Field Nats News No.254

Newsletter of the Field Naturalists Club of Victoria Inc.
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Understanding Our Natural World
Est. 1880

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Reg. No. A0033611X

Office Hours: Monday and Tuesday 9.30 am – 4 pm.

July 2015

From the President

Time certainly flies. Suddenly I find myself writing my second President's Report. Over the last few weeks I have attended as many SIG meetings as I could. Meeting with like-minded people, as ever, is a highlight of my week. This was brought home to me very clearly when a long-time friend and fellow naturalist Leigh Winsor delivered an expert presentation on terrestrial flatworms for the TIG. Leigh was a member and convenor of the original Field Survey Group in the early seventies until he moved to Townsville in 1974. After the meeting he expressed his pleasure in being able to meet with fellow naturalists as we do at our meetings. It seems that it is not really possible to do that in Townsville. We really are very fortunate to have the facilities and motivated membership that we enjoy. The FSG meeting this month featured an excellent presentation by Dr. Euan Ritchie on the mammals of remote Papua New Guinea .The fungal foray to the Ada Tree provided yet another welcome opportunity to meet with fellow naturalists in the pursuit of their passion for nature.

At the last Juniors' meeting I presented a short talk on arachnids, with an emphasis on Scorpions. The unbridled enthusiasm of the young naturalists is almost overwhelming in its intensity. Their acute fascination with and interest in living things is very encouraging and delightful to witness. The passion for nature that we feel throughout our lives develops best if it is both nurtured and encouraged by parents, teachers and experienced naturalists. However, a passion for nature and its study was not always tolerated, let alone encouraged. Anyone who has read the account of the life of Scottish naturalist Thomas Edmund (1814–1886) by Samuel Miles would appreciate the intensity of the insatiable curiosity of the budding naturalist. As a "wee bairn" and toddler he would disappear into the area known as the "Inches" at the mouth of the River Dee. The 'beasties', crustaceans, and other items brought home drove his parents to distraction. He was in fact regularly beaten at home and at school, to cure him of his unsavoury passions for nature. However, it didn't deter him and he continued his interest throughout his life despite having to work the very long working day of 4.00 am to 9.00 pm that prevailed at the time. He ended up being a shoemaker to support his family and interests. He ultimately was elected as an Associate of the Linnean Society and his contribution to natural history was recognised. Persistence, it seems, does pay.

Reference

Miles, Samuel (1882) *Life of a Scotch Naturalist, Thomas Edward, Associate of the Linnean Society*. (John Murray: London)

Max Campbell

Mycena subgalericulata. Photo Max Campbell from Fungal Foray 7th June.

The deadline for the August issue of Field Nats News will be **10 am on Tuesday 7th July.** FNN will go to the printers on Tuesday 14th with collation on 21st.

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CALENDAR OF EVENTS

All meetings are held at the FNCV Hall, 1 Gardenia St. Blackburn at 8 pm., unless otherwise indicated. On days of extreme weather conditions, excursions may be cancelled. Please check with leader.

July

Sunday 5th – Fungi Group—Foray: ***Greens Bush, Mornington Peninsula***. Meet at 10.30 am at Baldry Crossing on Baldry's Road (Mel Ed 37 Map 254 G6). Contact: Virgil Hubregtse 9560 7775.

Monday 6th – Fungi Group—Meeting: ***Fungi all sorts*** **.** Speaker: Dr Sapphire McMullan-Fisher, who is currently involved in a bioinfomatics project with Fungimap and the Atlas of Living Australia. Contact: Virgil Hubregtse 9560 7775.

Tuesday 7th - Fauna Survey Group—Meeting: ***Biodiversity on the Islands off Mexico.*** Speaker: Jose Barredo. Contact: Robin Drury 0417 195 148; robindrury6@gmail.com

Sunday 12th – Fungi Group—Foray: ***Cathedral Range State Park*****.** Meet at 10.30 am at Ned's Gully car park ,(Mel Ed 37 Map X910 T9). Contact: Virgil Hubregtse 9560 7775.

Monday 13th - Marine Research Group—Meeting: Speaker: To be advised. Contact: Leon Altoff 9530 4180 AH; 0428 669 773

Wednesday 15th - Terrestrial Invertebrates Group—Meeting: Speaker: To be advised Contact: Max Campbell 0409 143 539; 9544 0181 (AH); mcam7307@bigpond.net.au

Thursday 16th – Botany Group—Meeting: ***Pollination: Darwin's Abominable Mystery*** **—**Speaker: Patrick Honan. Contact: Sue Bendel 0427 055 071

N.B. Correction:
Graham Patterson is leading a geology exc. 27th June. His phone no. was incorrectly given in FNN 253. The correct no. is 9432 0163

Saturday 18th – Fauna Survey Group—Meeting: ***Annual equipment stock-take and repair***. Meet at the Blackburn Hall at 10 am. Contact: Su Dempsey 0437 172 333.

Saturday 18th – Juniors' Group—Excursion: ***Planting for Helmeted Honeyeater.*** Meet 10.30 am at Yellingbo. Contact: Claire Ferguson 8060 2474; toclairef@gmail.com

Sunday 19th – Fungi Group—Foray: ***Langwarrin Flora and Fauna Reserve.*** Meet at 10.30 am in car park on McClelland Drive (Mel Ed 37 Map103 C/D 10). Contact: Virgil Hubregtse 9560 7775.

July 21st - Collate FNN 255. Many hands make light work, but your editor has only one functioning at the moment! All welcome, beginning about 10 am. Contact: Joan Broadberry 9846 1218

Wednesday 22nd – Geology Group—Meeting: ***The Geology of Ile de la Reunion: UNESCO World Heritage Site.*** Speaker: Rob Hamson. Contact: Ruth Hoskin 9878 5911; rrhoskin@gmail.com

Sunday 26th – Fungi Group. Foray—***Gembrook: Fungi after Fire***. Meet at 10.30 am at the corner of Gembrook-Launching Place Road (C424) and the eastern side of The Pack Track, Gembrook. (Mel Ed 37 Map 299 A5). Contact: Virgil Hubregtse 9560 7775.

Monday July 27th - FNCV Council Meeting—7.30 start. Contact Wendy Gare at the FNCV office.

Tuesday 28th – Day Group—Meeting:***The Larapinta Trail.*** Speaker: Geoff Lay. Come at 10.30 am for coffee and a chat. Speaker 11 am**.** Contact: Joan Broadberry 9846 1218

Friday 31st – Juniors' Group—Meeting 7.30 pm: ***Beach Nesting Bird Project.*** Speaker: Meghan Cullen of Birdlife Australia. Contact: Claire Ferguson 8060 2474; toclairef@gmail.com

The policy of the FNCV is that non-members pay $2 per meeting and $5 per excursion, to contribute towards Club overheads. Junior non-member families, pay $2 per meeting and $4 per excursion.

Members' news, photos & observations

We always have space for member photos and natural history observations. Please share with us what you have noted in your daily life, travels or garden. Email: fnnews@fncv.org.au by the first Monday in the month.

Welcome

Warmest greetings to these new members who were welcomed into our club at the last Council meeting:

Deborah Zinn, Andrew Christie, Martin Banning, Emma Sumner and Torbjorn Von Strokirch

If you find injured wildlife:
Wildlife Victoria
1300 094 535
Help for Wildlife
0417 380 687
Will connect you to your nearest suitable wildlife shelter

PUT THESE NUMBERS IN YOUR PHONE NOW.

GEOLOGY EXCURSION TO BEAUMARIS ON SATURDAY 15 AUGUST

Melbourne's World-class Fossil Site **led** by Professor John Buckeridge of RMIT University. Details of this morning excursion will be published in the next FNN. **Participants must register with Rob Hamson 03 9557 5215 or rbhamson@hotmail.com.au**

Apologies for the incorrect email address in the Calendar of Events.

GOULD LEAGUE OFFERS US A DISCOUNT

At the end of last year, the Gould League generously put forward am offer to all Field Naturalists of Victoria club members, giving a discount of 10% off all books and posters that are available from their online bookshop. This offer is only available for this year, at this stage expiring on 30 December 2015.

The offer can be redeemed by entering in the code FNCV2015 when making an online order at the checkout

The minutes of the FNCV AGM will appear in the next issue of Field Nats News

Many thanks to those who helped collate and label FNN 254

Sheina Nicholls
Hazel Brentnall
Edward Brenrnall
Andy Brentnall
Neil McLachlan
Barbara Burns
Ray Power
Cecily Falkingham

Special thanks to Sheina for organising the morning's work.

Council for 2015 is currently:

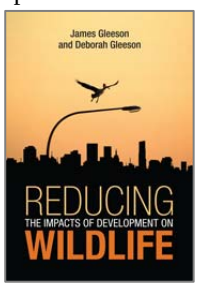
President:	Maxwell Campbell
Vice President:	Philippa Burgess
Secretary/Public Officer	Barbara Burns
Treasurer:	Barbara Burns
Assistant Secretary:	Andrew Brentnall
Councillors:	Sally Bewsher, Joan Broadberry, Su Dempsey, John Harris.

SIG Representatives:

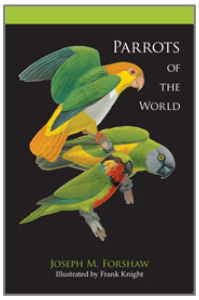
Botany:	Sue Bendel
Day Group:	Joan Broadberry
Fauna Survey:	Su Dempsey
Fungi:	Vacant – no nominations
Geology:	Ruth Hoskin
Juniors:	Claire Ferguson
Marine Research:	Audrey Falconer, Leon Altoff
Microscopy:	Philippa Burgess
Terrestrial Invertebrates:	Maxwell Campbell

NEWS FROM THE BOOKSHOP (July 2015)

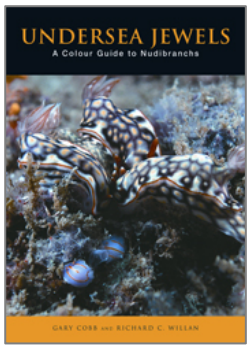
BARGAINS! BARGAINS! BARGAINS!! Members are in for a treat this month with prices slashed on a range of titles that are not usually available from the bookshop. I have recently purchased a variety of books at discounted prices that are being passed onto our members. Below is a range of titles that are only available for a limited time, while stocks last, so it is vital that you get in fast. Only limited copies are available at these heavily discounted prices. There is the potential to order in more of these bargains depending on demand if you get in before the 30 June 2015. The bookshop is brimming with options across a mixture of topics, so come and have a look at what is on offer. If you have any questions, would like to order or inquire about a book, please send me an email to, **bookshop@fncv.org.au** to submit your order or make an inquiry. ***Kathy Himbeck***



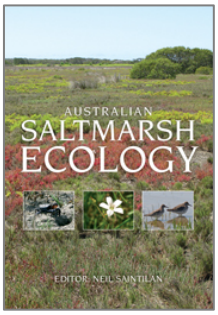
Reducing the Impacts of Development on Wildlife* (Geelson & Gleeson)** contains a comprehensive range of practical measures to assist others to reduce the impacts resulting from development on terrestrial flora and fauna, and promotes ecologically sustainable development. This book presents a variety of measures or strategies to reduce the impact on wildlife, including providing additional habitat, facilitate movement and deter wildlife from hazards. **(PB, 248 pp., 2012)** ***RRP $89.95, Members $48.00



***Parrots of the World* (Forshaw & Knight)** features 146 superb colour plates depicting every kind of parrot, as well as detailed, facing-page species accounts that describe key identification features, distribution, subspeciation, habitat and status. This premier field guide also shows where to observe each species in the wild, helping make this the most comprehensive and user-friendly guide to the parrots of the world. **(PB, 336 pp., 2010) RRP $39.99, Members $24.00**

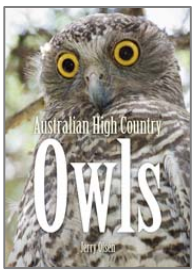


Undersea Jewels: A colour Guide to Nudibranchs* (Cobb & Willan)** is a guide to the nudibranchs of south-eastern Queensland, with most species found elsewhere in Australian seas or in the broader tropical Indo-West Pacific Region. The book covers 277 species, is beautifully illustrated and includes information on each species, providing a bridge between professionals and amateurs. **(PB, 312pp., 2006)** . ***RRP $54.95 Members $36.00



Australian Saltmarsh Ecology (ed. N. Saintilan) presents the first comprehensive review of the ecology and management of Australian saltmarshes. Leading experts in the field outline what is known of the biogeography and geomorphology of Australian saltmarshes, their fish and invertebrate ecology, the use of Australian saltmarshes by birds and insectivorous bats, and the particular challenges of management, including the control of mostiquito pests, and the issue of sea-level rise. **(PB, 248 pp., 2009)** ***RRP $99.95, Members $35.00***

Castiarina: Australia's Richest Jewel Beetle Genus (Barker) includes identification keys, diagnostic features, notes on mimicry, distribution and adult food plants, and realistic colour renditions of the beetles. This beautifully presented book covers 478 *Castiarina* species and will bring delight to book lovers. This book provides a wonderful display of the diversity of life within one group of beetles. **(HB, 348 pp., 2006)** ***RRP $84.95, Members $48.00***



Australian High Country Owls (Olsen) provides the latest scientific information on Australian owl species, especially *Ninox* owls. It details studies of Sothern Boobooks and Powerful Owls and publications that overturned some existing beliefs about Australian owls. The book includes numerous photographs on different owl species, and will be a handy reference for bird researches and amateur bird watchers alike. ***(PB, 2011) RRP $69.95, Members $36.00***

Terrestrial Invertebrates Group

"Terrestrial flatworms – the good, the bad and the beautiful".

The meeting on 20th May was well attended and there were demonstrations of live Tardigrads (water bears) and pseudoscorpions. Wendy Clark circulated interesting macro photographs via her notepad. Members reported on invertebrates they had seen.

Dr Leigh Winsor delivered a very interesting presentation on terrestrial flatworms.

Flatworms are members of the Phylum Platyhelminthes which comprises turbellarians (flatworms), cestodes (tapeworms) and trematodes (flukes). The terrestrial flatworms are essentially land dwelling members of what is a predominantly an aquatic taxon. It is thought there may be over 300 species in Australia, with only 90 or so currently described and named. They may be found coiled under rocks and logs or moving about over moist soil and vegetation. They leave a sticky mucous trail and range from 5mm to 600mm long in some exotic species. Those that live in

rotting logs are referred to as saproxylic while those living under rocks, leaf litter or soil are termed cryptozoic. They need some moisture to survive and favour moist habitats, but can be found in drier areas with adequate cover. There is adaptation to different altitudes with alpine, forest and woodland assemblages. Flatworms are susceptible to droughts, fires, environmental disturbance and land management practices.

They are top predators, feeding on other invertebrates including earthworms, arthropods and molluscs. They detect the slime trails of prey such as molluscs and follow them to the victim. An African species assembles in groups and fishes for termites with its sticky anterior. They are long, flat and tapered, often brightly coloured with stripes. The bright, aposematic colouration may be associated with their unpleasant taste and a warning to would-be predators.

Reproduction may be sexual or asexual (by fission). After pairing a large egg case is produced and this will hatch one or more worms. Flatworms may be very effective as biological control agents for introduced pests such as molluscs, but once they have eaten the pests they may start on the other species present. They may become pests themselves under certain circumstances and are easily spread by human activity such as shipping of plants, soil and food stuffs. The New Guinea Flatworm has been inadvertently spread throughout the northern Pacific islands by human activity and may be a serious threat to the many, varied indigenous snails throughout the islands.

They may be falsely accused of attacking crops such as strawberries because they may be found in the damaged fruit. In fact they will have followed molluscs or other pests to the fruit to prey on them. They may then rest up in the damaged fruit. So, if you find a flatworm sitting in a hole in your apple, it has probably already eaten the slug that created the hole.

Terrestrial flatworms are not easily identified on simple phenotypic features such as stripes and colour. A series of similarly coloured animals may be separate, distinct species. On the other hand, differently marked animals may be members of the same species. Identification and taxonomic studies require DNA analysis and histological sectioning to examine internal anatomy. The presentation was very well received and all present learned a great deal about a cryptozoic and interesting group of animals.

Maxwell Campbell

Geology Group

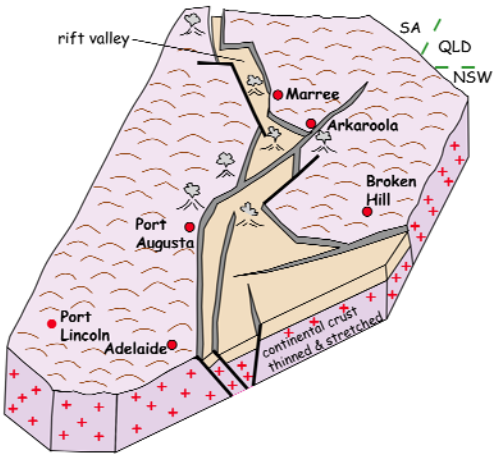
GEOLOGY OF THE FLINDERS RANGES

Dr Peter Jackson
22/4/2015

Dr. Peter Jackson's geological career has comprised Lecturer in Economic Geology at La Trobe University; 25 years of consultancy work assessing economic geology for mining operations; and Director of Geology at the Morning Star Gold Mine at Woods Point.

The speaker described the Flinders Ranges as one of the most popular regions in South Australia with a host of significant geology, flora and fauna features. He has led many field trips to the area with university students, visiting geologists and latterly with a U3A geology group.

Peter began his talk describing the geological history of the Flinders Ranges dating back 860 mya when marine sediments were deposited in a geosyncline, now known as the Adelaide Rift Complex, on the eastern side of the ancient Gawler Craton.



Adelaide Rift Complex

Sediments 10-24 km thick were deposited at an estimated rate of 1m/40,000 years. The resultant Neo-Proterozoic to Cambrian era sediments were then compressed and uplifted forming the Adelaide Fold Belt with troughs, sea invasions, glaciation, sea level rises and falls and erosional intervals. This created a variety of marine environments including shallow shelf, deltaic and lower sea levels. The Flinders Ranges are a result of these complex geological processes and they can be described by a number of lithostratographic units.

Lithostratigraphy of the Flinders Ranges

Time Units	Rock Units	
Era	Supergroup	Group
Cambrian	Moralana Supergroup	Lake Frome Group
		Hawker Group
~545 Ma Neo- Proterozoic	Heysen Supergroup	Wilpena Group
		Umberatana Group
	Warrina Supergroup	Burra Group
		Callana Group
1000 Ma	Beda Volcanics	
Palaeo-Meso Proterozoic	Willyama Complex	

The oldest rocks belong to the Willyama Complex comprising metamorphic rocks (schist, gneiss) found in diapirs. Diapirs are usually associated with sub-surface salt intrusions, however the Flinders Ranges diapirs result from the structural compression of older rocks forced up through slowly rising intrusions via structural weakness. Unlike granitic intrusions, diapirs show no regional metamorphism. They act as conduits for up-welling hydrothermal fluids rich in elements such as Cu, Zn, Pb, Ba, Au and are associated with mines in the Flinders Ranges, eg. the Blinman Copper Mine and the Oraparinna barite mine.

Early sediment deposits which took place around 850-700 mya, are seen in the rocks of the Warrina Supergroup and Burra and Callana subgroups, which are found in the eastern part of the Central Flinders Ranges.

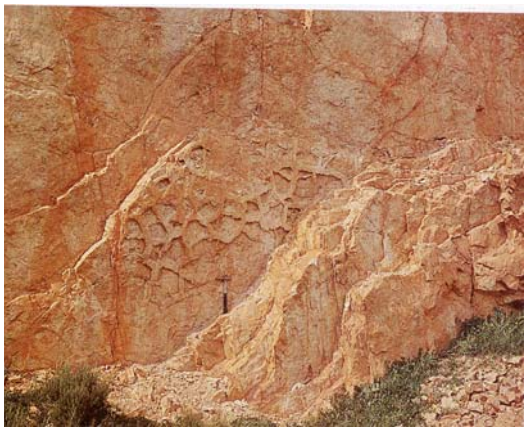
The next, Heysen Supergroup 700-545 mya, encompassed marine invasions associated with cycles of glacial sedimentation forming tillites. Tillites provide evidence for two major ice ages that occurred during the Neo-Proterozoic. The central Flinders Ranges provide extensive examples of the many characteristic formations comprising the Umberatana and Wilpena Groups.

Peter showed photographs of typical Umberatana rocks, including tillites, siltstone, shale, conglomerate, sandstone, limestone and dolomite found in outcrops. The Umberatana Group rocks also have fossilised stromatolites, which had formed in shallow, marine environments.

Umberatana tillite

The Wilpena Group rocks are the best exposed in the Flinders Ranges. They demonstrate well-defined fluctuations in sea level. The basal unit, the Nuccaleena Formation, is predominantly dolomite overlain by shale. Another formation, the Brachina Formation, comprises 500m thick deeper depositions of green (reduced iron) siltstones overlain by 400m shallower depositions of red (oxidised iron) siltstone.

Later in the Wilpena sequence, ABC Range Quartzite overlies Brachina Formation and represents marginal shelf sedimentation. Warren Gorge features impressive near vertical folding of the ABC Range Quartzite and shows heavy mineral banding and exposed dessication cracks.



Warren Gorge (top); Desiccation cracks

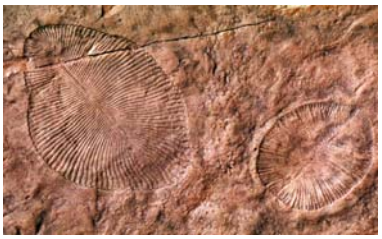
Above the ABC Range Quartzite, the Bunyeroo Formation was formed in a deeper, low energy marine environment.

Its shale beds range up to 1200m thick and are noteworthy for pencil cleavage and layer of the 590 mya Acraman meteorite impact ejecta. Ejecta spread up to 450km from the impact site in the Gawler Ranges and a thin layer is preserved in the Bunyeroo Gorge in the Flinders Ranges.

Further periods of shallowing depositions (between 625 mya and 545 mya) led to the Wonoka Formation of cacareous shales and flaggy dolomites approx. 220m thick then to Pound Quartzite Formation.

As part of this formation, Bonney Sandstone 900m thick was deposited on coastal land flats and Rawnsley Quartzite now forms distinctive ridges, with the rim of Wilpena Pound being the well-known example.

Wilpena Pound Rim of Rawnsley Quartzite



Ediacarian fossil *Dickinsonia*

It is in the Rawnsley Quartzite beds that Ediacaran fossils (dating 620-545 million years old) were found by SA geologist Reg Sprigg in 1947. Photos illustrate these soft-bodied organisms, the first multicellular fauna on Earth, but much remains unknown about them, despite the fact they are found on all continents except Antarctica.

Finally, in his Flinders Ranges talk, Peter described the formations from the Cambrian period (542-509 mya) – the Hawker Group comprising the Parachilna, Wilkawillina and Billy Creek Formations. Unique to this period are the reef building fossilised ancient sponges called Archaeocyathids.

Kaye Oddie

Fungi Group

FNCV FUNGI GROUP FORAY TO TOORONGO FALLS, NOOJEE 3 May 2015

Wet Sclerophyll Forest with small patches of Myrtle Beech and Tree Ferns

A fine sunny morning greeted some 14 forayers and we were pleased to welcome Julia and Livia, university students from Brazil. Their course in Brazil included studying fungi, so it was especially interesting to have their views on our fungi and numbers of them were familiar. There were also some keen-eyed Juniors helping us.

Reiner Richter arrived early and set up a 'show and tell' table for us which was a good introduction to the foray, especially as most of the fungi were very small. Forayers were made aware that they needed to look closely for small fungi on woody substrates, twigs and Tree-ferns. On eucalypt bark were thin black *Xylaria filiformis* with white tips. Another thin species was the coral Fairy Club *Macrotyphula juncea* (Fungimap Target) growing on eucalypt bark. This had the typical thin brown stalk with a thinner, whitish fertile head and was ca 60 mm tall. Later, we saw lots of these, which is unusual because we do not usually see very many, nor very often. There were two minute stalked discs - *Torrendiella* species - the inner surface is a smooth greenish-yellow/pale yellow, the outside dark grey and supported on a dark stalk. Long dark, sparse hairs on the outside cup and stalk come up to frame the disc. Both the *Torrendiella* are similar to look at but can be differentiated by the substrate on which they grow – *T. clelandii* on a eucalypt twig and *T. eucalypti* on a dead leaf from Blackwood *Acacia melanoxylon.* Blue-green Tunbridge Discs *Chlorociboria subaeruginosa* were growing on a small piece of branch.

There was no sign of the green stained wood, which would have been within the branch, not seen on the surface. *Neobarya agaricicola* (*Barya agaricicola*) is a minute yellow pyramidal fungus that parasitises small agarics such as *Galerina* and *Mycena*. It is highly distinctive because of its yellowish flask-shaped fruit-body, which grow in large numbers all over the host. Reiner had collected a couple of gilled species found on litter – *Mycena subvulgaris* which is a small grey fungus with a dimpled cap and characteristically very slimy grey stem. This makes it difficult to pick up for closer study. A smaller species, another *Mycena*, *Mycena* sp indet 'marasmiodes' (*Larger Fungi of South Australia* by CA Grgurinovic 1997, p 262) was found on the ground on a small twig. It has a minute white cap and yellowish stem, whose relative toughness (a characteristic of *Marasmius* spp.) helps distinguish it, thus the name 'marasmioides' became the tentative field name attributed by Tom May and Bruce Fuhrer. This shows that for those fungi, which are impossible to identify easily, it is important to make detailed field notes so that, even though the fungus cannot be named, the particular species can be recognised again when it comes up in the area. *Mycena* spp. such as Tiny Blue Lights (which has yet to be formally described), although cryptic, has very distinct macro-characteristics: white caps (to 2 mm diameter) on a blue stem, attached to the substrate by a blue disc. The fruit-bodies are found growing on decaying, damp rachises of the Smooth Tree-fern *Dicksonia antarctica* where they appear as tiny, off-white dots. Under a 10x hand lens, it is possible to see the white cap and blue stem and disc. Reiner found several more massed groups throughout the foray.

Paecilomyces tenuipes Photo: Eileen Laidlaw

Then, in the afternoon Ed Grey found this species growing on a thin woody branch when he walked along the carpark-to-campsite river track. This was an exciting find because it had never been recorded as growing on wood, only Soft Tree-fern. Collections were made for the RBG of this and some of those growing on Soft Tree-fern rachises.

Tree-fern rachises were thoroughly examined initially for *Mycena* sp. the on Soft Tree-fern but later for *Lachnum* species. On Rough Tree-fern *Cyathia australe* rachises were numbers of minute *Lachnum* cups – inside cup pale yellow, smooth, and on the outside dense white hairs. We have always called *Lachnum* on Tree-ferns *L. pteridophyllum*, but a study by Jurrie Hubregtse has indicated that the pale cup and white hairs are not *L. pteridophyllum* which Spooner (see ref. below) says has a pale yellow disc and yellow hairs often with amber particles, a species that we have seen on the Smooth Tree-fern. Spooner mentions two other species that grow on Tree-ferns *L. lanariceps* and *L. varians*. The former has a pale yellowish disc, pale yellowish stem and long white hairs with a red exudate and the latter a pale orange disc, whitish to pale buff hairs with amber-coloured particles. Thus it is important to measure the size of the disc, and to note what colour the stem and hairs are and whether there is any coloured exudate in the hairs.

On almost every mossy granite boulder were large numbers of the lichenised fungi *Lichenomphalia umbellifera* with their deeply funnel-shaped light brown caps. This is an unusual habitat for a fungus that normally grows on the ground, so the algal mat associated with the fungus must have been present. Ed Grey saw the apricot-coloured fruit-bodies of the Lichen *Dibaeis arcuata* massed on the steep banks around the

car park. Among the *Marasmius* species that we could identify were two small horse-hair stem types - *M. crinisequi* with the characteristic 'dimple with a pimple' in the centre of the cap, and *M. alveolaris* with the parachute-shaped cap, as well as the larger *M.* sp. 'angina' with its distinctive as purple tones.

There were several examples of *Paecilomyces tenuipes* (**photo previous page),** which is the anamorph (asexual stage) of *Cordyceps takaomontana*. They consisted of a number of whitish to pale yellow stems covered with a white feathery deposit and were about 10-15 mm tall. They always parasitise either a pupa/cocoon of a moth or butterfly larva. Regarding *Paecilomyces* species, recent DNA work (Luangsa-Ard J *et al* 2005, on the relationships of *Paecilomyces* sect. *Isarioidea* species. *Mycological Research* 109 (5) 581-589) indicates that all these should now be listed as *Isaria* sp. eg *P. tenuipes* becomes *I. tenuipes*. The infecting mycelia does not cover the outside of the host as is the case with the Icing Sugar Fungus *Beauvaria bassiana* which is the anamorph of *Cordyceps bassiana*.

Throughout the foray there were a variety of *Cortinarius* species – many of them brown, but several had distinctive features: one had a conic cap with a very pointed umbo. The cap was zoned white at the margin, then purple and finally the umbo was bright tan and the pale lilac stem had rusty-brown spores trapped in the longitudinal fibres; *C. phalarus* (**photo right)** has an orange-brown cap with a white membranous patch in the centre, and at the base of the stem, a saccate volva. Both characteristic features are derived from a strongly developed outer veil, unusual in the genus *Cortinarius*, but *Fungi of Southern Australia* by N Bougher and K Syme 1998, p 254 mentions that there are several other volvate species in Eastern Australia. *C. phalarus* is a member of the subgenus Phlegmacium ie. the cap is viscid, but the stem dry with a marginate bulb, in this case a volva. Another larger *Cortinarius* sp. (cap diameter 110 mm) had a greasy mauve cap, turning brown, a white ring on a thick very pale lilac stem with a bulbous base. This looks like *C. roseolilacinus* (Fungimap Target) which our group has not seen before. John Eichler saw *C.* aff. *alboviolaceous* which is a another lavender species (cap to 70 mm diameter). It usually has characteristic water droplets at the top of the lilac stem. Jurrie Hubregtse (FNCV Fungi Group (2012). *The Fungi CD: Fungi in Australia* [CD-ROM] 3rd edition) had this to say about it: "*Cortinarius* aff. *alboviolaceus* is readily identified by its pale lilac colour, and neither the pileus nor the stipe is glutinous. *Cortinarius alboviolaceus* is the name of a Northern Hemisphere species that is mycorrhizal with deciduous trees. This Australian species has an affinity to that species: the morphology of the Australian and Northern Hemisphere species are very similar. Because it has not yet been decided that the Australian species is unique, for the time being it has been given the name *Cortinarius* aff. *alboviolaceus*."

In the afternoon the group walked up the track to the Amphitheatre Falls. Scott Ferguson photographed a large rubbery dark-brown almost black cup, the upper surface was convex with a large central very wrinkled depression John Eichler said this was an unusual form of *Plectania* (*Urnula*) *campylospora* like the one he had seen in the Otways, but normally this is more cup-shaped and smoother on the inside. Eileen Laidlaw and Reiner Richter saw both forms growing close together.

It was exciting to find the Orange Fan *Anthracophyllum archeri* on a thin woody branch. The caps were pale orange and the widely-spaced gills were dark orange. The colour of the cap can vary from pale orange in drier areas, to vibrant red where it is redder (*Fungi Down Under: the Fungimap guide to Australian fungi* by Pat Grey and Ed Grey. 2005, p 22). Richard Hartland found them at Toorongo Falls in 2013, but the last time the group saw them was in the Otways in 2010.

Unlike earlier forays, all about the same date, we did not find abundant numbers of Ghost Fungus *Omphalotus nidiformis* which had been widespread. However Eileen and Reiner found some further along the track to Toorongo Falls. They were rather ragged with undulating black caps, white gills and stem attached to a tree. But no-one found the green jelly discs *Classenomyces australis*, and the log on which they had been growing is now covered with weeds. John

Cortinarius phalarus
Photo: Richard Hartland

Eichler and Richard Hartland found a large *Cordyceps gunnii* growing from a large moth larva. It had an unusual knob-shaped fertile head instead of the usually thinner club.

Re the 'mystery' cups from last week. Cecily Falkingham thought they may be Peziza, but they are too small, and grow on wood. As they are so distinctive when we see them again, perhaps we will call them 'grey cups with a yellow outer surface'.

Thanks to all the forayers who found species and helped identify them and thank you to the photographers (John Eichler, Scott Ferguson, Richard Hartland, Eileen Laidlaw, Reiner Richter) who supplied many photos to select for the report.

Pat and Ed Grey

Reference

Spooner, B.M. (1987) Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae. In *Bibliotheca Mycologica Band* p. 116.

Thanks to the editorial and layout team who put together FNN 254

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Wendy Gare
Sally Bewsher
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FUNGI GROUP MEETING 4th May 2015

'The Kingdom Fungi'

by Jurrie Hubregtse

The Kingdom Fungi is vast and complex. In this presentation Jurrie Hubregtse battled a bout of bronchitis as he gave some historical background to the relatively recent recognition of the fungal kingdom, took us on a tour of parts of this kingdom, and emphasised the growing importance of field mycology.

Historical background

In 1859 Charles Darwin popularised the notion of an evolutionary tree in his book *On the origin of species*. Classical biologists believed that they could use the concept of comparative morphology to determine evolutionary relatedness and thus construct the Tree of Life.

Ernst Heinrich Philipp August Haeckel was very impressed by Darwin's *On the origin of species* when he read it in 1864. In 1866, Haeckel proposed a tree of life, based on morphological differences, which consisted of the kingdoms Protista, Animalia and Plantae. It is noteworthy that in his tree of life he put fungi and lichens close together (at the time these organisms were considered to be part of the plant kingdom).

In 1959, Robert Harding Whittaker was the first to propose the five-kingdom taxonomic classification of the world's biota: the Animalia, Plantae, Fungi, Protista and Monera (Bacteria). This was the first time that fungi were placed in a kingdom of their own.

In 1981, Thomas Cavalier-Smith published a paper titled ' Eukaryote kingdoms: seven or nine?

This was one of the last attempts at defining the Kingdom of Life by relying predominantly on classical differential morphology. In this attempt the Kingdom Fungi was split into two new Kingdoms – Eufungi (non-flagellated) and Ciliofungi (flagellated, e.g. Chytrid fungi). This arrangement did not last very long once Thomas Cavalier-Smith started using DNA sequence analysis.

DNA Deoxyribonucleic acid

The image known as 'Photograph 51', showing the diffraction pattern of a pseudo-crystalline DNA specimen, was taken by Rosalind Franklin in 1952 and clearly shows that DNA has the structure of a double helix. This was the last piece of information needed for Francis Crick and James Watson to create their double helix model for DNA.

In April 1953, The journal *Nature* vol. 171 contained 5 papers by the above and other authors that described and provided evidence for the double helix being the structure of DNA. This was a defining moment in DNA research.

In 1977, there was another fundamental breakthrough in biological science, which probably was not noticed by most biologists. The paper by Carl Woese and George Fox, titled 'Phylogenetic structure of the prokaryotic domain: the primary kingdoms', published in *Proceedings of the National Academy of Sciences of the United States of America*, was 2.5 pages long and was the first paper reporting how DNA (RNA subunit) was used to determine the relationship between organisms. This paper marked the start of the DNA revolution.

In 2004, The Royal Society published Thomas Cavalier-Smith's paper titled 'Only six kingdoms of life', the six kingdoms being Bacteria, Protozoa, Chromista, Plantae, Fungi and Animalia.

In 2006, the journal *Mycologia* published an issue titled 'A phylogeny for kingdom Fungi. Deep Hypha Issue'. The papers in this issue, together with the paper by David Hibbett *et al*., titled 'A higher-level phylogenetic classification of the Fungi' published in *Mycological Research* in 2007, give us the first clear view of the Kingdom Fungi, showing the relationship between major fungal lineages.

There is now an international collaborative effort to Assemble the Tree of Life (AToL), and a part of this project is the Assembling the Fungal Tree of Life (AFToL). The core tools being used to advance this project are those derived from the latest advancements in the fields of DNA analysis and computational methods. Darwin's vision of the great tree of life is being realised.

Kingdom Fungi

Jurrie outlined the structure of the current Kingdom Fungi as described by the AFToL project (see http://lutzonlab.org/aftol-research/). After presenting a picture of the overall structure, he moved on to the area of Kingdom Fungi that is more familiar to us, specifically Ascomycota (which produce their spores in sac-like structures called asci) and Basidiomycota (which produce their spores on usually club-like structures called basidia). Within the phylum Ascomycota he focused on the subphylum Pezizomycotina, and in the phylum

Examples of fungi in the order Agaricales:
A. *Cortinarius archeri* in the family Cortinariaceae. **B.** *Lycoperdon pyriforme* in the family Agaricaceae.
C. *Nidula emodensis* in the family Agaricaceae. Photos by Jurrie Hubregtse

Extracts from SIG reports given at the last FNCV Council Meeting

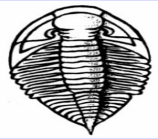
Botany Group: At our May meeting Maggie Riddington presented on cool temperate rainforests. Maggie said she had loved the myrtle beech at Tarra Bulga from a young age, so was excited to be able to study them and southern sassafras for her honours thesis. Only 0.08% of Victoria is cool temperate rainforest but it contains 4% of floral diversity. Cool temperate rainforest is a climax community that persists in sheltered gullies with high rainfall. Maggie looked at the physiological acclimatisation of myrtle beech and southern sassafras to see their response to light and rainfall during the growing season of spring. She looked at trees growing in Tarra Bulga National Park and at Cement Creek, Mt Donna Buang. Maggie measured gas exchange in the leaves. Southern sassafras photosynthesised less at higher temperatures and myrtle beech photosynthesised less with increased light. Southern sassafras was more conservative in water use with myrtle beech using 4 times as much transpiration. By 2070 with climate change expect temperatures to be 3°C higher and much less rainfall. Cool temperate rainforests are protected in Victoria and are supposed to have a 40 metre wide buffer of mountain ash surrounding them for protection.

Day Group: No report submitted

Fungi Group: Since the April Council meeting the Fungi Group has held four forays and one meeting. The forays were at Toorongo Falls, near Noojee; Mount Worth State Park; Jack Cann Reserve, Blackwood; and Sanatorium Lake Picnic Ground, Mount Macedon Ranges National Park. About 14 people have attended each foray.

At our May meeting, Jurrie Hubregtse battled a bout of bronchitis to give his presentation titled 'The Kingdom Fungi', an overwhelmingly vast and complex kingdom that was not proposed until 1959.

Geology Group: On 2nd May there was a City Buildings excursion. Dr Phil Bock led an extensive walk around the east side of Melbourne's city block looking at the origin of building stones and other geological places of interest e.g. the large Silurian outcrop off Sargood Lane and the fossils embedded in the Devonian Buchan marbles in the State Library staircase. Dr Bock's knowledge and enthusiasm for such a rich history was much appreciated by the group of interested geology SIG members and visitors.



Basidiomycota he focused on the subphylum Agaricomycotina.

Pezizomycotina are filamentous ascomycetes and form the largest subphylum of Ascomycota. Within this subphylum there are 11 classes, 11 subclasses and 57 orders, with more than 32,325 described species. Jurrie showed photos of fungi that belong in some of the orders, such as Pezizales (which have operculate asci, i.e. at the top of the ascus they have a 'lid' which opens to let out the spores), Geoglossales, Helotiales, Hypocreales, and Xylariales. Lichens (in the class Lichinomycetes) are now classified according to their fungal component, and there are 20,000 known species. At least 22 of the 57 orders in the Pezizomycotina contain lichenised fungi.

Agaricomycotina consists of 3 classes, Agaricomycetes, Dacrymycetes and Tremellomycetes. This subphylum contains approximately 21,000 described species. The class Agaricomycetes consists of 17 Orders, 100 Families, 1147 Genera and about 20,000 described species, which comprise 98% of the described species in this subphylum. Jurrie showed photos of fungi belonging to the Agaricales, Boletales, Russulales, Polyporales, Geastrales, Auriculariales, Dacrymycetales and Tremellales, demonstrating how fungi that produce quite different fruit-bodies now belong in the same order. The Agaricales, for example, which traditionally were defined as fungi with gills, contain genera as diverse as *Cortinarius*, *Entoloma*, *Lycoperdon*, *Nidula*, *Favolaschia* and *Macrotyphula*! Not all gilled fungi are in the Agaricales. The Russulales contain *Russula* and *Lactarius*, as well as *Hericium*, *Auriscalpium*, *Artomyces* and *Stereum*!

The phylogenetic approach gives us a much clearer picture of how fungi evolved. Morphologically dissimilar taxa can be very closely related. There is a lot about fungi that we don't know.

Role of Field Mycologists

Field mycologists have become more important than ever before. The rewriting of the Kingdom Fungi was made possible because of collected specimens. You need a specimen before you can do any DNA analysis. Probably less than 10% of all fungal species have been collected and named, and from those that have been collected only about 25% have had their DNA analysed.

If we are to get a better understanding of the Kingdom Fungi, many more collections will need to be made. And you can help! Get out there, enjoy the fungi you see, document them, and assist in the collection of specimens.

In fact, field collections are now being made with greater urgency as we witness our planet's ever-diminishing wild habitats and corresponding biological diversity. Mycological clubs and amateurs can play a significant role. Who better to document ecological information than those who observe and collect mushroom species on a regular basis?

Marine Research News

Report on MRG meeting Mon. 8th December, 2014. This was a members' night in which presentations of highlights of the 2014 fieldwork were made (refer to previous FNNs for a summary of the 2014 MRG excursions). Joan Broadberry and Carol Page also showed field images from trips to Queensland. Thanks to all for a productive evening.

Report on MRG meeting Mon. 9th February, 2015: Lisa Goudie, a consultant sponge taxonomist, spoke on

Sponges of southern Australia

Sponges are **animals**, belonging to the Kingdom Animalia and the Phylum Porifera (meaning *pore-bearers*). They are the oldest and simplest of the multicellular animals, having lived in the oceans for at least 700 million years. They are not colonies of individual animals but rather collections of individual cells (not tissues). They are bottom-dwelling **filter-feeders**, extracting food and oxygen from inhalent currents and expelling waste and reproductive cells in exhalent currents.

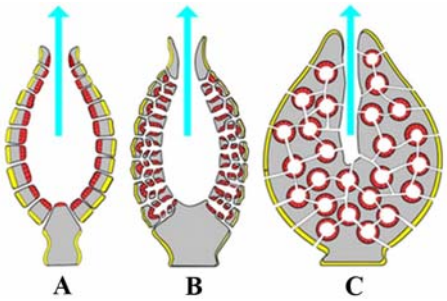
All sponges are aquatic, the vast majority being marine, distributed from the tropics to polar seas at intertidal to abyssal levels. Worldwide there are about 20,000 species, 8,500 of which are described. There are about 150 freshwater species. Australia has about 5000 species, approximately 1500 of which are described (1000 of these being recorded from southern Australian waters).

Genetic studies suggest an ancient sponge-like ancestor was the first true animal. Living unicellular animals called Choanoflagellates share this ancestor and are very alike in shape and function to the **choanocyte** cells of sponges, having a collar of cilia surrounding a beating flagellum. These produce the current flow through sponges.

Sponges are generally long-lived; many live for decades and longer; some show seasonal die-back. In the 1980s, the genus *Vaceletia* (thought extinct since the late Cretaceous period) was rediscovered in the Coral Sea; they are chambered and calcified, display concentric growth rings and are up to 5000 years old. More recently they have also been discovered elsewhere in the Indo Pacific at depths of 10-500 metres, forming tube-like structures up to 30 centimetres in diameter.

Fast-growing sponges can grow a few centimetres per week. These also often have high reproductive output and can colonise unstable environments. Slow growing sponges have low reproductive output and are adapted to stable (usually deep water) conditions. The giant barrel sponges of the Caribbean Sea are slow-growers—those of 1m width are about 100 years old, those of 2.5m width more than 2000 years old. Some sponges can vary their growth rate, possibly in response to changing water temperature.

The **sponge body plan** consists of a system of canals and chambers through which flows a unidirectional current (generated by the choanocytes). Water comes in through many small inhalant pores called **ostia** and expelled (with waste and reproductive products) through larger exhalent openings called **oscules**. There are three basic body structures in sponges: **asconoid**, **syconoid** and **leuconoid.** The asconoid is the simplest, limiting the sponge to a small spherical form with a single oscule. In the syconoid forms, folding of the body wall to form a system of canals increases the surface area relative to volume and allows more water to be pumped through the sponge. In the leuconoid forms, further body folding produces a more complex structure that further enhances the internal surface area to volume ratio; these sponges often have many oscules and are varied in form from encrusting, erect and branching, or massive, and can pump water 10 times their own volume per hour.



Sponge body plans: asconiod (A), syconoid (B), and leuconoid (C). Arrows indicate exhalent current flow.

Sponges have a relatively small number of cell types, each performing a different function, such as current generation, digestion, reproduction, spicule formation or waste removal. The most important are the **archaeocyte** cells, which are mobile and totipotent (that is, they are capable of transforming into any of the other cell types as required).

Most sponges have three body layers—the outer layer (**pinacoderm**), formed by a single layer of cells called **pinacocytes**); the middle layer (**mesohyl**), consisting of a collagen matrix that can also include skeletal components consisting of **organic spongin** fibres and **inorganic spicules** composed of silica or calcium carbonate; and the inner layer (**choanoderm**), consisting of the **choanocytes**, which generate the water current.

Sponge skeletons may be **collagenous** (having flexible fibres), **spiculose** (having solid silicon dioxide or calcium carbonate spicules), a combination of both, or completely lacking.

Sponges do not typically exhibit movement but contain **actinocyte** cells which are contractile and can close ostia as a way of regulating internal flow and to help prevent silting-up. Recent studies on *Tethya wilhelma* have shown it able to roll by rhythmic contractions of the outer layer in response to unfavourable local conditions.

Reproduction may be sexual or asexual. Most sponges are sequential hermaphrodites, producing eggs and sperm at different times, thus avoiding self-fertilisation. Fertilization of egg cells by sperm cells may occur in the water column but also within the adult sponge. The youngest sponge stage, called the **amphiblastula**, may remain in the water column for 2-72 hours before settling, or may be non-swimming, crawling over the substrate before settling. Asexual reproduction occurs through budding or fragmentation. Some freshwater sponges have a **gemmule** (a resting phase) which can survive for up to 2 years in a dried-out, spore-like state.

Sponges are **filter-feeders**, trapping organic particles filtered from the water; they are more selective in their feeding than was once thought—the presence of many small ostia (a tenth to a hundredth of a millimetre in diameter) allows them to preferentially filter and trap tiny micro-organisms from the water column. Recently, however, macro-carnivorous sponges have been discovered. One example, *Asbestopluma hypogea*, from a French submarine cave at 15-20m depth,

captures shrimp-like crustaceans to 10mm in length using filaments covered in hook-like spicules (acting much like Velcro); these sponges lack canal and digestive systems; instead, individual cells migrate from throughout the sponge body to concentrate around the prey and it is digested by archaeocytes and other cells called **bacteriocytes**.

Sponges are **vulnerable** because they are stationary, bottom-dwelling and slow-growing. Key threats are being eaten, being out-competed for space, and being settled upon by other organisms. Sponge **defences** may be **physical** (in the presence of sharp or barbed skeletal spicules) but most significant are their **chemical defences**—many produce or contain a diverse and as yet largely undiscovered array of **toxins**. Most of these are either metabolic waste products, or metabolic waste products that have undergone specific modification by the sponge. Toxins may make sponges unpalatable or even lethal to eat, or can repel or even kill neighbouring organisms competing for space. Because of the extensive dilution effect of surrounding water, sponge toxins must be extremely potent to be effective. Sponges must thus be handled with great care, even beach-washed specimens. Most sponge toxins are organic compounds that are of great interest to the pharmaceutical industry. Sponges which do not produce toxins use other strategies to survive—they often exhibit faster healing rates following damage.

Despite their defences, sponges do have a number of **predators**. Molluscs such as certain chitons, limpets, cowries and nudibranchs feed on sponges and utilise their toxins for their own defence, sometimes even passing them to their egg ribbons. Many nudibranchs in particular mimic the colour and form of the sponges on which they live and feed. Other predators include certain polychaete worms, alpheid shrimps, brittle stars, fish such as leatherjackets, boxfishes, pufferfishes, wrasse and parrotfishes) and green & leatherback turtles.

The nudibranch *Noumea verconis* on its food sponge, *Aplysilla rosea*. Aireys Inlet, 5/2/2014. Photo: P. Vafiadis

Ventral view of *Dromia wilsoni* with camouflage sponge on the carapace. Pt. Lillias, 5/4/2014. Photo: P. Vafiadis

Sponges provide **substrate** and **protection** for algae, hydroids, bryozoa, octocorals, crustacea and fish. Some have **symbiotic relationships** with other animals, providing them with camouflage or chemical protection in exchange for being transported to areas of high water flow or food availability. Examples include: the doughboy scallop *Mimachlamys asperrimus*, whose valves are externally covered in living sponge (commonly *Crella* sp); some ascidians, which are coated with a thin layer of living sponge; and crabs such as *Dromia wilsoni* which are perfectly camouflaged by holding living sponge to their carapaces. Some sponges have intracellular cyanobacteria which can nutritionally supplement the sponge via photosynthesis.

Sponges have long held a **commercial interest.** They have been harvested for thousand of years for use as bath sponges. Today the greatest interest lies in their potential **pharmaceutical properties**. Much of the novel chemistry of sponges is thought to be produced by the symbiotic bacteria they harbour (which can account for up to 40% of the body mass). Bioprospecting and testing of these organic compounds continues for potential applications in agriculture (to increase crop production), shipping (to prevent hull fouling) and medicine (anti-microbial and anti-cancer treatments).

In **sponge taxonomy**, the Phyllum Poriphera consists of three classes, the Demospongiae (containing 85% of living sponges), the Calcarea and the Hexactinellida. These are in turn divided into 25 orders, 127 families and about 700 genera. **Identification** of sponges is notoriously difficult because external features such as colour and body shape can vary according to local conditions. A combination of characters is thus used in order to positively identify a sponge. **Macroscopic characters** include the growth form, colour (living & ethanol-preserved), texture, surface and oscule characters (location, size, shape). **Microscopic characters** include characteristics of spicules, (type and size of **megascleres**, which are large structural spicules, and **microscleres** which are small reinforcing spicules, often of unique shape) and fibres (such as construction and mesh-shape) and the placement of both.

Images were shown of sponge growth forms and spicule types, and some common sponges of Victoria including *Mycale (Grapelia) australis, Tedania anhelans, Iotrochopsamma arbuscula, Acheliderma fistulatum, Holopsamma laminaefavosa, Suberites globosus, Spheciospongia purpurea, Spheciospongia papillosa, Fenestraspongia intertexta; Aplysilla rosea, Dendrilla cactos, Darwinella australiensis* and *Aplysina lendenfeldi.*

Lisa also noted that sponges were the first **reef builders** of the ancient seas, creating structures rivalling today's coral reefs. In the warm shallows of the Tethys Sea 160 million years ago, the early sponges had cemented calcium carbonate bases and one such reef occupied an area that is today most of modern Europe; fossil remains of it are exposed over areas from Spain to Romania and also Poland. Speculation on what wiped out these reefs includes possible ocean acidification, which is also a very contemporary problem. This led Lisa to conclude her talk with some thoughts on **sponge conservation**. Sponges are vulnerable from commercial fishing and climate change (via oceanic uptake of excess carbon dioxide and its effects on calcareous sponges). Over the last 100 years there has been a decline in commercial bath sponge harvests due to rising water temperature, rising salinity, and water quality problems. Recent studies also suggest that sponge diseases are becoming increasingly more common.

We thank Lisa for her excellent and comprehensive presentation on this important but under-studied group. This summary has been compiled directly from her powerpoint presentation and field guide (see below). The latter provides an excellent overview and beautiful photographs and line drawings of the common local species, and notes on sponge collection, preservation and preparation of spicules and histological sections for microscopy.

Reference: Goudie L, Norman M, Finn, J (2013). *Sponges.* (A Museum Victoria Guide to Marine Life). Museum Victoria, 2013.

P. Vafiadis

Definition of FNCV Membership Categories 2015

Category	Definition	Cost
Single Membership	An individual with no concession card.	**$80**
Family/Joint Membership	Up to 2 adults and 4 children living at the same address.	**$104**
Concessional/Country Membership	A holder of a Centrelink concession card, age pension, disability pension card, etc. (Must provide number). Country members are included in this category.	**$60**
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Overseas Institutions	Tertiary institutions and university libraries not within Australia.	**$172**
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Exchange	This category includes organisations with which we exchange publications .	
Free List	People who receive our publications free of charge.	
Honorary Member	Members who have given long and significant service to the club.	

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