

LSM1303 Animal Behaviour Symposium 2017

Student observations of animal behaviour in Singapore

Group No. 1: “How does the water level affect aggressive behaviors of giant mudskippers (*Periophthalmodon schlosseri*) at Sungei Buloh Wetland Reserve, Singapore”

Leslie Ho Zong Hong (SOC2), Lee Lu Ke (SOC2), Peh Yi Xiu (FAS3), Xu Yidong (SCI3), The Zheng Yuan Marcus (SCI4)
Symposium I (20 March 2017)

Giant Mudskippers (*Periophthalmodon schlosseri*) are amphibious fish commonly found in mudflats in Singapore. In this project, we investigated the effect of the water level on the frequency of aggressive behaviour of Giant Mudskippers at Sungei Buloh Wetlands Reserve (SBWR). All occurrence sampling of aggressive behaviours of Giant Mudskippers was conducted at SBWR mudflats viewed from the Tree-Top Walk through a period of two hours during the first low tide on four different days. Each non-consecutive display of aggressive behaviour was counted as a single instance of aggression. The results indicate that aggressive behaviour increases with higher water levels: two fights per hour when the ground was exposed at low tide; 12 fights per hour in shallow water; and 21 fights per hour at high water. This may be attributed to the congregation of mudskippers at shoreline, resulting in more territorial disputes.

Group No. 2: “What is the foraging and vigilance behaviour of Red Junglefowl (*Gallus gallus*) in Botanic Gardens?”

Lionel Lee (FOE4), Chan Gin Yong (FOE4), Wee Chee Cheong (FOE4), Yeo Song Rong (FOE4), Lim Wen Zhen (FOE4)
Symposium I (20 March 2017)

The Red Junglefowl (*Gallus gallus*) belongs to the Phasianidae family that is identified by a prominent red comb and white ear-wattles in males. We asked the following questions: i) What proportion of time is spent on foraging vs. vigilance? ii) What was the foraging success rate? iii) Were there any differences between grass patch & leaf pile and also between a male and female? iv) Does *Gallus gallus* have a master leg? The behaviour of a group of *Gallus gallus* at the Botanic Gardens was video-recorded from 7.00am to 9.00am over five days. Most foraging occurs from 7.00am to 7.40am. More time is spent on the leaf pile where higher success rate was observed. The males spend more time in the grass patch. There are no noticeable dominant leg tendencies. *Gallus gallus* forages mainly in leaf piles where males have a lower success rate due to higher vigilance requirements.

Group No. 3: “How do locomotion, scanning and feeding behaviours vary between adult and juvenile long-tailed macaques (*Macaca fascicularis*)?”

Goh Yi Sin (FAS3), Ma Xin Wei Jessie (FAS3), Au Jin Kai (ENG4), Lau Zi Jun (FOS2)
Symposium I (20 March 2017)

Long-tailed macaques (*Macaca fascicularis*) are primates commonly found in southeast Asia. In this project, we compared the time spent on locomotion, scanning and feeding behaviours between adult and juvenile macaques along the MacRitchie Trails. Focal animal sampling of the activity budgets of adult (n=8) and juvenile (n=4) macaques was conducted by four observers for 5-minute intervals at different times of the day (0900-1200, 1400-1700, 1700-1830) for three days (7, 21 & 23 February 2017). A total of 3153s of focal data was recorded. The results showed differences in percentage of time spent on locomotion (juvenile>adult), scanning (adult>juvenile) and feeding on natural (juvenile>adult) and non-natural (adult>juvenile) food items. Percentage of time spent on locomotion and scanning behaviour can be explained by difference in level of physiological deterioration in juvenile and adults. Due to scarcity of resources, adult and juvenile monkeys also target different food sources for greater success in foraging.

Group No. 4: “On the (Butter)Fly: Are feeding and flying behavioural patterns of Plain Tiger butterflies (*Danaus chrysippus*) affected by the level of urbanization in their resident habitat? ”

Lai Yousheng Lester (FAS3), Doris Sun Ruo Xuan (FAS3), Anton Tan Kee Boon (FAS3), Choong Sin Ying Esther (FAS3), Hoo Chong Xian (FOE3)

Symposium I (20 March 2017)

This project investigates the effects of urbanized and less urbanized habitats on the behaviour of plain tiger butterflies (*Danaus chrysippus*); a common species in Singapore marked by orange forewings, and black borders with white spots. Five observers conducted a study from 25-26 February 2017, at Botanic Gardens (less urbanized) and Fort Canning Park (more urbanized). Focal sampling of four butterflies at Botanic Gardens, and three butterflies at Fort Canning, were conducted every 5-minutes with 1-minute rest intervals, from 0920hrs to 1137hrs. The duration spent on flying, feeding, and resting behaviours were recorded. Results indicate that butterflies in more urbanized areas spent more time in directed flight and less time feeding. We conclude that butterfly behavioural patterns are influenced by the nature of their habitat in terms of flower availability and extent of urbanization, highlighting the need for better butterfly conservation efforts in Singapore.

Group No. 5: “Do Red Weaver Ants (*Oecophylla smaragdina*) remain stationary and autogroom more in groups as compared to when they are alone?”

Cheng Ke Jing (SOC4), Koh Wai Kit (SOC4), Tng Xin Jie Jordon (FASS3), Venetta Angeline Ho Li-Min (FASS3), Aaron Seow Chengyi (FoE4)

Symposium I (20 March 2017)

Red Weaver Ants (*Oecophylla smaragdina*), a eusocial species of ants, can be found among vegetation around Singapore. We investigated the differences in stationary and autogrooming behaviours between group and lone ants. Focal sampling were conducted using footages of 10 minutes each taken along Rivervale Drive on 22nd, 24th and 27th of February 2017 at 9am, 11am, 1pm, 3pm at Berlayer Creek Boardwalk on 28th and 29th at 2pm and 3pm. Ants that remained motionless for longer than two seconds were considered as stationary and ants rubbing antennae against each other's bodies were considered autogrooming. Results showed that group ants remained stationary for a larger proportion of time compared to lone ants (40% vs 3%). Additionally, group ants displayed lesser autogrooming behaviour (7% vs 23%). In accordance to the theories on group size, this could be the result of lower individual vigilance when social animals are in groups.

Group No. 6: “During low tide, do tree-climbing crabs (*Episesarma* spp.) feed more frequently on land or in shallow water?”

Bevin Seetoh Jia Jin (SOC3), Gan Wen Jie Adam (SOC3), Joleen Chan Geok Ching (SOC3), Pay Hao Jie (SOC3), Quek Yang Sheng (SOC3)

Symposium I (20 March 2017)

Tree Climbing Crabs (*Episesarma* spp.) are commonly found at mangroves in Singapore. There are three different species and they can be identified by the colour of their claws. In this project, we investigated if there is a relation between locations, on land and in shallow waters, and how frequently the crabs feed during low tide. Five observers did focal and occurrence sampling totalling 40 hours on 32 crabs at Pasir Ris Park across 5 days (20-24 February 2017). There were no fixed timings because we had to take the tidal level into consideration. Specifically, we observed crabs that were within 20 cm from the water, and ended our observation when the crabs moved out of range, or did not carry out any foraging or feeding action for one minute. From our results, we conclude that crabs feed more frequently on land (642 occurrences) than in shallow waters (348 occurrences).

Group No. 7: “How often do Asian army ants (*Carebara diversa*) forage in Kent Ridge Park and how frequently do worker and soldier ants interact during foraging?”

Niveetha Nair(SOC3), Angie(SOC3), Brehmer Chan Xi Quan(SOC2), Chua Yu Peng(SOC2), and Moy Jun Jie (FOS3)
Symposium I (20 March 2017)

Carebara diversa, also known as Asian army ant, are known for large foraging trails and extreme specialisation among the different castes of ants. Our project investigates the foraging intervals for Asian army ants from 8am to 6pm in Kent Ridge Park, and how worker and soldier ants interact during foraging. Ad Libitum sampling was used to establish an ethogram, and scan sampling was employed in a 2min/8min interval across 4hours/pair of observers, over 10 hours of observation in two days. An interaction was defined as any occasion when ants were in direct contact of foraging material, or by the transportation of worker ants by soldier ants. Foraging is when the ants bring back substance into their nest. From our results, we conclude foraging frequency increases from 8am to 12pm but decreases thereafter from 12pm to 6pm, and there is a positive correlation between foraging and interaction frequency.

Group No. 8: “How does path efficiency of foraging *Oecophylla smaragdina* compare between a disturbed environment (with high human interaction) versus a less disturbed environment (more natural) in Singapore between 3.00 and 5.00pm?”

Natasha Qayyum (Exchange), Jack Belham (Exchange), Regent Neo Wee Leen (FoS2), Goh si Xuan Rita (FASS4), Alison Tan Pang Hsin (FoS2)
Symposium I (20 March 2017)

The Red Weaver Ant (*Oecophylla smaragdina*) is commonly found across Singapore in different habitats. We sought to measure the path efficiency of foraging Weaver Ants, comparing one location with frequent human interference (UTown) against a more naturalised location (Kent Ridge Park) every Thursday 3-5pm for 5 weeks. Scan sampling was conducted to calculate the ratio of foraging to non-foraging ants; and focal sampling was conducted over one minute intervals to calculate the efficiency of ant travel whilst foraging. Our results showed that the location with more human interaction had higher path efficiency. This could be due to the nest being nearer to a known food source, in addition to smaller food pieces being present due to human presence. These factors mean that less time is wasted looking for other food sources. The signalling pheromones are thus kept local and individuals become more familiar with the foraging route, along a man-made railing.

Group No. 9: “What are the effects of unintentional food provisioning on the frequency of feeding and foraging behaviors of Javan Mynas (*Acridotheres javanicus*) at a park and a hostel?”

Audrey Tang Yoke Peng (FAS3), Tan Kang Soon (SOC4), Liu Longying (SOC4), Lareina Ting (SOC4), Hoe Yu Ming (FOS3)
Symposium I (20 March 2017)

Javan Mynas (*Acridotheres javanicus*) are highly adaptable omnivorous birds commonly found in Singapore. This project investigated the effects of unintentional provisioning of food (UPF) on the frequency of feeding and foraging behaviors of Javan Mynas at a park (Botanic Gardens - BG) and hostel (King Edward 7 - KE7 Hall). Scan and all-occurrence sampling were employed at the park (lower UPF) and hostel (higher UPF) across 7 days between 9am to 12pm and 4pm to 5pm, to observe the mynas' feeding (pecking ground = 'FP') and foraging (lowering chest to the ground = 'FC', lunging forward = 'FL') behaviours. Approximately 20 birds were analysed across 4 hours of video. Results indicated no FL, 60% more FC and 30% more FP in KE7 as compared to BG. Therefore, we concluded that the frequency of feeding behavior is higher at places with higher UPF, while foraging behaviour varies according to the level of UPF at the location.

Group No. 10: “Do wild and domestic chickens (*Gallus gallus*) behave the same?”

Chow Zheng Jie(FAS3), Hong Wei Ren(FAS3), Pearlyn Goh Pei Ling (FAS3), Ryan Cheok Jia Yuan (FOE4), Wong Hui Yi Pamela (FAS3)

Symposium I (20 March 2017)

The Red Junglefowl (*Gallus gallus*) is the genetic ancestor of the domesticated white leghorn (*Gallus gallus domesticus*) and has had a growing presence in Singapore. We have observed that wild Red Junglefowls in Pasir Ris live together the domesticated White Leghorn, despite their different genetic breed and hence characteristics. Thus, we aim to investigate if Red Junglefowls and White Leghorns exhibit the same behavior in the wild by comparing the count of various foraging, preening, and social behavior. We conducted all occurrence sampling on two flocks of chickens for four days from 9.30am to 11.30am. We concluded that the genetic influence on behavior is less than that of environmental influence, as both breeds exhibit similar behavior. However, the aggression exhibited by the White Leghorn despite its supposed docile characteristics shows that these White Leghorns experience social strain within the flock.

Group No. 11: “What is the effect of tidal levels on the frequency and type of aggressive behaviours of tree-climbing crabs (*Episesarma* spp.) in Sungei Buloh Wetland Reserve?”

Angeline Yip Wei Peng (FASS2), Christine Yip Wei Ling (FASS2), Li Xiang(FASS3), Keith Jayden Fernandez(FASS3), Ng Yun Hui Winnie(FASS3)

Symposium II (03 April 2017)

Tree-climbing crabs (*Episesarma* spp.) are leaf-eating crabs which inhabit mangrove tree bases and mud lobster mounds. Our research aims to investigate possible effects of tidal levels on the frequency and type of aggressive behaviour among *Episesarma* spp. in Sungei Buloh Wetland Reserve. We employed all occurrence and focal sampling to record the frequency and types of *Episesarma* spp.'s aggressive behaviours (cheliped extension, rapid locomotion and pincer engagement) during different tidal levels, over two days at three locations in Sungei Buloh Wetland Reserve. Our findings show greater frequency and diversity of types of aggressive behaviour displayed by *Episesarma* spp. during lower tide levels. Rapid locomotion was the most common across different tidal levels, although other types of aggressive behaviour were occasionally observed. Overall, we conclude that lower tide levels coincide with more aggressive behaviours among these crabs, and this could be due to the competition for food sources during foraging hours.

Group No. 12: “What is the most common foraging behaviour of Little Egrets (*Egretta garzetta*) between mudflats and sandy areas at Sungei Buloh Wetland Reserve?”

Chelsea Goh Jia Hua (FASS4), Derek Teh Ming Jie (FOE4), Gerald Wong Wei Chuen (SOC2), Johann Wong Jun Guo (SOC2), Lee Wan Qing (SOC2)

Symposium II (03 April 2017)

Little Egrets (*Egretta garzetta*) are wading birds characterised by yellow feet and black beaks that usually feed at mudflats and sandy areas . Amongst various foraging strategies, we examine which is frequently used between mudflats (1C and 1B Hides) and sandy areas (1D Hide) at Sungei Buloh Wetlands Reserve. Scan sampling (15 minutes of activity at 5 minutes intervals) was used to record our observations. Five members recorded 32 hours of data for 4 days in the morning (7am-11am) and evening (2pm-6pm) when the birds are most active. We counted one count of foraging activity after each probe. The population count was then averaged. The results indicate little egrets feed more in muddy areas than in sandy areas. In both microhabitats, the most common foraging behaviour was stand and feed (74.2% and 51.9%). Furthermore, they feed more in the morning. Thus, the lead recurrent foraging behaviour exhibited was stand and feed at both microhabitats.

Group No. 13: “Does the frequency of grooming, duration of grooming or the gender of grooming initiator affect the occurrence of copulation of Long-tailed Macaques (*Macaca fascicularis*)?”

Lee WanLing Felicia (BIZ4), Tan Unice (BIZ4), Vishnu Prem (SOC4), Lim Shen Yi (FOS3), Xi Chen (FOS3)
Symposium II (03 April 2017)

Long-tailed Macaques (*Macaca fascicularis*) are a common primate species in Singapore that live in social groups and rely on grooming efforts to manage relationships. In our project, we observed if the frequency, duration of pre- or post- copulation grooming and the gender of grooming initiator affected the occurrence of copulation. 19 observations points were collected using all occurrence sampling of the troop (n=10) residing in MacRitchie Reservoir Park's Prunus Trail from 0800hrs to 1200hrs on 4 occasions. Only adults were considered and they were distinguished from juveniles based on physical characteristics. Our results indicate that the frequency of grooming may not increase occurrence of copulation (<30%). There is no direct correlation between duration of grooming and occurrence of copulation. Grooming that occurred with copulation was predominantly initiated by males (80%), and we will endeavour to explain why.

Group No. 14: “How different is the vigilance and foraging behaviour between the rooster and mother-hen among the Red Junglefowl (*Gallus gallus*)?”

Thatchinamoorthy S/O Krshnan (FASS4), Wong Jia Wen Kelly (FASS2), Lu Yu (SOC3), Ee Jing Wen Chelsea (FASS1)
Symposium II (03 April 2017)

The Red Junglefowl (*Gallus gallus*) is the wild ancestor of the domestic chicken. We studied a flock of one rooster and one mother-hen with two chicks and compared the frequency of vigilance and foraging between a mother-hen and rooster in the Singapore Botanic Gardens. Focal sampling was used to record vigilance and foraging behaviours in 10-min intervals over six days for a total period of 10.5 hours. After accounting for outliers, a one-tailed t-test was carried out which produced results contrary to our hypothesis that the mother-hen would be more vigilant. It was observed that the rooster was more vigilant than the mother-hen and the mother-hen foraged more than the rooster. We discuss our findings and compare our results with existing literature which suggests greater vigilance in mother-hens.

Group No. 16: “What is the most widely occurring foraging behaviour in Red Weaver ants (*Oecophylla smaragdina*)?”

Chiam Min (FASS1), Lakshmi Ganesan (FASS3), Wong Sze Xin (FOS3), Tithi Paul (EX3)
Symposium II (03 April 2017)

Red Weaver ants (*Oecophylla smaragdina*), commonly found in tropical Asia and Australia, are known for their remarkable chain formation during nest construction and foraging. In this project, we decided to investigate on what is the most widely occurring foraging behaviour of the red weaver ants. We conducted our observations in Labrador Park on five separate days. Scan sampling was conducted every 30 seconds for 30 minutes between 0800-1000 hours and an ethogram of 10 behavioural traits was obtained. Five different foraging behaviours were recorded – “Chain Forming”, “Walking”, “Biting”, “Carrying” and “Not Moving”. The most widely occurring foraging behaviour would be the one with the most number of ants performing it within our sampling time frame. Our results indicated that “Forming Chains” is the most widely occurring behaviour during foraging and we will investigate the reason why it is as such through current research and literature.

Group No. 21: “How do tide conditions affect the activities of giant mudskippers (*Periophthalmodon schlosseri*) at Sungei Buloh Wetland Reserve?”

Sam Tan Chin Hiang (SOC3), Barnabas Tan Sheng En (SOC3), Yan Chan Min Oo (SOC3), Chua Wei Jie (FOE4), Foo Chee Wei Nicholas (FOE4)

Symposium I (20 March 2017)

Giant Mudskippers (*Periophthalmodon schlosseri*) are mangrove-inhabiting amphibious fish identifiable by long black stripes on sides of their body. We investigated the effects of tidal conditions on the activities exhibited by giant mudskippers. We used ad libitum sampling at Sungei Buloh Wetland Reserve to create an ethogram. Following which, we conducted scan sampling in 1-minute intervals over two days on 21 individuals. Observations were made between low tide to one hour before high tide. Non-movement, locomotion, territorial, and nesting behavioural states were observed and recorded. Our results showed that the ratio of activity-to-inactivity of behavioural states were (5.04 times) higher during rising tide (1.51) than receding tide (0.30). Hence, we conclude that a higher tide level results in an increased frequency of locomotive activities in the mudskippers.

Group No. 22: “How does the vigilance and foraging behaviour of the White-breasted Waterhen (*Amaurornis phoenicurus*) vary according to the distance from it's roosting site?”

Tan Vanessa (BIZ3) Ko Kai Jun, Cedric (Eng4), WONG LUE WEI MARCONI ATARU (Eng4), Vivek Lakshmanan (SOC1), Li PengCheng(SOC1)

Symposium I (20 March 2017)

White breasted waterhens (*Amaurornis phoenicurus*) are small birds with distinctive white breasts which are commonly found in damp swampy areas in Singapore. In this project, we scrutinized the effect of distance from roosting areas on their foraging and vigilant behaviours. Focal sampling of 18-20 waterhens was conducted at Bishan Park for six days from 0700 hrs to 1000 hrs (20-26 February 2017). The duration of keeping its head low and every incidence of looking up were recorded as foraging and vigilant behaviours respectively. Longer duration of foraging and higher frequency of vigilance behaviours were observed near the roosting areas. The waterhens' main priority for the protection of its roosting areas while foraging may be due to presence younglings. The waterhens exhibit more foraging and vigilant behaviours near roosting area. Other possible reasons such as familiarity of ground and scarcity of food will also be discussed.

Group No. 23: “Do adults and juveniles long-tailed macaques (*Macaca fascicularis*) exhibit different frequencies of vigilance behaviour?”

Ng Li Teng Cheryl (FOS3), Samantha See (FOS3), Matthew Yap Rong Jie (FOS3), Gu Yining (FOS2), Qu Wenqin (FOS2)

Symposium I (20 March 2017)

Vigilance is thought to have evolved as an antipredator defense amongst primates. Little is known, however about the variation of vigilance behavior amongst long-tailed macaques (*Macaca fascicularis*). We examined vigilance in one group of macaques along Old Upper Thomson Road. We studied the frequencies of vigilance behavior between adults and juveniles. We collected a total of 341 minutes of all occurrence samples (N=192) on six separate occasions during February and March, 2017. Adults and juveniles macaques do exhibit different frequencies of vigilance behavior. The results however, do not support the hypotheses that adults are more vigilant than juveniles and that macaques are most vigilant when on the ground. This could be due to differences in familiarity of the area between adults and juveniles, and group size effect respectively.

Group No. 24: “What are the differences in foraging behaviours between adult and juvenile long-tailed macaques (*Macaca fascicularis*)?”

Cai Deshun (SOC2), Ang Hwee Lee Jasmine (SOC2), Mak Zhi Hao Keloysius (SOC1), Valerie Lui Qi (BIZ2), Ian Tan Wei'En (SOC2)

Symposium I (20 March 2017)

Long-tailed macaques (*Macaca fascicularis*) live in matrilineal social groups. In this study, we aim to investigate the specific differences in the foraging behaviour between adult and juvenile macaques. We studied the differences in ingestion and non-ingestion related behaviour between the different age groups during a foraging bout. We conducted scan sampling on a troop of macaques residing in the forest of Bukit Timah Nature Reserve over four days between 0800 hours to 1200 hours in February 2017 for a total time of 11 hours. We recorded the time each macaque spent on each behavioural activity in seconds. Adult macaques were observed to spend 56% of their time on non-ingestion related activities compared to the juvenile's 37%. Furthermore, adults spend more time on vigilance-related behaviours during foraging bouts. This supports the hypothesis that adult macaques spend a smaller proportion of time ingesting than juveniles.

Group No. 25: “How does the foraging behavior for Giant Mudskippers (*Periophthalmodon schlosseri*) vary according to their size and the tide levels in the mudflats in Sungei Buloh Wetland Reserve?”

Teh Ee Thai (SOC5/BIZ5), Kenneth Ho (SOC3), Liu Zhen Dong (SOC2), Leah Lim (SOC2), Choy Wan Ying Amanda (SOC2)

Symposium I (20 March 2017)

Giant Mudskippers (*Periophthalmodon schlosseri*) are carnivorous intertidal organisms native to tropical mudflats. We investigated how differently sized Giant Mudskippers' foraging behaviors vary with tide levels in Sungei Buloh Wetland Reserve's mudflats. Using focal sampling, each of our 5 members recorded one mudskipper's behaviors over 4-hours, with 2-minute breaks every 5-minutes. Three 4-hour sessions were conducted with 15 mudskippers observed in total. Results indicate that mudskippers spent more time foraging during low tide (17% frequency) compared to high tide (~0% frequency), and smaller mudskippers were more active foragers. These behaviors may be due to fewer predators, more prey, and different foraging costs for differently sized mudskippers at low tide. We conclude that mudskippers generally minimize foraging at high tide, likely because costs (energy expenditure/predatory risk) outweigh food gains, and vice versa at low tide. Smaller mudskippers are more active likely because their energy expenditure costs are lower than larger mudskippers.

Group No. 26: “How do the individual and paired Black Carpenter Ants (*Camponotus pennsylvanicus*) worker ants at Bukit Timah behave differently in terms of communication?”

Mirei Iida (FOS3), Lavina Wee Jia Lin (FOS3), Syed Buhari Naushad Begum (FOS3), Lim Pei Yen (FOS3) Dewi Adrini (FASS4)

Symposium I (20 March 2017)

Black carpenter ants (*Camponotus pennsylvanicus*) are known for behaviour called tandem running in which ants exhibit paired behaviour. Our research aims to study if individual ants and paired ants behave differently in terms of communication. Ad libitum and all occurrence sampling were employed in the morning (7:00-8:30) and evening (18:00-19:30) over seven days at Upper Bukit Timah Road to establish an ethogram. Three types of communication were identified and the result shows that nudging is the most preferred mode of communication except in individual ants which prefer antennae interaction. Our results corroborate previous finding in the literature, hence further suggested that nudging behaviour was done to keep the leader ant informed the presence of follower ant and antenna interaction was used when two ants intersect with one another for exchanging

information. In summary, ants have preferred type of communication which best suits their intentions when they are in different settings.

Group No. 27: “What prey capture techniques are used by weaver ants (*Oecophylla smaragdina*) for varying prey sizes?”

Aw Wei Lin (SOC4), Gangadevi D/O Balakrishnan (SOC4), G. Vishnu Priya (SOC4), Duan Xu Zhou (SOC4)
Symposium I (20 March 2017)

Weaver ants (*Oecophylla smaragdina*) prey on a large range of arthropods, such as insects and spiders. We aim to investigate what prey capture techniques were utilised by the weaver ants for varying sizes of prey. All occurrence sampling of the foraging behaviour was conducted over two days at NUS Computing, where the nest was located. Observations were made in the morning (Feb 22: 8am to 2pm) and afternoon (Feb 20: 2pm to 7pm). The techniques were recorded while the size of the prey and the ants were measured by a ruler in the screenshot from the video and were categorised according to their sizes. The results showed that the ants killed small prey individually by biting them, while they killed a large prey together by stretching it. In conclusion, we observed that the weaver ants used different prey capture techniques according to the sizes of the prey.

Group No. 28: “Does size affect tree climbing behavior above water level of *Episeserma* spp. at Sungei Buloh Wetlands Reserve (SBWR) during rising tide?”

Chan Yuan Shan, Lim Hui Qi, Lim Qin Ying, Ng Zhi An, Ten Zhi Yang
Symposium I (20 March 2017)

Tree climbing crabs (*Episeserma* spp.) are crustaceans with squarish carapace that grow up to 5cm. They climb above the water level during the rising tide. In this project, we investigated the climbing occurrences across sizes during rising tide. Ad libitum sampling was conducted for 10 hours over 2 days (21st and 23rd Feb). We used quadrats and observed activities on 3 separate trees at Lumnitzera Walk, Sungei Buloh Wetland Reserve. All-occurrence sampling was done for a period of 10 minutes, during the rising tide. Every crab that moved more than 2 body lengths’ height were considered climbing. Results indicate that 94.6% of tree climbing activities observed were of crabs larger than 3.5cm. Assuming smaller crabs that were not observed were burrowing, our results agree with (Sivasothi, 2000) in that larger crabs tend to climb trees. The advantages of climbing above water level will also be discussed."

Group No. 29: “A study of temporal behaviour difference in the daily activity of the Long-Tailed Macaques (*Macaca fascicularis*)”

Khairul Rizqi Bin Mohd Shariff (SOC3), Adrian Pheh (SOC3), Terence Kong Kai Yuan (SOC3), Toh Ee Gek Shermaine (FOS3)
Symposium I (20 March 2017)

Long-tailed macaques (*Macaca fascicularis*) (LTM) are native to Singapore and are social animals found in different types of habitats including forests and mangroves. In this project, we investigated the temporal behaviour of LTM at different times of day at Bukit Timah Nature Reserve. Scan sampling was conducted from 0800 hrs to 1800 hrs by four people for 2 days, giving us 10 sets of data consisting of frequency and intensity, how much they move around, of activity (such as movement) for a troop of 13 LTM. Our results showed, for example, the frequency for movement are high ($n > 4$) in the late morning and late afternoons while low ($n < 3$) at noon. Also for intensity of movement being high ($n > 3$) in late mornings and evenings while low at noon ($n < 2$). From our data, we conclude that LTM are more active in late mornings and evenings compared to noon.

Group No. 31: “What is the optimal and preferred foraging area of the white-breasted waterhen (*Amaurornis phoenicurus*) at Singapore Botanic Garden’s Eco Lake?”

Alexandra Denise Galvez (FAS4), Charmaine Eu Hui Min (FAS3), Cheng Boon Yew Joseph (SOC3), Ong Jingyu, Zoe (FAS3), Lim Wei Ling Ruth (FAS4)

Symposium II (03 April 2017)

The White-breasted Waterhen (*Amaurornis phoenicurus*) is a small waterbird commonly found near water bodies such as well-vegetated wetlands, lakes and adjacent open areas. Since foraging is essential for waterhens’ survival, our project investigated the optimal and preferred foraging area of the waterhens at Singapore Botanic Garden’s Eco Lake. Over the course of five days, we filmed the waterhens’ feeding behaviour across three different terrains (water, grass and decomposed leaves) from 8am to 10am and 5pm to 7pm. All occurrence sampling was conducted to count the number of successful foraging attempts made as well as the total time spent at each terrain. A successful foraging attempt is recorded when the waterhen swallowed its food. Our results indicated that the average time taken for a successful foraging attempt is the shortest in water. Hence, it is concluded that the water is the optimal and preferred foraging area of the waterhen.

Group No. 32: “Do plantain squirrels (*Callosciurus notatus*) prefer foraging on the ground compared to in the trees?”

Tricia Tan Zi Ying (COM4), Tan Chia Kai (COM4), Mong Yunheng (COM4), Tan Yong Khai (FOS3), Amitkumar Gamane (COM4)

Symposium II (03 April 2017)

The plantain squirrel (*Callosciurus notatus*) is a small rodent, commonly found in Singapore’s parks and forests. This project aims to investigate whether plantain squirrels prefer to forage in trees or on the ground. Ad libitum sampling was conducted on 14 squirrels across three different habitats in Singapore (Botanic Gardens, Berlayer Creek Boardwalk and NUS Techno Edge Canteen), between 1100 - 1300 on different days, by five observers. The squirrels’ behaviors were recorded and analysed to determine the foraging preferences of squirrels. Approximately 35 minutes of raw footage was collected. Overall, we found that squirrels prefer to forage in trees as compared to on the ground. There was, however, no clear correlation between the type of habitat nor the preference of the squirrels to forage in trees or on the ground. We will also discuss our findings at Berlayer Creek, where we noticed that squirrels foraged exclusively on trees.

Group No. 33: “What is the difference in the foraging efficiency of Little Egrets (*Egretta garzetta*) and Great Egrets (*Ardea alba*) at Sungei Buloh Wetlands Reserve?”

Soh Wei Xuan (FASS3), Lee Hwi Soo (FASS1), Tan Xin Hui Serene (FASS3), Hazel Lee Xi Wen (FASS3), Vivien Chan Jia Yi (FoS2)

Symposium II (03 April 2017)

Little Egrets (*Egretta garzetta*) and Great egrets (*Ardea alba*) are two different species of white herons. They feed at Sungei Buloh during the migratory season. The difference in the foraging efficiency of Little Egrets and Great Egrets at Sungei Buloh Wetlands Reserve (SBWR) was studied. Focal sampling of both egrets were conducted in pairs at SBWR Main Hide at low tide timings in the morning at 5 minute intervals for 5 days. Twelve samples of each egret species were collected. The results indicated that little egrets have a higher overall foraging efficiency than Great Egrets (42.2% vs 37.93%). In addition, little egrets are also more active foragers than Great Egrets (1.33 vs 0.48 attempts per minute). With reference to literature, we hypothesized that the difference in foraging efficiency may be

due to the little egrets' wider variety of foraging behaviours and greater behavioural flexibility.

Group No. 34: "How does the proximity between smooth-coated otters (*Lutrogale perspicillata*) and proximity of humans and dogs affect their vigilance?"

Chan Ee Ray, Adrian (SOC3), Koh Ling Ling Jean (SOC4), Luah Bao Jun (SOC4), Won Jun Ru Daphne (SOC4), Goh Yuan Tat (SOC4)

Symposium II (03 April 2017)

Smooth-coated otters (*Lutrogale perspicillata*) are one out of two otter species native to Singapore. They are usually seen in mangroves, mudflats, rivers, and coastal areas. We examined how the proximity of the smooth-coated otters and their perceived threats will affect their level of vigilance.

We hypothesised that the nearer the perceived threats are to the smooth-coated otters, the higher their level of vigilance. We have decided to focus our research on the Marina otter family; eleven trips have been made in the mornings (0630 to 1100) and evenings (1730 to 1830). All occurrence sampling was conducted to measure the frequency the smooth-coated otters look up and the corresponding distance between them and their perceived threats. We will compare these otter's behaviour against an undisturbed environment. Our analysis supports our hypothesis that smooth-coated otters are more vigilant when perceived threats are closer to them.

Group No. 35: "Does the foraging environment (natural vs urban) affect the success rate of foraging Cattle Egrets (*Bubulcus ibis*)?"

Fiona Tan Yi Yun (SDE3), Pan Guan Shen (SDE4)

Symposium II (03 April 2017)

Cattle Egrets are commonly found in open fields and wetland habitats of Singapore. In this project, we investigated the effect of different environments (natural and urban) have on the foraging success rate of Cattle Egrets at Bishan Park and Sungei Ulu Pandan. Focal sampling of a total of 12 Cattle Egrets were conducted for 2 minutes each from 0900 hrs to 1200 hrs for three days (20 - 22 Feb 2017). Only clear visual cue of prey swallowing were tabulated as a successful hunt. The results indicated that a natural location (Pandan) provided a higher rate of success (76.4%) of foraging as opposed to Cattle Egrets of an urbanised (Bishan Park) location (66.6%). Assuming that the preys are evenly distributed across both locations, differences in success rate may be caused by higher human/vehicular traffic that interfered with foraging attempts. Hence, Cattle Egrets are more successful while foraging in a more natural environment.

Group No. 36: "Do plantain squirrels (*Callosciurus notatus*) display different levels of vigilance when foraging under different canopy cover densities in Clementi Woods?"

Patel Drashtiben Mukeshbhai (SOC2), Sng Yong Jie Dylan (SOC2), Marcus Ng Wen Jian (SOC2), Lim Wei Jie (SOC2), Lim Wei Ling (SOC2)

Symposium II (03 April 2017)

Plantain Squirrels (*Callosciurus notatus*) are highly adaptable arboreal rodents found in various habitats. Our study investigates the difference in the vigilance level of a squirrel when foraging under different canopy cover densities in Clementi Woods, Singapore. 19 samples were collected by groups of 2-3 observers stationed at two different areas. All occurrence sampling method was used to observe the squirrels from 7.30am to 12.30pm and from 1.30pm to 6.30pm for 2 days. Our results show that the average time a squirrel spends on the tree and ground in a more exposed area is approximately 3.5 times more and 0.2 times less than that in a less exposed area respectively. Our observation suggests that the vigilance level of the squirrels tends to be higher under low canopy density. The reason as to why they do so will also be discussed.

Group No. 37: “How fearful are Red junglefowls (*Gallus gallus*) towards humans and other animal species in Labrador Park?”

Chang Zhi'An Andrew (ARS3), Xie Ziyang Colin (FOE3), Lim Chen Gim (SOC4), Yau Yu Hong Nicholas (BIZ3)
Symposium II (03 April 2017)

The Red junglefowl (*Gallus gallus*), which can be found in small flocks around Singapore, is the common ancestor of the domestic chicken. This project investigated if increased vigilance was exhibited by Red junglefowls towards humans and animals that approach within an estimated five meter distance. All occurrence sampling was conducted amongst a group of 6-8 Red junglefowls in Labrador Park Nature Reserve from 1600-1800 on 5 different days in February 2017. 318 observations were then recorded in an ethogram when they displayed positive, neutral or negative behaviour. Results showed that the Red junglefowls in Labrador Park were indifferent towards both humans and other animals from their largely neutral fear reaction (53.4%). We believe that they may already be accustomed to humans in a highly urbanized country. Surprisingly, they displayed positive behaviour (19.1%) towards other animals in the vicinity that included chasing them, which could suggest aggressive territorial behaviour towards potential food competitors.

Group No. 38: “Does handedness affect fighting behaviour pattern of male porcelain fiddler crabs (*Uca annulipes*) at Pasir Ris Park Mangrove?”

Amos Wong Wen Jet (SOC3), Chua Jia Xuan (SOC2), Lek Jia Ying (SOC3), Tay Jie Hao (SOC3), Zhu Lingjie (SOC3)
Symposium II (03 April 2017)

Male Porcelain fiddler crabs (*Uca annulipes*) are identifiable by their enlarged left or right pincer, with a smooth outer palm and no triangular depression. This study aims to investigate the effect of handedness on the fighting behaviours of male *U. annulipes*. Observations using focal sampling were recorded on 31 right-clawed and 35 left-clawed crabs engaged in fights over 5 trips, between February and March, during low tide periods. Behaviours exhibited from the start of the fight - two males within a 5-cm distance, facing each other - to the end of the fight when both crabs disengage, were recorded. The observations indicated no differences in fighting behavior of male *U. annulipes*, which could be due to similar abundance of right and left-clawed individuals in the studied species. Therefore, this suggests that the handedness does not affect fighting behaviour in male *U. annulipes* at Pasir Ris Park Mangrove.

Group No. 39: “How does the foraging patterns of the zebra dove (*Geopelia striata*) vary between developed and natural environments?”

Gurvinderpal Singh (FOS3), Ho Qian Yi (FOE4), Maia Ravyn Yarborough (EXC3), Low Jin Siang (FOS4)
Symposium II (03 April 2017)

Zebra Doves (*Geopelia Striata*), belonging to the Columbidae family, are common residents of Singapore. The effects of environment on their foraging patterns were analyzed through observation of foraging and alert behaviors. Occurrence sampling was conducted by four members once in the morning and once in the afternoon at three different locations: a developed area where humans eat, a developed area where they do not, and a natural area. In five minute intervals, individual pecks were recorded for foraging behaviors, and stiffening and fleeing for alert behaviours. Group size varied between observations ($1 < n < 5$); the total number of individuals observed was 32. Our data showed that frequency of both foraging and alert behaviours were significantly higher in developed environments. Thus, we conclude that different environments do affect the foraging patterns of zebra doves: they forage more in developed areas than in natural areas, but are more alert while doing so.