Abstracts

Session 7
Emerging, re-emerging Diseases and Urban Entomology

Plenary paper

S7.1 *Blastocystis hominis* – on the trail of an emerging parasite

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The concept of emergence is attributed to an organism if the occurrence of the respective organism in humans has increased in the past two decades or threatens to increase in the near future. Emergence also can be attributed to a spread to new geographic areas or populations or the existence of different isolates and strains which responds to drugs differently conferring a survival advantage. *Blastocystis hominis*, an intestinal protozoan widely found in humans and in a range of animals continues to have its life cycle, taxonomy, transmission mode and pathogenicity still in enigma. The present review provides evidence to show that *Blastocystis* fulfils the criteria to be referred to as an emerging parasite. Evidence will be provided to demonstrate the surge of concern including anecdotal experiences that has recently emerged with regard to this parasite. Our development of an improved laboratory detection method contributed to determine the significance of *Blastocystis* in human and non-human hosts. We have recently elucidated phenotypic and genotypic characteristics associated with human-pathogenic and human-non-pathogenic *Blastocystis* with the establishment of the amoebic forms based on morphological, biological, biochemical and pathological differences. This probably accounts for the discrepancies observed when highlighting the parasite's role in causing gastrointestinal symptoms. The resistance to treatment with metronidazole and the changes in morphological forms could have contributed to the emergence of new isolates. Lifestyles and environmental changes such as global warming may influence environments to be conducive enough for potential sources for protozoan parasites such as *Blastocystis* to be transmitted to humans.

S7.2 Non-invasive measurement of oxidative stress level in humans infected with intestinal parasites

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Oxidative stress has been implicated as an important pathogenic factor in the pathophysiology of various life threatening diseases such as cancer, atherosclerosis and diabetes. Oxidative stress occurs when the production of free radicals overcome the antioxidant defenses in the body. Numerous studies have shown that oxidative stress is present in parasitic infection. However, such studies are lacking in the Malaysian population infected with intestinal parasites. The objective of this study is to establish standardized methods for the assessment of oxidative stress level in the urine of humans infected with intestinal parasites. Four biochemical assays namely lipid peroxidation (LP), ferric reducing antioxidant power (FRAP), hydrogen peroxide (H_2O_2) and advanced oxidative protein product (AOPP) assay were carried out using methods previously established and further modified. Stool examination showed that the subjects were positive for the presence of *Blastocystis hominis*, *Ascaris, Trichuris*, hookworm and microsporidia. The levels of AOPP, H_2O_2 and LP were significantly higher ($P<0.05$, $P<0.001$ and $P<0.05$ respectively) in parasite infected subjects (n=75) compared to the controls (n=95). FRAP level in the parasite infected subjects was almost two fold higher than the controls ($P< 0.001$). This could support the hypothesis that the free radicals generated by the enzymes of the parasites will also increase the level of reductants secreted in our body. This study provides evidence that oxidative stress is elevated in humans infected by intestinal parasites. Future researchers should consider free radical related pathways to be a target in the interventions of new drugs against parasitic infection and related diseases.

S7.3 Studies on the field effectiveness of the mosquito exterminator, SkeeterVac®SV-35

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A study was conducted to evaluate the field effectiveness of a commercially available mosquito trap, SkeeterVac®SV-35. The SkeeterVac®SV-35 is a mosquito trapping device with thermoelectric generator that is capable of converting propane into carbon dioxide, heat and water vapour, with additional attractants of octenol and light source. The study was conducted for 12 weeks, viz. 3 weeks of pre-treatment and post-treatment each, and 6 weeks of SkeeterVac®SV-35 placement at the study site. Outdoor "bare leg catch" (BLC) was carried out for 24 hours during every pre-treatment and post-treatment weeks. Percentage of mean number mosquito/man/day obtained from BLC in the pre-treatment studies indicated that *Culex quinquefasciatus* (45.78%) and *Aedes albopictus* (43.75%) were the predominant mosquitoes. A total of 2,397 mosquitoes belonging to 8 mosquito species were collected from 3 units of SkeeterVac®SV-35 after 6 weeks of placement at the study site. SkeeterVac®SV-35 was able to attract and trap large number of *Cx. quinquefasciatus* (85.82%). A total of 77.69 - 100% of mosquitoes trapped by SkeeterVac®SV-35 were females, showing that SkeeterVac®SV-35 was effective in attracting female mosquitoes. The placement of SkeeterVac®SV-35 at the study site for 6 weeks gave a significant reduction of *Ae. albopictus* (60.08%) and *Cx. quinquefasciatus* (34.73%) populations trapped ($p < 0.05$). SkeeterVac®SV-35 used in this study exerted trapping effect against *Ae. albopictus* and *Cx. quinquefasciatus* during the trial period.

S7.4 Antibacterial effects of the water extracts of Carpenter Bamboo Bees, *Xylocopa* sp (Hymenoptera : Xylocopidae) against *Streptococcus pyogenes*

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Insects have always been associated with human, either by causing diseases or being beneficial to mankind. The carpenter bamboo bees, genus *Xylocopa* sp (Hymenoptera : Xylocopidae) are large bees that have been used as traditional medicine by the Chinese community since hundreds of years ago for the treatment of sore throat. The present study was conducted to evaluate the antibacterial activity of water extracts from adult carpenter bamboo bees against Gram-positive bacteria, *Streptococcus pyogenes*. Inhibition of bacterial growth was investigated using bacteria count method, grown on Mueller-Hinton blood agar culture media mixed with the bee extracts. Optical density (OD) was also measured to determine the inhibition of bacterial growth in Luria broth mixed with the bee extracts. Extraction of whole bees was done by using heated water at 55°C – 60°C and water at room temperature. The results showed that antibacterial activity was detected in the water extract of carpenter bamboo bees obtained from Chinese traditional medicine shop, extracted using heated water at 55°C – 60°C. On the contrary, little or no antibacterial activity was obtained from both Chinese traditional shop and wild bees extracted using water at the room temperature. Higher concentration of bee extracts and heated water were required in order to obtain the antibacterial activity. Future study should be done to determine whether the bacterial properties in the extract of carpenter bamboo bees from Chinese traditional medicine shop is bacteriostatic or bactericidal, and to determine the active agents of the extract.

S7.5 Feeding responses of the ghost ants, *Tapinoma melanocephalum* (Fabricius) and *Tapinoma indicum* (Forel) to macronutrients: preference, and effects of periodical changes and nutritional satiation

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The ghost ants, *Tapinoma melanocephalum* and *Tapinoma indicum,* are pests commonly found infesting residential premises and food outlets in Malaysia. Controlling these ants can be extremely difficult and lengthy since the ants' activity inside a building may vary by day and location. The ability to colonize disturbed habitats and the ability to relocate nesting sites rapidly makes it difficult to be managed. Exploring into the feeding behaviour of these ants would be a very important preliminary step in the baiting strategies. In this study, the feeding responses of both ghost ants towards three macronutrients, namely carbohydrate, protein and lipid using laboratory-bred colonies was observed. Results indicated that 50% (w/w) and 60% (w/w) sucrose solution were chosen as the most preferable carbohyhdrate-based foods. Fresh dog food (beef chunks in sauce), male Lobster cockroaches (*Nauphoeta cinerea*) dried powder, fresh sardine and fresh cat food (roasted chicken feast) were chosen as their main protein sources. Egg yolk was the most preferable lipid. Throughout the entire course of the periodical feeding preference study (12 weeks), both ghost ant colonies showed significant preferences for carbohydrate ($p < 0.05$). Carbohydrate satiation would cause *T. melanocephalum* to forage for either lipid or protein-based food. On the other hand, *T. indicum* consistently showed preference towards carbohydrate-based food, irrespective of what they were satiated with. The implications from these findings and the possibility in enhancing the success of baiting are discussed.

S7.6 Tunneling behaviour of subterranean termites *Coptotermes gestroi* Wasmann, *Coptotermes curvignathus* Holmgren and *Coptotermes kalshoveni* Kemner

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Coptotermes is an important genus of subterranean termites which consists of some of the most destructive termite species, attacking buildings and wooden structures worldwide. There are three economically important species of *Coptotermes* in Peninsular Malaysia, namely, *C. gestroi*, *C. curvignathus* and *C. kalshoveni* with varying prevalence of infestation. This study was conducted to study the tunneling behaviour of the three *Coptotermes* using two different methods, the petri dish method (using agar as tunneling medium) and the glass jar method (using the mixture of sand and water as tunneling medium). In the first method, four pieces of rubber wood were inserted into four directions of a 15-cm petri dish prior to the agar casting. Glass jar method utilized a glass jar containing mixture of sand and water with a piece of rubber wood and a piece of pine wood. In both methods, 200 worker termites and 10 soldiers were allowed to forage freely in the tunneling arena for 28 days. Experiment was replicated 10 times for each termite species. *C. curvignathus* was found to be the most aggressive species with most extensive tunneling activity, followed by *C. gestroi*. *C. kalshoveni* has the least tunneling activity, and was found to show higher resource fidelity. *C. kalshoveni* also showed the highest wood consumption rate within the 28 days of evaluation period. Both *C. gestroi* and *C. kalshoveni* preferred rubber wood over pine wood while *C. curvignathus* showed same affinity toward both rubber and pine wood.

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