March 2005

SYDNEY SHELLER

Newsletter of the Shell Club of Sydney
NSW Branch, The Malacological Society of Australasia Limited ACN 067 894 848

Next Meeting:

23rd April 2005
Easter –
No March Meeting

Ryde Eastwood Leagues Club
117 Ryedale Rd, West Ryde, Sydney

1.30 for 2.00pm

View these newsletters with more pictures, plus references, and club information at
www.sydneyshellclub.net

Contributions:

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Text by disk or email only. Photos, and disks by mail, or preferably by email to
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If you cannot get your text onto disk, then **Karen Barnes** may be prepared to type it for you - send material to:
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Vice Pres: Maureen Anderson
Secretary: Chris Barnes

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Treasurer: Peter Pienaar
Sheller Editor: Steve Dean
Librarian: John Franklin
Annual Shell Show Mgr: Steve Dean
Special Projects Mgr: John Dunkerley

Shell Club of Sydney Mission Statement:

To appreciate, understand and preserve shells and their environment and to share this with others.

The last of the October Shell Show “Shell of the show” entrants

Some of the topics inside:

- Shell Show Judging Guidelines
- How useful is your collection to scientists
- & A disservice to Bivalves
- Shell Naming
- Ultrasonic Cleaning

(*Editors Note:* The following is based on a presentation at our club meeting. It is not the formal instructions for judges at the 2006 national shell show, although it captures the spirit of how the national will be judged)

What the Judges look for:
Guidelines for exhibitors at Shell Show Competitions

John Franklin and Ron Moylan

A prescription for the future.

Shell Shows are interesting venues in that in each visit one can almost feel the pervasive atmosphere of emotion and tension, no doubt the result of many hours work in preparing exhibits for display.

These exhibits are presented in response to the host organisers request for displays mainly of shells relating to particular families.

Unfortunately hard work alone does not necessarily win the blue champion's ribbon or certificate.

As the experienced exhibitor well knows, there are innumerable factors behind the submission of a display of shells for public exhibition. For the amateur conchologist without advice, exhibiting material at a Shell Show can be a nightmare. Apart from thoughts of complying with the host organiser's rules for exhibiting shells, we come to the first and fundamental question: Will my shells satisfy the quality guidelines for exhibition? In this paper we have attempted to set out guidelines to assist potential exhibitors at Shell Shows in the future.

In the past there has been considerable hot debate on several of the factors we raise when exhibiting shells and how the judges react to those exhibits when awarding points.

For example, when considering shell quality, remembering that no two persons perceive a shell in the same light, it is essential to make individual assessments. These assessments can be very different when one considers, say, whether or not the defect, blemish or flaw will or will not diminish the attractiveness of the shell. The shell could end up categorised as either G^- or F^{++}.

Another example is the question of rarity. In the past it has been argued that rarity alone deserves first prize. It is our opinion that whilst rarity is appreciated, it is essential to consider the other shells in the exhibit and view the exhibit as a whole. The attached guidelines are not exhaustive and, whilst they reflect our views, we do recommend that such be read in conjunction with the particular Shell Show category requirements.

A. Shell Specimen

(1) The shell specimen must be mature, not juvenile or sub-adult or thin-lipped.

(2) Exhibitors should strive to submit for display only quality, maximum sized specimens from their collection.

(3) The spire of the shell should be intact.

(4) Specimens showing special colours, patterns and freshness are most desirable.

(5) Whilst it is desirable to exhibit a specimen with its operculum for completeness, however, demerit points will not be incurred if the shell is displayed without its operculum.

(6) Demerit points will be incurred if specimens are displayed with growth lines and scars, unless such are typical for the species, e.g. ***Conus pergrandis*** and ***Conus teremachi*.**

(7) No deduction in points will occur if specimens displayed inherently show small sand grains under the nacre, e.g. ***Cypraea umbilia.***

(8) Points will be deducted for flaws, holes, immaturity, faded colours, uncleaned or buffed shells. Not all purchased shells have been cleaned thoroughly and exhibitors to attend to as necessary.

(9) The standard for quality aimed for should be F^{++} to Gem. There are three accepted categories of quality that fit the exhibition standard. These are:

Gem
A perfect specimen with an unblemished spire, unbroken spines and lip without chips, fully adult and normally coloured – a shell without a visible flaw. Well cleaned inside and out, with original natural gloss and colour. Bivalves must have both valves, property matched. Cone lips may have minor natural roughness.

There are two tests to be applied in order to establish GEM^- quality. Firstly, under very close examination, the shell shows a faint visible minor blemish, defect or flaw which is almost unperceivable to the observer but still noticeable. Secondly, the observer must consider the shell's overall appearance and if the appearance is not diminished by the existence of the minor blemish, defect or flaw then the shell is GEM quality.

Fine++
This category of shell quality rests upon the fact that the blemish, defect or flaw is noticeable without close examination or scrutiny. Whilst these characteristics are obvious to the observer, they must not diminish the attractiveness of the shell.

Fine+
This category is virtually the same as for $Fine^{++}$ except that a particular species normally exhibit the noticeable defect, flaw or blemish. We do not recommend exhibiting F^+ material.

(10) We are of the view that rarity alone will not be a persuasive factor when judging the entire display. Indeed, it is the essence of judging that consideration should be given to a totality of factors including quality, variety, presentation and labelling of *all specimens* comprising the display.

Shells are beautiful objects in the eye of the beholder. It is this very overall quality that shell competitions compel us to bring together in the form of a display. Therefore it can only be when the display as a whole is considered, that the matter of rarity enters into the equation.

B. The Display

(1) Aesthetic appeal of display; judges look for some *uniformity* of layout and attractiveness.

(2) Within the display the direction of the shell spire should be the same.

(3) Serious consideration should be given to *exhibit layout*. It is not desirable to mix the exceptionally large with exceptionally small specimens.

(4) The general convention for specimen display is *dorsum up* unless there is some special feature of the aperture that is worthy of display, e.g. strombs or bursidae.

C. The Label

(1) All specimens displayed must have a label.

(2) All labels should clearly describe the essential features of the specimen. That is:-

(i) Family
(ii) Genus/species
(iii) Authority (i.e. author/date)
(iv) Location/data, how collected (ie trawled, tangle nets, dredged, diver, low tide)
(v) Reference

(3) The label must not overpower the presentation in size, that is, the label must be *concise.*

(4) *Handwritten* labels are acceptable and no demerit points will be incurred.

(5) Whilst the labels can be typed, it is most desirable to *computer generate* the label for clarity. In the event that all else is equal between two competitors, the computer label may sway the judges.

(6) Taxonomic specimen identifications and judging will be based on the most recent generally accepted revised text relevant to each display category. The onus is on the exhibitor to ensure that the genus/specimen identification can be confirmed by reference to a modern text, if necessary.

D. Nomenclature

(1) Exhibitors should be aware that older reference material is constantly changing. Therefore it is essential to describe specimens using the *most current references.*

(2) Do not automatically accept dealers labels without *investigating* the reference material. This is particularly so when checking on the accuracy of the locality data.

E. Method of Collection

(1) Apart from an accurate description of the specimen, equally important is to give an accurate description of how the shell was *collected* and its *habitat*. We cannot over-emphasise the importance of these factors as they are basic to research and to our knowledge of Molluscan life.

(2) Specimens can be collected by hand in numerous ways on the beach, at low tide or by a diver etc. Boats are used to trawl, dredge or tangle nets.

(3) Descriptions as to *depths of a trawl* for instance can be inaccurate, so be careful to check the reference material.

(4) Demerit points will be incurred if the *habitat details* are either missing or incorrect.

F. Compliance with Category requirements

(1) Definitions.

(2) Endemic = native to a locality or country.

(3) New South Wales = endemic to and collected in New South Wales

- Thus select the display material to illustrate as wide a distribution as possible, e.g. Eden in the south to Tweed Heads in the north.

- It is most desirable to further select the material to illustrate both different habitats and different methods of collection, e.g.
  Habitat:
  in sand/mud, under rocks, coral slabs, rubble, on sponges etc.
  How collected:
  at variable depths, trawled, dredged, diver or by hand etc.

(4) Australian = endemic to and collected in Australia

Refer remarks above under New South Wales but in this case, ensure that each State is represented in the display.

(5) Worldwide = extending or spread throughout the world.

- That is to say, it is most desirable to avoid exhibiting say two shells from the same country. The ideal would therefore be to display one shell endemic to a particular country, selecting countries as far apart as possible.
- Refer comments above under New South Wales.
- Categories for worldwide localities must include at least one Australian species. Judges will view favourably a wide geographical distribution of specimens.

(6) One locality = molluscs of one locality should be from one area not exceeding a range of 15km. Locality should be described on the label.

(7) It is important for exhibitors to comply with the particular shell show rules which will be available at the time of registration.

(8) Entries in the Junior categories (i.e. under 15 years of age as at the day of the show) should be their own work, with minimal adult assistance. Each entry should be titled.

G. Number of Specimens in Display

(1) The number of specimens for display must be strictly adhered to. Demerit points will be incurred if suggested display maximums are exceeded. However many shell shows instruct judges not to mark down the display if it has less than the maximum, especially if specimens are large and still fill the allowed display box size.

(2) In the event that displays are of equal merit then scoring would favour the one that has the full quota of shells, per maximum for the category.

Weekend Low Tides

An analysis showing the lowest tides for the purpose of research, club meeting dates excluded.
Measured at Fort Dennison Sydney. Eastern Standard Time. (Add 1 hour for daylight saving)
Sorted by height:

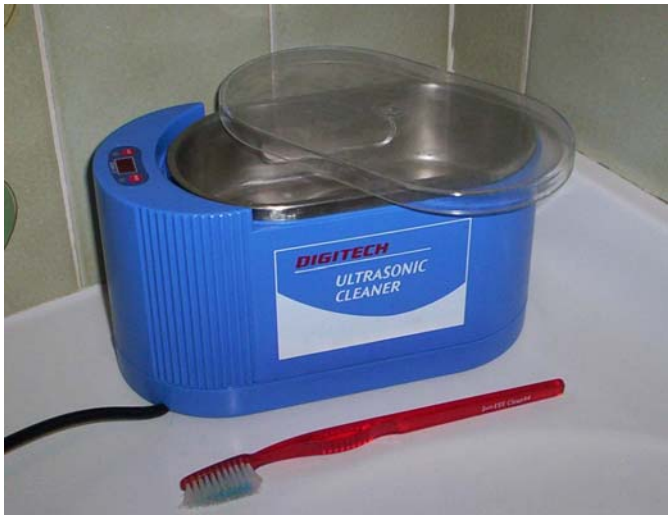
0.17m	18/9/05	2.06pm
0.21m	21/8/05	3.10pm
0.22m	20/8/05	2.16pm
0.22m	17/9/05	1.14pm
0.23m	26/6/05	5.52am
0.34m	24/7/05	4.17pm
0.35m	29/5/05	7.13am
0.38m	04/9/05	2.21pm
0.40m	07/5/05	1.23pm

Tide differences at selected research areas:

LATER		EARLIER		ZERO
8 MIN	JERVIS BAY/HUSKISSON	38 MIN	CRONULLA	BOTANY BAY
20 MIN	NELSON BAY	5 MIN	LA PEROUSE	KIAMA
19 MIN	NEWCASTLE	8 MIN	SUSSEX INLET	ULLADULLA HARBOUR
8 MIN	PORT HACKING			YAMBA
5 MIN	PORT STEPHENS			
45 MIN	SALAMANDER BAY			

Ultrasonic Cleaning

Steve Dean



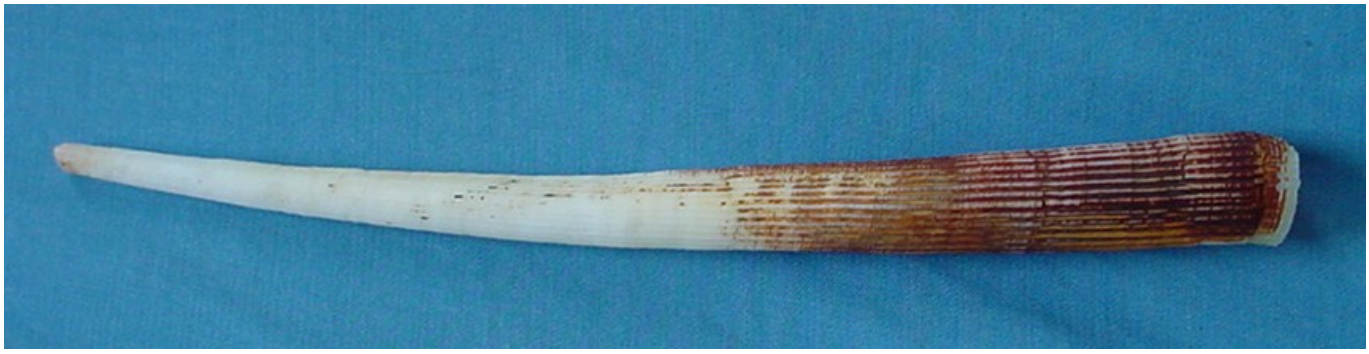
After reading an article on the Jacksonville Shell Club web site about using ultrasonic cleaners to clean shells, I had been looking to purchase a small low cost unit. Last year Jaycar Electroincs started selling a small ultrasonic lceaner for $99 so I got my first unit. (Its construction is only domestic grade so I do note expect it to last).

It is great, but now I also want a larger unit to take heavier encrustations off, and rip the light ones off faster.

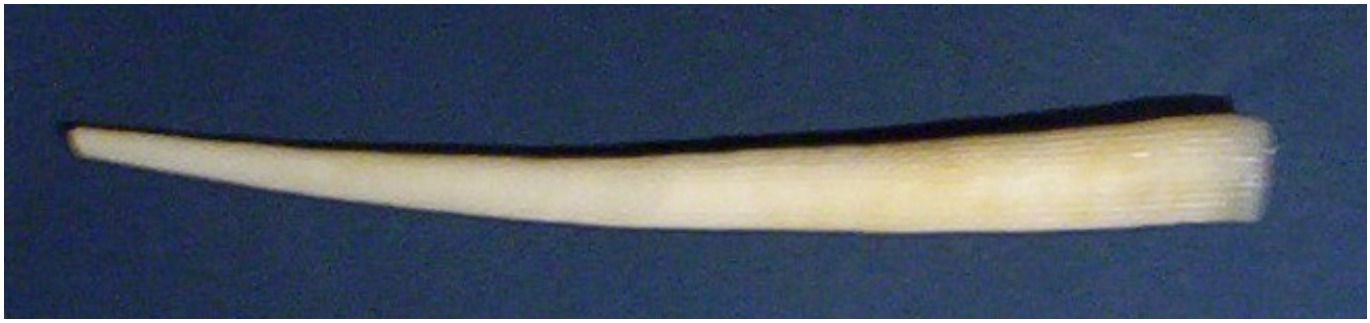
I have used it to clean all my Scaphopods. It does a great job of shaking animal and dirt out of long small tusk shells including all my fossil specimens. There were some species that I thought were half dark coloured as this is the only way they are ever sold or photographed. (I guess no dealers could remove the dirt) In the cleaner all this came off.

EG ***Fissidentallium vicdani***

Cleaned and scrubbed, but before ultrasonic cleaning:



Same shell after ultrasonic cleaning:



I also tried it on a deep water volute I got from an old collection. The volute had coloured banding across the dorsum due to long-term dehydration and had the deep water brown staining more common on New Zealand volutes, so the volute was useless. I wanted to see if it could remove the brown staining. It took a long time but it did remove the stains without any shell damage. Also the shell was re-hydrated and the banding disappeared. (I do not know if this was because it was in the water for a long time or if the ultrasonic agitation helped the water penetrate through the shell material)

Mud in micro-groves in shells that make them look less attractive and cannot be scrubbed out, washed off with high pressure hose, or bleached off, just falls off as a cloud of dust in the first few seconds of ultrasonic cleaning.

Here are a few tips relative for using this low powered unit:

- As it is not being used to clean grease off jewellery there is no need for the special cleaning fluids referred to in its instructions. Water is fine. I tried adding detergent, but cleaning seemed to take the same amount of time.
- To avoid overheating it has a 90 second timer. To clean some shells you may need to push restart many, many times. My unit sits in my bathroom so I can restart it whenever I am passing)
- The Jacksonville article suggests it is OK to put your hands in the water while in use. I prefer to wait the 90 seconds or push stop. I can see no point in micr-shaking my blood cells.
- Ultrasonic sound travels through liquid better than gas or solids, so ensuring the shell is full of water, and small surface air bubbles are shaken off the outside of the shell is important. The ultrasonic action does not shake the bubbles off. For the tusk shells this meant using a fine wire to push water in and bubbles out as layers of dirt come away inside the shell tube.
- Shells can rattle due to lower harmonics visibly agitating the water. If delicate place them in small plastic zip bags containing water before immersion, so thy cannot bump against the stainless steel walls of the tub, or other shells and damage themselves.
- The unit has 2 power settings, but I have only once used it on the low power setting.
- It will also do what it was made for and clean jewellery and coins, even without cleaning fluid, just water.
- Only add enough water to cover the shell(s). A lower water level provides more concentrated faster cleaning.

How useful is your collection to scientists & researchers. (+ A disservice to collectors of bivalves)

Steve Dean

Desire for 'scientific worth'

Many collectors hope that their collections and their efforts in cataloguing and maintenance are of 'scientific value'.

Most shell collectors, who field collect also hope to eventually find a brand new species, possibly even one that subsequently gets named after them.

Perhaps this desire for scientific relevance is so collectors can feel their collection has more worth other than just dollar value or beauty. It may be a subconscious desire to feel more important and experienced in their hobby (the next step on from just collecting). It may be part of the desire to learn more about their interest, or even a justification for taking things from nature.

Most shell collectors become extremely aware of conservation and are keen conservationists, even if only so there are plenty of the shells they wish to collect. So for some, scientific relevance is a desire to help contribute to the overall knowledge within a hobby where they have passionate interest.

Whatever the reason this causes the collecting community to ask the scientific community what can be done so collections are of some scientific worth.

What collectors are told to do for their shells to be of scientific worth:

The answer to this question 100 years ago was as follows:

1. Keep accurate data of collecting locality, date, depth, habitat and collecting method with the shell.
2. Accurately name the shell including the author who named it and the reference paper/book you got the name from. (The author and reference is because the amateur does not have access to all the ongoing published scientific works that may cause the name of the species or the family name to be amended)
3. For gastropods that have operculum (operculate), keep the operculum with the shell (and for shell collectors, there are then instructions on how to pack the aperture with cotton wool and glue the operculum on with water-soluble non-acidic glue, so that they still look pleasing and the operculums do not get mixed.
4. Shells are gradually damaged by light. As much as possible, shells for scientific study should be stored in darkness. (Drawers, not glass display cases) Also to avoid damage over the long term, temperature and humidity should be controlled and shells should be protected from dust. The combination of dust and moisture settling on shells can be acidic in nature and over may years etch away the top surface of the shells (Bynes Disease).

5. Do not acid etch or buff any shell as it removes important microstructure that aids in identification and research using microscopes. (In fact some suggest only cleaning the outer surface of the shell enough so that plant or animal material that may rot and damage the shell is removed. Most collectors ignore this recommendation, remove barnacles and other growths and clean their shells so they are attractive for display and competition.)
6. Where available keep the animal and its shell together, preserved in alcohol
7. For bivalves leave the periostracum on as it aids identification, especially for otherwise similar looking white bivalves.
8. Also for bivalves leave the ligament attached to both valves (Ligament is the horny band that joins the two valves together near the hinge)
9. For bivalves leave the two halves of the shell attached together and if possible tied together, so they do not get separated and mixed.

Subsequent books written for shell collectors have perpetuated these instructions without much questioning of them.

The fallacy:

If the above steps are followed most collections are still of little scientific value.

There would be a number of other things required, the most important being taking steps to ensure that the locality data tags are verifiable as correct say 100 years from now. (This may mean you undergoing training and working for a malacological research organization, until they have confidence in your scientific method for labelling and not mixing labels, to the extent they endorse the accuracy of your data for any future shells that you collect. Even then they would probably need to take possession of your shells while you were still around rather than after you die for the labels to be so endorsed.) Past shells you collected would still have non-verifiable data and be of less scientific value.

100 years back there was less difference between scientists and amateurs in the work they were doing. Over time this has changed and the knowledge base and training of the professionals is vastly different to the amateur.

On the flip side, to appease your desire for scientific worth of your collection, professional researchers are few and have very limited funding. Therefore anything done by amateurs may end up proving to be of value, so take heart and do not be discouraged.

Analysis of what collectors are told to do – challenging the traditions:

Lets consider if each of the above bullet points should still apply today for amateur shell collectors.

1. Accurate locality & habitat data is still critically important. In fact the minimum requirement of Museums is now an accurate latitude and longitude taken from a GPS. Saying a shell is from say “Long Bay, Sydney, Intertidal, under a rock” is no longer acceptable. To be of use the exact location in Long Bay is required.
2. If a shell ever became part of a research collection the name is less important other than as a guide as to where to initially file each shell and subsequently find it. Professional researchers should know what a shell is actually called, and of any naming changes.
3. Gluing the operculum in the shell or to cotton wool in the aperture helps guarantee it stays with the correct shell and allows the shell to still look attractive. (Of course this has to be ‘sterile cotton wool’ otherwise it may give off toxins that damage shells, and glue has to be water soluble if operculum are to be studied.) However if you store your shells individually in sealable plastic bags, cotton wool and glue is not needed except for shells you take out for display or competition. (Come on now confess your sins – how often, when you are cleaning a batch of shells of one species, do you place all the operculum together then, after the shells are cleaned, roughly size them and allocated the operculums back to similar sized shells, but not necessarily the original shell. Or worse you clean a number of different species from one family, and just allocate operculum based on size and best guess, not necessarily even with the correct species. - Do you still feel your past collected specimens are of use to scientists.)?
4. Collectors do not want their shells damaged, so as best as they can humidity and temperature and dust are controlled. However those of us that display shells in glass cabinets usually do not invest in light proof covers for the cabinets. Collectors often have special rooms for their shells that are kept dark much of the time. Zip bags can help, but if the display shells are in bags they are less easy to view. For best long term survival shells may need re-hydrating from time to time, and retained periostracum may need re-oiling to avid shrinkage and cracking.
5. Here is where you really need to consider if your shells are for you and your friends to admire. If they are buffed and/or acid cleaned they are close to useless as a scientific reference. However dead worn beached specimens may be brought back to life to the naked eye, hence your display cabinet. From a conservation point of view this means less live shells need be taken.
6. When collectors find out the correct embalming procedures and then preserve their best specimens along with the animal in a jar of liquid, they are foregoing the ability to display or compete with the shell, or to sell it other than to researchers. Perhaps this is one of the true signs that an amateur is starting to take research seriously. (They may still

have a display collection of course) Is it time yet to admit that your amateur collection is just that, an enjoyable attractive amateur collection, not a scientific research project?

7. Why is it that many books when describing cleaning procedures encourage periostracum removal from Conidae, Ranellidae, Strombidae and other gastropods so everyone can see their spectacular colours thus making them more collectable, while for bivalves they want equally colourful shells left looking plain, drab and uncleaned with their periostracum on. How about just some specimens in a batch have their periostracum left on to aid identification as a solution for both Gastropods and Bivalves. Why encourage cleaning guidelines that make gastropods attractive and leave bivalves boring and ugly. By the way do you keep at least one specimen of each species of gastropod with the periostracum left on, to be scientific? (Periostracum removal from one valve of each bivalve is not a solution as each valve can be quite different in colour, pattern, shape and periostracum)
8. Most bivalves cannot be properly cleaned if the ligament has to be left attached, or at the very least a cleaning step that may take minutes for separated valves may take hours of slow scraping and careful supporting if the ligament has to stay attached. For bivalves that can tolerate bleach, cleaning can be simple, but the ligament is lost or weakened in the process. I can only assume the ligament intact and attached requirement came from a time when all shells found were of scientific value and the ligament was needed, and a time when this helped to not get the valves separated. It was probably also a time when cleaning shells for attractive display was not a key consideration. Now the world has plastic zip bags so bivalve segments can stay together.
9. I still receive bivalves with a string around them. Worse, some dealers and wholesalers glue the two valves together thinking that this is what collectors and researchers want. Unfortunately many bivalves cannot be identified at all without looking at the internal scar patterns, internal colours, the hinge structure and dentition. To do this, the shells have to be open and in some species the ligament has to be cut for proper viewing.

Scientific disservice to Bivalves and Bivalve collectors:

Publications and dealers perpetuate the myth that retaining the ligament and keeping the two valves attached together makes the bivalve more valuable. They have to charge more for attached specimens as there was more work to clean them and more work to store them and keep them attached, thus reinforcing the myth.

The unfortunate upshot of this is that bivalves in most collections are left 'ugly.' Therefore most collectors do not develop a keen interest in bivalves. *Properly cleaned, many bivalve families are amongst the most attractive and interesting shells collectors can collect*, yet most collectors do not even realise the truth of this statement as they see so few well-cleaned bivalve collections on display or with dealers.

Lets get rid of ligaments, and clean our bivalves properly!
(If a ligament stays attached to one valve, or splits with half on each, and survives the cleaning process, that is OK, but should not be considered essential)

As a final proof, I encourage you to look in any bivalve reference used by amateur collectors, and see if ligament shape, colour, size or texture features in any description or aid to identification. The location and attachment point of the ligament comes into identification, but this is best observed once the ligament is cut through, or completely removed, or dissolved away in bleach.

As most serious amateur collectors know, one 'scientific' service they can perform is observing their favourite species and noticing changes such as population increases, decreases or mass sudden deaths. Then alerting relevant research or government bodies. As researcher funding, especially for field trips, is very limited, amateurs are in a better position than the professionals to notice these changes. If few serious amateurs collect and study bivalves then there are less people observing and protecting the interests of this Class of animals.

Shell Naming

Steve Dean

In 1758 a Swedish naturalist Carl Linné or Linnaues introduced a scheme for naming all living things. (Published in his 10th edition of his *Systema Naturae*.) He went ahead and over a relatively short time, defined a name that would apply for vast amounts of living creatures known at the time, including shells. This naming scheme is what we still use today.

His scheme is called 'binomial nomenclature' whereby each species has two names. The first is its Genus (a group of similar living things) and the second is its specific name (species). The Genus is written with a leading capital letter and the specific name in lower case. They are written next to each other and are in italics. (In these Shellers I usually also have them in bold letters so they stand out from other words that are in italics for other reasons)

The rule is that once a species is named the specific name cannot be changed. Naming usually means naming and publishing in a recognised work. Sometimes the specific name turns out to be already allocated within the Genus to another species, in which case the name has to be changed. Sometimes a specific name is published and the name adopted world wide, then a

more obscure earlier publication and naming of that species comes to light. Usually the earlier naming takes precedence and the species name is corrected. Sometimes species from different parts of the world that look different turn out to be the one species, in which case the oldest name takes precedence. (These days this is often verified using DNA testing)

As species are studied it may be shown that a species actually belongs to a different group than it was previously allocated, in which case the first name of its binomial name is changed. Sometimes, but not always, Genus is broken into Subgenus groupings where there are a lot of species and obvious smaller sensible groupings. This does not cause a three-part name. It is just an extra level of grouping.

There has to be a structure to the grouping process for all living creatures. As long as this is known documented and defined, there is no need to write it out in full on the data tag of every specimen. This grouping structure works as follows: Living Creatures are broken down first into KINGDOMS (eg ANIMAL KINGDOM and PLANT KINGDOM) These are then further broken down into smaller and smaller groupings until you reach the Genus (or Subgenus). Below is a partial beak down for an example shell to give you the idea. The groups are continually fine tuned, so my example may already be incorrect. There may be more or less sub-groupings, or the species could even change groupings completely.

Grouping	Examples	Extra Information
KINGDOM	ANIMAL or PLANT	
SubKingdom	Metazoa	Animals formed of several cells
PHYLUM	MOLLUSCA	Invertibrates
SubPhylum	Conchifera	Shell Bearing
CLASS	GASTROPODA	Single shelled animals with 4 SubClasses
SubClass	Prosobranchia	This has 4 Orders & 1 Super-Order
SUPER-ORDER	CAENOGASTROPODA	This has 3 Orders
ORDER	Neogastropoda	
SubOrder	-	
SUPERFAMILY	Muricoidea	
FAMILY	Volutidae	
SubFamily	Odontocymbiolinae	This has 4 Genus
GENUS	*Volutoconus*	There are 4 living species in Australia
SubGenus	-	
species	*grossi*	
subspecies	*mcmichaeli*	
Form or Variation	-	

Just like the rule for italics and case for the binomial name, there are rules for how each level of grouping is written to help distinguish it from the others. These use combinations of capitals, bold, larger text sizes, and different suffixes on the names. I wont go into these here.

Sometimes you will see species, genus or families, where there is only one or very few different species in the group, yet they are still placed in a sub group. This is usually means there are many other, now extinct, fossil species in the grouping that did need the subgroups to be defined.

Definition of a Species

To be considered a separate species there are two things that must apply:

a) The individuals must resemble each other
b) The individuals can interbreed and produce fertile offspring. (Interbreeding must be by natural means, and the result should resemble the parents)

Sometimes different species crossbreed and produce a child. In this case the child cannot reproduce. The child does not get a separate species name, and the parents are not deemed the same species.
EG Horse + Donkey = Mule, or Tiger + Lion = Liger, or in the shell world similar sized abalones of different species producing rare attractive hybrids. (***Haliotos laevegata*** cross ***Haliotis rubra***)

There are many instances where the 'jury is still out,' to take another Haliotis example: There are two small, rare, Haliotis from NSW ***Haliotis hargravesi*** and ***Haliotis brazieri***. They are similar shaped, but with ***Haliotis brazieri*** having a smooth outer surface and ***Haliotis hargravesi*** having deep spiral ribbing, and smaller deeper adult shell. The problem is that about 1 in 25

specimens collected has a smooth surface, but with some ribs towards the periphery. Are the in-between specimens infertile hybrid crossbreeds of two species, or an indication that the pattern varies and that they are all one species. For the last several years now the serious Haliotis collectors in NSW have been trying to get a live specimen of both species, even commissioning divers to search. They plan to privately pay for DNA testing to try to resolve the controversy. Just recently one live ***Haliotis brazieri*** was collected by a diver in Southern NSW, but a live ***Haliotis hargravesi*** is yet to be found. Until proved otherwise my vote is that they are separate species. If they prove to be the one species, the older of the two names will apply ***Haliotis brazieri.*** Then ***Haliotis hargravesi*** would be termed a 'synonym' of ***Haliotis brazieri*** in the literature, and would not be a species in its own right.

Haliotis brazieri, Angas, 1869 Sydney Harbour

Haliotis hargravesi, Cox, 1869, Typical of Sydney form

Haliotis hargravesi/brazieri, crossbreed, Sydney Harbour

There are many shells where a species looks quire different in different locations, depths, climates, food sources, but is still considered one species. As research continues sometimes a pattern variation is found to have fundamental anatomical differences as well, such as different teeth structure (radula). The variant then is re-named as a separate species. Other times different looking shells from different locations with different names turn out to be the same species. It is rarely practical to place variants in tanks and see if they breed, so other research techniques are required.

In Western Australia there are many shells where the tropical form is similar to but different to the southern form. Typically if the two forms have a significant overlap region where both forms co-exist at the same depth and habitat they are usually considered different species, rather than geographical variants and given separate species names. If the evidence suggests they are the one species but just look different in different locations, then they may be given sub-species status or just described as a different form or variation. This enables collectors to better understand what a shell will look like when they buy or swap it. EG all humans are one species, but geographic variants developed with different body shape and hight and skin and hair colour. However we can all interbreed, producing fertile children who resemble a composite of the parents, so we are all one species.

In the case of the ***Haliotis Brazieri*** there is a similar tropical species from Queensland that may also turn out to be the same species but a geographic variant. As the three species are so rare it is hard to tell the true geographic range of each, but it appears that ***Haliotis hargravesi*** has a more limited range that is completely within the range of ***Haliotis brazieri*** giving credence to the thought that it is perhaps a different species, not a geographic, climactic variant. (It could of course be a habitat based variation)

Collectors usually write the binomial name and then append the sub-species or variation or form information to indicate what the shell actually looks like. For Example the Ranella, ***Charonia lampas*** is widespread in temperate waters around the world, and varies considerably. The Australian/NZ form is given a subspecies name of *rubicunda*, but even then there are multiple forms.

Charonia lampas rubicunda (Typical form)

Charonia lampas rubicunda (Deep water form)

When binomial names are written it is normal to add the name of the person who first named the shell, and the year of their publication. This helps researchers when identifying valid earlier names, and if the name written next to a specimen is still therefore valid, so the above sub-species becomes ***Charonia lampas rubicunda*** Perry, 1811

How are the names chosen.

Names are usually of Latin or Greek origin and are descriptive of the shell they represent. More recently with all the descriptions used, names are often based on the locality, or the person who discovered the species, or even the person who documented and named the species. Sometimes it is to honour prominent researchers.

Latin and Greek are often used for other descriptive words associated with shells. EG sometimes cowries develop with jet-black colouring instead of the normal colour for their species. They are described as *melanistic*, from the Greek word *melas* meaning black.

In 332BC Aristotle wrote a book on animals, that includes Mediterranean shells. Soft animals such as slugs, squid and octopuses he termed *Mollusca* or *Malakia*. (Latin *Mollis* and Greek *Malakos* both mean soft.) In 1797 George Cuvier demonstrated that the animals of shelled snails, bivalves and the non-shelled slugs, octopuses etc all had similar anatomy. As a result the original Aristotle naming was extended to the whole group of animals. Hence the Phylum *Mollusca* and the study of Molluscs, *Malacology.*

Word suffixes and pronunciation.

The Latin language has 3 genders, masculine, feminine, and neuter. There is also possessive case and plurals. These all manifest as different suffixes on words.

In a binomial name the gender of the species must match that of the Genus.

If the Genus name changes and the new Genus has a different gender, then the suffix portion of the species also has to change. This means that published reference books have both the wrong Genus and the wrong suffix on the species name for many listed specimens.

Below is a brief introduction to gender and pronunciation, taken from an earlier article:

Gender	Singular	Pron.	Genitive	Pron.	Plural	Pron.	Genitive	Pron.	Meaning
Masculine	modus	mode-us	modi	mode-eye	modi	mode-eye	modorum	mode-orum	method
Masculine	radius	ray-dee-us	radii	ray-dee-ey	radii	ray-dee-ey	radiorum	ray-dee-orum	radius
Feminine	terra	terrah	terrae	terry	terrae	terry	terrarum	ter-rar-um	earth
Neuter	donum	doh-num	doni	doh-nigh	doni	doh-nigh	donorum	doh-nor-um	gift

The double vowel **ae** is not pronounced as ay in pray. It is pronounced as the ee of feet or the y of hurry

EG:
Cypraea is pronounced sip-pree-ah
Cypraeinae is pronounced sip-pree-in-ee
Cypraeidae is pronounced sip-pree-id-ee

A request:

It would be good if someone with more knowledge on these subjects could contribute a follow on article on any of the following, as I do not have the knowledge to do so:

- When author details change, are unknown, or author is correct but the name has still changed, how these are correctly indicated with combinations of brackets etc.
- Rules and guidelines for pronunciation. Armed with all the above information, many are still scared to say the names out aloud for fear of mispronunciation.
- Comprehensive rules for case, gender and ownership
- Anything else relevant to shell naming

Use of Shell Collecting Permits in NSW (As issued by Dept. of Fisheries)

In most cases before embarking on a research field trip, it is a requirement that members contact the Dept. of Fisheries and advise them as to time and date of your excursion.

Therefore, so we are informed, Mr Tom Bennetts is the inspector who covers the area between Palm Beach to Cronulla. He can be contacted on the following telephone numbers: 0438 304 446; office 9439 3148 and in the field on 0419 185 525