

Safety Procedures for Palaeontological Techniques at Macquarie



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SAFETY PROCEDURES AND PALAEOLOGICAL TECHNIQUES AT MACQUARIE

Facilities and Services

- Availability of literature
- Services

Acid Leaching Facility (ALF)

- Services offered
- Supervision of the area
- Users
- How to access and use these services
- To use the facility out of normal week-day hours
- Safety facilities and signage
- In case of an emergency
- Annual maintenance program
- Procedures

Palaeobiology Laboratory (PAL)

- Services offered
- Supervision of the area
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- How to access and use these services
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- Serial Sectioning
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FACILITIES AND SERVICES

Availability of literature

The identification of fossils is largely dependent on the availability of published literature. Much of this is difficult to access so palaeontologists tend to build up collections of journals and reprints in their areas of specialty. Because of the size of our group we have built up large collections of reprints covering our main research interests: e.g. brachiopods, conodonts, microvertebrates, Cambrian faunas, fusulinids, corals, sedimentology (especially concerning limestones), and tectonics. Such collections are housed in our research areas for our own use and that of our students.

In 1994 Macquarie University Library purchased at our request the library of the late Professor Jess Johnson, University of Oregon, Corvallis to be housed in a designated room in the Library. This will form the basis of a research facility, especially for the time slot Silurian to Carboniferous and will be added to from time to time from the books, journals and reprints of other palaeontologists in Australia. Already over 700 relevant Russian monographs and 200 Chinese monographs have been promised. The room in the library has been set up with microscope and computer facilities to enable work to be carried out in the library with the literature at hand.





SERVICES

Our offices house 6 IBM compatible computers, 4 of which are connected to the network. Two of these are housed in E5A234 for the benefit of our postgraduate and honours students.

*Acid-leaching facility - believed by us to be the best of its kind globally. See later slide on Acid Leaching Facility (ALF).

*Binocular microscope laboratory with heavy liquid separation facilities, serial sectioning facilities, etc. See slide on Palaeobiology Laboratory (PAL)

*Mass spectrometers for stable and radiogenic isotopes [obtained, as members of a consortium, through ARC for co-operative research with CSIRO]

*Scanning Electron Microscope (housed in Biological Sciences, bought jointly)

*Cathode luminescence microscope [obtained by us through ARC for isotope work; housed at CSIRO]



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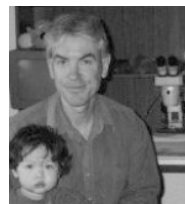
ACID LEACHING FACILITY (ALF) - E5A032

1. SERVICES OFFERED

- a) Hydrochloric Acid leaching of silicified limestone
- b) Acetic Acid and Formic Acid leaching of limestones to recover phosphatic or chitino-phosphatic fossils
- c) Hydrofluoric Acid treatment of materials - because of the high possibility of contamination in the area, the fume hood is unsuitable for palynology preparations.

2. SUPERVISION OF THE AREA

Michael Engelbretsen is the Technical Officer in charge of the area. In his absence, Glenn Brock, John Talent, Ruth Mawson, Peter Molloy or David Mathieson will be able to assist with queries. Phone 7484, 8335 or 8336.



Michael Engelbretsen

3. USERS

- a) Staff involved with palaeontologic teaching and/or research, after checking safety procedures, etc. with Technical Officer in charge.
- b) Honours and postgraduate students involved with palaeontologic projects, after supervisors have organized training sessions and discussed costs involved with Technical Officer in charge.

NOTE: Processing of samples can be arranged at low cost for those who do not fit into either of the above categories.



4. HOW TO ACCESS AND USE THESE SERVICES

- a) Permission and training **MUST** be obtained from Michael Engelbretsen, Glenn Brock, John Talent or Ruth Mawson. See Michael Engelbretsen in the first instance.
- b) Protective clothing must be worn in the area: gum boots, lab coat or apron, gloves.
- c) Special care must be taken when using acid taps. The tap on the wall should be turned on first. When turning taps off, turn the tap at the wall off first to drain out all acid in the hose before turning off the one at the end of the hose.
- d) Any splashes of acid should be neutralized immediately with soda ash provided and the area washed down.

(see over)



4. HOW TO ACCESS AND USE THESE SERVICES (cont)

- e) Acetic acid should be mixed in the watering can provided before being poured into plastic dishes. **Never** should a running hose be moved seriatim along a row of containers.
- f) All benches and the floor must be washed down when work is completed in the area.



5. TO USE ANY FACILITY OUT OF NORMAL WEEK-DAY HOURS

a) Staff must carry their ID card. Students should have their ID card with them plus a **AUTHORITY TO ENTER THE DEPARTMENT'S ROOMS**. This can be organized through the Division's Manager of Facilities and Support Services, Rod Bashford. Rod can be found in E7A Room 725, ph. 9850 8417, e-mail: rod.bashford@mq.edu.au.

b) If you work in the acid area out of hours or at the weekend, you should phone Security (7112) and inform them that you will be working in the area and indicate the approximate time you intend to spend there. When work is completed, phone Security again to tell them you have finished.

6. SAFETY FACILITIES AND SIGNAGE

a) Make sure area is always left clean and tidy, hose down floor.



b) Always wear protective clothing, i.e. Gum boots, lab coat, glasses or safety visor, gloves.



6. SAFETY FACILITIES AND SIGNAGE (cont)

- c) Know where the showers are situated
- d) Turn off wall tap and let drain before closing of hand tap
- e) Wash all equipment before and after use



6. SAFETY FACILITIES AND SIGNAGE (cont)

- f) No smoking, drinking or eating is allowed





7. IN CASE OF AN EMERGENCY

- a) If there is a major acid spill, immediately pull the emergency shower; upon activation the shower alarm will sound automatically to summon assistance. Turn off any acid taps running and turn on all water taps you can reach without coming in contact with the acid spill. Leave the area and seek help.
- b) For HF burns apply cream stored in the fume hood for that purpose. Seek medical assistance immediately.
- c) If there is a break-down in the fan system, leave the area immediately. Inform security, the Manager of Facilities and Support Services (Rod Bashford, ph. 8417, the Technical Officer in charge, and Buildings and Grounds electrical services area.
- d) If acid splashes in your eye, use the eye-wash bottles supplied, or turn the fresh water hose into the eye direct. Report to the university Medical Centre as quickly as possible



8. ANNUAL MAINTENANCE PROGRAM

- a) Check all hose fittings and replace any rusted clamps.
- b) Check all taps for ease of turning off and on. Treat with Vaseline where necessary.
- c) Check all fume cupboard doors and replace any worn or rusted fittings.
- d) Clean out sediment traps.
- e) Replace any fading light fittings.
- f) Check wheels on trolleys for rust. Treat, oil or replace as required.

(see over)





8. ANNUAL MAINTENANCE PROGRAM (cont)

- g) Check hosing on taps over sinks. Replace any stiffened hosing with new, pliable material.
- h) Check for any signs of corrosion, particularly in the HCl room.
- i) Check filters and exhaust ducts.
- j) Check safety shower alarm system.
- k) Check acid level indicators on outside of bulk storage tanks for clarity. If cloudy, replace.
- l) Replenish eye-wash bottles and HF burn kit.



9. PROCEDURES

Hydrochloric Acid leaching of silicified limestone

- a) Silicified limestone should be placed on plastic gauze (fly screen wire) in one of the large vats or plastic containers.
- b) Cover the limestone with water.
- c) Submerge the nozzle of the Hydrochloric hose under the water and turn the tap slowly. Add sufficient acid until the liquid bubbles gently. DO NOT add too much acid as rapid bubbling breaks the silicified fossils
- d) When the bubbling stops (4-8 hours), add more HCl to revive the bubbling. Do this until the limestone has dissolved.
- e) If you add acid each day, test the liquid in the vat or container with a fresh piece of limestone. If the liquid around the limestone starts to bubble, you know that your limestone sample has dissolved completely.



a)



a)



b)

(see over)



9. PROCEDURES

Hydrochloric Acid leaching of silicified limestone (cont)

- f) Pour off any unspent acid (it may be able to be re-used). Gently lift the gauze out of the vat and place in a clean container of clean water. With a hose, gently wash the fossils on the gauze.
- g) Prepare aluminium containers with a small hole in one corner. Gently wash the clean fossils into the alfoil container and allow to drain. Air dry before sorting the fossils



f)

9. PROCEDURES

Acetic Acid leaching of limestones to recover phosphatic or chitino-phosphatic fossils.

- a) Thoroughly clean plastic container (washing-up dish size). Place limestone sample (preferably broken into pieces the size of a plum in order that the acid can attack all broken surfaces) on fiberglass gauze. Note: It is best to break the limestone in the field rather than in the lab to prevent contamination of samples
- b) Add to the sample (in the order given) 60% water, 25% buffer, 15% new Acetic Acid
- c) Leave for a week. Gently lift the undissolved pieces of limestone out of the container, was gently. Decant the water from the dissolved residue, fill with water. Repeat until the liquid decanted off the residue is clear.



Step (c)

(For more Information on Acetic Acid leaching process see Michael Engelbreetsen)



9. PROCEDURES

Sodium Polytungstate Separations

- a) Add a small amount of Sodium Polytungstate to the bottom of two tubes (4 tubes may be necessary if the sample has a large residue).
- b) Add a small amount of residues to the tubes then fill the tube to about three quarters full.
- c) Place the tubes in the centrifuge on opposite sides so the machine is balanced. Close the lid and set the time for 5 minutes and start the machine.
- d) After the centrifuge has stopped carefully pour off the light fraction at the top of each tube onto a filter in the funnel at the top of the first side arm beaker. Turn on the vacuum and allow the Sodium Polytungstate to drain into the beaker. After all the sodium polytungstate is recovered carefully move the filter paper to the funnel at the top of the second side arm beaker and flood with de-ionised water to remove any remaining heavy liquid. When completely drained remove the filter and leave on bench to air dry.

(see over)



9. PROCEDURES

Sodium Polytungstate Separations (cont)

- e) Now go back to the first funnel and insert a new filter paper and repeat the process but pouring of the heavy residue this time. Again move the filter to a second beaker and flood with de-ionised water. Also at this stage wash out with de-ionised water any remaining residue in the tubes onto the filter paper. Remove the filter paper with heavy fraction and leave it on the bench to air dry.

(for further information see Margaret Anderson, Peter Molloy or David Mathieson)



Separation area in E5A228



Centrifuge





9. PROCEDURES

Hydrofluoric Acid Treatment of Materials

When using HF you **MUST** always wear protective clothing and have another person present. The following instructions pertain to samples of carbonates or carbonate shales. Also make sure HF first Aid kit is close at hand.

- Place 50 gm pea-sized sample into glass beaker with 400 mL water and 100 mL HCl. Make sure it does not fizz too quickly as this will break the fossils. Leave overnight.
- Decant carefully. Fill with water, leave 1 hours and decant again. Repeat.
- Add 250 mL of 50% HF. Leave until dissolved. (3 days to 3 weeks). If it is slow to dissolve, after 3 days stir gently each day until dissolved.
- Wash and decant twice with an hour between. Make sure the residue has fallen to the bottom of the beaker. Take care with the decanting as the Hydrosilic Acid you are pouring off is just as dangerous as the HF! Keep the Hydrosilic Acid in a plastic dish.



(see over)



All must be worn
(except wet suit)



9. PROCEDURES

Hydrofluoric Acid Treatment of Materials (cont)

- Neutralize the Hydrosilic Acid before pouring down the drain with Sodium Carbonate (soda ash).
- Sieve residue in a 53 micron sieve. View.
- Add Nitric Acid to cover the residue and an equal amount of water and leave for a minimum of 10 minute up to 45 minutes. You need an experienced person to help you judge the time in Nitric Acid (Theresa, David or Luke). Decant.
- Fill beaker with water, leave an hour and decant. Repeat.
- Your residue is now ready to view.

(For further information see Theresa Winchester-Seeto)





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PALAEOBIOLOGY LABORATORY (PAL) - E5A228

1. SERVICES OFFERED

- a) Heavy liquid separations with Sodium Polytungstate (see previous instructions)
- b) Binocular microscope facilities
- c) Serial sectioning facilities

2. SUPERVISION OF THE AREA

Michael Engelbretsen is the Technical Officer in charge of the area. In his absence, Glenn Brock, John Talent, Margaret Anderson or Ruth Mawson will be able to assist with queries. Phone 7484 or 8336.





3. USERS

a) Staff involved with palaeontologic teaching and/or research, after checking safety procedures, etc. with Technical Officer in charge.

b) Honours, postgraduate students and honorary associates involved with palaeontologic projects, after supervisors have organized training sessions and discussed costs involved with Technical Officer in charge.

NOTE:

Separating of samples can be arranged at low cost for those who do not fit into either of the above categories.



4. HOW TO ACCESS AND USE THESE SERVICES

a) Permission **MUST** be obtained from Michael Engelbretsen, Glenn Brock, Margaret Anderson, John Talent or Ruth Mawson. See Michael Engelbretsen in the first instance.

b) Polytungstate training sessions can be arranged with Margaret Anderson, Peter Molloy or David Mathieson.

c) Special care must be taken when using polytungstate as it is very expensive.

d) Any splashes should be wiped up with a tissue and the tissue placed in the jar provided on the bench; **NEVER** throw away such tissues as the polytungstate can be recycled from them.

e) Always make sure you bottle your samples and store the lights.



5. TO USE THE FACILITY OUT OF NORMAL WEEK-DAY HOURS

- a) Bookings must be made with Michael Engelbretsen.
- b) Staff must carry their ID card. Students should have their ID card with them plus a **AUTHORITY TO ENTER THE AREA** – SEE Rod Bashford, Manager, Facilities and Support Services.

6. SERIAL SECTIONING

See Glenn Brock for instruction.

7. IN CASE OF AN EMERGENCY

In the case of a polytungstate spill, use water to mop up all the polytungstate you can with tissue, filter papers, etc. and place in a plastic dish with distilled water. Fire extinguisher is clearly marked and placed on wall next to storage room near entrance of Laboratory. First Aid kit is situated on the wall next to the sink in the tea room area.





8. ANNUAL MAINTENANCE PROGRAM

- a) Check all vacuum lines and clean out bowls.
- b) Check the microscopes and lights.
- c) Check centrifuge every six months.
- d) Check condition of polycarbonate tubes used in centrifuge for stress cracks.
- e) Check on stocks of heat lamps; keep stock of at least 2 spare globes.
- f) Check calibration of serial sectioning machine.
- g) Clean out and check ultrasonic cleaner.



Author of CD: Paul Rowley, Master of Museum Studies Internship Student

With the help of: Ruth Mawson, Peter Molloy, Michael Engelbretsen and David Mathieson.

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