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AURA Newsletter

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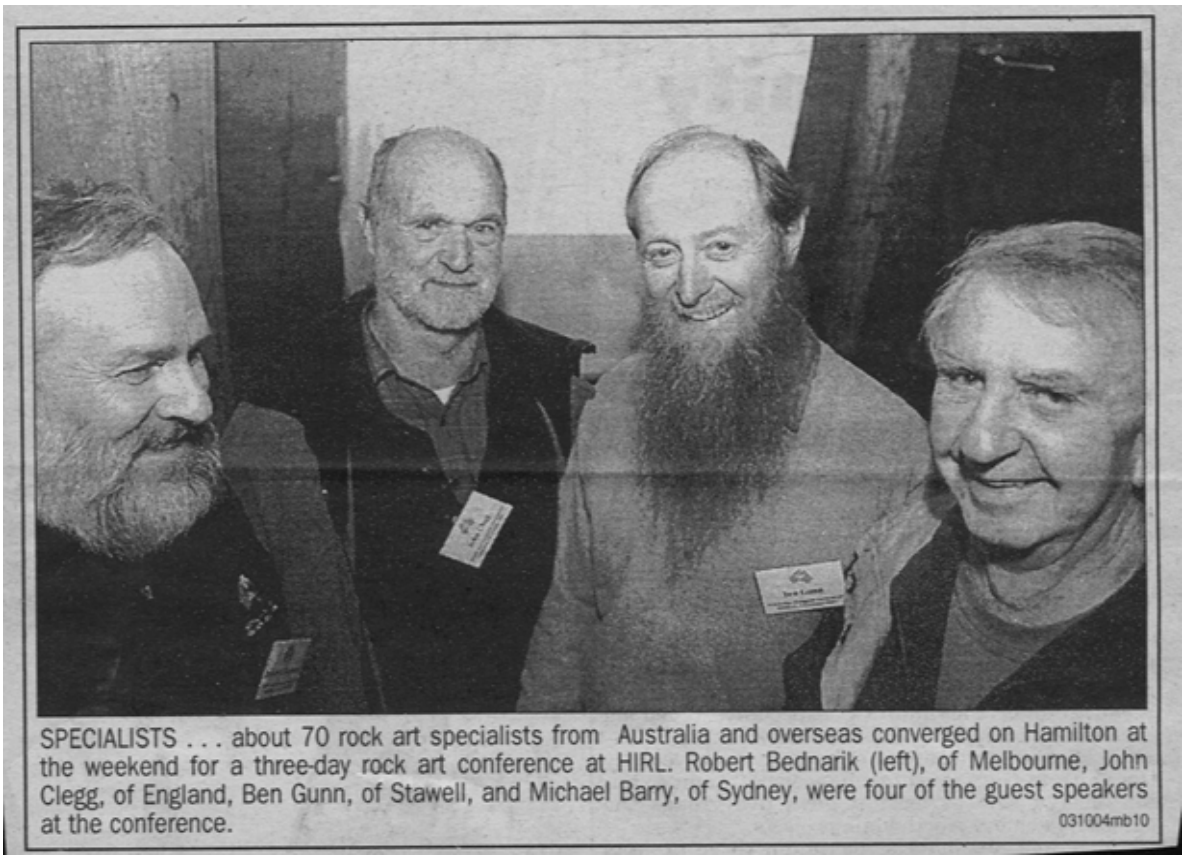
AURA at Hamilton

Compared to previous AURA conferences, the 2003 AURA Inter-Congress Symposium was a small affair, but it was also the most intimate and cordial AURA event held so far. It took place on the weekend of 4th and 5th October 2003 at the Hamilton Institute of Rural Learning, located on the northern outskirts of Hamilton. This consists of a sprawling complex of unique mud-brick buildings and superb gardens with adjacent bushland and small lakes, originally designed as an artists' enclave. Despite its name, the centre is not used for teaching purposes, but is a community centre used for social functions. We found it uniquely suited for a small conference such as ours.

Hamilton, a friendly country town near the southernmost mountains of the Grampians (Gariwerd), is the world's greatest centre of wool production (the district yields a sixth of Australia's total output). At this time of the year, in spring, it is a brilliantly green region, with morning mists and crisp days, and the wood stoves in the centre were put to good use. In fact AURA President Ken Mulvaney, down from the tropics of Dampier, was rarely seen more than a couple of metres from the stove. He opened the academic proceedings with his superb exposition of the current threats to the rock art of the Dampier Archipelago in Western Australia.

As several participants have commented, all papers presented in Hamilton were of the best academic quality. Combined with the relaxed atmosphere and the ample opportunities for debate, this consistency alone rendered the event most satisfying. But other aspects added greatly to its value and pleasant atmosphere. For instance, the efficiency of the event's honorary 'caterers', the Bednariks' daughter Cathrin Plunkett and her husband Michael, deserves special mention. The Plunketts put on an im-



SPECIALISTS . . . about 70 rock art specialists from Australia and overseas converged on Hamilton at the weekend for a three-day rock art conference at HIRL. Robert Bednarik (left), of Melbourne, John Clegg, of England, Ben Gunn, of Stawell, and Michael Barry, of Sydney, were four of the guest speakers at the conference. 031004mb10

From *The Hamilton Spectator*, with permission.

peccable barbecue on Saturday night, they prepared all tea breaks and organised lunches with great verve and competence, giving the conference also a very personal touch. And Elfriede manned the registration desk with the proficiency AURA members have long become accustomed to. It was, some have commented, one of the best conferences they ever attended. That's high praise indeed, when one considers the international smorgasbord of rock art events available nowadays.

Still, the core of the symposium was the presentation of papers. The event was chaired by ben Gunn and Robert Bednarik, who both presented new perspectives on subjects they had previously visited. Ben addressed the design structure and spatial patterning in early Gariwerd rock art, Robert the recent developments in his campaign to save the Dampier rock art. Michael Barry presented a masterful and wide-ranging analysis of the human figures in the Gwion Gwion rock paintings of the Kimberley, formerly known as Bradshaw figures. Caryll Sefton provided a detailed report of her team's survey work in the rugged Woronora Plateau and Southern Highlands of New South Wales. John Clegg offered a challenging account of a baffling series of circular depressions found in the sandstone country near Sydney. Margaret Bullen provided a most erudite discussion of the shamanic explanation of rock art, showing that the occurrence of such patterns as spirals, dots and circles is not at all a typical shamanic feature. Noelene Cole, who had recently undertaken a tour of numerous major public sites in Europe and India, compared these in terms of their different management approaches and concluded that in certain respects Australia was beginning to lag behind overseas initiatives. John Morieson tapped into his encyclopaedic knowledge of Victorian stone arrangements and provided an overview of a series of sites he has closely studied. Heather Builth, from the Winda-Mara Aboriginal Corporation near Hamilton, expounded the findings of her study of stone structures in the region, designed by the Gunditjmara for water and resource control. Esmée Webb, together with ben Gunn, reported the discovery of new rock art near Cue, in Western Australia. The papers were followed by introductions to the destinations of the two post-conference field trips, one to the Mount Gambier cave art precinct, and the other to painting sites in the nearby Grampians/Gariwerd mountains.

About one half of the conference participants joined each of the two field trips. The Gariwerd one-day excursion was led by ben Gunn, and was addressed on site by a representative of the Goolum Goolum Aboriginal Co-operative. The cave art tour of two days was led by parietal art specialist Geoffrey Aslin and included seven cave petroglyph sites (Paroong, Moora, Koongine, Malangine, Prung-kart and Gran Gran Caves, and Mt Burr Rockshelter).

On behalf of all conference delegates I thank Cathrin and Michael Plunkett, Elfriede Bednarik, Geoffrey Aslin and ben Gunn for their invaluable contribution to making this conference the success that it was.

Robert G. Bednarik

Dampier report May 2004

The Dampier Campaign seeks to prevent the destruction of the huge petroglyph concentration of the Dampier Archipelago, Western Australia. There have been many new developments in this campaign over the past year (see 'Dampier report April 2003', *AURA Newsletter* 20/1). In July 2003, a contract was awarded to construct a major service corridor across the Burrup Peninsula, which reportedly destroyed between 170 and 180 sites. In August, IFRAO (the International Federation of Rock Art Organisations) advised the Chairman of the Dampier 'emissions committee' that its proposed research program was unsuitable, and submitted a detailed critique of the Draft Management Plan to the Burrup Peninsula Conservation Reserve Planning Advisory Committee. On 25 September 2003, the World Monuments Fund accepted IFRAO's nomination of the Dampier rock art precinct, made on 24 October 2002, as one of the 100 most threatened sites in the world. This is the first Australian site to be blacklisted by the WMF. Four days later, Methanex, the proponent of the largest of the proposed industrial developments on Murujuga (Burrup), announced the cancellation of its plans. The official reason given was that development costs are too high on the peninsula. The Canadian firm is the largest methanol producer in the world and has been in serious conflict with conservationists before.

In the following month, work at the Woodside plant at Dampier was significantly interrupted by a strike of 1700 workers. On 21 November 2003, militant trade unions won access to Pilbara sites from which they had been excluded for well over a decade. This ushers in a new balance of political power in the region.

On 12 January 2004, the President of the World Monuments Fund, Bonnie Burnham, travelled to Dampier with the President of IFRAO to inspect the rock art and the industrial development within the rock art precinct. The Western Australian Minister for State Development, Clive Brown, immediately condemned her visit, even before her findings became available. On the following day, the WMF and IFRAO Presidents met a panel of government officials in Perth and informed them that nowhere else in the world is there a monument of the magnitude and significance of the Dampier rock art that has to share its locality with an industrial estate. The WMF President requested that the new developments be located elsewhere. Minister Brown rejected her advice flatly, stating that Americans should focus on their own environmental problems, 'rather than coming to Australia and telling people what to do'.

In late January 2004, the terms of reference of the Burrup Rock Art Monitoring Management Committee were released, after the four study contracts had all been let to a governmental agency, CSIRO. Accordingly, two studies will cover the monitoring of ambient concentrations of air pollutants, and microclimate and deposition. The two others will feature artificial fumigation of rock surfaces and fieldwork on rock surface colour changes. Below is the full text of the summaries of the terms of references for these studies, followed by a critical review of this program.

On 19 March 2004, IFRAO announced that it would expand Robert Bednarik's rock art deterioration study he began in 1968. Three days later, IFRAO submitted the Dampier rock art precinct for inclusion on the National Heritage List, and prompted its nomination for World Heritage by two other stake holders. On 26 April, Japanese conglomerate Japan DME announced that its one-billion-dollar development at Dampier may not proceed. This follows the defections of all other major proponents.

In May 2004, the WMF confirmed that it would provide substantial financial support for the IFRAO study. In view of these developments it is appropriate that the study conducted by the Western Australian state government be reviewed comprehensively. This is attempted here.

SUMMARIES OF PROPOSED ROCK ART MONITORING STUDIES

Introduction

Listed below are summaries of the studies that have been endorsed by the Burrup Rock Art Monitoring Management Committee. These studies are the outcome of discussions between the Committee, researchers and the local Aboriginal and broader community following a Rock Art Monitoring Workshop in Dampier in March 2003.

In accord with Government procedure these studies are being finalised in terms of arranging contracts and engaging qualified consultants/researchers (external to government) to undertake and report on scientific findings. This process has followed a formal government tender process, which commenced with advertising for tenders in July 2003. The successful consultants for these studies were announced in February 2004 with commencement of field work expected in late April or early May following monitoring site establishment.

The Committee expects regular updates on the monitoring studies with six-monthly and annual reporting to the Committee. These reports will be made available on the Web (*www.doir.wa.gov.au*). The Committee will continue to provide updates on the progress of the rock art-monitoring program and will report to, and consult with the community annually.

Following completion of studies and peer assessment of the work of the consultants, the Committee will produce a final report to government and the community. It will then make recommendations to the Burrup conservation area management body for the ongoing preservation and conservation of the rock art, whether further industrial development on the Burrup Peninsula proceeds or not.

Study 1 - Air monitoring of ambient concentrations of air pollutants

Monitoring required:

- NO_2, SO_2, NH_3, BTX

Monitoring locations:

- Six locations selected (1 each at northern Dolphin Island and northern Burrup Peninsula and 4 within the industrial area of King Bay-Hearson Cove).
- Note: SO_2 and NH_3 monitoring (1 control and 1 industrial location only).

Monitoring timeframe:

- Initially for 1-year period with possible extension following annual review of monitoring results.

Proposed sampling system:

- Each sampling site to have anodised aluminium sampling lid fitted with a rail with passive gas samplers for NO_2, SO_2, NH_3. BTX samplers to be housed under the same lid and secured with metal clips. Aluminium casing to be attached to a metal or treated pine pole.
- Passive gas samplers to be mailed to a central location for exchange drop-off and pick-up by trained technician.
- Exposed samplers to be removed and placed in the vials and new samplers installed into the housing.
- Record sheets to be used by operators to record time and date of sampler installation and removal, serial number on the vial, average temperature and any additional observations/comments.
- Exposed samplers to be placed in pre-addressed envelopes supplied by researchers and posted to researchers for analysis.

Sampling period:

- Monthly sampling periods.

Study 2 - Microclimate and deposition study

Monitoring required:

- Temperature;
- Relative humidity;
- Wet deposition - amount and chemical composition;
- Dry deposition - amount and chemical composition;
- Bulk deposition - amount and chemical composition;
- Chemical composition (including pH) of dew on rock surfaces on exposed and protected/shaded faces.

Chemical composition shall include sodium, chloride, iron, total nitrogen and sulphur.

Monitoring locations:

Six locations selected (1 each at northern Dolphin Island and northern Burrup Peninsula and 4 within the industrial area of King Bay-Hearson Cove).

Monitoring timeframe:

- Initially for 1-year period with possible extension following annual review of monitoring results

Site establishment
(equipment to be co-located with passive samplers)

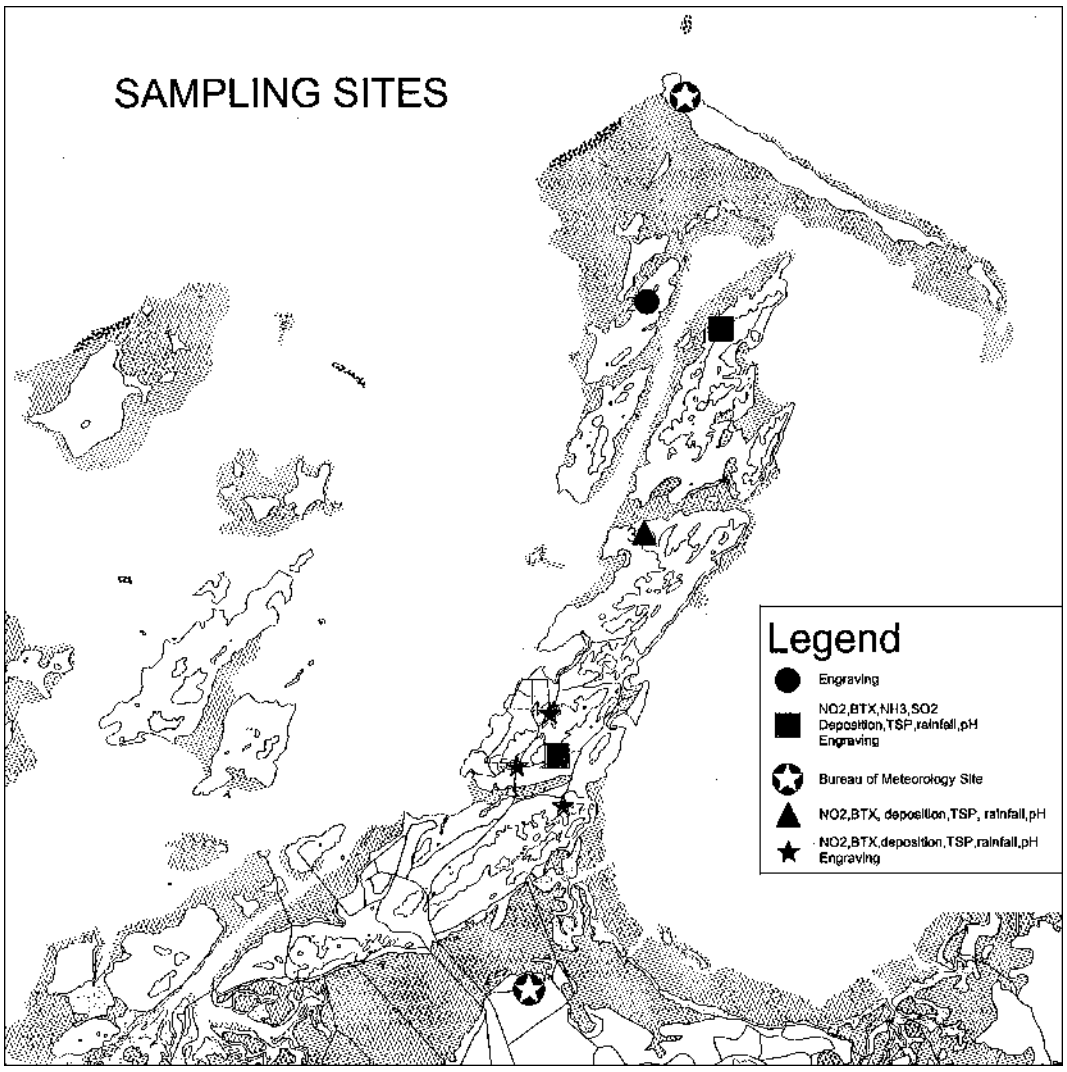
- Consists of a rainwater sampler, total suspended particulates (TSP) particle sampler, a deposition sampler and temperature and humidity meters.
- Rainwater and TSP particle samplers to be bolted to a free-standing concrete slab and placed in an appropriate position.
- Temperature and humidity will be measured electronically with a sensor mounted in a screened enclosure approximately 1.5 m above ground, powered by a gel cell battery.
- During each visit the technician will download data to a notebook computer and e-mail the file to researchers. Notebook computer can be supplied by researchers if required.

Sampling period:

- No greater than monthly sampling for wet, dry and bulk deposition.

Sampling and analysis methodology:

- Rainwater samples to be collected monthly using Ecotech Model 200 'wet only' rainwater samplers. These will be supplied with solar panels to charge the battery. To counteract effects of bacteria consuming some species such as organic acids, ammonia and sulphate thymol (a biocide) will be added to the sample bottle prior to field installation.
- At end of each month sampling period, data stored in the data logger will be downloaded to the notebook computer and the data file e-mailed to researchers for chemical analysis.
- Dry deposition to be collected using Ecotech Microvol 1100 samplers configured to collect TSP. They are fitted with a solar panel to charge a battery.
- After sampling the filters will be returned to researchers, extracted with high purity water and analysed for species as for rainwater.
- For measurement of amount and chemical composition of bulk deposition, a pre-cleaned plastic funnel and bottle at each site exposed for monthly periods will be used. At end of each month, high purity water will be used at the site to wash particles deposited on the funnel into the bottle.
- Dew samples will be collected from rock and surrogate surfaces using pre-cleaned pasteur pipettes. Samples to be transferred to glass vials, sealed and sent to researchers for analysis as for rainwater.



The sampling sites of the Burrup Rock Art Monitoring Management Committee

- In all cases, record sheets will be provided by researchers to the field technician to record sampling times, dates, volumes and any observations or comments.

Summary of joint proposals

- Six sites for NO_2, BTX, wet deposition, dry deposition and bulk deposition measurements.
- Two sites (1 control and 1 industrial site location) for NH_3 and SO_2 measurements.
- Sampling for gases, rainwater and particles at monthly intervals.
- Sixteen dew samples at each site during the year.
- Sixteen dew samples are on the basis of 4 samples/site unshaded and 4 shaded and a similar number on a surrogate surface such as Teflon.
- Number of rainwater samples is estimated at 10 per year per site based on data from Bureau of Meteorology.

Study 3 - Field studies of colour changes

Monitoring required:

- There is a need to assess whether there is a loss of colour contrast between rock art/petroglyphs and adjacent rock surfaces, and to establish a scientifically valid baseline for future assessments. Physical assessments are required at a number of monitoring sites to assess whether colour changes are occurring and if these are occurring at a greater rate than that due to normal weathering.
- It is expected that due to the small changes expected, monitoring of the same sites would only be needed annually over the four-year period study period.
- Any monitoring would need to ensure that there were controlled or carefully characterised conditions so that comparisons are reproducible.

Monitoring locations:

- Six monitoring locations (2 at northern Dolphin Island and 4 within King Bay-Hearson Cove).

Monitoring timeframe:

- Annual monitoring over a 4-year period, with possibility of extension following review of the monitoring results.

Proposed sampling system:

- The proposed methodology demonstrated an understanding of the need for a reproducible, reliable approach through the use of a BYK-Gardner portable spectrophotometer with natural light being excluded using a compressible collar. Such an instrument has a range of standard illuminants, including those for natural light. It does not have the capability to provide readings for light in particular spectral intervals. It would, however, provide detailed comparable information about changes in colour in standard natural light as perceived by the eye.
- The measuring head measures a diameter of 4 mm, which would allow for measurement of contrast between engravings and surrounding rock faces.
- Contrast in colour between engravings and adjacent rock faces

would be in terms of Delta E, the standard CIE colour difference method.
- Each petroglyph would be monitored at three points with three adjacent points on the rock surface, each an average of 7 readings — 42 readings per petroglyph.
- In order to relocate the instrument, digital photography with a macro lens will be used to relocate to within a millimetre.

Sampling period:
- Annual

Study 4 - Artificial fumigation studies of rock surface changes

Monitoring required:
- In order to gain some indication of the types of changes to be expected from prolonged exposure to existing and possible future industrial emissions it is considered that there may be value in conducting fumigation cabinet studies of typical rock samples with weathered surfaces from the Burrup Peninsula.
- Fumigation trials of nitrogen dioxide, sulphur dioxide, ammonia, xylene, benzene and toluene would be needed at a range of concentrations to provide a dose-response assessment but in the above proportions with realistic Burrup temperature and humidity conditions. The fumigation trials should examine the gases in combination for existing and future industry scenarios and multiples of those concentrations to assess any physical, mineralogical or chemical changes.

Monitoring timeframe:
- One-year period, exercisable at the absolute discretion of the Rock Art Committee.

Proposed sampling system:
- The proposed 8 cycles per day of dry/wet/dry transitions over 3 months would be equivalent to some 7 years of climatic cycles
- Further acceleration is proposed through 'a combination of adjusting temperature and pollutant dosage (to an extent limited by the need of not distorting the damage mechanism' leading to obtaining 'an equivalence of 20 years of climatic cycles'.
- Consideration will be given to assess possible damage over a longer period than 20 years, it would be necessary to identify early indicators of damage. These may be chemical changes in desert varnish or specific mineral structure alteration, identified by analytical tools such as XRD or XPS.
- Possibly conduct a preliminary assessment to decide on the number and conditions of test cycles.
- There is also a proposal for a limited study using extreme exposure doses to assess the early indicators of chemical or mineral change mentioned above.
- Analysis will be done using SEM and XPS by the relevant researchers.

A recipe for failure

ROBERT G. BEDNARIK

The Dampier rock art monitoring program by the Western Australian government was initiated in response to my paper 'The survival of the Murujuga (Burrup) petroglyphs', in *RAR* 19(1). In that paper I had reported detecting quantifiable degradation of the ferruginous mineral crust in the Dampier Archipelago, on whose preservation the rock art depends for its continued existence. Having measured changes in colour and crust degradation since the late 1960s, I had observed a marked deterioration since the late 1980s. In extrapolating from these empirical observations I predicted that the proposed three-fold increase in acidic gaseous emissions would cause widespread loss of colour contrast among the massive petroglyph corpus over the course of the 21st century.

I have therefore every reason to welcome the initiative of the government. Moreover, our knowledge base of the effects of atmospheric acidification on mineral patinae remains woefully inadequate, and any work that is designed to improve this is more than welcome. However, if the full potential of such an opportunity is not realised, it is just an opportunity lost, and it is for this reason that we need to examine the above proposals critically.

It seems to be agreed that the primary purpose of this exercise is to (a) determine the precise nature of the processes causing deterioration, and its secondary purpose is (b) to use this information to design ways of alleviating these effects. From a scientific perspective, the first purpose is the more valuable, because it will enrich our generic understanding of threats to rock art. However, from a purely pragmatic point of view, only the secondary purpose (b) is of ultimate interest, for the possible implementation of palliative measures. Nevertheless, it is obvious that, in order to design such measures, it is imperative that the basic research be conducted under optimal conditions. The terms of reference make it clear enough that this project will fail to deliver the optimal information we require.

The main reason for this lies in the central assumption that the deterioration processes are very slow and *gradual*. This is no doubt acceptable for Study 3, where colour changes are to be examined. These occur over a long period of time and the proposed four-year period may in fact be inadequate. Moreover, none of the studies is concerned with the key issue to be addressed: the physical degradation of the mineral accretions that are the very centre of this preservation problem. Instead we have monthly monitoring of four pollutants, which will offer vaguely relevant background information; we have monthly sampling of some factors of atmospheric deposition, which is much more relevant but is incompletely covered; the colour monitoring program; and simplistic accelerated weathering experiments.

Dampier is a locality of climatic extremes, where most precipitation occurs within a few weeks in the year. Gaseous emissions by themselves are not likely to dissolve the crusts, they would become operative in the presence of moisture. Unless dew has an effect, which remains unknown, we could reasonably assume that the deterioration only takes place in the course of a few weeks, essentially in the cyclon season. Obviously what we need to know more than anything else is what happens at the rock face when it rains. What I would like to know most is this: does solution take place only during rain, does it proceed evenly or does it peak, for instance in the first ten minutes of rain, when radicals in dormant solids are activated by the water? Or perhaps it takes a certain time of rainfall before the micro-erosional front becomes fully active? At this stage, we cannot claim to understand the processes of mineral accretion deterioration at all, therefore any study must commence without unwarranted assumptions. It is quite probable that most of the deterioration of the crusts is by the reaction of NO_2 and rainwater in the atmosphere, yielding nitric acid, but how does its effectiveness vary as a function of duration of the precipitation event? We have no idea about these crucial details, and the most obvious aspect of the proposed study project is that it cannot possibly provide such details. The simplistic design of the project prevents the acquisition of the most important data, and instead meaningless data are likely to be collected.

It would have been much more appropriate to determine the variation of rainwater pH at the atmosphere/lithosphere interface

and to plot it against time over the duration of a rain episode. The most relevant study would be a direct observation of the process under a binocular microscope, visually observing the physical mobilisation of material. The detailed recording of just one such event would tell the judicious analyst far more than four years of unfocused and purposeless gathering of probably meaningless data. Moreover, such observation results would quickly lead to the formulation of alleviating measures. For example, if it were found that most of the degradation occurred in the early part of a rain episode and is attributable to a flushing with nitric acid, then it would be possible to avoid most damage simply by closing down emissions several hours before rain. Since most rains occur during a brief spell in the monsoon period, Woodside could easily schedule this period for annual maintenance shut-down, or for the periodic repairs or construction works entailed in the normal operation of such installations.

I am of course not suggesting that this is the correct solution, I merely use this example to show that we must not make assumptions about the relevance of specific empirical indices. All we know with certainty is that there was deterioration of the accretions since the late 1980s, because this has been monitored over decades and is quantifiable. We also know, from my work, that the micro-morphology of the accretionary deposits in the Pilbara is heavily influenced by precipitation. The core issue, then, is one of geochemistry. Emissions are the most obvious culprit, but it seems perfectly possible that factors or catalysts we have not even considered are contributing, or are even crucial. In science the solution to a problem can come from even the most unexpected direction. If we work from the assumption that only long-term average exposures are relevant, as the terms of reference in this project stipulate, we may not just be limiting the effectiveness of the project (if the short-term event peaks were the problem), we may render the entire project ineffective. And we may miss a rare opportunity to conduct badly needed basic research into this generic subject area of iron-rich mineral crust deterioration resulting from industry.

There are still other objections to the research proposal. The accelerated weathering study ('fumigation') is likely to lead to severely misguided pronouncements about the effects of exposure to various gases. It does not simulate the natural exposure conditions, but will extrapolate from the probably negligible effects of fumigation at multiples of concentration. If the gaseous emissions have little or no effect in the absence of water, as may be the case, what is the point of demonstrating that they have also little effect at twenty times the predicted concentration?

Of particular concern is the proposed methodology of monitoring colour changes in the accretionary ferromanganous deposits. As indicated in the above terms of reference, it is proposed to use a BYK-Gardner spectrophotometer with a 4 mm aperture opening for this purpose. Therefore the instrument proposed is the 45/0 model, catalogue number CB-6807. This instrument is designed for manufacturing processes, e.g. of plastics products. It is highly sensitive to extreme conditions of temperature and relative air humidity, and cannot be operated either above 42°C or above 85% relative humidity — conditions that both occur commonly in the Dampier region. Moreover, the instrument is very imprecise, with a spectral interval of 20 nm, over a spectral range from 400–700 nm. Hence it does not even cover the full range of visible light. Indeed, Gardner call it a 'colour guide', a much more appropriate description than 'spectrophotometer'. The impression that an unsuitable methodology has been proposed is reinforced by the description of how the sampling site will be re-located (not 'relocated'): digital photographs will guide this process. Yet the baffle surrounding the aperture is of about 12 cm diameter. First, it will be physically impossible to re-locate the baffle so that the original sampling site is targeted 'to within a millimetre', as stated. Second, it should not be approximately re-located, or within a millimetre, it must be precisely re-located, otherwise the result can only be imprecise, if not meaningless.

What amazes me most about this methodological blunder is the fact that a vastly more accurate method of colorimetry is available. It was designed precisely for measuring changes in rock art, it has been published, and has been used in the Dampier Archipelago for many years. The colorimetric method I have developed specifically for rock art is much more accurate, simpler and cheaper, and I have used it not only at Dampier, but also elsewhere in the Pilbara (notably on repatinated inscriptions at Spear Hill) as well as on red pigment in Mladeè Cave, Czech Republic, on petroglyphs in Saudi Arabia, and elsewhere. In this method with its spectrum of over 16 million colours, the spatial sampling accuracy is well under 100 microns. It requires no expensive American gadget and measures colour change with much greater precision, by relying on aliquot readings rather than single but questionable values. Moreover, because calibrated photographic records can be included to determine earlier colour changes, the duration of the monitoring period can be extended to the earliest such records we have. They are in this case of 1968, so in 2008 they will provide coverage of the highest accuracy for a total of forty years, whereas the results of this government endeavour will cover just 10% of that duration, at vastly inferior accuracy, at massive cost (hundreds of thousands of dollars), and yield results which I can only reject: I remain unconvinced that the Gardner instrument is even remotely suitable for this task.

Why, then, this unfortunate choice of methodology? The answer is simple. This Rock Art Committee does not include a single rock art researcher, or even a specialist in accretionary mineral crusts. This is despite the fact that such expertise would have been available in Perth, and amply available in the eastern states of Australia. The committee is unaware of previous attempts to measure rock art deterioration by spectrophotometry or spectrometry, which were unproductive or inconclusive, and which were the very reason why I opted for digitised colorimetry a long time ago. The exclusion from this project of rock art specialists is deliberate, as shown by the simple fact that all four studies were awarded to a single government agency (CSIRO) that, significantly, has no previous track record in rock art research or rock art conservation. Having conducted all previous analytical work on the Dampier rock art, and having prompted this project, I find it sad that I was not consulted on any aspect of its design. Its mistakes were all avoidable.

Therein lies the problem: this is not an attempt to resolve the issue, but a political whitewash and a measure to procrastinate further. I predict that the results of this project in 2008 will be inconclusive and unreliable, and that the main finding will be that CSIRO will require further funding to continue the work. Meanwhile the government expects to continue its destruction of the Dampier rock art, bulldozing many more sites, and permitting the huge petrochemical industries to belch out ever more acidic emissions, at the rate of tens of thousands of tonnes per year. And all the while, the alternative Maitland Industrial Estate remains unoccupied.

Footnote: the International Federation of Rock Art Organisations (IFRAO) will this year expand the monitoring and inventorying program I began in the 1960s, and prepare the documentation and data required for the establishment of a National Park in the Dampier Archipelago.

Please visit the Save the Dampier Rock Art site at
http://mc2.vicnet.net.au/home/dampier/web/index.html

Pinerolese rock paintings, western Alps, Italy

By DARIO SEGLIE, MAURO CINQUETTI AND PIERO RICCHIARDI

Pre-History and rock art in the Pinerolese territory

The Study Centre and Museum of Prehistoric Art of Pinerolo (CeSMAP) was established in 1964 to continue the archaeological studies of the western Alps and Pinerolese territory, started in the previous century by the scholars of the Turin Royal Academy of Sciences. The general directions were forged by Piero Barocelli, dean of Italian archaeologists, by Carlo Carducci, Director of the Piedmont Archaeological Regional Office, and by Diego De Castro, professor in Turin University.

The need to secure a continental dimension for the studies was immediately manifested in Pinerolo, to best contextualise and understand a characteristic and archaic phenomenon of the Alpine mountainous arc: rock art, the specific subject and specialised sector of archaeological research by CeSMAP. From the very beginning till today, the competence and the research field of the Pinerolese Centre was in continual expansion, both in the Western Alps and around the world. In 1988, in Darwin, Australia, it took part in the founding of IFRAO (International Federation of Rock Art Organisations). CeSMAP, in consideration of its great international engagement, was decorated with the European Culture Award by the EU, and was recognised as IFRAO – UNESCO Liaison Office, c/o the Paris General Direction. The Prehistoric Art Museum of Pinerolo possesses the wider international rock art collection.

The most important archaeological campaigns of the CeSMAP, accomplished in the last quarter of the last century, defined the overview of the peopling of the Pinerolo region since pre-History, although an immense work of survey and excavation in this territory must still be accomplished. The area is characterised by a strong potential and high density of archaeological finds, as it was already foretold by the early scholars in connection with the strong rock art presence in this area.

The CeSMAP archaeological excavations

The Balm'Chanto shelter, at 1500 m a.s.l. in the Chisone valley, has yielded very important remains of human presence in the Cottian Alps since the Epigravettian, at the end of the last glaciation, from about 14 000 years BP, and also data on the population of the middle alpine slopes during the Copper Age, about 4200 years ago, as confirmed by radiocarbon dating. The Roc del Col site, in the high valley at 2083 m a.s.l., has furnished the dimensions of the agro-pastoral activities during the Bronze Age, about 3500 years ago. The Neolithic rock paintings, dated 6000 years ago and the coeval VBQ sites of the Middle Neolithic, discovered at the Cavour Rock, testify to the presence of the oldest farming communities of the Pinerolese region in north-western Italy.

Recently, further excavations in the Piedmont territory confirmed the presence of numerous sites indicating a flourishing occupation during the last millennium B.C. and until Romanisation, already surveyed by CeSMAP in the sub-alpine area, and consisting of settlements raised on the first hills that stand on the Po plain.

Geographic environmental context

The Piedmont region is in the west hemmed in by the alpine chain raised by orogenetic pressures, lifting out from the Mediterranean Basin since the Tertiary period. In the Piedmont region the mountains are present without calcareous deposits, while the median belt is mainly formed by crystalline, eruptive and metamorphic rocks. This fact has caused the absence of a sub-alpine belt, consequently the distance between the highest ridges of the watershed and the plain is very short, 45 km in average.

The Italian Western Alps show wide and short valley corridors that penetrate into the mountain chain, developing — in some cases in the valley bottom — true plain tongues. After the last Würm glaciation, about 10 000 years ago, these morphological characters facilitated human colonisation. Man, also sporadically present during the glacial era, progressively extended his control on the territory to totally occupy, from the Neolithic, the alpine system up to the belt of the high pasturages. Also, and particularly in the Western Alps, thanks to the presence of frequent passes, the mountain relief — rather than constituting an isolating motif for the local populations — allowed frequent and continuous cultural and economic exchanges between the slopes and between the valleys.

This fact conferred to the western alpine region a sort of unity in the anthropic characters, from pre-History and proto-History till today. This cultural unity is also traceable in the rock art manifestations ascribed to the post-Palaeolithic period, although one can also see petroglyphs that date back only to the Middle Ages.

The surfaces engraved are variously dispersed in the territory, but are principally sited on the sides of ancient paths, in prominent positions. Rock art is often present in particular places that could have been experienced as sanctuaries by the pre-Historic populations settled here.

Rock painting sites

The name 'rock art' is traditionally attributed to all non-utilitarian anthropic markings on rock surfaces, made either by an additive process (pictogram, rock painting) or by a reductive process (petroglyph, rock carving). It is important to underline that the term 'art' is utilised *latu sensu,* without aesthetic implications, according to the Latin etymology that defines the human activity of producing artefacts, hence the derivation of the words artisan, artificer, artist. Still today, the traditional populations that make rock art, like Australian Aborigines, African San people or American Indians, lack words for defining 'art' as an autonomous activity because it is the result of ceremonies and complicated creative acts, including also graphic expressions.

Rock art is today only the 'residue' of the old religious complex, conserved over time, while songs, prayers, dances, gestures, votive offerings etc. are unrecoverable, but it displays the spiritual abundance of our oldest ancestors.

Pre-Historic man placed rock art in selected dominant strategic sites, perhaps expressing ritual, symbolic and religious possession of the territory that converted chaotic and unknown land into a domestic and recognisable landscape, garrisoned by a *genius loci*, land of ancestors — consecrated mother country.

The archaeological surveys undertaken since the 1920s, but particularly since the 1960s by the research of CeSMAP, in the Western Alps and Pinerolese region, have illuminated in some detail the dynamics of the early human settlements in this territory.

Cavour, Rocca

Also, in the case of Cavour Rock, the appearance of pre-Historic art coincides with that of the Middle Neolithic in the

Cavour territory, introduced by populations of the Late VBQ (Square Mouth Vase) culture, 4th millennium B.C. Evidence of the presence of shepherds and farmers was discovered by CeSMAP on the top of this curious *inselberg*, an isolated hill in the alluviums of the Po plain, similar to Uluru (Ayers Rock) in the centre of Australia, a monolith still today considered sacred by the Aborigines, with shelters painted and used for ceremonies and initiation rites.

The Cavour paintings are formed by red, violaceous and black pigments, covered by a translucent patina of whitish mineral accretion that partially obliterates the panel (Figure 1). This deposition seems to have increased during the last decade, probably in connection with the development of acid rain and pollution.

Figure 1 (above). *Cavour, Pinerolese, Italy. The Cavour paintings are formed by red, violaceous and black pigments, covered by a translucent whitish mineral patina of percolation. It is possible to see three anthropomorphous schematic figures and geometric horizontal series of dots. Fourth millennium B.C. (survey and tracing by Seglie D., Ricchiardi P., CeSMAP, 1980).*

It is possible to see three anthropomorphous schematic figures and geometric horizontal series of dots. Only specialist examination and eventually the removal of the superficial deposit may allow the revelation of elements of these complicated pre-Historic paintings.

A persuasive comparison of these paintings is possible with the geographically nearest and coeval expressions existing in Olmeta Cave, in the north of the Corsica, and with the pre-Historic rock art of eastern Spain and southern France. It is possible to perceive chrono-cultural correlations in a very large area that is lapped by the western Mediterranean Sea. The Cavour Rock is particularly important for its conspicuous archaeological stratifications dating from the Neolithic to the Roman period.

Monte Bracco, Balmalunga

During the CeSMAP survey in 1994 to realise the archaeological map of this area for the Piedmont Archaeological Regional Direction, new rock paintings were discovered in connection with pre-Historic settlement sites surveyed in the 1980s. The painting complex of Balmalunga (long shelter, in the local patois) is formed by two panels showing an anthropomorphous figure standing, with big hands, and a geometric composition of 'symbols'. The shelter is open at the bottom of the rocky slope where quarrying of quartzite continues, well known in the ancient time and also mentioned by Leonardo da Vinci.

The paintings are formed by red pigment. The anthropomorph presents what resembles a birth-mask, and another representa-

Figure 2 (below). *Ponte Raut, Pinerolese, Italy. This big rock painting complex was discovered in the 1920s by Prof. Silvio Pons of the Istituto Italiano di Preistoria, a pioneer of the rock art researches in Italy, and studied by CeSMAP since the 1960s. The decorations, imposing for the grand dimensions and for the chromatic contrast between the yellow-whitish pigment and the brown-dark rocky surface, display a schematic – geometric composition with grids, 'solar wheels', scutiform 'emblems', and fingerprints. First Copper Age, at the end of the 4th millennium B.C. (survey and tracing by Pons S., CeSMAP, 1964).*

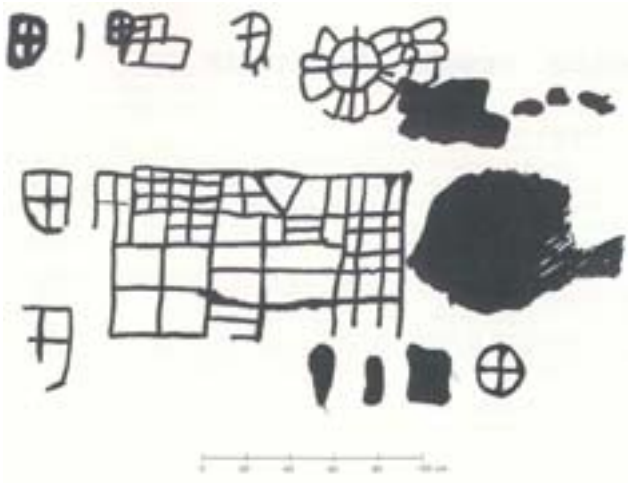


Figure 3. *Recording of rock paintings at Ponte Raut.*

tion shows a complex geometric figure resembling a solar wheel, in association with triangular, cross, and undefined 'signs'. The iconography of the Monte Bracco paintings allows to advance a chrono-cultural hypothesis: probably this singular rocky monument pertains to the full Copper Age (3rd millennium B.C.).

Germanasca valley, Ponte Raut

The Germanasca creek flows in the homonymous valley, as a lateral tributary of the main Chisone valley. In the territory of Perrero, at the Ponte Raut site, on the orographically left vertical slope, 100 m above the bottom of the valley, is the Roccio d'la Fantino (Rock of the Fay, in local patois) shelter.

This big rock painting complex was discovered in the 1920s by Prof. Silvio Pons of the Istituto Italiano di Preistoria, a pioneer of the rock art research in Italy, and studied by CeSMAP since the 1960s. It was the only site of the alpine pre-Historic rock paintings in Italy until the discovery, in 1979, of the Neolithic paintings of Cavour Rock (Figures 2 and 3).

The decorations, imposing for the grand dimensions and for the chromatic contrast between the yellow-whitish pigment and the brown-dark rocky support surface, display a schematic-geometric composition with grids, 'solar wheels', scutiform 'emblems' and fingerprints.

This majestic painting pertains typologically to the pre-Historic megalithic art, from the Neolithic to the Copper and Early Bronze Age. A more precise chrono-cultural determination will be possible in comparing the old data with the new data of the surveys and excavations in this area. Preliminarily, by comparison with the petroglyphs of Mount Bego, it is reasonable to propose a dating to the Early Copper Age, at the end of the 4th millennium B.C.

Pellice Valley, Balma di Mondon

New rock paintings were discovered in the Pellice valley in the 1990s, placed on the surface of a large shelter named Balma di Mondon, in a site dominating the landscape. The paintings, with red-brown pigment, are horizontally developed and the composition seems to present tree grids showing vertical parallel lines, surrounded by smaller anthropomorphous figures in concatenation. Thanks to digital enhancement of the photos (Arcà 2000) anchorforms and fitoform were also identified. The complex is partially covered by mineral deposits of percolation that obliterates the paintings progressively.

Museological conclusion

The interest in the pre-Historic rock painting complexes of the Pinerolese area derives from their rarity, as sites that indicate the current limit of a 'Mediterranean province' including eastern Spain and southern France.

The main problem now is their conservation and protection. All the paintings are affected by progressive degradation due to the increase in atmospheric pollution, and specifically the influence of acidic sprays and rains, in progress in this last decade, is well proved by comparison with old data.

To identify the best procedures for a valid protection it is necessary to plan monitoring with instruments recording the variability in the environmental parameters and the impact on the rock monuments. In the same way, it is urgent to determine the age of the art by direct dating, especially using the AMS method on organic fragments still included in the paint residues. The exploitation and the cultural-educational measures remain secondary, in view of the primary conservational necessity.

Professor Dario Seglie, Dr Mauro Cinquetti and
Dr Piero Ricchiardi
Centro Studi e Museo d'Arte Preistorica
Pinerolo
Italy

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International conference

The Archaeology of World Megalithic Cultures

Theme session: Euro-Mediterranean Megalithic Cultures, 5000–1300 B.C.
Rhodes, Greece, 28-31 October 2004

Organising Institute: University of the Aegean, Dept. of Mediterranean Studies, Laboratory of Archaeometry
Organising Committee: Prof. I. Liritzis (Chairman), Prof. A. Sampson, Dr M. Stefanakis, Dr P. Kousoulis, Dr S. Spyropoulos, Asoc. Prof. S. Varlokosta
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The various world cultures that developed megalithic (or else cyclopean) monuments during pre-History are not well known. The origin of these peoples, the acquisition of masonry techniques, their sudden decline and disappearance, the lack of sufficient archaeological data concerning the interaction with neighbouring people, the indirect and thus insecure dating of these monuments, the lack of ancient literature or insufficient historical accounts regarding their construction, the submerged underwater monuments, the trade of goods during the period of megalithic cultures, the lost lands on which megalithic cultures once flourished, and many more intriguing issues will be tackled under the newest available archaeological data, as well as with the application of archaeological sciences.

Particular topics will include:
Dating of megalithic structures; Use of megalithic monuments; Analytical techniques applied to artifacts, pigments, and carved rock for provenance studies; Religion and worshiping: the role of priesthood; Earth goddess, figurines and gender; Archaeological context; Signs of writing; Trade of artefacts (obsidian, flint, ceramic pots, metals, etc); Autochthonous / semi-autochthonous development; DNA studies of bone remains within megalithic structures; Mythological reports; Inundations, the decline of megalithic cultures and the survival of their cyclopean masonry; Natural / social factors causing their demise; Astronomical significance; Masonry techniques; Recording of meteorological / astronomical events; Art; Conservation techniques; World heritage megalithic monuments; Monumental buildings and statues; Parallel issues between distant megalithic cultures: signs of contact or archetypical conceptions?; Insular versus mainland megalithics; Satellite imaging
The theme session will include amongst others the following: Egyptian temples and pyramids; Maltese pre-Historic temples; Mycenean masonry: their exact dating; Sardinian tombs of giants; Rock carving structures and their use (hypogeum, oracles of the death, sanctuaries); Stonehenge: direct and indirect dating; Interaction between megalithic cultures in Mediterranean during 2nd millennium B.C.; The megalithics in central Europe; Karnack – Stonehenge – Corsica: similarities and differences; Working tools in carving techniques; South-eastern and western Mediterranean megalithic cultures: distant relatives or foreigners?; Legendary traits referring to the cyclopean monuments; Reconstruction of palaeocoastal lines during Holocene; Circum-Mediterranean rising and submergence of land due to seismic and volcanic activity: evidence of lost megalithic settlements during pre-History.

Registration fee: 350 euros. It includes conference material, four nights' hotel accommodation with breakfast and lunches, guided archaeological tour, coffees and refreshments during breaks, gala dinner, free-of-charge volume of proceedings).
Languages: English and French (no translation)
Abstracts: Potential presentations should include: title of presentation, name of author(s), affiliation institute(s) and an abstract (200–400 words). All abstracts should be of concise and informative content, and will be reviewed by the scientific committee regarding acceptance, rejection or revision. They should include 1–3 references.
Deadline of abstracts: 30 June 2004.
Proceedings: Papers will be published in 2005 as a special issue in the international journal of *Mediterranean Archaeology & Archaeometry* (*www.rhodes.aegean.gr/maa_journal*), following the peer review procedure of the journal. Those who wish their paper to be published should prepare it according to the instructions to authors of this journal and submit it to the registration desk during conference. Others may submit their papers until 20 December 2004 to: Prof. Ioannis Liritzis, Editor-in-Chief, *Mediterranean Archaeology & Archaeometry*, University of the Aegean, Laboratory of Archaeometry, Dept. of Mediterranean Studies, 1 Demokratias Ave., Rhodes 85100, Greece (e-mail: *liritzis@rhodes.aegean.gr*).

AURA Inter-Congress Symposium 2005, Cairns

To be held in conjunction with the international conference

'Oxalate films on rocks and works of art'

29 August – 1 September 2005

AURA invites expressions of interest in presenting a paper and/or displaying a poster at the AURA Inter-Congress Symposium of 2005. This event will be held at the conclusion of the Third International Conference on 'Oxalate Films associated with works of art'. Both conferences will be at the Cairns Colonial Club Resort, in Cairns, Queensland, Australia, from 29–30 August 2005.

Cairns is located in Far North Queensland, in close proximity to the Great Barrier Reef, the wet tropical rainforest and the magnificent Aboriginal rock art of the Laura and Chillagoe regions. It is also a playground for holidaymakers and sports fishing enthusiasts. In September the weather should be perfect: warm sunny days (26–28ºC), cool evenings (18-20ºC), fresh breezes and low humidity (65%).

The topics of the conference on oxalate films address the formation, environment, microbiology, conservation and dating of oxalate minerals in films on natural rock surfaces and on various works of art. Techniques for sampling, microanalysis, restoration and conservation, synthetic production, microbiological control, monitoring, and age determination are welcomed and will be programmed in specific sessions. Session chairpersons will be nominated from the range of papers submitted. Session programming of topics and their duration will be based on the titles of the papers received in the expressions of interest.

One topic of the **AURA Inter-Congress Symposium, 31 August – 1 September,** will be

Rock art dating

and will include presentations on all aspects of the age estimation of rock art. There will be a second session entitled

New developments in rock art research.

⇨ **Please send your proposals for presenting papers and posters for the oxalate conference to Dr Alan Watchman, those for the AURA Symposium to Robert G. Bednarik, by no later than 31 August 2004.**

⇨ **Titles and Abstracts: are required by 31 December 2004.**

⇨ **Final text copies and illustrations of papers by 31 May 2005.**

⇨ **Final notification of posters by 31 July 2005.**

Initial registration for the oxalate conference is by a form, which can be obtained from Dr Watchman and should be returned to him by 31 August 2004. Further information will be provided later on a web site.

Registration forms for the AURA Inter-Congress Symposium will be distributed in the November 2004 issue of *RAR*.

Dr Alan Watchman
Professor Alan Watchman
Dept Archaeology & Natural History
Research School of Pacific and Asian Studies
Australian National University
Canberra, ACT 0200
E-mail: *Alan.Watchman@anu.edu.au*

Robert G. Bednarik
AURA
P.O. Box 216
Caulfield South, VIC 3162
Australia
E-mail: *auraweb@hotmail.com*

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Editorial address: AURA, P.O. Box 216, Caulfield South, Victoria 3162, Australia
Tel./Fax No.: (613) 9523 0549
E-mail: *auraweb@hotmail.com*