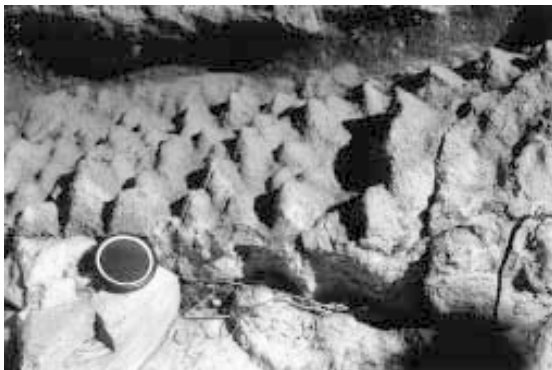




Pilbara fossil rescue mission

GSWA geologists recently rescued some of the oldest fossils in the world to protect them from the effects of weathering and the depredations of poachers. The fossils, which consist of a group of conical stromatolites that look like egg cartons, have been presented to the Museum of Western Australia where they will be on display for all to see.

GSWA geologists Dr Kath Grey and Dr Arthur Hickman, working with Prof. Hans Hofmann of the University of Montreal, discovered the stromatolites in 1997, in the 3.4 billion year old Warrawoona Group in the eastern Pilbara region, one of the oldest parts of WA.



Detail of the three-dimensionally preserved 'egg-carton' stromatolites

Because of their exceptional three-dimensional preservation, the stromatolites provide the most convincing evidence found so far that life was both fairly widespread and already capable of forming complex structures 3.4 billion years ago.

The find raised issues of how to ensure that the fossils would remain available for other scientists to study. In recent years, some of Western Australia's key fossil sites have been targeted by commercial collectors, who disregard both export legislation and the reserve status of certain sites because of a lucrative overseas fossil market. Recent court cases involving the removal of dinosaur footprints from near Broome and an attempt to export fish fossils have demonstrated the risk posed to the State's fossil heritage because it is difficult to keep remote areas under constant surveillance.

After much deliberation and consultation, GSWA Director Dr David Blight and Specialist Palaeontologist Dr Kath Grey decided that the 'egg-carton' slab should be collected and transferred to the Museum of Western Australia for conservation. However,

the removal was not to occur before international experts on early life had the opportunity to study the fossils in the field. This resulted in an expedition in July in which David Blight, Kath Grey, Hans Hofmann, and members of the GSWA Pilbara mapping team, Arthur Hickman, Martin van Kranendonk, and Ian Williams, were accompanied by a team of international scientists to examine and collect the 'egg cartons'. Five of the scientists are involved in the NASA Mars Lander mission, which leaves Earth in 2003. These scientists welcomed the opportunity to examine the Pilbara fossil localities because the Mars Lander will be searching for traces of similar fossils when it reaches the red planet.

DME's Corporate Communications section liaised with a film crew from the ABC science program Quantum to document the examination and removal of the fossils, and to publicise the need to protect fossil sites. The segment aired on Thursday 2nd September.

Concerns about preservation were justified when the party arrived at the 'egg carton' site. In the two years since discovery, the site has been affected by flooding. Photos from the ►

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From left to right: Dr Mike Sommers (University of California, Santa Barbara), Prof. Jack Farmer (Arizona State University), Prof. Bruce Runnegar (University of California, Los Angeles), Prof. Malcolm Walter (Macquarie University), Dr Dave DesMarais (Ames Research Center, California), Dr Kevin Heather (Barrick Gold Corporation, Chile), Dr Kath Grey (GSWA), Dr Martin van Kranendonk (GSWA), Mr Ian Williams (GSWA), Dr Arthur Hickman (GSWA), Dr David Blight (GSWA), Prof. Stan Awramik (University of California, Santa Barbara), Prof. Hans Hofmann (University of Montreal), Prof. Bill Schopf (University of California, Los Angeles), Dr Andrew Glikson (ANU, Canberra).

earlier trip showed how some loose fragments had washed away. The main slab, originally firmly embedded, was now loose and easily removed, and the arrival of two tourists while filming was in progress emphasized the vulnerability of the location. Remoteness does not necessarily confer protection.

The surface was photographed extensively before removal operations began, and a plastic mesh was used as a grid to ensure accurate reconstruction once back in Perth. The collecting team carried rock drills and moulding materials to aid removal, but in the end none of the equipment was used. Wide, soil-filled cracks meant that making an on-site cast was too risky because the silicon moulding material could have bonded to the dirt infill and become impossible to remove. Drills and sledge hammers were not needed because the loose fragments could be collected by prising them away from the underlying surface.

In the end, the methodical removal operation resembled archaeology more closely than geology. Each fragment was outlined on a polaroid photo mosaic of the outcrop. The cracks were cleaned with a brush and traced out, and then gently

widened with a chisel. Each rock was lifted out carefully, numbered, and its orientation marked. It was then wrapped in soft paper to protect the delicate peaks of the cones, and then in bubble wrap to provide further protection. The sample was finally bagged and packed in a tin can ready for the journey back to Perth.

Despite initial anxieties, the whole operation went smoothly and the

samples arrived safely at the West Australian Museum, where they have been re-assembled for display using the photographs and orientation data. □

For more information contact:

Dr Kath Grey

Ph: (08) 9222 3508

k.grey@dme.wa.gov.au

Also see our website :

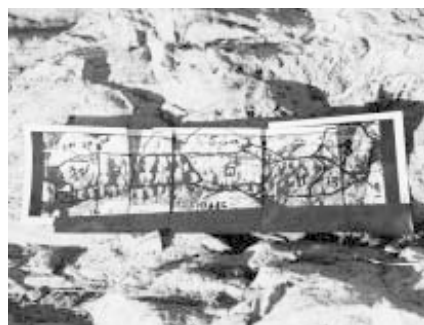
www.dme.wa.gov.au/ancientfossils



'Quantum' crew filming the excursion



A plastic mesh was used as a grid



A photo mosaic showing the fossil layout



Removing sections in planned sequence



From the Director's Desk

In this first issue of FIELDNOTES for the 1999–2000 financial year, I would like to comment briefly on our recent published output. Financial year 1998–99 was again a big year for GSWA in terms of published output. During the year, we produced 28 geoscientific maps, 57 manuscripts, and 5 digital data packages. This total of 90 published products exceeded last year's total of 86 products.

In recent years we have measured our annual 'productivity' in terms of the number of published products against dollars spent (our total budget). Although things were a little hectic in our Publications and Map Production Sections in the last quarter of 1998–99, for the second successive year we have exceeded our productivity improvement target of 5%. We are proud to say that we are continually improving our productivity, and believe we are doing so without any compromise in terms of the quality of the geoscientific data we publish. I hope you agree.

Please feel free to contact me with any suggestions you may have that will improve the service we are providing.

David Blight (Director)

Ph: (08) 9222 3168;

Fax: (08) 9222 3633

d.blight@dme.wa.gov.au

GSWA Core libraries — an update

In early 1997, the State Government accepted a Department of Minerals and Energy proposal to build integrated core storage facilities in Kalgoorlie, and at Carlisle in Perth, at a total cost of \$9 million. On completion, these modern, high-tech facilities will provide explorers with easy access to billions of dollars worth of core from past exploration.

WA DRILLCORE STORAGE FACILITY AND OPERATIONAL BASE — KALGOORLIE

The Design Development stage for the Perth and Kalgoorlie facilities was completed by Sandover Pinder Pty Ltd Architects and accepted by GSWA in May 1999. Currently, detailed drawings are being prepared for the Kalgoorlie store prior to inviting tenders for construction in October.

The 15 m-high storage building in Kalgoorlie will be complemented by single-storey buildings to accommodate an internal core-viewing area and the operational base for the GSWA Kalgoorlie regional office.



SOUTH EAST ELEVATION (BROADWOOD ST)

The construction program provides for a builder to be appointed for the Kalgoorlie facility in November 1999, and the expected completion date is June 2000.

Detailed drawings of the Carlisle facility will be finalized prior to inviting tenders for construction, which will commence in July 2001. Construction of the Carlisle facility is expected to take nine months. □

For more information contact:

Dr Tim Griffin

Ph: (08) 9222 3172;

Fax: (08) 9222 3633

t.griffin@dme.wa.gov.au



NORTH EAST ELEVATION



We have experienced some 'teething' problems with our new dme.bookshop; but it is getting close. Please keep an eye on our Home Page for its release during the next few weeks.

An electronic bookshop on the web

The DME has developed an electronic bookshop, which is accessible via its web site (www.dme.wa.gov.au)

The dme.bookshop contains all GSWA publications and maps and makes it 'oh so simple' to find and purchase the items you need.

You can now:

- *search our catalogue on-line*, using a variety of keywords and geographic pointers, to find the geological publications, maps or datasets you need,
- *place an order*, and use your credit card to
- *pay for items ordered* without leaving your desk.

dme.bookshop has been developed as part of our ongoing commitment to provide comprehensive and convenient service to our customers — within Australia and across the world. At present **dme.bookshop** covers only GSWA publications. Publications from the rest of the Department of Minerals and Energy will be added soon.



Bookshop homepage

How do I find the book or map I want?

1. Simple search

You can enter a single search term relating to the product you require in the field that is located near the top of the **dme.bookshop** Home Page screen. This will return items that match the word you have entered. All items in the bookshop have a number of searchable attributes.

For books they include:

- Author and title
- Broadterms — a set of geoscientific keywords
- Geological ages
- Commodities

For maps they include:

- Author and title
- Map name
- Map scale
- A simple search that will interrogate all the above search fields.

2. Advanced search

The advanced search facility allows you to filter your search by selecting the product type you require, then refining your search by using 'drop-down' menus to enter any additional information you may have on the product you require.

3. Browsing dme.bookshop

For those who love to wander around the shelves in real bookshops, we have the browse facility. In browse mode, the main categories of GSWA books and maps are visible in the left hand menu. By clicking on any category, it will expand to list the contents in the right hand frame. In this way, you can browse the entire contents of the bookshop based on the category of information you require. ►

How do I purchase an item?

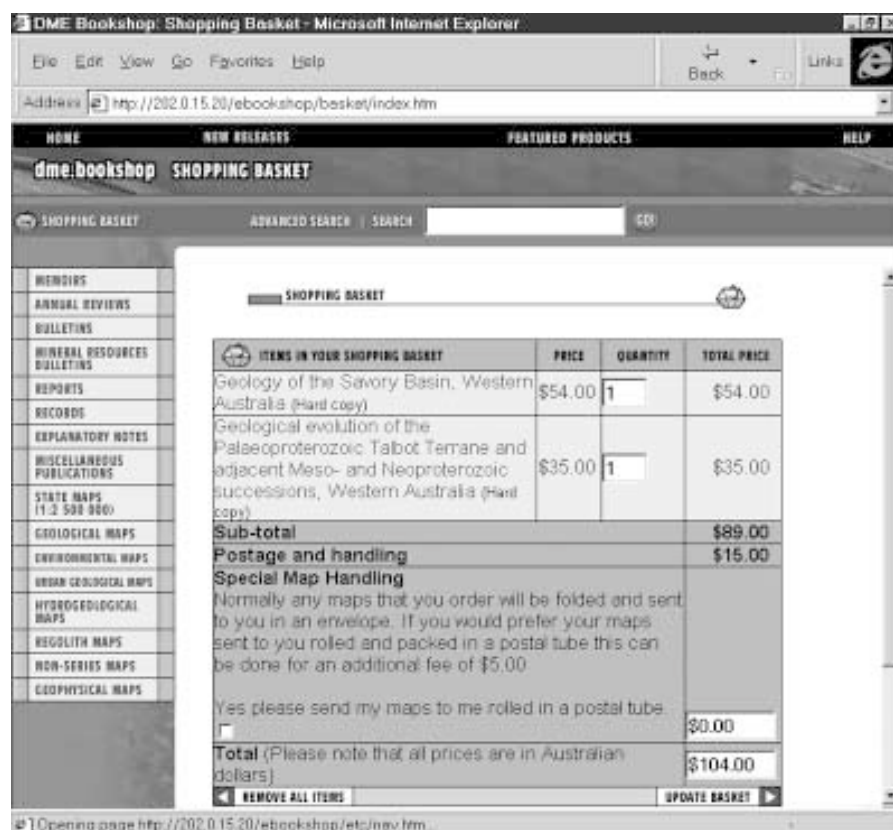
After browsing or searching for the products you require, you can add them to a 'shopping basket'. When you have added all the items you wish to buy to the 'shopping basket', you will be asked to enter your shipping details before proceeding to the 'checkout'. You will then be prompted to fill out your credit card details.

Are my credit card details secure?

Yes, all credit card and personal details are secured. They cannot be seen or modified by anyone else. Our online payment facilities employ 1024bit RSA/56 bit DES content keys. Further information on the payment gateway is available at <http://www.sos.net.au>

Can I pay by cheque?

If you are not comfortable with supplying credit card details via the Internet, you can print the 'shopping basket', and mail it to us with a cheque. □



Shopping basket

New release of MINEDEX digital data

The Department's MINEDEX database provides a coordinated, project-based, enquiry system for textual information on mine and site locations (coordinates, etc.), notice of intent to mine, mineral resources, mine production, mining inspection data, and environmental reports.

The latest digital dataset was released on 26 July 1999, and includes most publicly released resources up to that date.

Digital data are released via GSWA Record 1996/13 — 'Mineral resources and locations, Western Australia: digital dataset from MINEDEX', and include information on project, project owner and percentage owned, commodity group, sites, site

coordinates, mine operating status, and estimated mineral resources. Terminology for resources follows the JORC code as much as possible. Digital data are available as *.txt files and as an MS ACCESS 97 database file, and can be purchased from the DME Information Centre, First Floor, Mineral House, 100 Plain Street, East Perth for \$50.

The MINEDEX system is not yet available on-line or via the Internet, but a web interface is being developed.

For more information contact:

Don Flint

Ph: (08) 9222 3328;

Fax: (08) 9222 3633

d.flint@dme.wa.gov.au





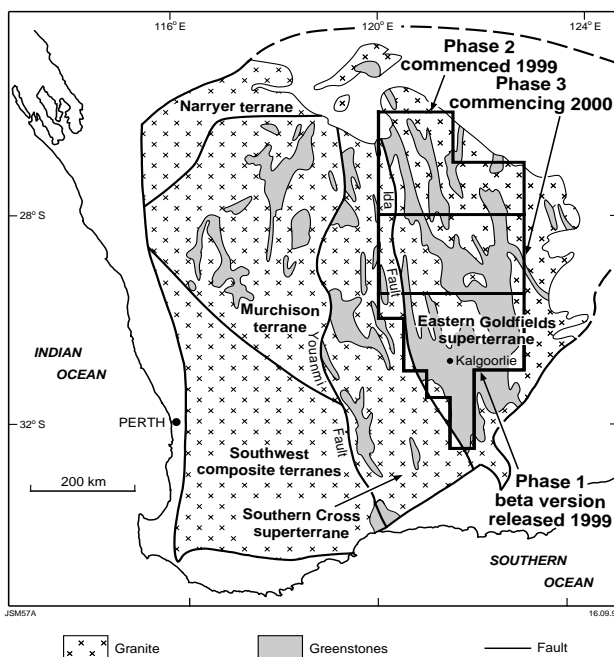
Beta release of the East Yilgarn geoscience database — a digital 1:100 000-scale map from Menzies to Norseman

The Geological Survey of Western Australia recently released the beta version of a new digital geological map of the Eastern Goldfields region at the *Mining in the Goldfields* conference in Kalgoorlie. This represents phase one of the development of a GIS-based geoscience database by the East Yilgarn Terrane Custodianship team, based in Kalgoorlie.

The digital Menzies to Norseman map covers a 55 000 km² area and incorporates 20 published 1:100 000-scale maps covering the southern part of the Eastern Goldfields. These maps were produced over a 15-year period during which considerable advances were made in the understanding of the regional geology and crustal structure of the area, and successful mineral exploration yielded several large economic ore deposits.

This beta release provides exploration and mining geologists with an early opportunity to use the prototype, and evaluate its structure and content. Users will also be able to provide us with constructive criticism, which will contribute to the final database, due to be released in late 1999.

The digital data were generated either by scanning and vectorizing published hard copy or through conversion of digital cartographic files generated in the course of publication. These files were then collated using ArcView. The geological information is presented as 'layers', which can be



superimposed and combined as required. Themes provided include mineral deposit location, resource data, tenement details, Landsat images, and an aeromagnetic layer derived from the historic BMR and AGSO datasets.

A difficult aspect of generating the digital dataset was the merging of geological subdivisions or rock units on maps produced by a number of different geologists over a time span of 15 years. Code changes were sometimes necessary to attain uniformity, and highlighted the need to re-examine the regolith layer in the light of recent redefinitions.

Mismatches at map sheet boundaries required many minor modifications and there was some local remapping to confirm the joins between map sheets.

Expansion of the database is already progressing, with phase two, incorporating eighteen 1:100 000-scale maps in the northern part of the Eastern Goldfields region, due out next year. Phase three will commence in 2000 and will bring in a further 18 sheets from the Leonora–Laverton area in the central Eastern Goldfields region, filling the gap between phases one and two. □

For more information contact:
Dr Ivor Roberts
Ph: (08) 9021 9426
Fax: (08) 9091 4499
i.roberts@dme.wa.gov.au



GSWA & AGSO KALGOORLIE OPEN DAY

Thursday 14th October 1999
GRADUATES HALL, W.A. SCHOOL OF MINES
50 MacDonald St, Kalgoorlie
9.30 am to 5.00 pm

Staff from both agencies will be on hand to discuss products, progress and plans.

New geoscience products for the Yilgarn Craton will be on display

- East Yilgarn Geoscience Database**
- Regional geological mapping**
- Isotopic dating**
- Geophysical data**
 - Aeromagnetic
 - Radiometric
 - Gravity
- Regional regolith geochemistry (Collier, Wyloo, Ajana sheet areas)**
- Mineral prospectivity packages**
- Guidelines for submission of annual reports in digital form**

For more details contact:

GSWA Kalgoorlie
Ivor Roberts
Phone: (08) 9021 9426
Fax: (08) 9091 4499
e-mail: i.roberts@dme.wa.gov.au

AGSO
Alan Whitaker
Phone: (02) 6249 9702
Fax: (02) 6249 9983
e-mail: alan.whitaker@agso.gov.au



Bush Telegraph — Where we are working

<i>Location</i>	<i>Map sheets</i>	<i>Dates</i>	<i>Activities</i>	<i>Team members</i>	<i>Contact details</i>
Northwestern Bangemall Basin, southwestern Gascoyne Complex	MANGAROO and EDMUND 1:100 000 sheets; GLENBURGH 1:250 000 sheet	Early September – middle October 1999	Field mapping; stratigraphic, structural, and sedimentological analysis; sampling for geochemistry and geochronology	Alan Thorne, David Martin, Sandra Occhipinti, Steve Sheppard	Alan Thorne Ph: (08) 9222 3335; Fax: (08) 9222 3633 a.thorne@dme.wa.gov.au
Central Yilgarn (Southern Cross district)	BARLEE, MARMION, and RICHARDSON 1:100 000 sheets; MENZIES 1:250 000 sheet	September–December 1999	Field mapping; geochemical and geochronological sampling; map compilation	Stephen Wyche, She Fa Chen, Angela Riganti, John Greenfield	<i>Perth:</i> Stephen Wyche Ph: (08) 9222 3606; Fax: (08) 9222 3633 s.wyche@dme.wa.gov.au <i>Kalgoorlie–Boulder:</i> Angela Riganti Ph: (08) 9021 9425; Fax: (08) 9091 4499 a.riganti@dme.wa.gov.au
Geraldton and the South West region	COWARAMUP, HOWATHARRA, and GERALDTON 1:50 000 sheets	September–October 1999	Field mapping, suitable for development and landuse planning, using 1:10 000-scale orthophotomaps	Richard Langford, Glennis Hall, Jodi Marnham	Richard Langford Ph: (08) 9222 3632; Fax: (08) 9222 3633 r.langford@dme.wa.gov.au
Murchison district	CUE, SANDSTONE, KIRKALOCKA, YOUANMI, BELELE, and GLENGARRY 1:250 000 sheets	25 September 1999 — ongoing	Inventory of abandoned mine sites	Roger Cooper, Nicos Adamides, David Townsend, Don Flint	Don Flint Ph: (08) 9222 3328; Fax: (08) 9222 3633 d.flint@dme.wa.gov.au
North Pilbara region	TAMBOURAH, SPLIT ROCK, WALLARINGA, WHITE SPRINGS, COOYA POOYA, NULLAGINE, and EASTERN CREEK 1:100 000 sheets; PYRAMID 1:250 000 sheet	September–October 1999	Geological mapping at 1:250 000 scale for production of maps at 1:100 000 and 1:250 000 scales; structural and stratigraphic studies; sampling for petrography, geochemistry and SHRIMP U–Pb zircon geochronology	Arthur Hickman, Ian Williams, Leon Bagas, Hugh Smithies, Martin Van Kranendonk, Terry Farrell, and (part-time) Caroline Strong	Arthur Hickman Ph: (08) 9222 3220; Fax: (08) 9222 3633 a.hickman@dme.wa.gov.au
Earaheedy Basin	MUDAN, WONGAWOL, and GLENAYLE 1:100 000 sheets	20 September – 26 October	Geological mapping, petrography, geochemistry, geochronology and palaeomagnetism studies	Franco Pirajno, Roger Hocking, Amanda Jones	Franco Pirajno Ph: (08) 9222 3155; Fax: (08) 9222 3633 f.pirajno@dme.wa.gov.au





SOME RECENT PUBLICATIONS

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- Kaolin in Western Australia**
MINERAL RESOURCES BULLETIN 19
by P. B. Abeyasinghe and J. M. Fetherston \$40.00
- Mineralization of the Halls Creek Orogen, east Kimberley region, W.A.**
REPORT 66 by T. S. Sanders (Book, map, and digital data) \$40.00
- Six industrial minerals of significance in Western Australia: bentonite, feldspar, kaolin, micaceous iron oxide, talc and tourmaline**
REPORT 67
by J. M. Fetherston, P. B. Abeyasinghe, J. Shanqing, and W. Guowu \$35.00
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First floor, Mineral House, 100 Plain St, East Perth, W.A. 6004.
Phone: (08) 9222 3459; Fax: (08) 9222 3444

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