



# RAFFLES MUSEUM NEWSLETTER

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## International Coastal Cleanup Singapore (Mangrove)

The International Coastal Cleanup (ICC) is the largest marine pollution cleanup effort in the world, involving over 1 million volunteers in more than 100 countries. The Raffles Museum led the Mangrove Section of the ICC Singapore in 2001, and we worked the Kranji as well as the Buloh mangroves for the first time in the five-year history of the programme.

From July to September 2001, more than 11 "recce" trips were conducted by museum staff and volunteers to prepare the operational procedure for the exercise,

the communications network (with the help of the Singapore Amateur Radio Transmitting Society), safety plans and routes, guide training, etc. It helped that we had been conducting research and studies in the mangroves there for 10 years or more!

A briefing session in NUS explained to participants the surprising biodiversity of Singapore and the rationale and operational details of the cleanup. Participants were then guided and quizzed at Sungei Buloh Nature Park to introduce to them the depth and beauty of our mangrove ecosystem. The cleanup itself was conducted on 8th September 2001. More than



300 students arrived early that morning, from Catholic High, Commonwealth Secondary School's Girl Guides, St. Andrew's Junior College, Tao Nan Marlin Sea Scouts, Singapore American School, Middle School and SAVE, Temasek Junior College, Victoria Junior College, Woodlands Ring Secondary School and Yusof Ishak Secondary School.



The briefing session for guides before the operations began

Crossing a stream at low tide



The day started with “dry ops” - students battling through some very soft mud to reach their site. For many, it was their first taste of the mangroves so the expedition was accompanied with a lot of screaming! Museum volunteers and student leaders who had attended the relevant “recce” trips helped guide them to their sites.

The groups set to work at their pre-arranged quadrats, collecting trash while data recorders took note of the type and number of debris collected. Strong young students (“loaders”) transferred the filled trash bags to a collection site where bags were weighed before being stacked.

In just 90 minutes, the marine debris collection was halted. There was enough trash there to supply 10 years of cleanups, so we were taking it slow. And as part of the programme to expose the students to new challenges, they discovered how fast the tide rises, for the muddy channel they had crossed earlier had been filled by the rising and orange-capped guides on either side in the water, students

were treated to the excitement of a river crossing!

At Sungei Buloh Nature Park, they reported to the Data Manager, and then washed, dried, and fed hungrily on pizza sponsored by the Nature Society (Singapore).

Meanwhile, the afternoon high tide operation (“wet ops”) began - Tao Nan Marlin Sea Scouts and volunteer sailors from Raffles Marina transferred the accumulated marine debris to Kranji Reservoir Park. Dry ops guides had rushed back to help out and were wrestling trash bags onto boats and canoes. The bags broke under their load, so the guides struggled to re-bag the trash on the spot as the tide kept rising - exhausting work!

At the unloading point, primary school scouts from Tao Nan scrambled over boats and trans-

ferred the trash to the disposal point near the road. The shore line team would join them later and some of the wheelbarrows even broke down under the load! Three tonnes in all, which ENV’s Western Environment Health District Office and Altvater Jakob Pte. Ltd. coordinated in hauling away at the end of the day.

Once the result had been collated, it was uploaded onto the website at <http://mangrove.nus.edu.sg/iccs> on the very same day! A new record in the 10-year history of the cleanup in Singapore! The preliminary results immediately revealed the sober news that 90% of the 2.7 tonnes of marine debris collected was plastic, which lasts for years in the ocean.

The data report was submitted to the global coordinator at the Centre for Marine Conservation in Washington, United States of America. Analysed data is used to raise legislative issues at the United Nations, and at the national level in various countries to promote public awareness and education programmes.

The ultimate goal of the cleanup is to reduce marine debris and enhance marine conservation by eliminating pollution by people and industries in the first place. That will take a very long time, but with little steps such as these, we will get there!

-N. Sivasothi



Data recorder and collector clearing rubbish



River crossing at high tide



## TALES FROM THE CRYPT

### The Body-snatchers

Once in a while, our forests and seas reveal their hidden animal secrets to our great surprise and dismay. For when we do witness the surprises, it is usually animals which turn up dead, as a result of roadkill, injury or old age.

The body is still important - it is an important record of the species' continued presence in Singapore, and fresh specimens provide clues about diet from stomach contents. DNA is also easily extracted from fresh internal organs. All important in conservation work, we do try our best to retrieve these carcasses.

Getting the carcass can be tricky! Though I once reached the scene of roadkill at Adam Road within an hour of the phone call, the pangolin (a scaly anteater) had disappeared! Ex-graduate student Alvin Wong once separated the head of a dead

dugong at Changi beach, toiling in the rain. Too smelly for the car, he hid the head for retrieval later. It too disappeared! Both occasions, workers from the Ministry of the Environment (ENV) had cleaned up the scene by early morning.

In recent years, we publicised the need to retrieve such dead animals through our electronic newsletter *Habitatnews*, ensured that we were better prepared when retrieving bodies, and got the help of volunteers and the ENV or NParks unit in charge of the area. And the group of us who do this call ourselves "the Bodysnatchers"!

The year 2001 saw more bodies recovered. A rare leopard cat roadkill was recovered (June) - the first such incident in more than 30 years, three beautiful, migratory Blue-winged Pittas which mistook glass panes for the sky and bashed their heads against the hard glass (October), we extracted a dugong

skull from a 5-day old rotting carcass off East Coast (July) and a fresh young pangolin roadkill was collected off Jalan Bahar (November).

Singapore is full of surprising wildlife, and when you encounter a wild animal that has met with an untimely demise, call us at the museum at 6874-5082 and fill in the roadkill report at the webpage. We'll try to convert that specimen into a valuable record. It will remain within the museum of RMBR for a long time. Having lasted more than 150 years, that's not an idle promise!

Once in a while, we get pleasant news. I received a call about a live pangolin wandering in a friend's garden. I contacted one of our *Bodysnatchers* in NParks, Benjamin Lee. He retrieved the animal and it was released back into its forest home!

-N. Sivasothi



## PROFILE

**T**an Heok Hui's love affair with fishes started when he was a kid. From aquarium fish, he went on to collect wild fishes in streams around Singapore and the region. In 1995, he completed his honours thesis on fighting fishes (see box below). And for the last six years, the zoologist, who is pursuing his doctorate at the NUS, has been studying a unique freshwater fish living in fast-flowing waters of Borneo, commonly known as the Borneo sucker or *Gastromyzon*.

When asked about his current choice of research, he deadpans: "Well, it takes a big sucker to study a small sucker."



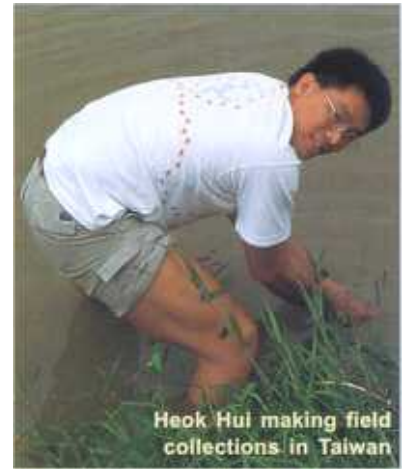
*Gastromyzon* (dorsal view)

But on a more serious note, he explains that these fishes, which have a distinctive ventral suction disc formed by modified fins, are still poorly known. The suction disc allows Borneo suckers to stay firmly attached to rocks or crawl along the bottoms of fast-moving waters, making them difficult to collect. This task was made easier by various simple tricks taught to Heok Hui by local fishermen during his field trips.

It is a chance to learn from the locals and other cultures that make field trips so fun, says Heok Hui. On one memorable trip to the Kayan Basin at East Kalimantan in 1999, he stayed with a Christian farming-cum-hunting gathering community. "They still cook with firewood, and either boil or steam their food. Sugar and coffee are considered luxury items. We had two meals a day, and by the time I had to come back, I had lost 5 kg!"

In 2000, he went to the headwaters of the Red River, Mekong, Yangtze, Irrawaddy and Salween basins in southern China. He says, "we had a wonderful time collecting fishes, but at the same time, it was somewhat of a culture shock, because the hygiene conditions were not very good, and I had a bit of food poisoning." But he was none the worse for the experience. "It's trips like these that make you count your blessings and kiss your toilet bowl," he says.

-Lea Wee



Heok Hui making field collections in Taiwan



A typical habitat of the Borneo suckers in Kalimantan

**Fighting fishes** - Fighting fishes (genus *Betta*) are one of the most speciose groups of fishes in SE Asia, the best known species being the Siamese Fighting Fish (*Betta splendens*). In 1990, 24 species were known. From Heok Hui's studies, we now know that many more species exist. He was responsible for discovering several new species! Fighting fishes are amazing. They breathe air, and can live in pools with poorly oxygenated water! The male fish takes care of the young, with some species even brooding the eggs and babies in the mouth! Many researchers are now studying their biology, adaptations and evolution.



*Betta simorum* - a large species from Sumatra described by Heok Hui and his supervisor in 1996

*Betta livida* - a small but brightly coloured species found in the peat swamps of North Selangor



## NEW DISCOVERIES

### A new giant river carp

In the angling world, the Indian mahseer (genus *Tor*) is renowned as a fighter. Growing to a metre in length, many species of these large river carps are found in Asia.

In Malaysia, they are known as Kelah and are popular with anglers and fishing enthusiasts.

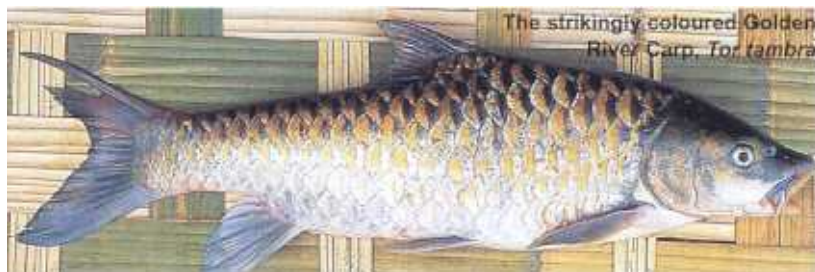
Recently, American ichthyologist Tyson Roberts reported a large and almost black species from Laos, which he appropriately named

*Tor ater* (for its dark colour). This is in sharp contrast to more colourful species like the Golden and Chinese river carps.

Like many large riverine fishes in the region, they are threatened by water pollution, dams which cut off

their movements and use of unsustainable fishing methods (like with poison).

Ref: Roberts, T. R., 1999. Fishes of the cyprinid genus *Tor* in the Nam Theun Watershed (Mekong Basin) of Laos, with description of a new species. *Raffles Bull. Zool.*, 47: 225-236.



### New land crab

Land crabs (Family Gecarcinidae) are important components of many tropical island ecosystems. This group of relatively large crabs is well studied, and also is also a regular feature in the diet of locals where they occur.

The recent discovery of a previously unknown species from coastal caves in Philippines came as a bit of a surprise to some, including the scientists who reported on the new species, Peter Ng and Danièle Guinot. The new species is called *Discoplax gracilipes*, alluding to its long, slender walking legs.



Ref: Ng, KL Peter & Danièle Guinot, 2001. On the land crabs of the genus *Discoplax* A. Milne Edwards, 1867 (Crustacea: Decapoda: Brachyura: Gecarcinidae),

with description of a new cavernicolous species from the Philippines. *Raffles Bull. Zool.*, 49: 311-338.

## Frogs galore

The wet forests of Southeast Asia abound in frogs. The discovery of new species is thus not surprising. Just two years ago, Rob Stuebing (Chicago Field Museum) and Anna Wong (Sabah Museum) described a new species of tree frog, *Philautus erythrophthalmus* (appropriately named the “red-eyed one”), from a 1500 m high mountain in Sabah.

At about the same time, Australian herpetologist Stephen Richards and his Indonesian counterpart, Djoko Iskandar, reported on a new but extremely small frog, measuring only 11.5 mm in length, from the mountains of Indonesian Irian Jaya! Naming it *Oreophryne minuta*, the species is known only from a 2000 m high mountain thus far!

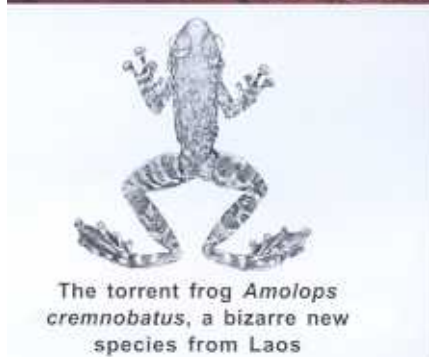
In 1999, renowned American herpetologist Bob Inger discovered that a odd-looking frog collected by Swiss ichthyologist Maurice Kottelat from an isolated waterfall in Laos belonged to a new species of with numerous special adaptations (such as suction-tipped fingers) for living in such a hostile habitat! To get the torrent frog,

Kottelat had to inch along the face of the waterfall with its smooth boulders and thundering water, risking life and limb. Together, they named the newly discovered species *Amolops cremnobatus*, its specific epithet meaning “frequenter of steep places”!

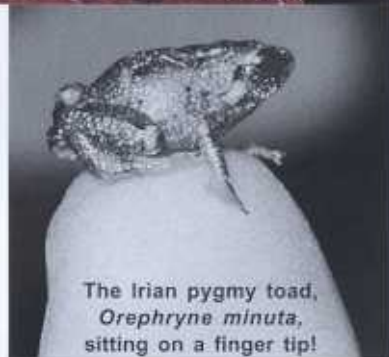
Refs: Inger, RF & M Kottelat, 1999. A new species of ranid frog from Laos. Raffles Bull. Zool., 46: 29-34. Richards, S & D Iskandar, 2000. A new minute *Oreophryne* (Anura: Microhylidae) from the mountains of Irian Jaya, Indonesia. Raffles Bull. Zool., 48: 257-262. Stuebing, RB & A Wong, 2000. A new species of frog, *Philautus erythrophthalmus* (Rhacophoridae) from southwestern Sabah, Malaysia. Raffles Bull. Zool., 48: 293-296.



The beautiful red-eyed tree frog, *Philautus erythrophthalmus* from Sabah.



The torrent frog *Amolops cremnobatus*, a bizarre new species from Laos



The Irian pygmy toad, *Oreophryne minuta*, sitting on a finger tip!

## New snapping shrimps

While walking along an exposed rocky shoreline at low tide, one can often hear characteristic snapping sounds. These are produced by snapping shrimps (also known as pistol shrimps) of the family Alpheidae using a specially modified enlarged claw. Snapping shrimps are one of the most prominent groups of crustaceans, and can be found in numerous other habitats as well, including coral reefs, mangroves and even freshwaters.

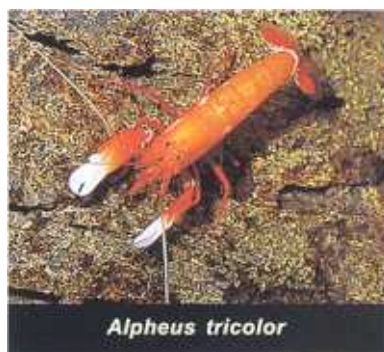
Taxonomic studies of snapping shrimps are notoriously difficult, with very little separating many

cryptic or sibling species, resulting in live coloration being relied on as the only easy way to distinguish species. An example of this is seen in the recent description of two new species, *Alpheus tricolor* and *Alpheus fasqueli*, from Indonesia and Sri Lanka, respectively, by Arthur Anker (Paris Museum). Both species are closely related, with only very slight morphological differences separating them. However, their unique colours and colour patterns sets them apart from each other as well as from all other known snapping shrimp.

Ref: Anker, A, 2001. Two new species of snapping shrimps from the Indo-Pacific, with remarks on colour patterns and sibling species in Alpheidae (Crustacea: Caridea). Raffles Bull. Zool., 49: 57-72.



*Alpheus fasqueli*



*Alpheus tricolor*



## FEATURE

### Fabulous ferns and fern allies of Gunung Pulai, Johor, Malaysia

Gunung Pulai Forest Reserve, situated 45km to the north of Johor Bahru, is an 8-hectare protected forest reserve, and was a water catchment area for Singapore in the recent past. The summit of this mountain is about 654 m above sea level. Unlike some of the other mountains in Johor (i.e. Gunung Belumat and Gunung Pantii), few botanical studies have been carried out in Gunung Pulai. This spurred us to seek out the hidden treasures of pteridophytes in this mountain.

Pteridophytes (ferns and fern allies) are non-vascular plants whose reproduction and dispersal rely on the spores. Based on past publications, Gunung Pulai boasts roughly 73 species of teridophytes. Our studies conducted from 1999-2000 resulted in six more species.



**Grass fern (*Schizaea dichotoma*)** - This plant can be mistaken as a grass, hence, its common name-the grass fern

The pteridophytes found here include several sun-loving ferns, the Resam (*Dicranopteris linearis* and *D. curranii*), and some species of *Tectaria* and *Blechnum*. Contrastingly, there occur shade and moisture dependent species, such as members of the filmy fern family, found mostly by the riverbank. In the relatively moist areas, the fern ally, *Selaginella*

*intermedia*, forms beautiful and dense carpets on the forest floor. A species now endangered in Singapore, Bua Cek (*Dipteris conjugata*), can be seen in abundance at the edge of this forest reserve. *Taenitis dimorpha*, believed to be endemic to the Peninsular Malaysia, can be found in isolated populations in the shadier parts of this forest. Likewise, *Schizaea dichotoma*, an uncommon grass-like fern, was found growing singly along a forested path. In addition, the fascinating tree-twining fern, *Teratophyllum aculeatum*, is frequently encountered.

As Gunung Pulai is a relatively dry forest, many epiphytes encountered are in areas close to the river and waterfalls. Among them are the Tender Bird's Nest fern (*Asplenium*



*tenerum*) and the spoon shaped fern (*Anthrophyum callifolium*). Undoubtedly, due to the wide array of micro-habitats, more species of pteridophytes will be discovered with additional effort of investigation. Because of its geographical proximity to Singapore, the pteridophytes of Gunung Pulai is a good starting point for students who want to study the great diversity of the regional pteridophytic flora.

-Farida binti Yusuf & Benito C. Tan



***Teratophyllum aculeatum***  
The highly dissected juvenile leaves of the climber *Teratophyllum aculeatum* continuously change in form as the rhizome climbs up the tree trunk

**Centipede fern (*Blechnum orientale*)** - Contrary to popular belief, ferns are not always just plain green, as displayed by the juvenile plant of the centipede fern



**Peacock fern (*Selaginella wildenowii*)** - The iridescent foliage of this plant is an unbelievably brilliant blue!

## THE NEW EXPLORERS

### Freshwater fish studies in Brunei

Over the past few years, Brunei has been visited by staff and students from the Raffles Museum of Biodiversity Research, Singapore, participating in joint field work with local institutions on the diverse freshwater fish fauna there. Various habitats, including lakes, freshwater swamps and peat swamps, have been surveyed, and several new species of freshwater fishes have been identified, as a result of these studies.

During a recent visit in October 2001, we collaborated with staff of the Universiti Brunei Darussalam on a field study of Borneo suckers (genus *Gastromyzon*). These are flattened fishes that inhabit the upper reaches of river systems throughout Borneo. Their pectoral and pelvic fins form a skirt or suction disc around their abdomen, enabling the fish to cling and

manoeuvre on smooth rock surfaces without getting swept away by strong currents. They feed on algae and other organisms growing on the rocks.

From specimens obtained, morphological data will be collected, and live colour patterns and ecological observations noted. These will then be compared with congeners in the rest of Borneo. Preliminary findings from this trip indicate at least three of the five species in the Belalong area are new to science.

Their ability to cling tightly to rocks or river bottoms makes Borneo suckers difficult fishes to obtain for studies. One collecting method we tried was to set a net downstream of a bunch of rocks, and then kick the rocks to dislodge whatever fishes may be hiding there into the

net. A more gentle method involved positioning the net downstream of a rock, and running our hands over the rock to chase Borneo suckers into the net.

Another method was to quickly lift a rock out of the water and hold it over a net. If they are present, Borneo suckers will drop in.

As well as sampling, we also snorkelled in order to observe the fish's feeding and social behaviour. Despite the strong currents, we were able to view fishes that we otherwise couldn't see from above the water because they hide under rocks.

Kelvin K. P. Lim & Tan Heok Hui



*Rasbora kottelati*, a recently described species from Brunei



*Gastromyzon lepidogaster* (lateral view)

A view of Sungai Belalong from the top



Kelvin doing field work in the fast waters of Sungai Belalong

