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Biodiversity and Diplomacy on the High Seas: Ex Anambas 2002

An international expedition explores the biodiversity of the Anambas and Natuna island groups.

On 11th March 2002, the pride and joy of the Indonesian research fleet, the *Baruna Jaya VIII*, was anchored off the World Trade Centre in Singapore. It was about to set sail on a scientific expedition to study the marine biodiversity of the Anambas and Natuna Island Groups located in the middle of the South China Sea. First conceived almost five years ago, it was about to become a reality! That morning, 24 marine biologists from China, Indonesia, Malaysia, Philippines, Singapore, Taiwan, Thailand, and Vietnam bundled aboard a ton of luggage and equipment!

It was a historic occasion, being the first scientific effort in more than a century to explore these islands! More significantly, it was an expedition wholly planned and executed by the countries surrounding the South China Sea! Oddly enough, the expedition had its roots in politics, not science. Prof Hasjim Djalal, then Ambassador-at-large of Indonesia and the Director of Pusat Studi, is a central figure in an informal political process called "The Workshop on Managing Potential Conflicts in the South China Sea".


Expedition ship, Baruna Jaya VIII, anchored off Teluk Jebung

The expedition was an initiative of the workshop to promote regional scientific cooperation, termed in foreign affairs as 'a confidence building measure'.

Prof Djalal ensured it became a reality by coordinating the monetary and manpower contributions from various foreign ministries, whilst requesting the assistance in the scientific, logistics and planning aspects from the Raffles Museum of Biodiversity Research and Indonesian Institute of Sciences (LIPI). The result came to be known as "Ex Anambas".

Too many islands, too little time

With just 10 short days available to us, we conducted careful analysis everyday with the ship's captain to seek out the best sites. Multi-national teams were despatched by zodiacs to survey and collect the fauna of beaches, rocky shores, mangroves, coral reefs and even adjacent inland streams. In this short time, we dived, snorkeled, waded deep into mud and streams, seined, used line fishing, grabbed with our bare hands, trawled at night, etc. with bone-aching intensity, and threw in a visit to the major fish market! All in all, we managed to sample some 60 sites within the Anambas and Natuna island groups.

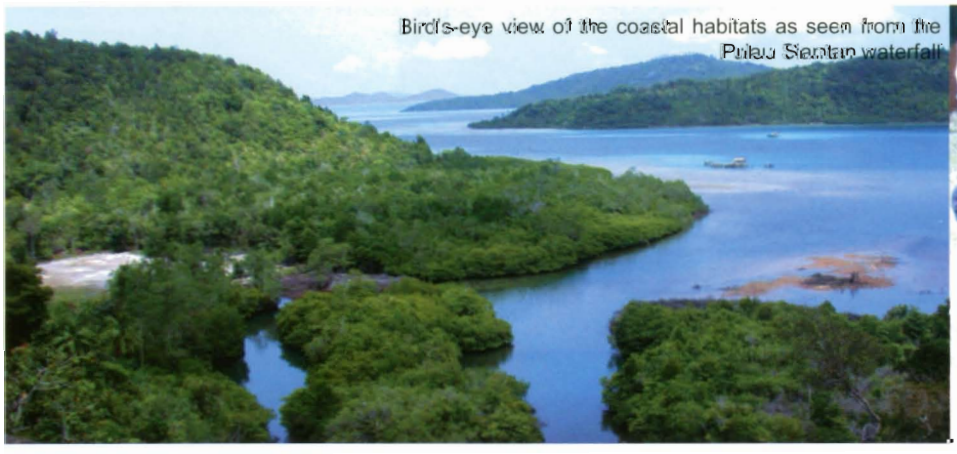
Some secrets and some luck

The ship's deck was soon awash with a fascinating array of seastars, urchins, fish of all sorts of shapes and colours, crabs, prawns, worms, sea cucumbers, squids and seahorses! We must have sorted, washed, preserved and catalogued over 3,000 specimens.

During the expedition itself, specialists realized that some of the species of fish, crustaceans and mollusks collected were new to science! Exciting news and imagine this - the complete post-expedition analysis will take some two years to complete - what gems will be uncovered then?! We were often lucky in more ways than one - late one night, a trawl pulled up a tiny but beautiful blue-ring octopus which we examined. Next morning, Anuwat Nateewathanam of Thailand, our cephalopod expert, declared that not only was the tiny creature a new species, its bite could have killed us within hours!

Sleep is a luxury

We were usually sleep deprived from sorting and photographing specimens or planning late into the early hours of the


Birds-eye view of the coastal habitats as seen from the Pulau Siantan waterfall


Turtle rescue at Pulau Laut


Teams about to embark on a survey

morning, but the *Baruna Jaya VIII* was a wonderful ship to be on board – it had an excellent lodging and lab facilities (even a laundry service!) and extremely enjoyable food!

One of the Philippines scientists, Miledel Quibilan or "Megs", an experienced voyager, leaned over and warned me one evening that such luxurious conditions were not common place during most expeditions!

The 'market raid'

Early one morning, the ship dropped anchor off Tarempa Bay, home of the biggest wet market in the islands. A gold mine of marine life from nearby islands was on sale and within easy reach! But we had just fallen into an exhausted sleep hours earlier. Unfortunately, we had earlier explained the importance of the 'market raiding expedition' to Mr. Satria Djambek, the Indonesian foreign ministry official assisting the expedition. Regaled by tales of the early morning raids of such precision and speed, 'Pak Djambek' enthusiastically pounded our cabin doors in the darkness! We groaned, but some of us struggled up and later bought one example of each and every fish that looked different in record time! A close examination later saw half the purchase rejected by the fish experts (common species), but the ship's cook was happy by the present of fresh fish for his kitchen!

Dynamite and pirates

The beautiful islands did reveal evidence of dynamite fishing on several reefs, no signs of replanting in degraded coastal habitats, and a fish trade supplying boats from East Asia that could strip the reefs of larger fish. Piracy by sea faring people in some areas was a worry, and Captain Lettu Muddan, the Indonesian Navy officer attached to the expedition, discussed this issue with the local village headmen in each site. He would report the details to senior officers in Jakarta.

It's a small world

In what we thought was a remote village, we met local inhabitants who could speak Vietnamese! An abandoned refugee boat that had run aground nearby explained it all. Nguyen Van Nguyen, one of our Vietnamese scientists, was visibly moved. As a child in the 1970s, he had seen his people leaving for the inky darkness of the sea, never coming back. As they ventured through the South China Sea, some boats had even reached the Anambas islands! They had stayed long enough before resettlement, sharing homes, and the local islanders had picked up their language! Most of the 'boat people' who made it that far were eventually resettled in Europe and America.

Luck of the innocent

On another remote beach on a blazing hot day, a large turtle was caught by its neck in a wooden fence close to land. It would be hours before the sea would rise again, and the heat would have killed it. By sheer luck, our coastal sampling teams chanced upon it, and the entire group kicked into action to free the creature. With the waterline now a considerable distance away, they lifted the heavy animal up, and huffed and puffed as they carried it back to the sea. That was one lucky turtle!

More on the internet

After 10 days, we were good friends and the rapport had helped us become more efficient in our work. But it was time to return! We returned to Singapore with a sizeable load: specimens, more than 1,500 digital and slide photographs, and an invaluable understanding of the biology and environmental conditions of the Anambas and Natuna islands. Little had been known previously, and now, just for starters, photographs, articles and all our sampling locations are available to all on the internet (see: http://rmbr.nus.edu.sg/exanambas/). One of the Malaysian scientists, Yusri bin Yusuf, has uploaded expedition photos to ReefBase as well (see: http://www.reefbase.org/). More to follow!

Friendship on the high seas

What better way to cooperate than to help unravel the endless secrets of the sea? Government officials agreed, and at the next meeting of the "The Workshop on Managing Potential Conflicts in the South China Sea", the group proposed a follow-up expedition in the near future. The Philippines suggested "Ex Palawan", and we eagerly await the unraveling of more secrets of the sea, and the chance to discover more friends amongst the scientists of this second South China Sea expedition!

—by N. Sivasothi

(Photos by Joelle Laï)

The Ex Anambas team says, 'Goodbye.'

TALES FROM THE CRYPT

New species of crabs and fish from Ex Anambas (March 2002)

Initial studies of the material from Ex Anambas revealed the presence of several interesting new species. One of the most dramatic was a new octopus with spectacular colours. This belongs to a group of octopuses of the genus *Haplochlaena* which have been known to kill man (they have a venomous bite)! At least three species of tiny but beautifully coloured gobies collected from the reefs are also believed to be new. Also of interest is a new species of crab of the genus *Cymo*, members of which are obligate coral symbionts.

In the islands of Anambas and Natunas, due to their rugged geography, freshwater streams and waterfalls often cascade very close to the seashore. Peripheral surveys in these nearshore systems also revealed several new species of crabs and fish. All these species are currently being described by regional scientists participating in Ex Anambas, and their names and descriptions will be formally published as part of a report on the scientific results of the Anambas expedition in 2004.

—Darren Yeo & Peter K. L. Ng

Photo: P.H. Ho

A new species of marine crab (genus *Cymo*) from the family Xanthidae discovered during Ex Anambas

New Gobies
(Photos: I.S. Chen)

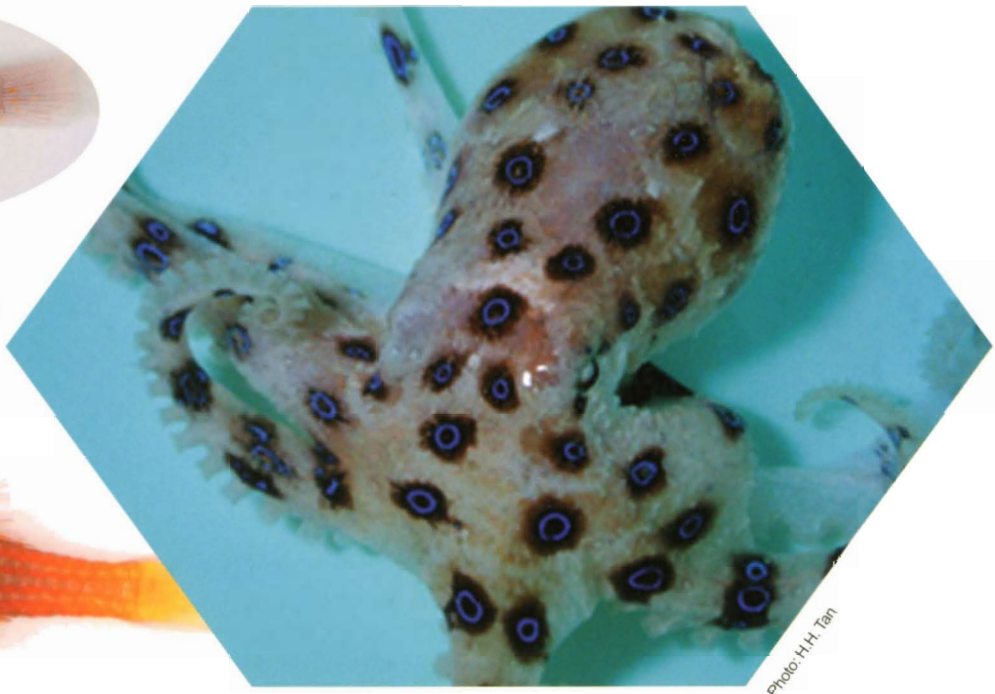


Photo: H.H. Tan

Blue-ring Octopus

The oldest plant specimen preserved at SINU Herbarium, Raffles Museum of Biodiversity Research (RMBR)

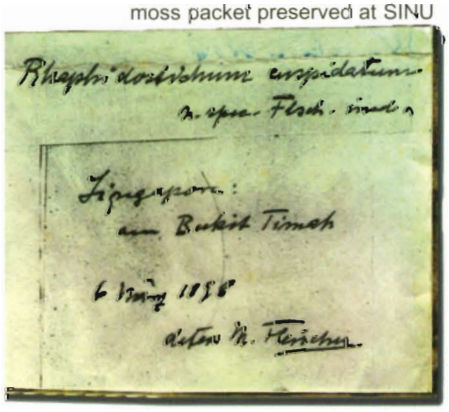
At SINU Herbarium, a duplicate moss specimen collected from Bukit Timah on 6th May 1898 by M. Fleischer easily became the oldest plant specimen preserved on campus.

The collector, Mr. M. Flesicher, was a famous Dutch bryologist a century ago who is the author of the classic moss flora of Java entitled "*Die Musci der Flora von Buitenzorg*". He was employed at the time to do portrait painting in Java by the Dutch colonial government. Because of this assignment, Fleischer had commuted between Europe and Indonesia with stop by in Singapore. Apparently while in Singapore, he had collected mosses from the Bukit Timah forest.

The old packet of moss bears the handwriting of Fleischer indicating the locality, collector, date of collection, and a provisional name for the moss specimen as "*Rhaphidostichum cuspidatum, n. spec. Fleisch., ined.*" True enough, the moss specimen represents a hitherto unknown new species which will soon be described officially in a botanical journal. What is more amazing is our discovery of living populations of this new species in Bukit Timah Nature Reserve today. This means that the Bukit Timah forest, in spite of experiencing a century of disturbances, still serves well as a refuge for many plant species, described or unknown.

—Benito C. Tan

A facsimile of the label of the oldest moss packet preserved at SINU



PROFILE

Jeffrey Low, a former marine biology student from NUS, won The Nature Society (Singapore)/Tan Teck Guan Gold Medal recently. The award, which was inaugurated in 1992, is given out every year to the best higher degree thesis related to nature conservation or environmental protection/improvement from selected tertiary institutions in Singapore. Jeffrey, who received his Masters of Science in 1999, has had a varied career, having been a research Assistant with NUS for 10 years, a freelance dive instructor and more recently, a writer. He is now working for the National Parks Board as a Senior Research Officer with the Nature Conservation Branch. He is also involved in setting up an alumni for the volunteers of the Youth Expeditions Project (YEP) under the Singapore International Foundation. He is the Vice-President of the alumni and Programme Co-ordinator for its Marine Conservation Projects. He tells us more about the recent happenings in his life and his plans for the future.

Q: *How do you feel about winning the award?*
A: I am, of course, glad to have won the award (besides, it looks good on my resume!) However, I can't help but lament the fact that there aren't many people these days who are working on conservation-related topics. I wouldn't be surprised to learn that all of the award winners over the next few years know each other.

Q: *Can you tell us about the thesis that won you the award?*
A: The title of my thesis was "Artificial reefs as a marine resource enhancement tool". Basically, I tracked the development of fish communities and other marine organisms on two artificial reefs. One reef was constructed of tyres and the other of concrete. The reefs were set down in 1989 in one of the regional projects (US-AID Coastal Resources Management Project). I found that the reefs did "change" the environment - the fish communities that developed were unlike the nearby reef ones, and there was a lot of other benthic and sessile organisms that made use of the hard surfaces to attach themselves.

Q: *Is winning the award the most significant thing that has happened to you recently?*
A: You can say that. The other significant thing that happened to me was helping Professor Chou Loke Meng from the Department of Biological Sciences in the completion of a draft for a book on the Marine Parks of Indonesia. This project took place in October 1999 (around the time I was conferred my MSc) when we toured the marine parks of Indonesia. Besides helping out in the research for the book, I was also one of the photographers for the two-month trip. Now that the text is done, I will be helping the layout artists to manage the photo library.

Q: *You came back from the Philippines recently. What were you doing there?*
A: It was supposed to be a dive holiday ... but I ended up taking underwater photos and looking for materials to write about diving in the Philippines. The Philippines is an under-exploited destination, at least for the Singapore diving community.

Q: *What are your plans?*
A: I was lucky enough to get a job with the National Parks Board, in the Nature Conservation Branch. I've only been at it since 2 Jan 2003, but it seems like there's a lot of work to do already. Since NParks is the scientific advisory to the government, we have to be on our toes to tackle conservation issues within the government agencies. I am also setting plans in motion to develop local projects on marine conservation through the Youth Expeditions Project alumni. Prof Chou is also the advisor to the alumni, so it's no problem for me to synergise with the research work going on at his lab. That way, we will be able to maximise our resources. I would like to continue with my underwater photography, and who knows? Maybe I'll even apply to do my PhD in this lifetime!

Q: *Do you have time for all your activities?*
A: No! ... But like they say in a song, "I'll sleep when I'm dead", although I do sleep a lot anyway. Right now, there's a "resistance" when you try to get a project off the ground, especially when you are working with volunteers who also have other jobs to tend to. There are so many things to sort out. But I hope that once the projects start, things will get carried through by the enthusiasm of the volunteers.

—Lea Wee

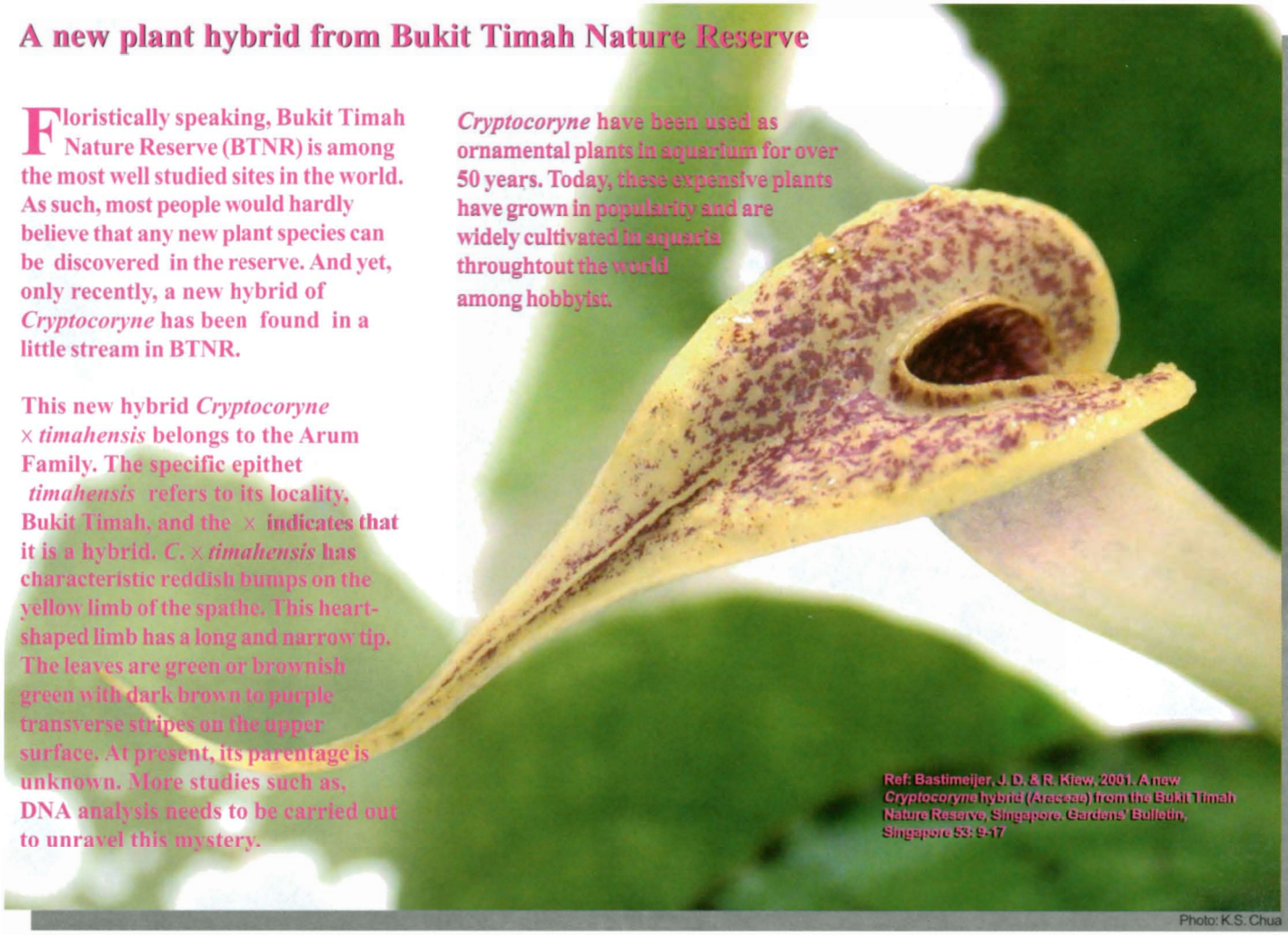
NEW DISCOVERIES

A new plant hybrid from Bukit Timah Nature Reserve

Floristically speaking, Bukit Timah Nature Reserve (BTNR) is among the most well studied sites in the world. As such, most people would hardly believe that any new plant species can be discovered in the reserve. And yet, only recently, a new hybrid of *Cryptocoryne* has been found in a little stream in BTNR.

This new hybrid *Cryptocoryne* × *timahensis* belongs to the Arum Family. The specific epithet *timahensis* refers to its locality, Bukit Timah, and the × indicates that it is a hybrid. *C.* × *timahensis* has characteristic reddish bumps on the yellow limb of the spathe. This heart-shaped limb has a long and narrow tip. The leaves are green or brownish green with dark brown to purple transverse stripes on the upper surface. At present, its parentage is unknown. More studies such as, DNA analysis needs to be carried out to unravel this mystery.

Cryptocoryne have been used as ornamental plants in aquarium for over 50 years. Today, these expensive plants have grown in popularity and are widely cultivated in aquaria throughtout the world among hobbyist.



Ref: Bastimeijer, J. D. & R. Kiew, 2001. A new *Cryptocoryne* hybrid (Araceae) from the Bukit Timah Nature Reserve, Singapore. Gardens' Bulletin, Singapore 53: 9-17

Photo: K.S. Chua

Lim Chu Kang mangrove mudflat habitat of *Ngirhaphium murphyi*

New flies from Singapore

Forty-four species of flies from the family Dolichopodidae (Order Diptera) are now known from Singapore. This was reported by entomologists, Neal Evenhuis and Patrick Grootaert, who recently published an annotated checklist of dolichopodid flies of Singapore.

In their report, 28 of the 44 species were recorded from Singapore for the first time (known as new records).

A new genus and several new species of flies from Singapore were also described in the report. One new fly was named *Ngirhaphium murphyi*, in honour of two well-known local biodiversity researchers, Peter K. L. Ng and D. H. Murphy.

Ref: Evenhuis, N. L. & P. Grootaert, 2002. Annotated checklist of the Dolichopodidae (Diptera) of Singapore, with descriptions of a new genus and new species. Raffles Bulletin of Zoology, 50(2): 301-316

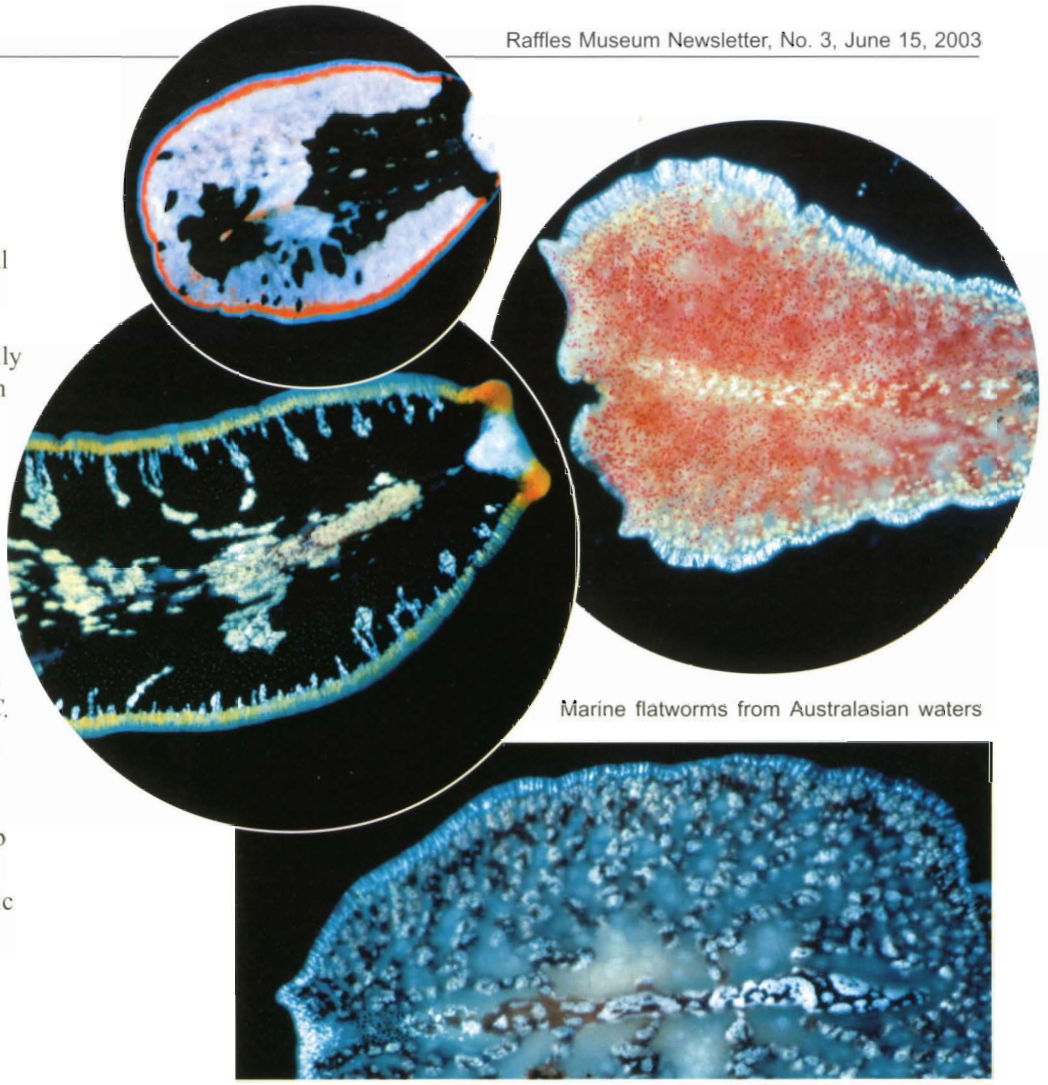
New flatworms from Australasian waters

Polyclad flatworms (Phylum Platyhelmintes) are small, colourful invertebrates found in tropical seas.

They can be difficult to spot, especially in coral reefs, where they blend in with the rich colours and patterns of the reef, and it takes a trained and experienced eye to locate them. They are also a very diverse group.

Recently, two Australian scientists, Leslie Newman and Lester Cannon, described eight new species from the genus *Cyclosporus* from Australasian waters: *C. albofasciatus, C. atratus, C. guttatus, C. harlequin, C. reticulatus, C. spiritus, C. venetus, and C. xanthopuntatus*. All are fairly small, with the largest reaching lengths of up to 20mm. The colours and colour patterns are some of the key diagnostic characters for these species.

Ref: Newman, L. J. & L. R. G. Cannon, 2001. The genus *Cycloporus* (Platyhelminthes: Polycladida) from Australasian waters. Raffles Bulletin of Zoology, 50(2): 287-299



Marine flatworms from Australasian waters

An extraordinary conifer from Vietnam

Deep in the remote mountains of northern Vietnam, an international team of scientists from United Kingdom, Vietnam, Russia and United States has found a new species of conifer that, according to its discoverers, represents a missing link between the true cypresses (*Cupressus*) and the false cypresses (*Chamaecyparis*). This new species of conifer, *Xanthocyparis vietnamensis*, is a relic of an ancient forest left after the last ice age.

This unique population of *X. vietnamensis* is confined to limestone ridges in the high mountains. The mature tree of this small conifer displays rather peculiar foliage, having both needle and scale leaves growing on the same tree. Its timber is fragrant and is highly sought after by the locals for making coffins and building shrines.

Although new to science, the species is already highly endangered with only a few semi-matured and coppiced members found. Efforts have been made to establish the mountain habitat, where this species is confined, into a conservation area.

Ref: Royal Botanic Gardens, Kew. 2001. Kew scientists involved in the discovery of new conifer in remote forests of northern Vietnam. (2002, April 9, Press release) < http://www.rbgkew.org.uk/press/newconifer.html >.

Fruiting branch of the golden Vietnamese cypress, *X. vietnamensis*

FEATURE

Raffles Museum Workshop on Techniques of Preparation of Biological Specimens for School Teachers

"How do I preserve an insect, a fish, a crab, a mollusc, or a stalk of flower so that the specimens will have scientific value?" —"Where can I go to collect specimens needed for teaching?" —"What kind of field data do I record for a voucher specimen used in the school project?"

These are the frequently asked questions the curatorial staff at Raffles Museum for Biodiversity Research (RMBR) received over the years. As a public service and in response to requests from many school teachers, RMBR offered a special workshop at the NUS campus on the techniques of preparation of biological specimens for use in teaching and school display on October 19 and 26, 2002. A total of 148 teachers from 33 primary, 44 secondary and 3 tertiary schools in two large groups attended the two Saturday morning workshop sessions.

During the workshop, the participants were shown different simple and inexpensive techniques used for preserving various organisms by the curators and scientific officers of RMBR. As this was a hands-on workshop, the participants were provided with ample fresh specimens of crickets, grasshoppers, fish, crabs, snails and plants to practise their newly acquired skills. There was a lively discussion and exchange of teaching experience at the end of the workshop.

It was a rewarding day for the many teacher participants as they were each awarded with a Certificate of Participation and presented with a memorable souvenir —their own nicely prepared and preserved specimens— to take home.

—Chua Keng Soon & Benito C. Tan
(Photos by N. Sivasothi)

Museum curator, Mr K. L. Yeo, showing the teachers how crabs are preserved (top); a participant injecting a crab with fixative before mounting the specimen (above)

The teachers were engaged in a discussion with museum curator, Ms H. K. Lua (below); a teacher learning to mount a fish specimen (bottom)

More RMBR Workshops are being planned!

In response to feedback, at least two workshops each on the following topics are being planned for 2003/4:

- **Guide to Specimen Preservation (half-day)**
- **Guide to conducting field trips to habitats in Singapore (1 day)**

These workshops will be open to teachers, who may also sign up their lab technicians or senior students. It will also be open to relevant agencies, and to other interested individuals as well.

A brochure will be sent out in August 2003 and updates will be available at http://rmbr.nus.edu.sg/education/ For enquiries or to be kept updated, please email: greasi@nus.edu.sg

THE NEW EXPLORERS

RMBR Expeditions to Mt. Wuyi Nature Reserve and marine areas in Xiamen, Fujian Province, China

Professor Li examining a bed of mosses at the summit of Wuyi Shan mountain

Under the bilateral joint research program arrangement between the School of Life Sciences (SLS) at Xiamen University and the Department of Biological Sciences (DBS) at NUS, the RMBR conducted a botanical expedition to Mt. Wuyi Nature Reserve and vicinity from Oct 2 to 7 in search of cryptogams or spore producing plants that may be used as indicator species for environmental monitoring. The RMBR team consisted of A/P Benito Tan and the herbarium plant curator. Mr. Chua Keng Soon, while the Xiamen University was represented by Professor Li Zheng-Ji.

The initial survey shows that Mt. Wuyi and nearby places still have a rich cryptogamic flora. There is an apparent change of species composition along the altitudinal gradients from lowland evergreen broad-leaf forest to mixed conifer-deciduous forest, grassland and elfin forests at the summit, as well as between the pristine forest and disturbed vegetation along the roads and around the touristy sites. The expedition collected some 150 specimens of Chinese plant species for the SINU herbarium. At the end of the expedition, the visitors were taken to the Jimei suburb of Xiamen to pay a visit to the mausoleum and birthplace of Mr. Tan Kah Kee, the famous Singaporean philantropist of the last century.

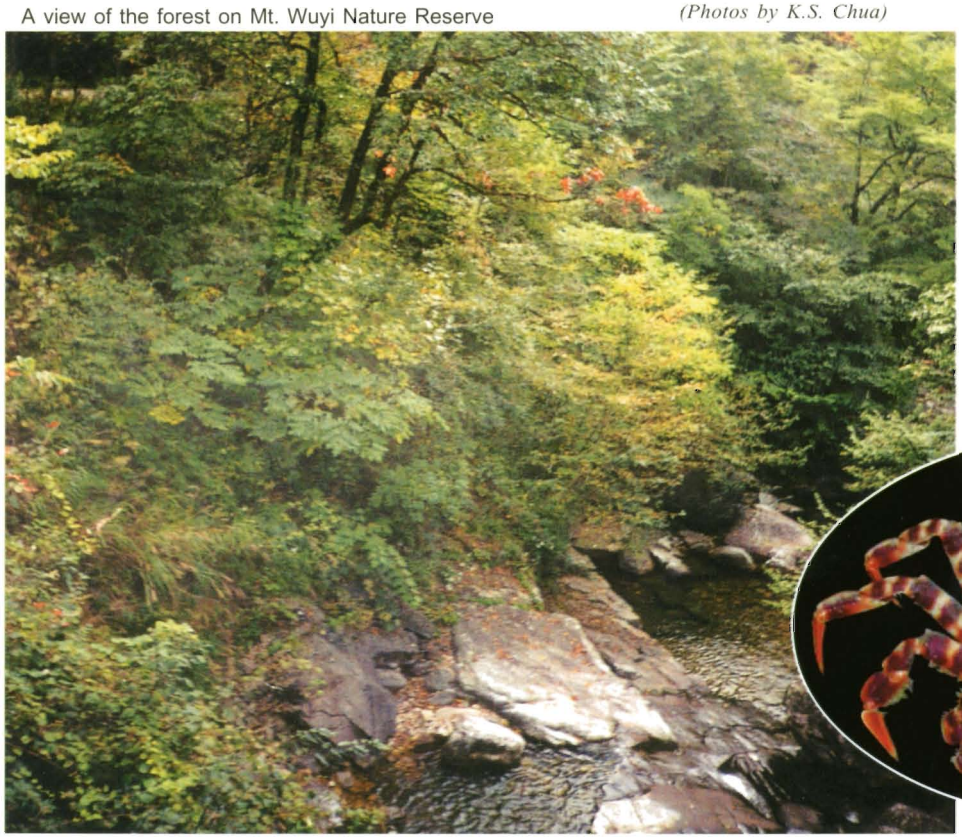
Tan Kah Kee Memorial in Xiamen, Fujian

Under the same bilateral program, preliminary surveys were also conducted at some marine and mangrove sites in Xiamen and vicinity by other Xiamen University and RMBR staff (together with the Fujian Oceanological Institute). Discussion was made for a possible future expedition to areas identified to have a rich marine biology heritage due to the many discoveries made in the 1920s and 1930s by the works of staff of the Xiamen University in collaboration with institutions worldwide. Of course, Xiamen was then known as Amoy.

—Benito C. Tan & Peter K. L. Ng

(Photos by K.S. Chua)

A view of the forest on Mt. Wuyi Nature Reserve



Orithyia sinica— the Tiger-Faced Crab, one of the beautiful and edible crabs endemic to the region

(Photo: Peter K.L. Ng)

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Editors: Chua Keng Soon, N Sivasothi & Darren Yeo. For more information on these and many other stories, see our webpage at *http://rmbr.nus.edu.sg/newsletter*