Abstracts of the Papers Presented at the 19th Biennial Conference of the AABE

The Asian Association for Biology Education – Thirty Years on

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AABE is holding its 19th consecutive biennial conference, a remarkable feat considering the Association's humble beginnings and its very broad goals and membership base. AABE is a society of biology educators with interests in the Asian region. AABE's aims include improvement in teaching and promotion of biology education in Asia, as well as providing an opportunity for biologists, education researchers and teachers to network for the mutual benefit of their own professional development. In this paper I present a brief history of the Association, its aims, achievements and future possibilities.

Key words: AABE, achievements, aims, future possibility, history.

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Greening the University Campus

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Anna Boustead attended the National Conference for Sustainable Universities in Melbourne this year (2002). She will be presenting ideas from the conference and through her work as Environment Representative for Deakin University Student Association Warrnambool, about ways in which universities can work with staff, students and community groups towards Ecologically Sustainable Development. She will briefly address waste management, water management, reducing energy consumption, improving biodiversity on campus and community engagement.

Key words: Campus activities, Ecological Sustainable Development, student association.

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(The full paper will be included in the next issue)

A Preliminary Assessment of Macroinvertebrate Composition along the Eumeralla River Estuary, South West Victoria

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In March 2002 a series of 62 dip net samples were taken at various sites along the estuarine section of the Eumeralla River to assess macroinvertebrate composition. Macroinvertebrate samples were taken at a total of 43 sites, with water chemistry data recorded for each sampling location. Of the 43 sites, 37 were taken within the channel and the remaining 6 taken from accessible inundated areas. Geographical Information Systems (GIS) was used to map and plot site locations within the sample area. ArcView 3.2a, a GIS computer package, was used to visually represent species distribution and abundance, also allowing for the visual determination of species 'hot spots.' The program was also used to determine any calanoid copepods the most abundant and widely distributed species. Other species found to be widely distributed included amphipods and *Pomatopygrus* sp. Overall, instead areas of high abundance were noticed at irregular locations. Inundated areas showed relatively high species richness and abundance, compared to that of samples taken from within the channel.

Key words: Eumeralla River estuary, GIS, macro-invertebrate fauna, water quality.

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Arthropod Biodiversity of the UST Biological Station, Zambales, Northern Philippines

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An inventory study of the arthropod fauna at the University of Santo Tomas (UST)' Biological Station and its vicinity was taken into account. Of the four study sites, results showed 20 orders, 25 families and 70 species of arthropods identified. The most abundant species are the beetles, followed by the grasshoppers and butterflies of the Orders Coleoptera, Hymenoptera and Lepidoptera, respectively. Species of arthropods with public health and economic importance were also noted.

Biting flies of the Order Ceratopagonidae which bites sea lovers and vacationers voraciously, causing allergy abounds in the study sites. *Chrysops dimidiate*, a tabanid fly which infects and destroys the flowers of mangoes was also noted. Mites, ticks, fleas and louse of the Order Siphonatera, Mallophaga and Anoplura were collected from domesticated animals in the areas of study. These ectoparasitic arthropods cause great annoyance and discomfort to the local inhabitants of the area. Species of edible crabs and shrimps of the Order Decapoda which serve as food for the seashore folks were listed.

This includes the rare species of *Birgo latro*, the coconut crab about the size of a basketball, which can climb the coconut tree, unhusk the fruit and break its shell. Rare arachnid species endemic only in this part of the Philippines like the "black widow spider" scientifically known as *Latrodectus mactans*, as well as the giant scorpion known as *Palamneus* sp. were studied. A species of micro crustacean of the Order Amphipoda, *Orchestia agilis*, were noted as a good indicator of water pollution as they abound in areas in which water is highly polluted and absent in non-polluted areas.

The species of arthropods collected were brought at the Department of Biological Sciences, UST and become a part of the lesson in Invertebrate Zoology Taxonomy class. Proper methods of preservation, mounting and pinning of the specimen were taught to the students. The rich arthropod fauna of the place become the haven for biology students performing entomological research and a way for appreciating the arthropods in their natural ecosystem. They were also taught conservation of arthropod species especially those which are in danger of extinction.

Key words: Arthropod, biodiversity, educational use, fauna, Philippines.

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Development and Utilization of Web Teaching Material on Biological Experiments and Observations

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In biological education it is very important to observe living things and carry out experiments. However, many of the students have very limited opportunities to carry out experiments and make observations during class lessons and they learn from the textbooks only. It is therefore difficult for them to acquire and improve the techniques and skills of observation and experimentation. We have developed several web materials since 1996 (1,

[2, 3]. Our web materials have taken so many accesses, (over 10 thousand), and we have already received many responses from students and teachers. The Web materials have the merit that anybody can get many kinds of the information in all places. In this research, we have developed a Web teaching material on biological experiments and observations using plant materials to support the experiments and observations and carried out for Asian and African teachers and students. In this material, we have selected three areas of plant biology based on secondary school biology contents: structure, functions and reproduction. Each area includes several activities on experimentation and observation. We have practiced many experiments, carried out observations, and taken many photographs of the procedure and the results. We have made new material and released them in September 2002. When users are using this material, they open up the Internet Explorer, and type the Internet address* (http://scied123.ed.hiroshima-u.ac.jp/experiment/indexe.html) or look for this material from the search engine. On its cover page, there is an index list of experiments and observation. They click the activity item they want to refer. Each activity consists of three web pages: one page for material, one page for procedure, and one page for observation. By viewing these pages in this order, users will be able to learn the procedure of experiment or observation. In the procedure page, for instance, the methods of experiment or observation are shown by many photographs which are used for explanation thus making it easier for users to understand the experiment/observation procedures. Users can use the photographs in the result page to compare with their results. When it is difficult for students to carry out an experiment or an observation in school, it is also possible for them to learn plants by viewing the pictures on the result page, and summarize the result of experiments or observations using the information. In the case of laboratory room or classroom where there is no computer, teachers can use the laminated and printed papers. Furthermore, we take some in-service training for teachers from Asian and African countries every year. We use this material in the training course, and we therefore consider it as good material for helping them to understand and learn the protocol of basic experiments and observation. Using this teaching material, the users will acquire knowledge and skills on how to carry out experiments and observations. It will enable them to study any biological topic effectively.

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Plant Mitosis: http://scied123.ed. hiroshima-u.ac.jp/mitosis/indexe.html (accessed 12/25/02)

Key words: Experiments and observations, Web teaching material.

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Inhibitory Effect of Mycelial Culture Broth of Edible Mushroom on Growth of Certain Bacteria

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The inhibitory effect of mycerial culture broth of fifteen species of edible mushrooms on the bacterial growth was investigated. Mycerial culture of each mushroom on potato dextrose agar was grown in potato dextrose broth and incubated in shaking incubator at the optimum temperature of each mushroom. The culture broth was taken every 3 days for 30 days and evaporated until 5 ml remained. The broth was tested for the inhibitory activity on the growth of *Bacillus cereus, Escherichia coli, Micrococcus luteus, Salmonella enteritidis* and *Staphylococcus* aureus by paper disc diffusion method. It was found that the mycelial culture broth of nine mushrooms were able to inhibit the growth of the tested bacteria i.e. *B. cereus* was inhibited by *Auricularia polytricha, Pleurotus pulmonarius, Agrocybe cytindracea, P. cystidiosus, Ganoderma lucidum* and *Lentinus edodus. Staph. aureus* was inhibited by *Au. polytricha, P. pulmonarius, Ag. cytindracea, Microcybe crassum* and *L. edodus. S. enteritidis* was inhibited by *P. cystidiosus* and *L. edodus. Micrococcus luteus* was inhibited by *Au. polytricha, P. pulmonarius, P. cystidiosus, P. ostreatus, Ag. cytindracea, G. lucidum, L. edodus, L. squarrosulus* and *M. crassum. E. coli* was only inhibited by *L. edodus.* The culture broth of *L. edodus* inhibited the growth of all the tested bacteria at 6-30 days cultivation. At the 15th day, the mycelial culture broth of this mushroom was then subjected to Thin Layer Chromatography and 2 bands with Rf 0.09 and 0.41 were obtained. Each band was tested against the tested bacteria but no inhibitory effect was observed. The culture broth of the other six mushrooms i.e. *P. ostreatus* var. *florida, L. polychrous, Shcizophylum commune, P. sajor-cju, Au. fuscosuccinia* and *Corpinus cinereus* were not able to inhibit the growth oc any tested bacteria.

Key words: Bacterial growth, edible mushroom, inhibitory effect, mycerial culture broth.

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The Growth Responses of the Floating Weed *Pistia stratiotes* to Lead and Cadmium Uptake

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The floating water weed *Pistia stratiotes* was examined for its phytoremediation potential for Pb and Cd absorption and accumulation. *Pistia stratiotes* were grown in half-strength Hoagland solution amended with either Pb or Cd: 0, 0.1, 0.5, 1.0 and 3.0 mg L^{-1} for 14 days inside a greenhouse. The Pb and Cd concentrations in plant tissues significantly increased with increasing levels of the heavy metals in the culture solution. The biological concentration factor (BCF) significantly decreased with increasing Pb exposure. Significant reduction in the BCF was noted in plants treated with 3.0 mg Cd L^{-1}. There was no significant effect of Pb treatments on the total plant biomass. The leaf production of Pistia plants exposed to 3.0 mg Pb L^{-1} was not significantly different with the control. Increasing Cd treatments in the culture solution significantly decreased the total plant biomass and the number of leaves of Pistia plants. The total leaf chlorophyll content of *Pistia stratiotes* significantly reduced with increasing Pb and Cd amendments. Base on the growth responses of the plants, they can tolerate high levels of Pb and Cd, hence, can be utilized as scavengers of the heavy metals in contaminated freshwaters and industrial sewage effluents.

Key words: Cadmium floating weed, growth response, heavy metal uptake, Lead, Pistia stratiotes.

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ISO14001 and Environmental Education in High Schools

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ISO14001, the International Standard for Environmental Management Systems, has become very popular in Japan, with the number of certified organizations rising to more than 10,000 as of September 2002. Although this trend started in private companies mainly in the manufacturing industry, many local governments and even some educational institutions have been applying for this certification.

The Government of Mie Prefecture has been promoting the introduction of ISO14001 in its own offices, municipal governments and small companies in an effort to make the region an "Environmentally Advanced Prefecture." Three high schools in Mie have also been granted ISO14001 certification so far.

Certification of high schools has only begun recently, and it is too early to comment on the effects of these programs, but systematic environmental education is being implemented in the certified schools.

The biggest obstacle is the cost involved in obtaining certification. This problem can be solved by creating simpler, domestic environmental management systems, such as the "Plan-Do-Check-Action" (PDCA) cycle, which incorporate ISO 14001 principles but which are easier to implement.

Key words: Environmental education, high school, ISO14001, "Plan-Do-Check-Action" cycle.

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Dividing into the Gene Pool: Teaching the Mathematical Consequences of Sexual Reproduction and Evolution Using XLGene, a Microsoft Excel-based Population Genetic Simulation Program

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Courses in population genetics, the study of the dynamics of gene frequency change in populations of organisms or gene pools, are demanding for students and challenging for teachers. The combination of sexual reproduction and the diversity of evolutionary processes that influence gene frequencies means that difficult new concepts need to mastered by students and the field relies heavily on mathematics. The first difficult concept that students have to come to grips with is that sexual reproduction ensures that every new individual or genotype created is genetically unique, never to recur.

The life expectancy of a genotype is therefore a single generation; in contrast the genes themselves transcend the mortality of the individual. Thus it is genes not genotypes that get transmitted to the next generation making the gene frequency the currency of population genetics. To understand, let alone teach students about the dynamics of gene frequency change in natural population it is necessary to make certain simplifying assumptions. These allow the behaviour of genes to be described by simple mathematical equations which constitute the essence of classical population genetics. In the pre-computer days innovative teachers used bags to represent populations and coloured beans (bean bag genetics) and had students randomly sampling beans from bags in pairs to illustrate sexual reproduction and the basic models of population genetics.

In this technological age we can use computers instead of bean bags to help teach basic concepts in population genetics and a number of different programs or packages in a range of formats and of

varying merit have been developed. This paper reviews some of these programs and introduces a program, XLGene, which runs under Microsoft Excel written by one of us (RC) that models the behaviour of genes under a range of conditions. The simplicity of the program and its innovative use of graphics make it a powerful teaching tool which greatly facilitates the transmission of genetic concepts from one generation to another.

Key words: CAI, dynamics of gene frequency change, gene pool, Microsoft Excel program, population genetics, sexual reproduction.

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An Example on the Practice of the Integrated Study in the Yoshii River etc

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In the present study, the trial of the Integrated Study was carried out through outdoor activities mostly in the Yoshii River, following the learning plan under the title of "The Time for Good Friends" in the 4th grade at the Yoshii Elementary School, in Okayama Prefecture on 6th July, 2001. As a result of the trial, kids attempted to apply the knowledge and practiced in their actual lives, and to make their lives better – they joined the local environmental campaign willingly, whatever they could do – never made leftover food, utilized the soap made of used oil and the acryl swab, sprayed the rice washing water to plants, etc.

Key words: elementary school, Integrated Study, outdoor activities, Yoshii River.

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Major Antigens of *Cryptosporidium parvum* Recognized by Serum Antibodies from Newborn Calves Using Western Blotting and SDS-PAGE Electrophoresis

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Cryptosporidium parvum is a protozoan parasite which is mostly pathogenic to neonate animals (especially ruminants) and immunocompromised humans (AIDS patients). The infection in the host is characterized by profuse aqueous diarrhea with anorexia and fever. Diarrhea is self-limiting in immunocompetent hosts but is life threatening in immunosuppressed humans and young animals.

In this study two main target antigens, having molecular weights of 15-17 and 23 kDa were recognized by the newborn calves, based on the evaluation of the serum humoral immune response in their blood and saliva. Serum IgA intensively recognized the 15-17 kDa antigens. Electrophoretic and Western blot analysis showed that specific animal antibody response appeared between Day 3 and Day 16 post challenge. This study demonstrates that these two antigens are consistent targets of humoral immune response and therefore can be of great interest in studies concerning therapy and prophylaxis against *Cryptosporidium parvum.*

Key Words: Antibody, antigen, Cryptosporidium parvum, *SDS-PAGE, Western blot.*

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The Taxonomy and Ethnobotanical Studies of *Dioscorea* (Dioscoreaceae) among the Aetas in Bataan, Philippines

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A total of 4 *Dioscorea* species *(D. alata, D. hispida, D. esculenata*, and *D. pentaphylla)* were collected, processed, examined and identified in Duale, Limau, Bataan. Distinctive morphological features such as root characters, presence of spines on the stem, nature of the stems type and indumentum of the leaves were included in the taxonomic key. The ethnic people called Aetas (Kulots), were provided with questionnaires to determine the conventional agricultural practices, utilization, conservation and ecological distribution of the said genus. The gathered data were classified, analyzed and tabulated. The most common yams are *D. alata* and *D. esculenata* utilized as sources of food and medicine.

Key words: Aetas, Dioscorea, *ethnobotany, Philippines, taxonomy.*

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Opening-Closing Movements in Response to Light Stimuli in Processed Leaves of *Oxalis corymbosa* DC. - A Study of Light Responses As Subject Matter for Biology Education -

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Fully opened leaves of potted plants of *Oxalis corymbosa* DC. closed completely by folding their leaflets downward after keeping the plant in the dark for 2 hours. The folded leaflets, then, moved upward gradually after exposure to light. We developed the methods to measure the leaf movement quantitatively. 1) A paper protractor folded every 10˚ was devised to measure angles, opening angles, between stalks and main vein of each leaflet. 2) The greater parts of lamina of an excised leaf with its stalk were removed to measure its stalk were removed to measure the opening angles more correctly. It was confirmed that the processed-excised leaf exhibited the opening-closing movement in response to light stimuli in the same manner as an intact leaf. We investigated the effects of light quality (blue, red and white) on leaf movements with the processed-excised leaf and the paper protractor. Blue and red light was obtained by covering the fluorescent lamps with red and blue cellophane filters. It was demonstrated that the pulvini cells of *O. corymbosa* perceived blue light and regulated their turgor pressure to open the leaflets.

Key words: leaf movement, nastic movements, Oxalis corymbosa, *response to light stimuli.*

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Rare Actinomycetes Isolated from Coastal Soils As Antimicrobial Producers

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Eleven soil samples from eleven sites were collected from Pai Island in Chonburi Province. Total actinomycetes colonies appearing on the Actinomycetes Isolation Agar, Starch Casein Agar and Glucose Asparagine Agar plates were quantified and examined. Representative colonies were picked up and morphological and some chemical characteristics of cells were studied. Out of 159 isolates, 13 antibiotic producing strains were found and most of which were *Streptomyces*, *Micromonospora* and *Microbispora*. Other non-antibiotic producing strains were *Streptomyces*, *Micromonospora, Pseudonocardia, Actinomadura, Nocardia, Nocardiopsis, Saccharopolyspora, Microbispora Promicromonospora, Saccharomonospora, Kineosporia and Thermoactinomyces.* The predominant species were *Streptomyces* and *Micromonospora*. Total

number of bacteria in soil was 18.58 x 10^3 cfu/g soil (3.6 x 10^3 ~ 57.4 x 10^3) in average. Most of the soil texture was silt and sandy in a small area. Soil humidity was 8.18 percent and humic acid was 0.58 percent in average. Furthermore, 93.79 percent of all isolates might be marine or halotolorant species. Eighty nine out of 159 isolates were thermotolerant actinomycetes and could grow at 40°C and some strains could grow at higher temperature up to 55°C.

Key words: Actinomycetes, Antimicrobial producer, Coastal soil, Thailand.

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