NATURE WATCH

Official Magazine of Nature Society (Singapore)

Volume 18 No 1 Jan-Mar 2010

Featuring:

Ode to Odonata
Philippine Bird Festival
An Old-timer
Biodiversity and True Love
Cyathocalyx

NATURE SOCIETY
(SINGAPORE)
MICA (P) 085/08/2008

Message from Editor

Sometimes it is good to look back and reflect a bit on where you are coming from. You need to do that once in a while to consider where you are going. On behalf of the Nature Society (Singapore), the President of the society, Dr. Shawn Lum, did just that in the last issue of *Nature News*, March-April 2010. He specifically highlighted *Master Plan for the Conservation of Nature in Singapore* (1990) as a milestone for the society, and for nature conservation in Singapore in general. Just around that time, in February 2010, I met the Editor and Coordinator of that plan, Dr. Clive Briffett, who also happens to be the founding editor of *Nature Watch*. My report from that meeting is in this issue of the magazine; now and then funny coincidences like that occur.

Also in society matters, Ng Bee Choo reports from the 5th Philippine Bird Festival, where she and some fellow birdwatchers represented NSS. At this event, the Filipinos managed to confirm their reputation as joyful and creative people. Lately they have also developed a much-needed sense of urgency regarding bird and nature conservation matters.

Closer to home, we bring in this issue a strong composition about insects of the order Odonata, the dragonflies and damselflies of Singapore. Dr. Cheong Loong Fah, a multi-talented scientist and naturalist, coordinated this contribution; we are truly fortunate here in being able to provide the fascinating new text and captivating photos compiled by him and his co-authors Tang Hung Bun and Robin Ngiam.

Photo: Jens Henriksen

The first and current editor of *Nature Watch*.

Tony O'Dempsey continues his interesting account of native flora with some engaging information and photographs of the *Cyathocalyx* group of trees.

On a more experimental note, Dr. Leong Tzi Ming submitted his poetic comparison of Biodiversity and True Love. I decided to print it, for the theme begs the question: is one morally coterminous in pondering a correlation between the wide vistas of various life forms and the subjective feelings of love and awe so surely embedded in the scientific observer? Do human emotions even belong in the field of nature conservation at all? Personally, I think that one is, and that they do.

Thank you,

Morten Strange
Editor-in-chief
April 2010

Share with us

Your stories, articles, surveys, observations and brilliant photographs and send them to the address on page 1. If you are not sure, please send an e-mail to contact@nss.org.sg with a proposal and we will get back to you. Articles can be e-mailed across as a simple Word document (no funny fonts or colours or inserts, please) or saved on a CD and mailed with the illustrations as separate high res. files. Digital pictures must be in 300 dpi, absolutely sharp and as large as possible, jpeg compression is OK. Do NOT crop, brighten or sharpen, we will do all that as necessary. Thank you very much.

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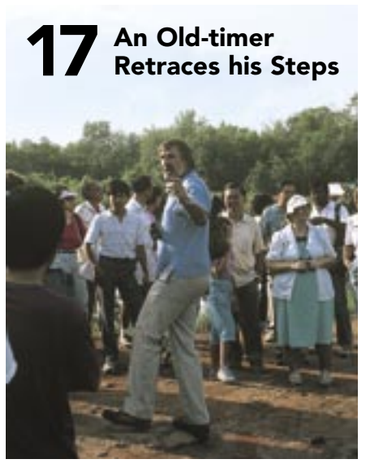

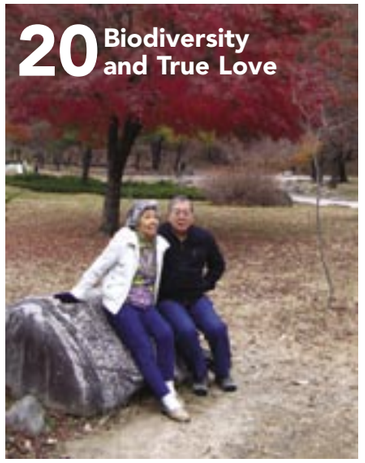

ON THE COVER Dragonflies are ferocious hunters, but here a *Ictinogomphus decoratus* became prey itself for a Little Heron (*Butorides striatus*). Photo by Lee Phek Thong

NATURE WATCH

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Printing by Utopia Press Pte Ltd

MICA (P) 225/07/2009

Philippine Bird Festival

Ng Bee Choo and friends represent the Nature Society (Singapore) at a glamorous bird conservation event in this neighboring country, which encompasses many hot-spots of avian biodiversity.

Text by **Ng Bee Choo** Photos by **Jimmy Chew**

It was a visit by Tan Ju Lin and Jimmy Chew to our shop, Nature's Niche @ Orchidville, that got me participating in the 5th Philippine Bird Festival. Ju Lin would represent the NSS Bird Group and set up a booth during the event. I was to be an observer and to do a write-up about the festival. I was not so keen on the writing bit, but I took up the cause; a planned bird watching excursion after the bird festival increased the interest!

Ju Lin was in charge of liaising with the Filipinos as she had attended two other Bird Festivals in the Philippines and knew the organizers, members of Wild Bird Club of the Philippines (WBCP). When I received an email from Ju Lin with the programme of the Bird Festival on 1 September I was flabbergasted. "Where got time to bird watch?" I asked Ju Lin. The programme was packed with activities hour-per-hour from the day of our arrival.

The 5th Philippines Bird Festival (5th PBF) was to be held over 2 days on 9 and 10 October 2009, but it actually started on 7 October when foreign participants were requested to arrive. We were met at Manila Airport by representatives of the Department of Tourism (DOT) who provided transport and arranged and paid for our one night stay at Trader's Hotel. DOT is vigorously promoting eco-tourism. In November 2008, DOT launched the first volume of the book *Birdwatching in the Philippines* in England during the World Travel Mart. The Secretary of DOT, Mr. Ace Durano, a keen supporter of bird conservation and bird watching, went to the British Birdwatching Fair in Rutland, England in August 2009 with members of WBCP to promote bird watching in the Philippines.

Balanga annually plays host to one of the highest concentrations of wintering shorebirds in the country. Later during the January 2010 Annual Bird Census, WBCP recorded an estimated 18,700 wetland birds there.

Balanga City, in the province of Bataan, and lying across the other side of Manila Bay from Metro Manila, was the host of the 5th PBF.

Delegate buses decked out with the bird festival logo, The Black-winged Stilt.

The crowd at Balanga cheering us on.

Inside the People's Centre in Balanga.

Hosted by DOT, the venue for the welcome dinner in Manila was Intramuros, the walled city, the oldest district of the capital. It was built by the Spanish colonialists in the 16th century, damaged during World War II but restored in the 1980s. Here we were introduced to the Governor of the Province of Bataan, Hon. Enrique T. Gracia, Jr. and his son, Hon. Jose Enrique S. Garcia III (Balanga City Mayor) and his wife, Mrs. Isabel F. Garcia, Chairperson Balanga City Tourism Council Foundation.

Balanga City, in the province of Bataan, and lying across the other side of Manila Bay from Metro Manila, was the host of the 5th PBF. Balanga annually plays host to one of the highest concentrations of wintering shorebirds in the country. Later during the January 2010 Annual Bird Census, WBCP recorded an estimated 18,700 wetland birds there including a staggering 3,992 Kentish Plovers, approximately 3,500 herons and egrets, 2,042 Black-winged Stilts and 1095 Red-necked Stints.

"The Balanga wetlands consistently figure in the country's top five wetlands with the most number of wintering water birds," said WBCP president Michael Lu, who participates in the annual surveys. Other top sites include Candaba Marsh in Pampanga and Olango Island in Cebu, These three sites are all on the Asian flyway. but the Balanga wetlands located across the Bay from Metro Manila continue to be a surprise. "We hope to bring attention to the need to conserve the entire coastline and waters of Manila Bay," Lu concluded in his speech at the dinner.

Bird Festival Committee Chairperson, Alice Villa-Real, said the annual event hopes to raise the bar of awareness about the bird life of the Phillipines in general, promote public interest in conservation in each area, such as the mudflats and remaining mangroves of the Manila Bay coastline, and encourage the creation of more public green spaces.

The next day we departed for Balanga City at 8:30 am. It was a Thursday morning and we were treated to the dubious experience of going through the grinding Manila traffic. Stopping at a well-named Joyous Restaurant for lunch, we found a small pond with some birds. Birdwatchers usually choose restaurants that are rustic and near nature areas. This was no exception. The Taiwanese, Thais, Hong Kong,

Foreign delegates and WBCP members enroute between Manila and the Balanga festival.

The floating parade along the Talisay River.

Street performances at the festival.

The Balanga City Nature and Wetland Park was set up recently by the Balanga City Mayor to harness the tourism potential of the areas. The wetlands and mangroves along the coastal shores, a haven for resident and migratory birds, could become a prime bird watching site for local and foreign tourists.

A Black-capped Kingfisher stillfully placed.

Malaysian and Singaporean participants were all out there bird watching. They had to be badgered to come in to eat. The birds to watch were some egrets, kingfishers and a few Brahminy Kites.

The theme of the 5th PBF was "Ibong Dayo; Kaibigan Tayo" (The Migrant Birds; Our Friends). The event had a Black-winged Stilt as its logo. It was selected as it is easy to recognize and identify, but we soon realized it was a rather appropriate choice as along the way we spotted many Black-winged Stilts.

We arrived in Balanga City at about 2 pm. Event organization and set-up started immediately after our arrival. A concurrent Bird Conservation Forum was held at Crown Royale Hotel where all participants were staying. There was also an optional birdwatching trip for foreign delegates who comprised eleven from Taiwan (Chinese Wild Bird Federation, Kaoshiung Wild Bird Society, Wildbird Society of Hualien and Wild Society of Taipei), two from Bird Conservation Society of Thailand, two from Hong Kong Bird Watching Society, one from Malaysian Nature Society and six from Nature Society (Singapore) – Ju Lin, Arturo Baluyot, Jimmy Chew, Yong Ding Li, Chong Pik Wah and myself.

We had another dinner hosted by City of Balanga at the Crown Royale Hotel. Entertainment included welcome remarks by Balanga City Tourism Council Chairperson Isabel Garcia and a Balanga City audio-visual presentation by Balanga City Mayor Jose Garcia. There was also an energetic dance performance by Bataan National High School Dance Troupe. Delegates were introduced by Mr. Michael Lu, President of Wild Bird Club of the Philippines. After dinner, we went to set up our booth as we had to start early the next day.

Breakfast was at 5:00 am and we departed for Balanga City Nature and Wetland Park (BCNWP) at 5:45 am. We were to participate in a fluvial parade from Talisay River to BCNWP in Tortugas, a distance of 2-3 km. I must say that I had never before participated in any parade, so this was a real novelty for me. The people of Balanga City were out in full force waving to us. After the parade, there was a dedication ceremony at the BCNWP. The BCNWP was set up recently by the Balanga City Mayor to harness the tourism potential of the areas. The wetlands and mangroves along the coastal shores, a haven for resident and migratory birds, could become a prime bird watching site for local and foreign tourists. I noticed a centre being built for the Wetland Park. A vehicular parade brought us back to Capitol Grounds. We had the opportunity to see this young vibrant city which aspires to become a world class university town by 2020. Street dancing by local troupes along the route brought some cheers and entertained us all the way to the new Plaza Mayor de Balanga.

At 9:30 am, we were back at People's Center, Capitol Grounds. The People's Center was filled to the brim with students, about 10,000 of them. Delegates and sponsors took turns to enter the People's Centre and waved to all students. The Mayor of Balanga City gave the welcome remarks, and a keynote speech by DOT Secretary Ace Durano kicked off the events.

Body painting activities.

The Mayor had extended invites to all schools there, and approximately 15,000 people visited the festival ground. The face-painting and colouring exhibits were very popular.

From left: The festival brought the creative traits out in the Filipinos. A local talent takes wings.

Outside, in the festival grounds, there were *Birding Basics* lectures and *Common Birds & Bird Calls* lectures for grade 4-6 students as well as for high school students. Members of WBCP headed bird watching trips. We took turns to look after our booth. We had some items to sell from NSS and Nature's Niche. I brought some bookmarks to give away and many children came to pick up the freebies. Ju Lin's husband, Arturo Baluyot, was a great help at the stand. As a Filipino he could communicate with the locals, who frequently wondered why a Filipino was representing Singapore.

The participants in the Balanga event read like a Who's Who of the Philippine nature conservation community. Philippine Eagle Foundation of Davao, the Katala Foundation of Palawan, World Wide Fund for Nature-Philippines, Isla Biodiversity Conservation Foundation, the Polillo Island Biodiversity Conservation Foundation, Pederasyon sa Nagkahiusang mga Mag-uuma nga Nanalipud ug Napasig-uli sa Kinaiyahan Inc. of Dumaguete, Birdwatch Palawan, Philippine Biodiversity Conservation Foundation, and Cebu Biodiversity Conservation Foundation, the Municipality of Candaba in Pampanga, the City of Bislig in Surigao del Sur and Bataan Artists Society were all there. We took turns to visit their booths to learn about their work or buy items from them.

That night, the Governor of Bataan hosted us to another dinner.

At all the dinners, the Philippine National Anthem was read by a group of students. I could see all the Filipinos putting their hands across their chest... very patriotic indeed. The Bataan Artists Society showed body painting on models that was creative and artistic. The Taiwanese male delegates were enthusiastic and quick to get up close to the female models. Jimmy was again busy snapping pictures for all. He took requests for pictures graciously. At dinner, we were informed that the next 6th PBF will be held in Davao City, Mindanao in 2010. The Mayor was there to extend his invitation. The Mayor of Balanga City then invited all delegates to a beer drinking session near the city centre. He was there to greet us but I didn't see him drink beer!

Mayor & Vice Mayor of Balanga City with delegates in the People's Centre.

The Philippine Bird Festival was launched by WBCP in 2005 and has since brought the message of bird life awareness and conservation to Cebu City and Puerto Princesa in Palawan, two of the country's important bird areas.

Performance before welcome dinner at Balanga City.

The next day saw more children visiting exhibits. The Mayor had extended invites to all schools there, and approximately 15,000 people visited the festival ground. The face-painting and colouring exhibits were very popular. At the People's Centre, two dedicated WBCP-members, Robert Alejandro and Anna Maria Gonzales were busy entertaining the children with lectures, games and quizzes. They were there from 8:30 am to 4:30 pm. I wondered how they managed to keep speaking.

The farewell dinner on the last day, was a less glittering affair. Representatives from various organizations gave a short speech. I represented Nature Society Singapore as I have been a member for a long time, since 1987.

The Philippine Bird Festival was an eye-opener for us. To be able to get so many people together and involving a whole city is no mean job. That night, Ding Li and I commented on the scale and size of the event and wondered whether it would be feasible to do something similar in Singapore. I have organized many events including the Nature Day in 1997 and 5th International Hornbill Conference in March 2009 with the National Biodiversity Centre (National Parks Board), and I recognize the time and work involved in organizing such events. The Philippine Bird Festival was launched by WBCP in 2005 and has since brought the message of bird life awareness and conservation to Cebu City and Puerto Princesa in Palawan, two of the country's important bird areas. I take my hats off to the members of WBCP for pulling it off every year for the last 5 years. The continued existence of WBCP and the support it generates bring much hope for the future of bird life in the Philippines.

Ng Bee Choo *has been a member of NSS for more than 20 years. She is currently active in the Vertebrate Study group. By day she is Managing Director of Nature's Niche Pte Ltd.*

Giant Hawker (*Tetracanthagyna plagiata*) female, in characteristic aeshnine position with down-hanging abdomen. Photo: Tay Soon Lian.

Ode to Odonata

Text by **Cheong Loong Fah**, **Tang Hung Bun** and **Robin Ngiam Wen Jiang**

With a new book out soon about dragonflies and damselflies (order Odonata), odonating (i.e. watching dragonflies) is about to take off in Singapore in a big way. Here we provide an introduction to help beginners find their way amongst a conspicuous and fascinating group of animals.

Dragonflies are truly kings of the air. One of the most majestic in appearance is the Giant Hawker *Tetracanthagyna plagiata*. Its wingspan that can go up to a whopping 160mm, which is larger than that of a sunbird. Watching this enormous creature flying about in the swamp forest, it easily feels as if one is transported to a lost world.

Indeed, *T. plagiata* belongs to an ancient noble lineage that has remained largely unchanged throughout evolutionary time. It belongs to the family Aeshnidae, which is considered to be one of the most archaic indeed, evidenced by the fact that, like damselflies, females possess well-developed ovipositors with which to insert their eggs into plant tissue or soil. Damselflies hark back about 300 million years. It was the time of invertebrate gigantism when the wingspan of the extinct dragonfly order Protodonata exceeded 700mm.

Nowadays, *T. plagiata* vies with a couple of other giants for the honor of being recognized as the world's largest known living dragonfly.

Hawkers (Aeshnidae)

T. plagiata, like many other members of the Aeshnidae family, exhibits a crepuscular lifestyle. However, the evening hours in our forests really belong to those aeshnid species in the genus *Gynacantha*. Like a conjurer's trick, these large, swift-flying hawkers appear from the dark inner space of the forest during this moment of transition between day and night. They create an active kinetic pattern in the dim evening landscape with their tireless and energetic flights, yet they always have a slightly unreal and supernatural appearance. While watching dragonflies by the sun-dappled streams has its charm and romance, beholding these spectral forms appearing at dusk in the silent shade also has a mysterious allure.

In *Gynacantha*, it is probable that the increased size and efficiency of the eyes make possible the swift and often erratic flight. Nevertheless, it is likely that *Gynacantha* escapes the ever present danger of spider webs not by keenness of sight but by sheer bulk and momentum. It is common to find a fully adult *Gynacantha* with bits of spider webs attached to its wings or body, strands which would have proved the undoing of other smaller dragonflies.

Crepuscular flight is probably an adaptation to the food supply, as there is a big burst of small insects flying everywhere at dusk. It could also be that there is reduced predation from birds during the crepuscular hours. The *Gynacantha* species typically cease to fly as soon as the bats begin.

It is very difficult to observe these wildly darting forms when they are in full flight. It is far easier to observe them by flushing them from their diurnal roost. When flushed, they usually fly a short distance and alight on some twig or stem, or in the undergrowth, in characteristic aeshnine position with down-hanging abdomen.

Curious about their specific identification, we have actually caught them by hand. Examining their wings and appendages under a field magnifying glass, we have been rewarded with the discovery of aeshnid species new to Singapore, like *Gynacantha dohrni*, *Heliaeschna crassa*, and *Heliaeschna uninervulata*.

The common aeshnid Lesser Green Emperor (*Anax guttatus*) inserting eggs into submerged reed. Photo: Francis Alvin Lok.

A Dingy Duskhawker (*Gynacantha subinterrupta*) female with its large eyes. Strands of spider webs can be seen attached to the wings and bodies. Photo: Cheong Loong Fah.

Dragons Of The Air (Gomphidae)

No spectacle of the odonate world is more awesome than the flight of the gomphids, especially the swirling skirmishes of gomphids in their territorial battles. They make incredible twists and turns, seemingly able to make 180 degree turns at full speed in little more than their own body length. They make aeshnids look slow! When gomphids are present, there is always a sense of drama in the scene. As they launch their long slingshot trajectory high into the blue sky, they scorch the air with the power and speed of their flight.

Gomphids are sometimes given the common name of clubtails because quite a number of gomphids have clubtails, like the very common Common Flametail *Ictinogomphus decoratus*. While the club itself would seem to carry an energy cost in long-distance flight, it might act as an excellent counterbalance to enable tight high-speed turns. Some gomphids lack clubs but have rather long abdomens, which might serve the same function of keeping the high-speed turn under control.

Gomphidae is one of the more speciose families, yet the least well known. Many gomphids forage high above the vast unexplored green ocean of the forest canopy, defying observation. Even those that are not arboreal tend to be extremely wary and are inclined to take evasive action very quickly. The result is that except for a few common species, many gomphids elude even the most experienced odonatologists and avid naturalists. Most are pronounced "rarely seen in the wild".

In Singapore, Ris' Clubtail *Leptogomphus risi* and Malayan Spineleg *Merogomphus femoralis* are recent discoveries. The former is classified as rare and local by Orr

(2005), whereas for the latter, only a single male specimen is known from Malaysia. The two *Burmagomphus* species, Splayed Clubtail *B. divaricatus* and Lesser Splayed Clubtail *B. plagiatus*, are only recorded from Singapore in their larva form; no adults have been seen in the wild.

Looking through many of the Peninsular Malaysia species, we find many gomphid species whose status are also pronounced as rare, such as *Acrogomphus malayanus*, *A. minor*, *Onychogomphus duaricus*, *O. thieemanni*, *O.aemulus*, etc. We suspect that some of these species could be present in Singapore too.

Common Flametail (*Ictinogomphus decoratus*) is by far the commonest member of its family. Photo: Cheong Yu Jia.

The locally rare Banded Hooktail (*Paragomphus capricornis*) emerging in the morning hours. Photo: Cheong Loong Fah.

Dragons Beware—Preys And Predators

Some of the best habitats for watching the spectacle of odonate life are at those rainwater-filled low-lying areas like Tuas and Marina East. It is a special moment when one arrives early in the morning hours. The mist blurs the sense of time and place, and all reminders of man are lost. Then the scene changes as the sun rises. As the air is heated up, the dragonflies are stirred into frenzied action. This sense of urgency seems not just a response to the rise in temperature, but a pattern of life characteristic of dwellers of ephemeral habitat. The timelessness of these marshes in the morning mist is but an illusion; they are ephemeral habitats after all, liable to dry up after the monsoon rains.

Here in these rainwater-filled basins, as elsewhere, one can observe two main modes of dragonfly hunting. The fliers catch and typically consume their prey while flying, while the perchers take off from an observation post, catch their prey and return, often to the same spot, and consume it. Many dragonflies are strong and fast fliers, capable of reaching speeds of up to 50-60 km/h. Their wings have a sophisticated architecture of veins, which ensure that the wings are stable enough to bear such speeds. On the other hand, hidden amidst the lush aquatic vegetation are many delightful Lilliputian damselflies, which are all perchers. While damselflies are slower, they are capable of exquisite wing control that facilitates forward-reverse flight and deft maneuverability.

Except for some specialists, most odonates are opportunistic foragers and have a catholic diet. However, as prey, flies and mosquitoes (dipterans) outnumber all other taxa. The celebrated naturalist W.H. Hudson once described how, on the pampas of Patagonia, the appearance of a foraging dragonfly was welcomed by travelers, because it resulted in the instant departure of the clouds of mosquitoes and blackflies that had been pestering them. Unfortunately, here in Singapore, the effect of dragonflies is not as dramatic in terminating the flight of the mosquitoes.

Some odonates are known to take large prey, even equal to their own body size, the most dramatic being cannibalism.

Some odonates are known to take large prey, even equal to their own body size, the most dramatic being cannibalism. For instance, the libellulid Variegated Green Skimmer *Orthetrum sabina* and the coenagrionid Ornate Coraltail *Ceriagrion cerinorubellum* both exhibit strong tendency for cannibalism. The term is here used in its zoological

A Blue-throated Bee-eater (*Merops viridis*) with a dragonfly along the Nee Soon pipeline trail. Photo: Morten Strange

A Blue-tailed Bee-eater (*Merops philippinus*) has just captured a Saddlebag Glider (*Tramea transmarina*). Photo: Lee Tiah Khee.

A Pied Fantail (*Rhipidura javanica*) has grabbed a female (*Brachythemis contaminata*). Photo: Wei Luen Chan.

Robber flies in the family Asilidae are also a threat to dragonflies. Here one has captured a *Diplacodes* sp. Photo: Cheong Loong Fah.

Charming Flashwing (*Vestalis amoena*) feeding on a cranefly. Photo: Cheong Loong Fah.

An *Orthetrum sabina* feeding on a *Tyriobapta torrida*. Photo: Cheong Loong Fah.

meaning, referring to a species eating members of its own kind, not always to species level.

Adult odonates themselves form important prey items. Birds that fly as well as or better than dragonflies have dragonflies at a disadvantage, not only in terms of their ability on the wing, but also because they have better eyesight. Examples are the smaller falcons such as the falconets and kestrels, and the dragonfly hunters par excellence, the bee-eaters. The duels between the bee-eaters and the dragonflies are always fascinating to watch, and as the prey and the predator re-enact this perpetual dance between life and death, one cannot help but admire their superb flying skills.

There are also birds that hunt in the marsh vegetation taking adult damselflies, such as bitterns and herons (family Ardeidae). They find the damselflies at a disadvantage because of the slow flight necessary to dodge between the upright sedges, cattails and similar plants.

Migration

During the monsoon months, the open spaces over both our urban and rural areas are invaded by dragonfly migrants like the Wandering Glider *Pantala flavescens*. These migrants fill the air with their effortless gliding motion. They are also known as the "Storm Chasers", seeking temporary pools created by the heavy monsoon rains and laying their eggs in them. Their ability to spot a rain pool is so acute that any smooth, shiny object can attract their attention. Thus females can often be found absorbed in the futile task of laying eggs on the roof of a parked car. Some evidence suggests that this species may actually hitch a ride with storm systems—even, perhaps, with hurricanes—in order to be perfectly poised to take advantage of fresh breeding habitats.

P. flavescens is the most cosmopolitan dragonfly in the world, found in both hemispheres to about 40 degrees latitude, and on such remote land masses as Hawaii and Easter Island. It is a consummate glider and can glide for a few hours on end. It has been recorded from ships in the middle of the ocean and at 20,000 feet in the Himalayas. Recent radar studies in China have

The sight of the Yellow-Barred Flutterer *Rhyothemis Phyllis*, another Libellulid, with its brown and orange batik colour, gliding over our open woodlands, is emblematic of our countryside. Photo: Cheong Loong Fah.

The Wandering Glider (*Pantala flavescens*) has a broad wing base that is adapted for lengthy gliding rather than strong flight. Photo: Cheong Loong Fah.

detected substantial migratory movements over the ocean at night and at heights of up to 1,000m. Nevertheless, how they achieve this navigational feat is still poorly understood. It is one of those commonplace miracles that keeps alive our sense of wonder and makes us go out to the field time and again!

Whereas bird migrations are true return movements in which an individual migrant completes one or more round trips between breeding and non-breeding areas during its lifetime, dragonfly migrations are thought to be intergenerational movements in which an individual migrant carries out a migration in only one direction, with its offspring making the return trip at a later time.

P. flavescens has a highly accelerated life cycle that allows it to get in and out of ephemeral pools before they dry up. The larvae feeds with exceptional aggression and appetite and can go from egg to adult in a blistering six weeks. The emergence of adults from a rain pool can be a real spectacle, with huge swarms forming, and moving off en masse in search of new breeding sites, which could be on an entirely different continent.

During the monsoon months, the open spaces over both our urban and rural areas are invaded by dragonfly migrants like the Wandering Glider *Pantala flavescens*... They are also known as the "Storm Chasers", seeking temporary pools created by the heavy monsoon rains and laying their eggs in them.

Colour and polymorphism

With their brilliant iridescent hind wings, the males of Green Metalwing (*Neurobasis chinensis*) are among the most conspicuous and well-known inhabitants of clear forest streams throughout the region. When the insect takes to the air during courtship, the slow hind wing beat produces bright flashes of metallic green to attract the females. The renowned odonatologist M.A. Lieftinck was so impressed by their beauty that he rapturously called them the 'Birds of Paradise' among Odonata. Sadly, *N. chinensis* is now probably extinct in Singapore due to habitat destruction. No specimen has gladdened our eyes for almost the last 50 years.

Green Metalwing (*Neurobasis chinensis*) with dorsal green iridescence on hind wings. Photo taken in Endau Rompin. Photo: Cheong Loong Fah.

Common Bluetail (*Ischnura senegalensis*) female andromorph, resembling the male it is mating with. Photo: Tang Hung Bun.

Two male Fiery Gems (*Libellago aurantiaca*) engaged in aerial territorial dispute. Photo: Tang Hung Bun.

Some odonate species occur in several colour forms which are genetically inherited rather than age-related. For example, mature females of Common Bluetail *Ischnura senegalensis*, a common damselfly in open ponds and marshes, are polymorphic. They occur in three colour forms: olive, orange and one form that resembles the male (andromorph), i.e. green on the lower part of the thorax and azure blue on the abdomen segment 8 and the sides of segment 9.

It has been proposed that male-like morphs in female Odonata serve to protect females from being harassed by males. This theory was supported by the fact that female polymorphism occurs more often in species where males search for mates, but less so in families in which males are territorial (whereby females can shun harassment by avoidance). There is still much to be discovered about this topic.

Sexual behaviour and territory

The sexual behaviour of the odonates is one of the most fascinating aspects of their life history. There are various issues of interest, such as whether it is the males or the females who control the mating – in other words, does female choice occur in the odonate world? The complicated mating system of the Odonata also offers many possibilities for mechanical isolation of species, both during tandem and copulation. Thus, it will be worthwhile to first understand the reproduction behaviour of the Odonata.

Most of the dragonflies that one sees around ponds or ditches are adult males. Around the water, adult males of some species establish territories for breeding, and they will drive away intruders by sparring, flight contests and threat displays of bright colours on the abdomen or wings. The territorial defense behaviour of some species is indeed very spectacular to watch.

For example, the beautiful Fiery Gem (*Libellago aurantiaca*) can be seen engaged in aerial territorial disputes, where two males face each other and make forward movements without bodily contact. They hold their nearly motionless forewings forward to display the dark apical spots while their flight is

maintained by the flapping of their hind wings. This can go on for more than half an hour until one of the males flees the territory.

Females typically spend most of their adult life away from the water, foraging in the nearby trees, bushes and grasses. They come to the water only when they are ready to mate.

Tandem Position

When a male encounters a receptive female in the breeding site, he will use the anal appendages to clasp her securely behind her head (dragonflies) or prothorax (damselflies) to form a tandem pair. This action usually takes less than a second. At this stage, the couple is said to be "in tandem position". Some species (e.g. damselflies in the family Calopterygidae) show complex courtship rituals before this stage. Tandem pairs of dragonflies and damselflies can occasionally be seen flying about, the female behind the male.

Sperm transfer

Odonata sex involves a bizarre step, unique among insects. Before a male can mate with a female, he must first "mate" with himself. The male genitalia, where sperm are produced, open under abdominal segment 9, near the tip of the insect's abdomen. The male insect also has secondary genitalia at segment 2, near the base of the abdomen. The secondary genitalia include a sperm storage reservoir and a penis. Before he can mate with a female, the male has to transfer sperm from the tip of his abdomen into the storage reservoir at the base of his abdomen. The male achieves this by curling his abdomen beneath his body, and touching the aperture of the sperm duct on the 9th segment to the opening of the sperm reservoir at the base of the abdomen. Depending on the species, this takes place either before or after the male has formed a tandem pair with a female.

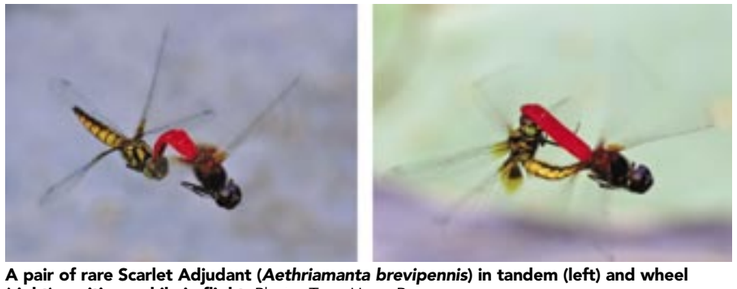
Copulation - Wheel Position

After the male's sperm transfer and the couple achieving the tandem position, the female curls her abdomen forward to link the tip with the male's secondary genitalia in order to receive sperm. The male and female form a heart shape

Shorttail (*Onychargia atrocyana*) in tandem position. The insect in front is the male. Photo: Tang Hung Bun.

Look-alike Sprite (*Pseudagrion australasiae*) in sperm transfer (left) and wheel position (right). Photo: Tang Hung Bun.

Shorttail (*Onychargia atrocyana*) in wheel position. Photo: Tang Hung Bun.



A pair of rare Scarlet Adjudant (*Aethriamanta brevipennis*) in tandem (left) and wheel (right) positions while in flight. Photo: Tang Hung Bun.

wheel and it is known as wheel position. This may take place while the two dragonflies are perched, and last several to many minutes, or in flight and be over in seconds. In some species of damselflies, during the wheel position, the pair's slender bodies form a delicate romantic heart shape.

Sperm displacement

A female dragonfly can mate repeatedly with different males. She stores sperm from various matings in a special receptacle within her body near the tip of her abdomen. Fertilization of the eggs takes place only as they are being laid. This offers the opportunity for the next male to displace the sperm stored in the female's sperm-storage organ delivered to her during her previous mating. Dragonfly males are endowed with multi-purpose penises fashioned with brushes and hooks to physically remove or displace rival sperm from the female reproductive tract. In some dragonflies, the multi-purpose penises can also provide sensory stimulation to the females during copulation to induce ejection of any previous sperm received. Hence, in dragonflies, mating first will not ensure paternity. This explains why some male dragonflies appear to be paranoid about guarding against rival males.

Egg laying

After the completion of copulation, the couple may split up, or they may stay together through oviposition, i.e. egg laying. In some species, the male guards the female from the competition of rival males. In other species the female is left alone to lay her eggs. Guarding may take several forms. The most basic form for damselflies is contact guarding, where the male stays attached to the female for the entire egg-laying process. Many dragonflies employ hover guarding, in which the male hovers above or perches near the female as she is laying eggs. A hover-guarding male may attempt to protect several of "his" egg-laying females at a time. The oviposition method varies according to species and/or circumstances.

In the family Aeshnidae of dragonflies and in all families of damselflies, the female is equipped with a curved, blade-like ovipositor with which she

Blue-spotted Flatwing (*Podolestes orientalis*) ovipositing by cutting a slit in a plant stem. Photo: Tang Hung Bun.

Spine-tufted Skimmer (*Orthetrum chrysis*) ovipositing by dipping her abdominal tip to the water surface. Photo: Tang Hung Bun.

cuts a slit in a plant stem or leaf and inserts a single egg. Egg laying may be above the waterline, at the waterline or even below the waterline — sometimes so deep that the insect plunges below the surface for many minutes, possibly obtaining oxygen from the water via a thin air pocket that is trapped in the fine hairs on its body.

In many Libellulidae species, the female dips her abdominal tip to the water surface and washes off her eggs while hovering or flying, often at high speed. Some species scatter their eggs over the water from the air and some use splash-laying to throw drops of water containing eggs onto plants or the bank. If the eggs are deposited above the waterline, the newly emerged larvae reaches the water by either falling, or by a series of spasmodic hops caused by arching its whole body and flicking itself into the air. There have been occasions when females oviposit on unsuitable surfaces such as oil slicks and vehicles, mistaking them to be a water surface.

Odonate Conservation in Singapore

In a fast developing Singapore the conservation of our natural heritage is of utmost importance. In particular, the conservation of dragonflies faces a huge challenge, as wetlands and streams are constantly under threat from urbanisation. One example is the recent conversion of the Tuas marsh into a motorcycle circuit. It is poignant to know that the marsh is the only place where the rare Hooked Midget *Mortonagrion falcatum* damselfly is recorded so far. Thankfully dragonfly conservation in Singapore has also taken a step forward. In our nature reserves the value of stream biodiversity has been realised and is now under appropriate conservation management. Furthermore, the creation and enhancement of ponds in public parks to attract dragonflies has been initiated. Already, ponds harbouring rare species have been

identified for management. The naturalisation of our waterways by PUB's ABC program will surely create more dragonfly habitats, see http://www.pub.gov.sg/abcwaters/abcwatermasterplan/Pages/default.aspx for details. In terms of outreach, dragonfly talks and courses have been conducted, and dragonfly storyboards have been produced in some parks. The Nature Society (Singapore) also played a significant role by adopting the Kranji Marsh, thereby preserving a good dragonfly habitat. Plans are also in place by the Society to conduct dragonfly-watching trips for its members.

With enhanced dragonfly appreciation in Singapore, these large and beautiful insects have the potential of becoming a flagship group of species for freshwater conservation in general.

So what can you do to help conserve Singapore's dragonflies? It is easy. Just go out and enjoy odonating (dragonfly-watching) in the many accessible places such as park ponds and nature reserves. Take pictures of them, observe their behaviour, and share your findings with fellow dragonfly lovers. You can also post dragonfly pictures on websites like Asia Dragonfly (http://www.asia-dragonfly.net/index.php). You might even discover a new species or some new aspect of odonate behaviour.

Also, spread the message of no littering and no releasing of unwanted pets in our forest streams and ponds to safeguard the freshwater habitats. One should also be aware of the harmful effect of pesticide usage on the integrity of the aquatic habitats.

Dragonfly-watching is already very popular in places like Japan, Taiwan, US and Europe. With enhanced dragonfly appreciation in Singapore, these large and beautiful insects have the potential of becoming a flagship group of species for freshwater conservation in general.

This rare *Mortonagrion falcatum* used to live at Tuas Marsh, which has been converted into a motorcycle circuit. Photo: Cheong Loong Fah.

Bishan Park is one of our best parks for dragonflies. 33 species have been recorded so far. Photo: Robin Ngiam.

Toa Payoh Town Park has a very accessible pond for dragonfly watching. Photo: Robin Ngiam.

Editor's note: *Odonata is an order of insects that includes dragonflies and damselflies. The word Odonate is an English version of this term. The last published checklist in 2008 contained 117 odonate species recorded from Singapore. Since 2008, more new records have been made, pushing the number of species to 124 currently. An updated checklist will be published in a dragonfly photo identification guidebook by Tang Hung Bun, Wang Luan Keng and Matti Hämäläinen in May this year.*

Dr. Cheong Loong Fah *started out as a birdwatcher, but now he likes to roam the forest searching for insects, including the dragonflies and the various beetle families. He has written a series of articles, on both birds and insects, in a column provided by the Chinese press.*

Tang Hung Bun *has always been a nature lover. Inspired by Loong Fah, he started watching dragonflies in 2005. In 2009, he retired early from teaching and now expends his energy on writing a book on the dragonflies of Singapore.*

Robin Ngiam *chased dragonflies during his childhood kampong days. Those fond memories have developed into a deep passion for them. That passion is deepened further after getting acquainted with the co-authors, who are his dragonfly mentors and friends. He has just completed a two-year dragonfly conservation project in NParks.*

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An Old-timer Retraces his Steps

Clive Briffett returns to his old haunts in what is now Sungei Buloh Wetland Reserve where his old friend, Morten Strange, awaits him to learn Clive's views on the changes that have taken place.

Hilary, Margie, Clive and editor on location. Photo: Jens Henriksen.

Text and photos by **Morten Strange**

The first issue of *Nature Watch*, Volume 1 Number 1 October-December, came out in 1993. The price was S$3; the same as it is today, plus GST. The editor was Dr. Clive Briffett, then an Associate Professor at the National University of Singapore. The inaugural issue was a whooping 54 pages and packed with information about plants, animals and environmental issues in the region. The main feature was on the just-opened Sungei Buloh Nature Park, subtitled "A Great Experiment", written by Ilsa Sharp. The cover featured a Great Egret fishing in that area, photo provided by undersigned.

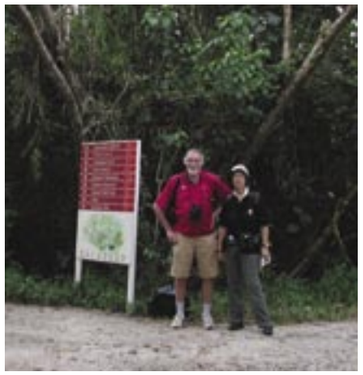
So when Clive announced that he was making a visit to Singapore in 2010, it was natural for me to arrange a trip to Sungei Buloh. After many years based overseas in Kenya, Hong Kong and finally Singapore, Clive moved to the Oxford area in England in 2001 to enjoy a period of active retirement. On 18 February this year, Clive and myself, Clive's wife Hilary and Assistant Editor Margie Hall all congregated at the location with my cousin Jens joining us as event photographer.

For Clive, this was a nostalgic revisit to a site he helped identify and ultimately save from development back in the late 1980s. Dr. Wee Yeow Chin was a very effective and proactive president of the Nature Society during that period; and Richard Hale, Dr. Ho Hua Chew and others were key instigators in the Sungei Buloh campaign. The current status of Sungei Buloh Wetland Reserve is well covered in a previous issue of *Nature Watch*, Volume 12 No. 1 January-March 2004. If you don't have a copy, get one from the NSS office, as it is an important reference to what has become one of Singapore's main nature destinations and our one and only ASEAN Heritage Park.

The first issue of *Nature Watch*.

After a long walk through the whole reserve, I asked Clive what he thought of Sungei Buloh today. I was pleasantly surprised when he replied: "This is the best state I have ever seen the area in." Clive said that the old prawn farmers, who operated the tidal ponds in the 1980s, didn't do a very good job. The sluice gates and the levees to the sea were poorly maintained; mud lobsters weakened the bunds, which often collapsed and allowed seawater to invade in an uncontrolled manner.

There had been some concerns raised about the rapid over-growing of the reserve, some parts of which was turning into coastal woodland. Having fully recognized how the trees very usefully screened visitors from the birds, Ho Hua Chew had written in *Nature Watch* (2004) that the area was missing "the open sky and panoramic views of the landscape", that it had had in the 1980s. He went on to document a decline of some migratory shorebird species that depend on wide-open expanses of mudflats for habitat. Dr. Ho provided advice for some landscaping improvements such as cutting back some of the vegetation and a different water management regime. Some cut-



This is the southern corner of Sungei Buloh in June 1988 when Clive conducted a Nature Society outing (left). Since there was no bridge across the river then, visitors came in from the the west. The same spot today; Margie Hall is in both pictures.

This is the exact junction where Clive Briffett conducted his outing in 1988, then (left) and now (above).

Below: Over-looking the ponds near what is today hide 2D, in annum 1988 and today.

ting back did indeed occur as part of the Reserve's later management. The vegetation on the mud island upriver from the Sungei Buloh bridge disappeared, for instance.

All this is exactly Clive's field of expertise; among his qualifications he happens to have an Msc. in Environmental Assessment and Management. So it is encouraging that Clive likes Sungei Buloh's new look. "The trees strengthen the bunds with their root systems," he says, "and they provide a screen, so that the birds are not disturbed by the increased number of visitors."

I ask him if he has any recommendations for improvement. "Any disturbed area like this has to be actively managed," he says, "Hua Chew is right that some clearing of grasses and mangrove tree seedlings is necessary, and the water levels have to be monitored and managed continuously, I am sure the Sungei Buloh management team is already doing this". Clive stays in touch with Jonathan Smith, the first manager of Sungei Buloh, who is now in charge of a wetland nature reserve in England. "He has become mainly a farmer now," Clive says about Jonathan in jest, referring to the widespread use of grazing cattle and sheep in European wetland management to keep vegetation at bay. "I will let Jonathan know that 'his' reserve here is doing well, but you should bring him back for a while and let him assess Sungei Buloh today."

Clive liked the plan to extend some visitor activities to the new Kranji Nature Trail, to relieve visitor pressure on the high biodiversity areas west of the Buloh River. He even suggested putting up some chalets for visitors to stay in, similar to what the Malaysian Nature Society has done at the Kuala Selangor Nature Park. "It would be great to wake up in the area for an early morning walk," he says, "the reserve is a bit hard to get to, maybe this could be combined with an expanded bus service to the MRT station during peak periods."

Clive concluded that even with a decline in some wader numbers, Sungei Buloh appeared to have more biodiversity now than before. "The reserve has proved to be a great refuge for more arboreal birds as well," he observed, "both resident and migrant species." During our casual late morning stroll, we saw Black Baza and Osprey flying overhead. The somewhat confusing features of the Great, Little and Intermediate Egrets could all be studied from the *Aerie* look-out tower. Important residents like Ashy Tailorbird, Pied Fantail and Malayan Bronze-Cuckoo all showed themselves. The five kingfisher species we saw and heard were an interesting mix of residents and migrants. The highlight was taking a break in the 3A hide at the Freshwater Ponds, a picturesque and tranquil part of the reserve. Two globally threatened Straw-headed Bulbuls were duetting loudly right outside the hide.

One of Clive Briffett's pet projects, while he was based here, was the establishment of green corridors across Singapore to connect up pockets of biologically valuable land. He wrote several scientific papers on the subject as well as a 40-page report still in print; *Multiple-use green corridors in the city: Guidelines for implementation*, together with Belinda Yuen and Cynthia Barlow Marrs, published by Research and Consultancy Group (NSS) in 2000, a group that Clive was chairman of. I gave Clive a copy of the National Parks Board brochure *A Guide to the Park Connectors*, and Clive was happy to see that many of his ideas and recommendations had been implemented and had become mainstream. "I just hope that these connectors will also be managed as ecological corridors for wildlife, not just as recreational passage ways," was his only reservation.

The above picture from November 1990 shows large flocks of mainly Mongolian Plovers *Charadrius mongolus* and Curlew Sandpipers *Calidris ferruginea* flying across Sungei Buloh. Changes in the landscape might have reduced some of these mudflat depending species. But then, other biodiversity rarely seen before has moved in, such as this Estuarine Crocodile *Crocodylus porosus* (left). Photo: Clive Briffett

Clive concluded that even with a decline in some wader numbers, Sungei Buloh appeared to have more biodiversity now than before.

The bund between hides 2D and 2E leading to the Freshwater Ponds then and now. On the picture from 1988 it is Margie Hall second from right.

Few people have done more for the nature conservation movement in Singapore than Clive Briffett. While he was here, he was one of those visionaries and getting-things-done people that are hard to come by. He was editor and coordinator of the groundbreaking *Master Plan for the Conservation of Nature in Singapore* (1990). Later, together with Dr. Ho Hua Chew, he edited *State of the Natural Environment in Singapore* (published by NSS 1999, reprinted 2002 and still in print). He was also founding member and chairman of the NSS Bird Group for six years and wrote two books about the birds of Singapore.

After the inaugural issue of *Nature Watch*, Clive did one more issue and then he handed the editorial responsibility over to Evelyn Eng-Lim. He himself moved on to do other things within the society. Clive was good at this, getting publications, events and groups off the ground and then moving on and letting other people run them. And today he comes full circle, by being featured in the magazine he started.

***Morten Strange** is a long-time member of NSS and currently editor-in-chief of* Nature Watch.

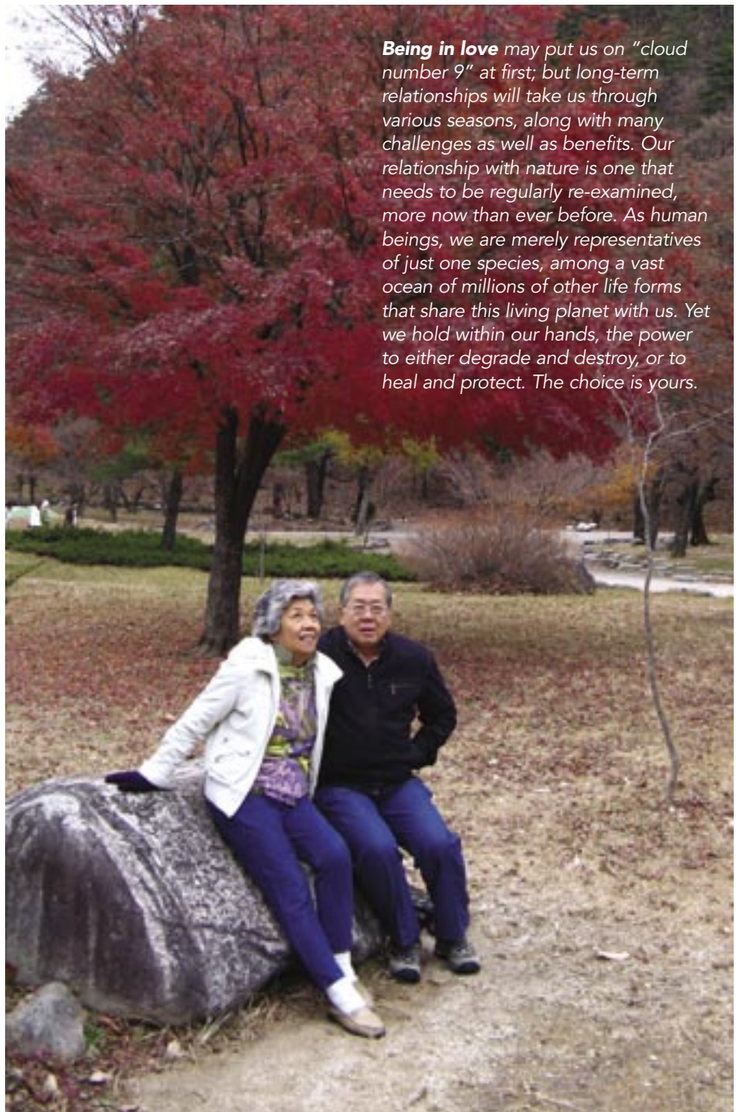
Biodiversity and True Love

Dr. Leong Tzi Ming is an accomplished scientist, but here we see him from a slightly different angle, as he takes time out to contemplate not just facts, but also feelings. Read his conception of 20 striking similarities between biodiversity and true love, and see if you agree with him.

Text and photos by **Leong Tzi Ming**

One of the best ways you can spend your time is being embraced in the open arms of nature's splendour. This is true whether you are in a steamy rainforest, sticky mangrove swamp, sandy coastal beach or you snorkel across a salty coral reef. Each of these habitats is unique in its own right and is home to an amazing array of plants and animals that have adapted to the multiple challenges of each ecosystem. The cumulative biodiversity from all of these natural environments can truly be astounding, and thankfully, representatives of such settings still remain in Singapore for us to appreciate, explore and even examine in greater detail.

Beyond our reclaimed shores, the documented biodiversity at the regional and global scale is virtually unfathomable. We don't even know how many species live on our fertile planet. Calculating and producing a reasonable estimate of the diversity of species will certainly be a daunting but exciting challenge for many more human generations to come. In the preceding centuries and decades, scientists have certainly achieved significant progress, continually describing new species, from flowers, to flies, to frogs. However, we have also witnessed exponential environmental degradation and reduction of original habitats, often depriving ourselves of opportunities to make further biological discoveries in such places.



Being in love *may put us on "cloud number 9" at first; but long-term relationships will take us through various seasons, along with many challenges as well as benefits. Our relationship with nature is one that needs to be regularly re-examined, more now than ever before. As human beings, we are merely representatives of just one species, among a vast ocean of millions of other life forms that share this living planet with us. Yet we hold within our hands, the power to either degrade and destroy, or to heal and protect. The choice is yours.*

Right: A mature couple savours their autumn years with deep appreciation and understanding.

A stunning visual representation of biodiversity, on public display at the Field Museum of Natural History, Chicago.

Biodiversity and True Love ...

1. ... comes in all shapes, sizes, textures, colours and may be expressed in numerous ways.
2. ... often brings a smile to your face and brings back fond memories.
3. ... improves with repeated contacts, and absence can make the heart grow fonder.
4. ... makes your heart beat faster sometimes.
5. ... can overwhelm you at times with its abundance.
6. ... can surprise you when or where you least expect it.
7. ... can occasionally make you laugh, yet also make you cry.
8. ... is to be enjoyed, shared and treasured.
9. ... certainly makes our lives more complete and fulfilling.
10. ... requires time and effort to get to know better.
11. ... needs sufficient space to grow.
12. ... is capable of evolving over time.
13. ... should never be measured in dollars and cents.
14. ... usually benefits from commitment and dedication.
15. ... constantly teaches us new lessons, as long as we keep an open mind.
16. ... should last indefinitely, with continual care and concern.
17. ... can also suffer from ignorance and neglect.
18. ... deteriorates, if we make poor decisions that we later regret.
19. ... amounts to an unimaginable loss, should it disappear.
20. ... should always be there, for future generations to enjoy, as much as you have.

As we commemorate International Year of Biodiversity 2010, I paused to ponder how I myself became engaged in this present passion of constantly pursuing nature and unraveling its secrets. Eventually, it dawned on me that I must have been bitten by the "Biodiversity Bug" during my younger days, when I sloshed around drains and canals to catch fish, prawns and crabs with my brothers and childhood friends. Having also been bitten by the "Love Bug" at later stages, I eventually began to recognize the common threads that intertwine biodiversity and true love.

So if you have a particular fondness for ferns, are a fan of figs, find fungus fascinating, or fulfill yourself photographing our feathered friends, then you might be able to relate to some of these similarities. And if you haven't fallen in love with biodiversity already, it is never too late!

Leong Tzi Ming *wrote about frogs in* Nature Watch *volume 17/3 and about hawk moths in volume 17/4. But he is also a hopeless romantic, who occasionally makes attempts at being poetic. Although hard working and productive, he is also an idealist who believes that life should never be too hectic.*

Cyathocalyx

Text and photos by **Tony O'Dempsey**

When you encounter a tree of the *Cyathocalyx* genus in our forest reserves, you instantly notice how different it is from the other trees, and you will be impressed by its unique and primitive form. The *Cyathocalyx* is a monopodial tree with a tight spherical crown made up of a spiral of branches that radiate straight out from the top section of the trunk. From seedling, this tree grows vigorously towards light until it is able to gain a place in the canopy. Often the trunk of a *Cyathocalyx* tree will have several twists and turns, testimony to the changing light conditions as the tree grew towards the sky above.

The genus is represented in Singapore by two native species: *C. ramuliflorus*, named in relation to the ramiflorous habit of flowering from the main branches, and *C. ridleyi*, named for Henry Ridley, the first Director of the Singapore Botanic Gardens.

***Cyathocalyx ridleyi* developing flowers.**

The *Cyathocalyx* genus is a member of the Annonaceae (Custard Apple) family which is a tropical family that includes shrubs, trees and vines. Some members of this family are known for their sweet edible fruits, examples are Soursop (*Oxalis* species) and Custard Apple (*Annona* species). Annonaceae members, including *Cyathocalyx*, are also known for their sweet fragrant flowers. The best known would be Kenanga (*Cananga odorata*) from which ylang-ylang oil is extracted for use in the manufacture of perfumes.

A third Cyathocalyx species, *C. sumatranus*, may be found on some checklists of Singapore native flora. However, its status as a native is questionable since the only records seem to have come from the Singapore Botanic

***Cyathocalyx ridleyi* flowers at later stage.**

***Cyathocalyx ridleyi* trunk.**

***Cyathocalyx ramuliflorus* flowers in distinct clusters along the branches.**

***Cyathocalyx sumatranus* fluted trunk.**

Often the trunk of a *Cyathocalyx* tree will have several twists and turns, testimony to the changing light conditions as the tree grew towards the sky above.

Gardens. It is suspected that *C. sumatranus* could have been introduced at the Botanic Gardens many years ago.

The form of *C. sumatranus* is somewhat different from that of *C. ridleyi* and *C. ramuliflorus* - the crown is less tidy, and the trunk is fluted towards the base.

When observed, *Cyathocalyx* should be reasonably easy to recognize due to its monopodial form and tight spherical crown. However, when observing from ground level you will not usually have a good view of the crown which will have grown higher than

***Cyathocalyx ramuliflorus* leaf.**

***Cyathocalyx ramuliflorus* flower close-up.**

***Cyathocalyx ridleyi* leaf.**

slower-growing adjacent trees. Therefore you must learn to recognize the broad leaf shape and be able to find these leaves amongst the leaf litter on the forest floor. Once you find the leaf, a careful scan of the nearby trunks will surely reveal the tree. Often it will be the only trunk for which you cannot readily see a crown. Now having identified a *Cyathocalyx* tree, true connoisseurs will want to distinguish between *C. ramuliflorus* and *C. ridleyi*. Closer inspection is required, because these trees are almost identical. If the tree happens to be flowering, identification is straight forward due to the different forms of the flowers, however generally you will only have the leaves to observe.

The key to distinguishing between the leaves of the two native *Cyathocalyx* species is to observe the angle of the two secondary veins closest to the base of the leaf. The lower two veins of *C. ramuliflorus* attach to the primary vein at a wider angle (almost a right angle) than the rest of the veins. For *C. ridleyi*, the lower two secondary veins join the primary vein at approximately the same angle as the rest of the secondary veins. The photographs above illustrate this distinction between the species.

Another differentiating feature is the amount of hairs on the back surface of the leaves. *C. ridleyi* is more pubescent, "furry" or "velvet" than *C. ramuliflorus*. This method of distinction requires that you either are already very familiar with the leaves or you have examples of both species in hand at one time. Certainly it is not unusual to find both species growing almost side-by-side in the Central Catchment Nature Reserve.

Flowering examples of *Cyathocalyx* can be found, particularly if you are a regular visitor to the nature reserves, and especially to the Tree Top Walk. This year, the *C. sumatranus* residing in the Botanic Gardens started flowering in late January and continued into February while both *C. ridleyi* and *C. ramuliflorus* started flowering in late February continuing into March. The petals of *C. ramuliflorus* are much shorter than those of *C. ridleyi*. When the small individual flowers of *C. ramuliflorus* fall to the forest floor they can be seen to be no larger than a thumbnail.

Tony O'Dempsey is a long-standing supporter of the nature community in Singapore and an active member of the NSS Vertebrate Study Group. He also has an interest in the trees and plants of the region. He will be presenting some of his favorite Singapore plants in this and future issues of *Nature Watch*.

Join Nature Society (Singapore) and get *Nature Watch* free!

NATURE SOCIETY
SINGAPORE

Nature Society (Singapore), NSS, is dedicated to the study, conservation and enjoyment of the natural heritage of Singapore, its neighbouring countries and Planet Earth.

The Society is a non-profit, non-government organisation and its members work with commitment and altruism to conserve Singapore's remaining nature areas, mangroves, rainforest and wetlands.

NSS was formerly known as the Singapore Branch of the Malaysian Nature Society (MNS). The Branch was formed in 1954 and became independent in 1991. Both societies still maintain strong links with each other.

NSS organises guided nature walks, bird-watching, butterfly-watching, plant walks, surveys, diving trips, slide talks and overseas eco-trips for its members. A bi-monthly newsletter keeps members informed of all these activities.

An NSS outing brings you in touch with not only nature's wonders but also with people of all ages, from all ethnic backgrounds and nationalities, and from all walks of life with one common passion – to appreciate and conserve Nature.

The Society also publishes books on nature, and organises conferences and workshops on the onservation and preservation of our dwindling natural habitats.

Join Nature Society (Singapore) for Fun, Fellowship and Fulfilment

The values that NSS upholds and promotes are a bulwark against the excesses of our ultra-materialistic society.

If you too feel that protecting our Natural Heritage is important, join NSS and support the Society in its work.

Members get the newsletter and *Nature Watch*, a quarterly magazine, free and get to participate in outings that are fascinating and which enable you to forge friendships with fellow nature-lovers.

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