. Human Remains from the Pleistocene-Holocene Transition of Southwest China Suggest a Complex Evolutionary History for East Asians. *PLoS ONE*, <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0031918>).



Skull from Red Deer Cave in Guanxi Province, southern China. Darren Curnoe

A block of sediment from Longlin Cave in Guanxi Province in southern China that was collected more than 30 years ago, has yielded skull fragments whose reconstruction reveals a most unusual individual, very different from anatomically modern humans, Neanderthals and from *H. erectus*. It had a wide flat face with highly prominent cheek bones, strong brow ridges and a diminutive chin. Remains of three other individuals found by recent excavations in Maludong (Red Deer) Cave 300 km to the south of Longlin share similar characteristics. Yet there are similarities to moderns, for instance CT-scans show that the brain likely had a height and frontal lobes similar to ours, but different from Neanderthals.

These are not truly ancient fossils; radiocarbon and uranium-series dating give an age range from 14.3 to 11.5 ka, around the time of the Younger Dryas cold episode that preceded the Holocene. These two individuals lived when East Asia had long been home to fully modern humans.

The finds perhaps open a major new focus for human evolution, directed towards less-well studied older fossils from elsewhere in the East including those referred to by [Jonathan Kingdon](#) as 'Mapas' from both southern and northern China. Certainly it will boost palaeoanthropological research within China

#### Related articles

- [Scientists may have just discovered a brand new species of human \[Evolution\]](#)(io9.com)

- [Evolution takes Asian refuge \(sciencenews.org\)](#)
- [Entire genome of extinct human decoded from fossil \(eurekalert.org\)](#)
- ['Red Deer Cave people' may be new species of human \(guardian.co.uk\)](#)

## → 1 Comment

Posted in [Anthropology and Geoarchaeology](#)

Tagged [China](#), [Denisova hominin](#), [Mapas](#)

### **Tiny shrinking horses**

Posted on March 12, 2012 by Steve Drury | Leave a comment



Reconstruction of *Sifrhippus*. Image via Wikipedia

The earliest known ancestors of modern horses occur in Palaeogene mammal-rich terrestrial sediments of the northwestern US, particularly those of the Wind and Bighorn Basins. The first with clear horse-like features was *Sifrhippus* (formerly *Eohippus*, or *Hyracotherium*), but famously it had four hoofed toes and was about the size of a household cat. Subsequent development to a single load-bearing toe has long formed one of the classic cases for evolution. *Sifrhippus* lived at the end of the Palaeocene. From the large numbers of well-preserved skeletons, this was a herding animal. The large numbers of fossils have also made it a candidate for testing a hypothesis that individuals of a mammal and bird species become smaller as climate warms: [Bergmann's Rule](#). The background to this view is that in modern warm-blooded or endothermic animal species individuals tend to be smaller the closer they are to the Equator.

The end of the Palaeocene was marked by a now well-documented rise in global surface temperature that left a marked sign of increased  $^{13}\text{C}$  in sediments spanning the Palaeocene-Eocene boundary, which is widely believed to have resulted from massive exhalations of methane from the seafloor. Bergmann's Rule arose because there appears to be a general decrease in size of most mammal fossils through the P-E Thermal Maximum. *Sifrhippus* lived through the event and indeed did undergo 30% decrease in size at the start of the carbon-isotope shift marking the PETM. Moreover, after the isotopic excursion its fossils indicate a 70% increase in size (Secord, R. and 8 others 2012. Evolution of the earliest horses driven by climate change in the Paleocene-Eocene Thermal Maximum. *Science*, v. **335**, p. 959-962).

The study was of *Sifrhippus* and other mammals over a period representing several thousand generations. It broke new ground in two ways: it used the size of the horses' teeth to estimate body mass, and teeth of a variety of mammals afforded systematic measurements of both carbon and oxygen isotopes. The carbon isotopic analyses pin-pointed the span of the PETM locally, while oxygen isotopes charted local changes in average temperature. The results show remarkable coherence with Bergmann's Rule, but reveal other interesting aspects of the PETM in North America. Oxygen-isotope in the teeth of different mammal species give some idea of their diet and habitat. *Sifrhippus* shows the highest enrichment of  $^{18}\text{O}$  in its teeth, which suggests that it ate leaves from which water evaporation selectively removed the lighter  $^{16}\text{O}$ , i.e. in open, dry areas. Another ubiquitous fossil, *Coryphodon*, consistently has lower  $^{18}\text{O}$  than other mammals, signifying that it was water-loving and ate aquatic plants, i.e. not subject to evaporation. Matching O-isotopes for the two species across the PETM shows a greater shift in  $^{18}\text{O}$  for *Sifrhippus* than for *Coryphodon*, which suggests that hidden in the O-isotope record of temperature is information about rainfall variations during the PETM. To further support Bergmann's Rule, changes in the size

of *Sifrhippus*, do not correlate with the aridity index. So it seem that heat alone was responsible for dwarfing – the other possibility considered by the researchers was that decreased availability or quality of diet could have been responsible.



Reconstruction of Coryphodon. Image via Wikipedia

#### Related articles

- [Little People: Will Climate Change Shrink the Species?](#)(ecocentric.blogs.time.com)

→ [Leave a comment](#)

Posted in [Climate change and palaeoclimatology](#)

Tagged [Bergmann's rule](#), [climate change](#), [Paleocene–Eocene Thermal Maximum](#), [PETM](#), [Sifrhippus](#)

#### Mesozoic fleas

Posted on March 12, 2012 by Steve Drury | [Leave a comment](#)



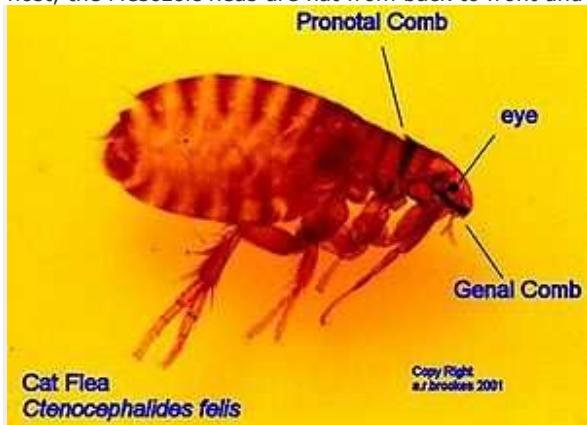
Giant Mesozoic fleas from China, 1.4 and 0.8 cm long. From Huang et al. (2012)

Strange as it might seem, rather than bringing to mind the opening pages of Michael Crichton's *Jurassic Park* ancient fleas suggest to me Frederick Engels's *Dialectics of Nature* (1883). In his lampoon of determinism, which might today be directed at a famous evolutionary biologist, Engels wrote:

'...last night I was bitten by a flea at four o'clock in the morning, and not at three or five o'clock, and on the right shoulder and not on the left calf – these are all facts which have been produced by an irrevocable concatenation of cause and effect, by an unshatterable necessity of such a nature indeed that the gaseous sphere, from which the solar system was derived, was already so constituted that these events had to happen thus and not otherwise.'

But a paper about fossil fleas from the time of the dinosaurs was always going to catch the eye (Huang, D. et al. 2012). Diverse transitional giant fleas from the Mesozoic era of China. *Nature*, v. **483**, p. 201-204), and that they come from China does have an element of inevitability that arises from that country's rich endowment with sites of exceptional preservation. The fleas are not at all like

the shiny creatures that are so difficult to trap in the fur of a cat's ear, and they are big: up to 2 cm long. Two species come from Middle Jurassic and one from the Lower Cretaceous. The fascinating thing about fleas, however, is that they evolved to live and thrive in fur and feathers. This niche is signified by their claws, whose form and articulation avoid entanglement with fibres: which is why cat fleas are so nimble. While cat fleas are flattened laterally to help them slip though fur and have powerful legs that allows them to leap from host to host, the Mesozoic fleas are flat from back to front and are not so leggy.



Cat flea ~1.5 mm long. Image via Wikipedia

Being so large, it seems unlikely that these Mesozoic fleas would have parasitized mammals that were probably far smaller on average than now. But by the Jurassic fossil evidence, largely from China, shows that dinosaurs had developed feather-like cover. Their evolution itself created a niche occupied thereafter by fleas and other bloodsuckers. They are wingless relatives of flies (Order: Diptera) that first appear in the Triassic fossil record, both thought to have stemmed from more primitive scorpionflies (Order: Mecoptera)