

# สัตว์ไม่มีกระดูกสันหลัง

---

## **Introduction of aquatic organisms to Thailand via the aquarium trade**

---

*S. Chavanich\* and V. Viyakarn*

*Chulalongkorn University, Bangkok, \*e-mail: suchana.c@chula.ac.th*

The spread of introduced species causes problems both nationally and internationally. The introduction of invasive species not only has an impact on biodiversity but also has an impact on the health of humans and animals. Pathways of introduction include intentional release, illegal import, and ships. At present, in Thailand, only a few studies have investigated the effects of invasive species on natural habitats and compiled lists of introduced species via the aquarium trade. To manage or predict the impact of introduced species, which have been released accidentally, information on species and quantities of imported organisms are needed. Such information will also help in establishing plans to prevent the spread of introduced species in the future. In this study, aquatic species (freshwater and marine species) introduced via the aquarium trade were surveyed at Chatujak Market. We assessed the potential risks of introducing aquatic species associated with stores that sell aquatic ornamental species by designing a survey that inquired about: 1) types and quantities of aquatic species being imported; and 2) store managers' familiarity with aquatic invasions. The results showed that freshwater species had a higher risk of becoming invasive species in Thailand than do marine species. To prevent future aquatic and marine invasions, better reporting requirements for live species imports are needed.

---

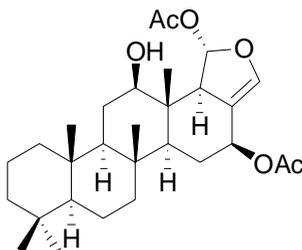
## Antitubercular marine-derived sesterterpenoid derivatives

---

*S. Jaisamut\* and A. Plubrukarn*

*Prince of Songkla University, Songkla, \*e-mail: s4852030@psu.ac.th*

Heteronemin (**1**) is a marine natural product isolated as a major component from the sponge *Hyrtios* sp. The compound was previously reported to be strongly active against *M. tuberculosis* (MIC 6.25  $\mu\text{g}/\text{mL}$ ), however with a strong cytotoxicity. In order to determine the structural moieties that could be responsible for either activity, a scaffolding structural development was established, and a series of chemical derivitizations were carried out. This included hydrolytic cleavage with  $\text{BF}_3 \cdot \text{OEt}_2$ , and chlorochromate oxidation on the available hydroxyl group. The detailed chemical derivitizations and activities will be presented.



heteronemin (**1**)

---

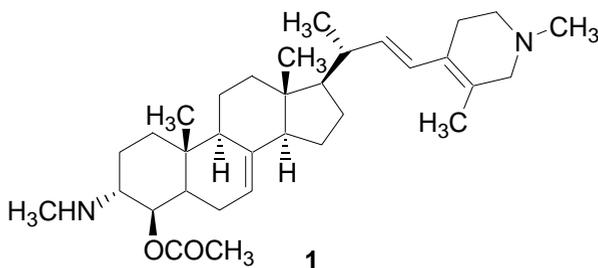
## An acetylcholinesterase-inhibiting steroidal alkaloid from the sponge, *Corticium* sp.

---

R. Langjae<sup>1,\*</sup>, S. Yuenyongsawad<sup>1</sup>, S. Bussarawit<sup>2</sup>,  
K. Ingkaninan<sup>3</sup> and A. Plubrukarn<sup>1</sup>

<sup>1</sup>Prince of Songkla University, Songkla, \*e-mail: roosanee.l@psu.ac.th,  
<sup>2</sup>Phuket Marine Biology Center, Phuket, <sup>3</sup>Naresuan University, Phitsanulok

A methanolic extract of the Thai marine sponge *Corticium* sp. collected from the Gulf of Thailand showed 95.19±2.6% inhibition of acetylcholinesterase (AChE) when tested at 0.1 mg/mL using a microplate reader assay. Enzyme inhibition assay-guided purification led to the isolation of a new steroidal alkaloid. The structural determination of the alkaloid, 4-acetoxy-plakinamine B (**1**), was achieved by means of spectroscopic analysis including 1D and 2D NMR, MS, IR and UV spectroscopy. The alkaloid exhibited good inhibition activity against AChE with an IC<sub>50</sub> of 3.75±1.69 μM. The kinetics of enzyme inhibition was determined to reveal a reversible type of inhibition with an increased *K<sub>m</sub>* and decreased *V<sub>max</sub>* upon addition of compound **1**, thus suggesting a mixed-competitive inhibition.



---

## Effect of wounding on renieramycin M concentration in *Xestospongia* sponges

---

*U. Darumas*<sup>1,2,\*</sup>, *S. Chavanich*<sup>1</sup> and *K. Suwanborirux*<sup>1</sup>

<sup>1</sup>Chulalongkorn University, Bangkok, \*e-mail: dkhundodo@yahoo.com,

<sup>2</sup>Walailak University, Nakhon Si Thammarat

Every wounded sponge showed a significant increase of renieramycin M content from an initial level ( $p < 0.001$ ). However, one month after cutting, renieramycin M concentrations were not significantly different. The greatest increase in renieramycin M was 3 hours after the initial cut. The content of renieramycin M was 218.8  $\mu\text{g/g}$  dry weight of sponge. Renieramycin M was not detectable after an initial cut of these sponges. Then, the content of renieramycin M rapidly decreased at an estimated 22.162 times above the initial concentrations within the first 24 hours. Renieramycin M content declined to 0.39 times above the initial concentrations per day from the 4<sup>th</sup> day until the 90<sup>th</sup> day. By day 90 after the initial cut, the content of renieramycin M in every sponge was nondetectable.

---

## New ergosterol peroxide and isonitrile diterpene compounds from the sponge *Ciocalapata* sp.

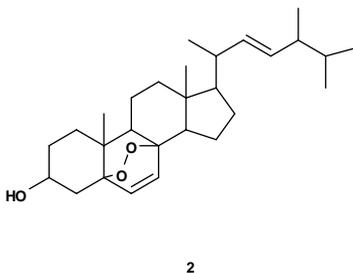
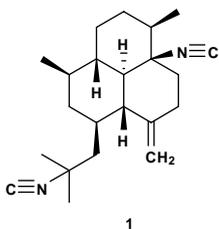
---

N. Chanthathamrongsiri<sup>1,\*</sup>, P. Kongsaree<sup>2</sup>, A. Plubrukarn<sup>1</sup>  
and C. Wattanapiromsakul<sup>1</sup>

<sup>1</sup>Prince of Songkla University, Songkla, \*e-mail: s4852009@psu.ac.th,

<sup>2</sup>Mahidol University, Bangkok

Screening for antimalarial activity of hexane-, CH<sub>2</sub>Cl<sub>2</sub>-, and MeOH-extracts of the Thai sponge *Ciocalapata* sp. showed that the highest activity occurred for the hexane-extract (IC<sub>50</sub> 0.05 µg/mL). The hexane-extract was further investigated for active compounds using chromatographic techniques leading to the isolation of an isonitrile diterpene and a sterol peroxide. The diterpene was identified to be 8,15-diisocyano-11(20)-amphilectene (**1**) by means of spectroscopic analyses and X-ray crystallography. An ergosterol was obtained from reverse phase HPLC and it was identified as ergosterol peroxide (**2**). The biological activity of all isolated compounds will be presented.



---

## Impacts of the Tsunami on coral recruitment at Mu Koh Surin National Park, Phang Nga Province

---

*C. Saenghaisuk\* and T. Yeemin*

*Ramkhamhaeng University, Bangkok, \*e-mail: sh\_chaipichit@yahoo.com*

Mu Koh Surin is a group of offshore islands in the Andaman Sea, located about 60 km from the mainland of Phang Nga Province, southern Thailand. It is recognized as one of the best diving spots. The 2004 tsunami caused severe damage to certain reef sites, especially those located in channels between islands which lie in an east-west direction, such as the channel between South Surin Island and Torinla Island. The present study concentrates on impacts of the tsunami on coral recruitment at Mu Koh Surin by using settlement plate experiments and field observations of juvenile coral colonies. Densities of juvenile corals at Ao Mai Ngam, Ao Pagkard, Ao Tao, Ao Maeyai and Ao Jak of Mu Koh Surin had decreased by 68.40%, 65.10%, 38.60%, 44.10% and 30.70 %, respectively. The main groups of juvenile corals that had decreased were *Galaxea*, *Fungia*, *Pocillopora*, *Acropora* and *Porites*. The settlement plate experiments showed that there was much variation in coral recruitment rates. The highest density of coral recruits on settlement plates was at Ao Pagkard while the lowest was at Ao Suthep. Certain high tsunami impacted reefs, such as Ao Pagkard, showed clear natural recovery trends. There should be preventive measures taken to limit anthropogenic impacts on coral reefs at Mu Koh Surin to accelerate natural coral recruitment rates.

---

## The developmental stages of the staghorn coral *Acropora humilis*

---

C. Raksasab\*, V. Viyakarn and S. Chavanich  
Chulalongkorn University, Bangkok, \*e-mail: chalothon\_r@hotmail.com

The sexual reproduction of the scleractinian staghorn coral, *Acropora humilis*, at the Naval Military Base, Sattahip, Chonburi Province, Thailand was investigated. This coral is a hermaphroditic broadcasting species that is commonly found in the Gulf of Thailand. In this study, gametes in bundles were collected directly underwater using a gamete collector during their spawning season in February 2006 and 2007. The collected bundles were carefully transferred to a fertilization tank in a land-based hatchery. The bundles from different colonies were mixed together for fertilization. Then, the morphological development stages of *Acropora humilis* larvae were observed every hour. The first equal cleavage division was observed one hour after the eggs were fertilized. The cell then started dividing quickly, and changed to the prawn-chip stage after 8 hours. After 18 hours, the shape of fertilized eggs became round again with folded edges. Cilia developed after 36 hours and the larvae started swimming slowly; this stage was called the planula larva. After 3-days old, the planulae started searching appropriate areas for settlement by swimming near the bottom of the rearing tank due to their negative phototactic behavior. From this study, the time period of each developmental stage may be different in different areas depending on physical factors, such as sea water temperature and light.

---

## Macrobenthic fauna communities in human activity areas in the Lower Songkhla Lake

---

**R. Puttapreecha\* and S. Angsupanich**

*Prince of Songkla University, Songkla, \*e-mail: ratneekorn@hotmail.com*

This research investigated and compared the distribution of macrobenthic fauna in areas in the Lower Songkhla Lake where there are, and are not, significant human activities. Study stations were set on transect lines, with each line divided into 5 substations beginning at the shore and extending into the lake at distances of 2, 50, 100, 200 and 300 m. Macrobenthic fauna were collected every 3 months from March to December 2006. BOD values for the area with low human activity (1.6 - 2.0 mg l<sup>-1</sup>) were markedly lower than at the area with high human activity (4.4 - 15.9 mg l<sup>-1</sup>), with the highest reading at a distance of 2 m from the shore. DO values at distances 2 - 100 m from the shore of the latter area were close to the critical point. Organic matter sediment was also higher at the high human activity area (3.9 - 5.9%) than at the low human activity area (3.1 - 5.3%) with a gradual reduction in values as distance from the shore increased for both areas. These were related to the species diversity of macrobenthic fauna which was very low for the human activity area; in particular at the distances of 2 and 50 m there was almost nothing. At 100 m, a high density of fauna was found but only for the oligochaetes (80,000 ind/m<sup>2</sup>). The low human activity area had amphipods, tanaidaceans, polychaetes and molluscs along the transect line.

---

## Comparison of interstitial faunal communities between Phromsong and Phromlaeng streams, Nam Nao National Park, Petchabun Province

---

*C. Boonyanusith<sup>1,\*</sup>, N. Sangpradub<sup>1</sup> and C. Aryuthaka<sup>2</sup>*

<sup>1</sup>*Khon Kaen University, Khon Kaen, \*e-mail: Chaichat2001@Yahoo.com,*

<sup>2</sup>*Kasetsart University, Bangkok*

Many freshwater invertebrate metazoans inhabit the subsurface sediment of streams and rivers. This investigation of the interstitial fauna community was conducted in Phromsong and Phromlaeng streams, Nam Nao National Park, Petchabun province, during October 2004 to June 2005. Interstitial fauna and sediment were collected from 0-5 and 5-10 cm with a 4 cm diameter PVC standing-pipe. The samples were taken at two month intervals. The results showed that natural seasonal droughts and spates of high water occurred only in Phromsong stream. Grain size of sediment in this stream is more diverse and coarser than that of Phromlaeng stream. In Phromlaeng stream, the water flow regime is more constant, and sand and organic matter are predominant. Sand and organic matter may be trapped by log dams formed during times of high water. Total dissolved solids of surface and subsurface water in Phromsong stream were lower than those of Phromlaeng stream, while dissolved oxygen of this site and in surface water were higher. Results of analysis of physico-chemical parameters of surface water revealed the seasonal variation of these streams. Temporary meiofauna groups were significantly more abundant in Phromsong stream ( $p \leq 0.05$ ). Gastrotrich and monogonont rotifers were more abundant in Phromlaeng stream but tardigrades and Acarina were more abundant in Phromsong stream. In both streams, bdelloid rotifers were the most abundant group. Among temporary meiofauna, chironomid larvae were more abundant than other groups. The results of cluster analysis show that the interstitial faunal communities of both streams were different which correspond with the physical characteristics of the streams.

---

## Cercarial infections of freshwater snails (Family Thiariidae) in the northern part of Thailand

---

*D. Krailas\* and W. Dechruksa*

Silpakorn University, Nakhon Pathom, \*e-mail: kduang@su.ac.th

Cercarial infections of freshwater snails (Family Thiariidae) in the northern part of Thailand, were studied at twenty-six different water sources. The snails were collected every two months for one year for each location; collection started and ended at varying times between December 2004 and July 2006. Eighteen species of freshwater snails were found: *Tarebia granifera*, *Melanooides tuberculata*, *Melanooides jugicostis*, *Thiara scabra*, *Paracrostoma pseudosulcospira pseudosulcospira*, *Paracrostoma paludiformis paludiformis*, *Paracrostoma paludiformis dubiosa*, *Paracrostoma morrisoni*, *Brotia (Brotia) binodosa binodosa*, *Brotia (Brotia) microsculpta*, *Brotia (Senckenbergia) wykoffi*, *Brotia (Brotia) pagodula*, *Brotia (Brotia) binodosa spiralis*, *Brotia (Brotia) insolita*, *Brotia (Brotia) manningi*, *Brotia (Brotia) costula costula*, *Brotia (Brotia) baccata* and *Brotia (Brotia) citrina*. The cercarial infections were investigated using shedding and crushing methods. Ten species of cercariae were found from 18 locations. They were *Haplorchis pumilio* (CtN<sub>1</sub>), *Haplorchis taichui* (CtN<sub>2</sub>), *Centrocestus formosanus* (CtN<sub>3</sub>), *Acanthatrium hitaense* (CtN<sub>4</sub>), *Loxogenoides bicolor* (CtN<sub>5</sub>), *Haematoloechus similis* (CtN<sub>6</sub>), *Cloacitrema philippinum* (CtN<sub>7</sub>), *Cardicola alseae* (CtN<sub>8</sub>), *Alaria mustelae* (CtN<sub>9</sub>), and *Transversotrema laruei* (CtN<sub>10</sub>). Seven species of snails were trematode hosts (1<sup>st</sup> intermediate hosts). They were *T. granifera* [(CtN<sub>1</sub>), (CtN<sub>3</sub>), (CtN<sub>4</sub>), (CtN<sub>5</sub>), (CtN<sub>6</sub>), (CtN<sub>8</sub>), (CtN<sub>9</sub>), (CtN<sub>10</sub>)], *M. tuberculata* [(CtN<sub>1</sub>), (CtN<sub>2</sub>), (CtN<sub>3</sub>), (CtN<sub>4</sub>), (CtN<sub>5</sub>), (CtN<sub>6</sub>), (CtN<sub>7</sub>), (CtN<sub>10</sub>)], *T. scabra* [(CtN<sub>1</sub>), (CtN<sub>2</sub>), (CtN<sub>4</sub>), (CtN<sub>5</sub>), (CtN<sub>6</sub>), (CtN<sub>10</sub>)], *P. p. paludiformis* [(CtN<sub>6</sub>)]; *B. wykoffi* [(CtN<sub>5</sub>), (CtN<sub>6</sub>)]; *B. c. costula* [(CtN<sub>1</sub>), (CtN<sub>5</sub>), (CtN<sub>6</sub>)] and *B. citrina* [(CtN<sub>1</sub>), (CtN<sub>5</sub>), (CtN<sub>6</sub>)]. *T. granifera* was infected by several kinds of cercariae. The infection rate of *T. granifera* was 5% (1,241/24,862).

---

## **Cercarial infections of freshwater snails (Family Thiariidae) in the Northeast of Thailand**

---

*D. Krailas\* and S. Chotsaengsri*

*Silpakorn University, Nakhon Pathom, \*e-mail: kduang@su.ac.th*

Cercariae, the larval stages of trematodes, were investigated in the freshwater snail family, Thiariidae, in the Northeast of Thailand. Thiariid snails are classified in the Phylum Mollusca, Class Gastropoda, Subclass Prosobranchia, Order Mesogastropoda. In Thailand, Brandt (1974) classified thiariids into 2 subfamilies: Thiariinae and Melanatriinae. There are 8 genera and 27 species of thiariid snails in Thailand. In this study, species diversity was recorded and habitats were examined for physical and chemical properties such as temperature, rate of water flow, conductivity, turbidity, dissolved oxygen and pH of water. The snails were collected by handpicking and scoop methods using counts per unit of time and the collected snails were identified. Thiariid snails were found in twenty-eight locations in the Northeast of Thailand. The snails were collected every other month for one year. Nine species of freshwater snails were found. The cercarial infections were investigated using shedding and crushing methods. Ten species of cercariae were found from 20 locations. This study can be used as a source of information on the biological diversity of parasitic infections in snail intermediate hosts of animal and human parasitic trematodes.

---

## Population dynamics of the blue swimming crab *Portunus pelagicus* (Linnaeus, 1758) at Khung Krabaen Bay, Chanthaburi Province

---

C. Kunsook\*, N. Gajasen and N. Ruenkaew

Chulalongkorn University, Bangkok, \*e-mail: chutapa9@hotmail.com

This study aimed to analyze the population dynamics of the blue swimming crab in Khung Krabaen Bay, Chanthaburi Province, from January to December 2005. The results of this study indicated a decline in crab production from 80 tonnes/year in 2004 to 62 tonnes/year in 2005. The sex ratio of males to females was 1:1.19. Statistical analysis showed significant differences in the seasonal distribution of crabs, with high numbers in the winter season, followed by the rainy season and dry season. The relationships between carapace width and weight were  $W = 0.0002CW^{2.7692}$  and  $W = 0.0004CW^{2.6067}$  in male and female crabs, respectively. Growth parameters for male crabs were  $L_{\infty} = 13.23$  cm and  $K = 0.87$  per year while growth parameters for female crabs were  $L_{\infty} = 12.95$  cm  $K = 1.05$  per year. Total mortalities of male and female crabs were 3.17 and 3.55 per year, respectively. Recruitment occurred all year but it showed two peaks. The first peak was during February to March and the second peak was during July to October. The size at sexual maturity of female crabs was 8.1 cm. Spawning of berried females occurred all year round with two peaks in September and January. The main foods of the crabs were fish, crustaceans and mollusks. For appropriate management of the blue swimming crab fishery, there should be: 1) a 6 month closed spawning season from July to December to allow recruitment recovery while providing compensation to fisherman; 2) an increase in mesh size to not less than 2.5 inches; 3) a ban on berried female crabbing; 4) protection of seagrass habitats as crab nursing grounds; 5) promotion of restocking and crab culture; and 6) education and publicity concerning sustainable fishing.

---

## Diversity of Protura in Doi Inthanon National Park

---

*N. Likhitrakarn\* and J. Tayutivutikul*

*Chiang Mai University, Chiang Mai, \*e-mail: kongerrrr@hotmail.com*

Proturans (Insecta, Protura) will be collected along an altitudinal gradient in Doi Inthanon National Park, Chiang Mai Province. Five different forest types will be chosen at 500 m intervals including dry deciduous dipterocarp forest, mixed deciduous forest, lower evergreen forest, upper evergreen forest, and summit cloud forest. At each site, a plot of one hectare will be established and further divided into 12 subplots. Ten soil samples will be collected monthly using 15 × 15 cm quadrats at a depth of 5 cm along a 100 m line transect at 10 m intervals located in each subplot. The soil samples will then be transferred to Berlese funnels with a light heating system for 72 hr. The proturan specimens will be separated and permanent slides will be made for each individual. Taxonomic information will be given. Species richness and species abundance values will be calculated. Biological data and environmental variables will be analysed using various statistical techniques (e.g. multivariate and univariate analyses). Multivariate analyses will be applied for explaining the ecological data by computer software, such as the PATN package which includes ordination and clustering by Semi-strong Hybrid Multidimensional Scaling (HMDS) and Two-way Indicator Species Analysis (TWINSPAN). Univariate analyses will be used for comparing abundances of species or environmental variables by Analysis of Variance (ANOVA) in the statistical SPSS package. The actual number of species present in each forest will be calculated and compared with the observed number using EstimateS 7.5 software.

---

## Cytogenetic and molecular evidence for two species in the *Anopheles barbirostris* complex (Diptera: Culicidae) in Thailand

---

**A. Saeung<sup>1,\*</sup>, Y. Otsuka<sup>2</sup>, V. Baimai<sup>3</sup>, P. Somboon<sup>1</sup>, B. Pitasawat<sup>1</sup>,  
B. Tuetun<sup>1</sup>, A. Junkum<sup>1</sup>, H. Takaoka<sup>2</sup> and W. Choochote<sup>1</sup>**

<sup>1</sup>Chiang Mai University, Chiang Mai, \*e-mail: atiporn44@yahoo.com,

<sup>2</sup>Oita University, Japan, <sup>3</sup>Mahidol University, Bangkok

Seventeen isolines of *A. barbirostris* derived from animal-biting females showed 3 karyotypic forms: Form A ( $X_2, Y_1$ ), 5 isolines (Phetchaburi); Form B ( $X_1, X_3, Y_2$ ), 3 (Chiang Mai) and 8 (Ubon Ratchathani) isolines; Form C ( $X_2, Y_3$ ), 1 isolate (Phetchaburi). All 17 isolines exhibited an average branch summation of seta 2-VI pupal skins ranging from 12.1-13.0 branches, which was in the limit of *A. barbirostris* (6-18 branches). Of the 12 human-biting isolines from Chiang Mai province, 5 isolines showed Form B ( $X_2, Y_2$ ) and 7 isolines exhibited a new karyotypic form designated as Form E ( $X_2, Y_5$ ). All 12 isolines had an average branch summation of seta 2-VI pupal skins ranging from 22.4-24.5 branches, which was in the limit of *A. campestris* (17-58 branches). Thus, they were tentatively designated as *A. campestris*-like Forms B and E. Crossing between *A. campestris*-like Forms B and E yielded viable progenies, suggesting conspecific relationships. Reproductive isolation among crosses between *A. campestris*-like Form B and *A. barbirostris* Forms A, B and C strongly suggested the existence of these 2 species. The very low intraspecific variation (genetic distance < 0.005) of ITS2, COI and COII of *A. campestris*-like Forms B and E supported their conspecific relationship. The large sequence divergence of ITS2 (0.203-0.268), COI (0.026-0.032) and COII (0.030-0.038) of *A. campestris*-like Forms B and E and the *A. barbirostris* Forms A, B and C clearly supported cytogenetic and morphological evidence.

---

## Distributions of black flies in Thailand

---

*C. Kuvangkadilok\**, *K. Meeyen* and *V. Baimai*  
Mahidol University, Bangkok, \*e-mail: scckv@mahidol.ac.th

A faunistic survey of Simuliidae at 40 sites in northern, southern and central Thailand was made during July 2006-January 2007. A total of 34 *Simulium* species were collected, of which one new southern species, *S. adleri*, collected from Bang Thao Mae waterfall, Krabi province, was assigned to the *batoense* species-group of the subgenus *Gomphostilbia* on the basis of the slender, parallel-sided hind basitarsus of the male. The larva of the new species is distinguished from those of other species in the same species-group by a postgenal cleft that extended less than half the distance to the hypostomal groove and by a dark grey-banded abdomen interrupted on abdominal segment VI by a lack of pigment. Ten species (*S. asakoae*, *S. siamense*, *S. caudisclerum*, *S. fruticosum*, *S. merga*, *S. mediocoloratum*, *S. chamlongi*, *S. nigrogilvum*, *S. doipuiense* and *S. weji*) were restricted to some northern sites whereas three species (*S. adleri*, *S. grossifilum* and *S. nobile*) were found only in southern sites. Differences in distribution and species composition of black flies seem to correlate with altitude as well as micro-habitat factors such as stream sizes, water temperature and water velocity.

---

## Development of a biotic index for rapid bioassessment in the Mekong II Basin, Thailand

---

*P. Getwongsa\* and N. Sangpradub*

*Khon Kaen University, Khon Kaen, \*e-mail: paiget1@yahoo.com*

Biological monitoring of freshwater is a use made of ambient biological communities, assemblages, and populations to protect, manage, and even exploit water resources. In addition to protecting the health and lives of humans, plants and aquatic animals, and environmental quality, biological monitoring can also be used to manage wider areas, i.e., all catchments, or evaluate stream ecology for protection. The aim of this project is to develop a standard rapid bioassessment procedure for streams in Thailand by following the Rapid Bioassessment Protocol of the USEPA (Barbour et al., 1999). The study was conducted in 20 streams of the Mekong II Basin (in the Thailand part). Spatial and temporal structure and composition of macroinvertebrate communities were considered. Environmental and physicochemical parameters were measured. During the last 5 seasons, 84 sampling stations were sampled. Fifty-one reference and 33 test sites were classified based on location and surrounding environments. Total habitat scores were significantly higher ( $p < 0.05$ ) in reference sites than those of test sites for all seasons. Some physicochemical parameters of water quality at reference and test sites were different between seasons. Most water quality parameters were significantly different ( $p < 0.05$ ) between seasons at both reference and test sites. In this study, four phyla, 20 orders, 101 families, 194 taxa, and 24,763 individuals of macroinvertebrates have been found so far. The study is ongoing. The total no. of taxa, intolerant taxa, % intolerant organisms, Beck's biotic index, no. of clinger taxa, % dominant taxon, % chironomidae, and no. of trichoptera taxa are potential candidate metrics for developing a bioassessment index in the basin.

---

## Ecological genetics and reproductive isolation of fruit fly parasitoids in the *Diachasmimorpha longicaudata* complex in Thailand

---

*S. Kitthawee*

*Mahidol University, Bangkok, e-mail: grskt@mahidol.ac.th*

Parasitoids are beneficial wasps that are useful in biological control. The parasitoid *Diachasmimorpha longicaudata* parasitizes fruit fly larvae which infest many commercially grown fruits. Several researchers have suggested that the taxon *D. longicaudata* is probably a species complex. Can these species complexes be used together for biological control? Answers to this question require a thorough understanding of host and parasitoid species. Thus, it is necessary to undertake genetic investigations of *D. longicaudata* populations in the field to understand their genetic structure and to elucidate their taxonomic status. Although genetic differences can ensure species isolation among species in a complex, it is still important to verify reproductive isolation. Cross breeding experiments can investigate reproductive isolation among such populations. If the populations of different species interbreed, the resulting offspring are either abnormal in number, unviable or infertile. The need to optimize the use of each parasitoid species in terms of their effectiveness is also necessary for a biological control program. Hence, the objectives of this project are: 1) to evaluate levels of genetic variation in natural populations of the *D. longicaudata* complex by using the SSCP technique; 2) to compare DNA sequences and to construct phylogenetic trees; 3) to determine the mode of reproductive isolation within the *D. longicaudata* complex; 4) to determine host choice by comparison of foraging and oviposition behavior among members of the *D. longicaudata* complex; 5) to study the co-evolution of hosts and parasitoids in this interesting group.

---

## **Genetic diversity of the *Diachasmimorpha longicaudata* complex in Thailand based on PCR-SSCP of 28S, 16S and ITS regions**

---

**Y. Chaopipat\*, S. Kitthawee**

*Mahidol University, Bangkok, \*e-mail: macrophage171@yahoo.com*

Species of the *Diachasmimorpha longicaudata* complex are parasitoids considered useful for classical biological control. The morphological similarity among species in the complex is a crucial classification problem. If genetic polymorphisms are present, then this problem may be solved. One efficient molecular technique that has been used for scanning genetic diversity is SSCP (single strand conformation polymorphism) analysis. The 28S, 16S and ITS genes are commonly selected for this technique because of their great significance for discrimination among closely related species. The polymorphisms of these genes can be detected by SSCP. Then different haplotypes of PCR products are sequenced. These sequenced genes are used to construct phylogenetic trees to analyze relationships and genetic structure within populations of this species complex in Thailand. This useful technique can be applied for further classification within other parasitoid species complexes.

---

## Species diversity of stingless bees (Apidae, Meliponinae) in the north of Thailand

---

*T. Jongjitvimol\* and W. Wattanachaiyingcharoen*

*Naresuan University, Phitsanulok, \*e-mail: touchkanin@yahoo.com*

A study of the species diversity of stingless bees (Apidae, Meliponinae) was conducted in northern Thailand during June 2005 to December 2006. A total of 500 nests of stingless bees was found at different nesting sites, i.e., underground, termite mounds, buildings or constructions, and tree trunks. All specimens were identified into 15 species in 2 genera: *Hypotrigona scintillans*, *Trigona apicalis*, *T. collina*, *T. fimbriata*, *T. itama*, *T. laeviceps*, *T. latigenalis*, *T. fuscobalteata*, *T. geissleri*, *T. melanoleuca*, *T. nitidiventris*, *T. peninsularis*, *T. terminata*, *T. thoracica*, and *T. ventralis*. They are distributed in areas in which altitude ranges from 45 – 1,700 meters above sea level.

---

## Relationships of brittle stars with sponges at the Lan Islands, Chonburi Province

---

**P. Komkham<sup>1\*</sup>, N. Gajasen<sup>1</sup> and S. Putchakarn<sup>2</sup>**

<sup>1</sup>Chulalongkorn University, Bangkok, \*e-mail: pattareena@hotmail.com,

<sup>2</sup>Burapha University, Chonburi

The relationship between sponges and brittle stars on the coral reef of the Lan Islands, Chonburi Province, the Gulf of Thailand, was studied during April 2005 to March 2006. Sponges in the Class Demospongiae that were associated with brittle stars were classified into 5 Orders, 2 Suborders, 19 Families, 21 Genera, and 25 species. The dominant species was *Iotrochota baculifera* (38%), followed by *Xestospongia testudinaria* (19%), *Hyrtios erecta* (8%), *Neopetrosia* sp. (6%), *Haliclona amboinensis* (5%), *Phobas arborescens* (4 %) and *Clathria (Thalysias) reinwardti* (4%). Associated brittle stars in Class Ophiuroidea were classified into 1 Order, 3 Families, 5 Genera, and 14 species. Among these, 11 species had disk diameters less than 10 mm and 3 species had disk diameters more than 10 mm (*Macrophiothrix aspidota*, *M. variabilis* and *Ophiothrix (Placophiothrix) fumaria*). The dominant species was *Ophiactis savignyi* (73%) which was associated with 24 sponges, while *O. exigua* (6%) was associated with 14 sponges. Volumes of sponges had no significant relationships with species, numbers and sizes of brittle stars. The sponge associated with the most numbers of brittle star species was *Iotrochota baculifera* (9 species) followed by *Hyrtios erecta* (8 species), *Clathria reinwardti* (7 species), *Pseudoceratina* sp. (6 species) and *Neopetrosia* sp. (6 species). This study indicated that *O. savignyi* had specific relationships with *Mycale grandis*, *Callyspongia (Euplacella) joubini* and *Gelliodes petrosiodes*, *O. exigua* had a specific relationship with *C. subarmigera*, and *O. maculosa* had a specific relationship with *Biemna fortis*. In conclusion, the factors affecting associations of brittle stars with sponges are the morphology and distribution of sponges.

# สัตว์มีกระดูกสันหลัง