

Great Crises in the History of Life



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AUSTRALIA'S LEADING UNIVERSITIES



MONASH University



CuriousSCI/ty



Photograph provided by the Herald Sun: Boy and Dinosaur



Sir David Attenborough, the patron of the CuriousSCI/ty and PrimeSCI/.

Photo by David McKay.

CuriousSCI/ty is the offspring of the Monash Science Centre, which was launched in 1993 as the brainchild of a research academic and the Vice Chancellor of Monash University. It filled a community need – that of access to content-rich science and technology information, particularly by youth, delivered in such a way that it could be understood, with observers empowered and enthused to seek more and personally evaluate the information they were accessing.

CuriousSCI/ty is located in the science precinct on the Clayton campus of Monash University. Monash University is Australia's largest and most internationally focussed University.

The Patron of this Centre is Sir David Attenborough.

CuriousSCI/ty

In the last 11 years

- Over 4+ million people have attended an MSC exhibition (1.2 million Australians, 2.5+ million International)
- Topics covered include Geosciences (especially Palaeobiology), Natural Disasters, Human Biology, Science and Art, Astronomy, Scientific Instrumentation, Climate Change

Exhibitions have toured around Australia and internationally (including the the Burke Museum (University of Washington, USA), the New Jersey State Museum (USA), the Los Angeles County Museum (USA), Argentina, Japan, Italy, the Singapore Science Centre,

the National Museum of Natural Sciences (Taiwan,) and Timor-Leste).

Successful Exhibitions rely on strong relationships with host venues and research organisations such as, National Geographic Society (Washington), Paleontological Institute of the Russian Academy of Sciences (Moscow), Museo Palaeontologico Egidio Feruglio (Trelew, Argentina), Queen Victoria Museum and Art Gallery (Launceston), the Fukui Prefectural Dinosaur Museum, the Gunma Prefectural Museum and the National Museum (the latter 3 in Japan).

CuriousSCI/ty and its outreach primary education partner PrimeSCI/ highly value the co-operative input to exhibitions and education modules by community groups, government and the private sector, for example the SES (State Emergency Services), EMA (Emergency Management Australia), CFA (Country Fire Authority), Qantas, and GlaxoSmithKlein and others.

CuriousSCI/ty and PrimeSCI/ are recognized leaders in Science Outreach institutions and have sought to provide professional guidance to other organizations such as National Museum of Australia (Canberra), Kyoto University Museum (Japan), the Gunma Prefectural Museum (Japan), the Paleontological Institute of the Russian Academy of Sciences (Moscow), the Shanghai Natural History Museum (China), the Kotelnich Regional Museum (Russia), the Singapore Science Centre, the Iranian Science and Technology Museum among many others.

Front Cover

"YORGIA" 2003

Pre-Cambrian Fossil: White Sea Coast, Russia
Watercolour & Gouache on Paper

36.5 x 27.5 cm 68 x 55 x 4 cm

Signed and dated lower right; Trusler 2003

Field study from White Sea Coast Expedition,
June-July 2003.

Exhibit ID 12

The Exhibition

GREAT CRISES IN THE HISTORY OF LIFE

This exhibition highlights four of the greatest crises that have faced life on Earth (Precambrian-Cambrian; Permian-Triassic; end of the Cretaceous, the last 30,000 years) using spectacular original material from the vast collections of the Paleontological Institute, Moscow.

This exhibition is a joint project between the Paleontological Institute, Russian Academy of Sciences, Moscow and Monash Science Centre, Monash University, Melbourne.

The Four major exhibition events that will be explored are:

1. End of the Precambrian – Vendian/Ediacaran fossil animals from the end of the Precambrian including such forms as *Kimberella*, *Ventogyrus*, *Dickensonia*, *Charnia*, and many other fossils from the White Sea of northern Russia, more than 560 million years old. These first animals diversified extensively from around 600 million years to about 542 million years old.

Then when innovative forms gained eyes and hard shells. These Vendians went extinct over a 10-20 million year period, leaving few if any offspring. The world changed immensely over this period. Oxygen levels rose, animals began burrowing and certainly getting big and armoured – with shells – to protect from predators and also perhaps to have a ready supply of phosphorus, which is a needed element in some of the energy generating life cycles – like the Krebs.

2. End of the Palaeozoic – Permian Mammal-like reptiles and associated vertebrates, plants, invertebrates from the Permian region and the White Sea Region of Russia. The Mammal-like reptiles and other primitive reptiles had ruled the landscape for more than 100 million years and then with massive outpourings of basalt (the Siberian Traps of northern Russia) as well as perhaps a major asteroid hit on earth, climate changed. Even before the late Permian events the Earth had been affected by major glaciations. So, the massive coal swamps and most of the

Mammal-like reptiles and their companions disappeared at the end of the Permian, around 251 million years ago. Specimens include: *Eryosuchus*, *Lanthanosuchus*, *Utegenia*, *Scutosaurus*, *Nyctiphruetus*, *Archosaurus*, *Inostrancevia*, *Biarmosuchus*, *Estemmenosuchus*, *Ennatosaurus*, *Mesenosaurus*, *Kamacops*, *Deltavjatia*, *Viatkogorgon*, *Ariekanepeto*, amongst others. Many of these are represented in the exhibition by full skeletons.

3. End of the Cretaceous – extinction of most of the dinosaurs. Cause seems related to an asteroid impact of massive proportions which seriously changed climate overnight. The only dinosaurs to survive were the birds. The dinosaurs had been so successful for more than 150 million years, moving into the niches that were vacated by the Mammal-like reptiles and their companions. They too were wiped out and only then did the Mammals and Birds, that so dominate the vertebrate faunas of the world, radiate into those same niches which were first occupied by the Mammal-like reptiles, then by the Dinosaurs and in the end by the Mammals themselves. Specimens include: *Lystrosaurus*, *Tarbosaurus*, *Liopleurodon*, *Tarchia*, *Mongolomys*, *Thoosuchus*, *Benthosuchus*, *Parotosuchus*, *Tichvinskia*, *Deinonychus*, *Psittacosaurus*,

Protoceratops (skeleton and eggs), *Probactrosaurus*, *Prenocephale*, *Saurolophus*, hadrosaur eggs, *Therizinosaurus*, *Gobipteryx* (eggs), *Karaurus*, *Sordes*, *Longisquama*, *Sharovipteryx* and others.

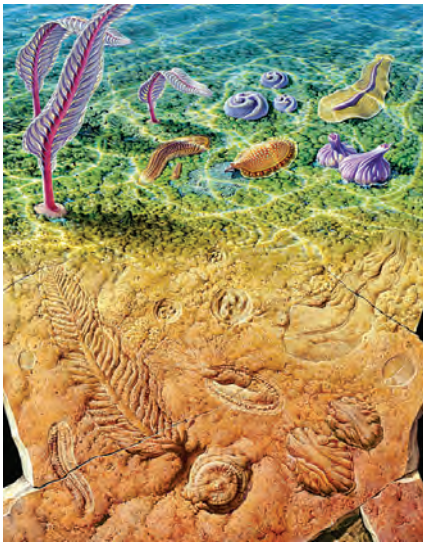
4. 30,000 years or more to Now and the Future. Humans have, for much longer than 30,000 years, been making their imprint upon Nature. This section takes a serious look at the changes wrought by humans, not only looking at past human history but (with the assistance of the Sustainability Institute at Monash), at what we now impose. A serious scenario is presented concerning what each and every one of the 7 billion of us can do to heighten the current crisis – which is well underway at present. Specimens include: *Mammuthus* (several specimens from a mummy (this is a cast), through several juveniles and adult skeletons (real), *Panthera*, *Homotherium* (Sabre toothed cat), *Coelodonta* (Woolly Rhino), *Hyrodamalys* (Steller's Sea Cow), etc.

This exhibition will travel with complete signage (in English supplied in Electronic format), press releases and educational materials that can be used by explainers and teachers.

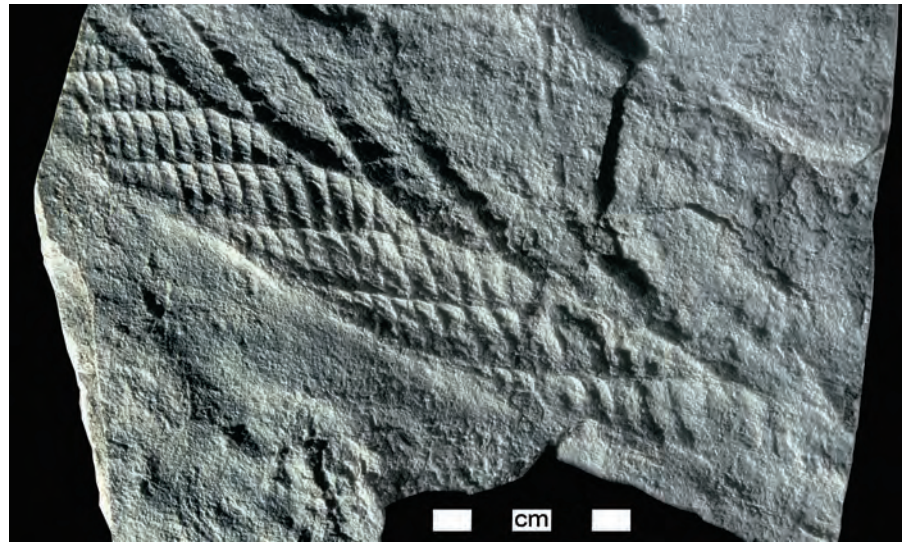
Set of dinosaur eggs



List of Specimens



Upper left: Reconstruction of the first animals on early from global locales, the world around 560 million years ago - fossils below, with reconstruction above (Artist Peter Trusler, courtesy of Australia Post).



Upper right: *Charnia* from the Vendian sediments of the White Sea of northern Russia (M. Leonov).

Below: Excavating on the White Sea Coast of northern Russia (M. Fedonkin).



Pteridinium nenoxa
Solza margarita
Solza margarita
Tribrachidium heraldicum
Ventogyrus chistyakovi
Yorgia waggoneri

Late Palaeozoic Crisis

Lanthanosuchus watsoni
Utegenia sp.
Scutosaurus karpinskii
Scutosaurus sp.
Pareiasaurian footprints
Nyctiphoretus acudens
Archosaurus rossicus
Inostrancevia alexandri
Inostrancevia alexandri
Biarmosuchus tener
Lystrosaurus georgi
Estemmenosuchus uralensis
Ennatosaurus tecton
Mesenosaurus romeri
Kamacops acervalis
Viatkogorgon ivakhnenkoi
Thoosuchus yakovlevi

Late Precambrian Crisis

Conical stromatolite *Conophyton* sp.
Longitudinal section of Conical stromatolite
Conomedusites lobatus
Hyalit
Etched archaeocyath bioherm
Archaeocyath colony
Phragmocone of cephalopod mollusk *Tunguskoceras* sp.
Albumares brunsa
Beltanelloides sorichevae

Charnia masoni
Cyclomedusa sp.
Dickinsonia costata
Dickinsonia costata ?
D. cf. tenuis
Dickinsonia
Yorgia waggoneri
Tribrachidium heraldicum
Kimberella quadrata
Nemiana simplex
Parvancorina sagitta



Labyrinthodont, Russia



Koolasuchus cleelandi, the last surviving labyrinthodont amphibian, Early Cretaceous by P. Trusler

Benthosuchus korobkovi

Parotosuchus orenburgensis

Ariekanerpeton sigalovi

Tichvinskia vjatkensis

Eryosuchus tverdochlebovi

Nyctiphuretus acudens

Ennatosaurus tecton

Suminia getamanovi

Ulemosaurus svijgensis

Estemmenosuchus uralensis

Estemmenosuchus mirabilis

Rock specimen with *Eurypterus fischeri*

Rock plate with coelenterates

Gastropod *Oriostoma coronatum*

Brachiopods *Tenticospirifer schelonicus* presented on rock slab

Artrodiran fish, *Ploudosteus trautschoeldi*

Rosette-forming Worm trace fossils *Fucoides foliosus*

Oxyptericus minimus, Palaeozoic fish

Brachiopods *Gigantoproductus sp.* on the rock

Deltavjatia vjatkensis

Late Cretaceous Crisis

Tarbosaurus bataar

Carnosaur Footprint

Deinonychus antirrhopus

Tarbosaurus bataar

Althirhinus kurzanovi

Psittacosaurus mongoliensis

Protoceratops andrewsi

Probactrosaurus gobiensis

Prenocephale sp.

Saurolophus angustirostris

Set of dinosaur eggs

Therizinosaurus cheloniformis.

Tarchia gigantea

Gobipteryx sp.

Karaurus sharovi

Sordes pilosus

Longisquama insignis

Sharovipteryx mirabilis

Liopleurodon rossicus

Below: *Avalofractus* reconstruction, Newfoundland Peter Trusler 2008



Ventogyrus, Vendian, White Sea, Russia



Wings of *Gigalitan* sp. Titanoptera

Ankylosaurus sp.

Tarbosaurus bataar

Kukers shale oil with bryozoans colonies

Trilobite *Asaphus lepidurus* on rock surface

Talarurus plicatospineus

Shamosuchus

Velociraptor mongoliensis

Protoceratops andrewsi

Protoceratops andrewsi

Saurolophus angustirostris

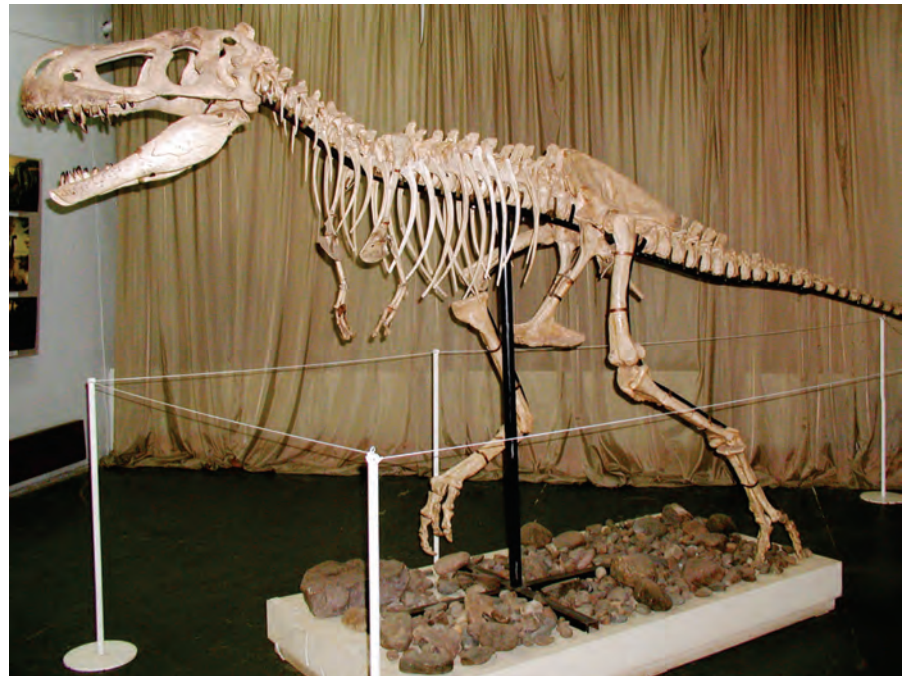
Mongolemys elegans



Above: *Protoceratops andrewsi*, Mongolia, Late Cretaceous



Above: Theropod, Mongolia, Cretaceous



Above: *Tarbosaurus bataar*, Mongolia, Cretaceous



Arstanosaurus, Mongolia, Cretaceous



Althirinus, Cretaceous

Technical Information

Crises, last 300,000 years

The Sevsik Collection is a unique sample of palaeontological exhibits consisting of six complete mammoth skeletons (*Mammuthus primigenius*). Specimens from one month to 6-8 years old. Four skeletons of baby mammoths of various preservation types and two mounted skeletons of adults.

Mammuthus trogontherii

Panthera spelaea

Sabre-toothed cat *Homotherium crenatidens*

Mammuthus trogontherii

Woolly Rhinoceros (*Coelodonta antiquitatis*)

Steller's Sea Cow (*Hydrodamalis gigas*)

Primeval bison (*Bison priscus*)

Ancient Bull (*Bos primigenius*)

Binagadic Rhinoceros (*Dicerorhinus binagadensis*)

Elasmothere Rhinoceros (*Elasmotherium sibiricum*)

Giant Cave Bear (*Ursus spelaeus*)

Small Cave Bear (*Ursus spelaeus rossicus*)

Fossil Cabaloid Horse (*Equus caballus*)

Kiakhtan Antelope (*Spirocerus kiakhtensis*)

Shoetensack's Bison (*Bison schoetensacki*)

Knobloch Camel (*Camelus knoblochi*)

Ground Squirrel (*Spermophilus superciliosus*)

Great Crises in the History of Life

SIZE

The exhibition fits into a 800-1000sq metre display area.

FURNITURE

Display plinths and acrylic barriers for each specimen will need to be provided by the host venue.

INFORMATION PANELS

Artwork for 54 Information panels is supplied in electronic form in English, additional languages by negotiation.

FLOOR LOADING

1000 kg per square metre.

BACKGROUND INFORMATION FOR DOCENTS AND TEACHERS

A manual of background information provided on disc for use by docents and teachers.

INSTALLATION

Onsite installation, and de-installation carried out by specialist staff from the PIN and MSC. Three additional qualified staff are required from the venue for the duration of the setup and dismantling of the exhibition (20 days total).

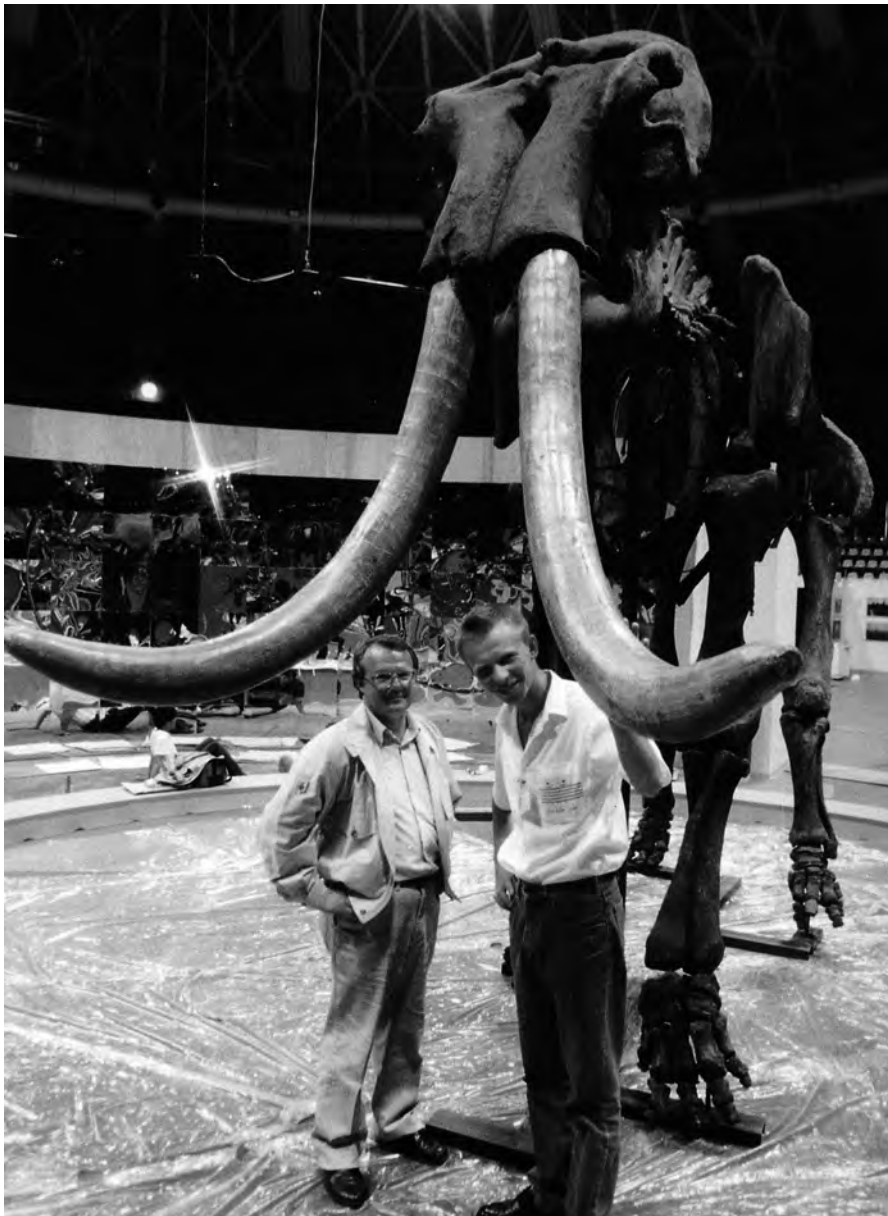
INSURANCE

Insurance for loss or damage to the exhibition is carried by the PIN (as part of the Upfront fee). Legal Liability insurance would be the responsibility of the Borrower while the exhibition is on display.

FREIGHT

The delicate specimens require that the exhibition travels by air. All travel costs to and from Moscow, including customs fees and charges, to be born by the Borrower.

Lighting is not provided by the exhibition and will need to be installed by the host venue.



Mammuthus trogontherii, Russia, Pleistocene



Top left & right: Adult *Mammuthus trogontherii*

Middle left & right: Juvenile *Mammuthus trogontherii*

Right: mummified Juvenile *Mammuthus trogontherii*, high quality cast



[For further details contact](#)

Professor Patricia Vickers Rich
Office of the Vice Chancellor

Chair in Palaeontology
School of Geosciences
Monash University
Building 28, Clayton Campus, Wellington Road, Clayton (Melbourne) Australia
Telephone: +61 3 9905 4889 Facsimile: +61 3 9905 4903
Email: pat.rich@monash.edu

www.monash.edu/science/about/schools/geosciences/precsite/

