

Hong Kong Firefly Survey Report 2020-2021

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ABSTRACT

Hong Kong Firefly Survey Team was established in 2020 July. 34 members from the public were recruited. After intensive lectures and field trainings, members did the surveys in 4 different modes - looking for unknowns, clarifying the range of restricted species, monitoring population trend of restricted species and surveying new sites. Totally, 210 surveys were done from 2020 December to 2021 June, involving 23 separated sites, and total distance of survey is about 432km. One targeted unknown was found, new location records of various species were added. Population of two restricted species was found to have significant reduction. Two probably undescribed firefly species were found. Establishment of Firefly Survey Team is found to be an effective way to diffuse knowledge and interest on fireflies to the public. It also brings more people to work for firefly conservation and research. Other possibilities are proposed.

Key words: Lampyridae, firefly surveys, Hong Kong

INTRODUCTION

Firefly diversity in Hong Kong is surprisingly high, 29 species have been reported, of which 9 species are endemic to Hong Kong (Yiu, 2017). However, distribution and population data are deficient for all the 29 species, resulting from insufficient surveying efforts. According to the map showing the location of visited sites in Hong Kong and frequency of visits for firefly survey from 2009 to 2020 by Yiu (2020), the following deficiency are noticed:

1. east, west and north New Territories were less visited;
2. except the 2 largest islands - Lantau Island and Hong Kong Island, all other Islands were not studied yet;
3. comparatively less sites on Lantau Island and Hong Kong Island had be explored;
4. very few surveys had been done in urban and sub-urban areas, as well as in villages in the New Territories, and;
5. frequency of visits to most sites is inadequate

On the other hand, the very high human population density in Hong Kong are causing various threats to the survival of these curious living organisms. Examples are habitat loss, habitat degradation, land pollution and light pollution.

The missions of the Hong Kong Firefly Survey Team are:

1. for conservation purpose, conduct persistent and systematic surveys on Hong Kong fireflies;
2. to bring together people involved in firefly conservation and research to exchange knowledge;
3. for advancement and diffusion of knowledge in Hong Kong fireflies;

Open recruitment was announced on a specific website: <http://hkentsoc.org/hongkongfireflysurvey/>, on the Hong Kong Entomological Society Facebook Page, on the HKWildlife.net Facebook Group as well as the on the HKWildlife.net Forum. After three weeks of recruitment, 38 applications were received. Applicants were selected according to their education background, physical fitness, night hiking ability and experience, photography and videography skills. 34 members were finally accepted (Fig. 1).

Members were required to pay HK\$2000 (HK\$1800 for Hong Kong Entomological Society Member) and HK\$1600 will be refunded to members who have fulfilled all of the following commitments:

1. 100% attendance to lectures;
2. at least 60% attendance to practical trainings;
3. at least 5 additional field surveys done;
4. at least 50% attendance to meetings.

Four lectures on firefly biology, firefly ecology, firefly morphology and anatomy, firefly classification, firefly identification, firefly survey methods, skills and safety; were conducted on: July 4 2020 (Sat) 19:00 - 21:00 ; July 8 2020 (Wed) 19:00 - 21:00; July 15 2020 (Wed) 19:00 - 21:00; July 22 2020 (Wed) 19:00 - 21:00. The last two lectures were conducted online owing to the legal restriction on social gathering during the outbreak of COVID-19. At the end of the final lecture, members were required to attend an online test, passing grade is 20/35.

Practical training were conducted in the following dates and places, for different observation targets:

August 1, 2020 (Sat) 19:00 - 22:00, Sze Lok Yuen, for *Lamprigera taimoshana* larvae, *Pygoluciola qingyu* adults and larvae and *Diaphanes lampyroides* larvae;

August 8, 2020 (Sat) 19:00 - 22:00, Sha Lo Tung, for *Absocondita terminalis* adults;

August 22, 2020 (Sat) 19:00 - 22:00, Fung Lok Wai, for *Pteroptyx maipo* adults and *Pyrocoelia analis* adults;

October 24, 2020 (Sat) 18:00 - 21:00, Tai Po Kau Nature

Reserve, for *Diaphanes citrinus* adults and *Pyrocoelia lunata* adults;

November 14 (Sat) 2020 18:00 - 21:00, Tai Mo Shan, for *Lamprigera taimoshana* adults, *Pyrocoelia lunata* adults;

December 12 (Sat) 2021 18:00 - 21:00, Ng Tung Chai, for *Diaphanes lampyroides* adults.

Due to the legal restriction on social gathering during the outbreak of COVID-19. The trainer (Yiu) prepared a 20-30 minutes video for each field site. The video introduces safety precautions, clothing, lighting equipment, observation points, observation skills, features and behaviour of the target species, the habitat and different surveying skills. Individual team members went to the field sites separately. Team members were required to use a GPS logging device – smart phone or sport smart watch, to log the route they have gone through and then submit the record to the trainer. They were required to walk along the designated routes not less than 1km for not less than 1 hour, to check for fireflies. All sighting records, as well as photo and video records were required to be submitted to the trainer.

After the training lectures and practical trainings, team members attended an online meeting on arrangement of the coming firefly surveys and firefly survey methods.

MATERIALS & METHODS

Trained members of the Hong Kong Firefly Survey Team were arranged to do surveys in small groups of 2-3 persons. For every survey site, the route map, requirements, methods, location of observation points and a short video showing the site and route were provided to the members beforehand. Each survey should last for 60 minutes or more. After each survey, members were required to fill in an online Firefly Survey Record Form.

There are four different modes of survey to be done from December 2020 to June 2021:

Survey mode 1- Looking for unknowns. Members were required to walk along designated routes in a slow pace – not faster than 2km/h, and check for the targets. The routes are more or less 2 km long.

1a. *Diplocladon atripennis* female, which is wingless, much larger than the male, displays spectacular 33 light spots (Li, 2008). Surveys were done in Tai Po Kau and Ng Tung Chai where male adults had been recorded. 22 members participated, and 16 surveys were done in Tai Po Kau and 26 surveys were done in Ng Tung Chai; from April 10 to May, 30, 2021.

1b. *Stenocladus* sp. female. The female of *Stenocladus bicoloripes* is known to be wingless and display weak green light from the whole body (Yiu, 2017). Surveys were done in Tai Po Kau and Tai Tong, where

Stenocladus sp. male was recorded a number of times. 20 members participated, and 11 surveys were done in Ng Tung Chai and 19 surveys were done in Tai Po Kau, from April to May, 2021.

Survey mode 2 - Clarifying the range of restricted species. Members were required to walk along designated routes in a slow pace – not faster than 2km/h, and check for the target species. The routes are from 2 km to 4 km long.

2a. *Rhagophthalmus hiemalis*. 13 sites with similar land features and vegetation as the sites with records of the species were selected, namely Tai Tong Nature Trail, Tsing Yi Nature Trail, Robin's Nest, Cloudy Hill North, Cloudy Hill South, Lan Nai Wan, Shui Long Wo, Sha Tin Pass, Black's Link, Mount Parker, Pak Mong, Fat Mun Ancient Path, Mui Wo. 23 members participated and 45 surveys were done from late December to Early March, 2021.

2b. *Oculogryphus chenghoiyanae*, 3 different routes with similar land features and vegetation as the sites with records of the species were selected, namely Tei Tong Tsai Country Trail, Wong Lung Hang Country Trail, Nei Lak Shan Country Trail. 7 members participated and 11 surveys were done in May, 2021.

Survey mode 3 - Monitoring population trend of restricted species. Members were required to walk along designated routes in a slow pace – not faster than 2km/h, check every encountered light spots and count the number of the target species found along the two sides of the routes – transect count. The routes are from more or less 2 km long. Similar counting was done along the same routes in previous years.

3a. *Oculogryphus chenghoiyanae*, surveys were done along a footpath in Tei Tong Tsai. 15 members participated, 17 surveys were done in May, 2021.

3b. *Rhagophthalmus hiemalis*, surveys were done along a foot path in Lin Fa Shan (MacLehose Trail Section 9). 17 members participated and 31 surveys were done from late December, 2020 to February, 2021.

Survey mode 4 - Surveying new sites - Smaller Islands. Members were required to visit selected small Islands. Four members participated and 7 surveys were done in Cheung Chau, Peng Chau and Sharp Island in May, 2021.

RESULTS

Survey results

Survey mode 1a - Looking for *Diplocladon atripennis* female.

Both male and female adult was not found.

Survey mode 1b. Looking for *Stenocladus* sp. female.

A mating pair of the *Stenocladus* sp. was photographed by a team member Fung Chun Sang at night, on April 14, 2021 in Tai Po Kau (Fig. 2). A larviform firefly recorded in Kuk Po, at 20:10, on May 30, 2013 (Fig. 3) has the same external features with the record by Fung, 2021. Body length approximately 10mm in resting position, compressed, tapering gradually anteriorly, widest at the 2nd to 6th abdominal segments which are almost identical, 7th abdominal segment slightly narrower, 8th abdominal segment broadly tapering posteriorly. All tergites not heavily sclerotized and are not explanate. Whitish in colour as a whole. Each thoracic tergite bears a large pair of brownish black trapezoidal markings which are narrowly separated in the middle. The 1st and 2nd abdominal tergite have similar markings, but colour at the interior and posterior part is diffused and leaving a pair of more or less triangle markings. The markings on the 3rd to 6th abdominal tergite are even more diffused and the colour is brown. On the 7th abdominal tergite, the markings become a pair of blur, light brownish, widely separated. The 8th abdominal tergite has a large reddish brown marking in the middle. Light spots were observed, but there is no clear record of one or two pairs of light spots. The phenomenon of whole body of the female glows weakly, as in *Stenocladus bicoloripes*, is not recorded.

Survey mode 2a - Clarifying the range of *Rhagophthalmus hiemalis*

A new location record of was discovered. 3 female adults of *Rhagophthalmus hiemalis* were recorded by team members Lau Chin Fan and Li Man Yi in Shatin Pass, at around 20:00 on January 17, 2021.

Survey mode 2b. - Clarifying the range of *Oculogryphus chenghoiyanae*

In all the 11 surveys, neither female nor male adult was recorded.

Survey mode 3a - Monitoring population trend of *Oculogryphus chenghoiyanae*.

Amongst the 17 surveys done in May, 2021, female adults were recorded in only 4 surveys, highest number was three and lowest was one. Comparing with the data recorded from 2014 to 2020 (Fig. 4), there is a significant drop of 80% for the population of female *Oculogryphus chenghoiyanae* in the past 7 years.

Survey mode 3b - Monitoring population trend of *Rhagophthalmus hiemalis*.

Average number of female adults recorded from the surveys done from late December, 2020 to February, 2021, is 0.65. Compared with the data from December 2012 to January 2014, a reduction rate of 88% is detected (Yiu, 2021).

Survey mode 4 - Surveying new sites - Smaller Islands.

No firefly was detected.

Other findings

1. *Stenocladus bicoloripes* was recorded in Lung Fu Shan and Pokfulam, Hong Kong Island, both are new location record.

2. *Pyrocoelia lunata* was recorded in Lung Fu Shan and Pokfulam, Hong Kong Island, both are new location record.

3. A *Lamprigera taimoshana* was predated by a harvestmen near Sze Lok Yuen, Tai Mo Shan. This is the first predation record of *L. taimoshana*, observed by Fong Ka Po on November 17, 2020, around 19:50.

4. A *Luciola* nr. *nicolleri* was recorded on May 15, in Ng Tung Chai – a new flight period record. Previously only known to fly between late February to early April.

5. Around 10 *Aquatica leii* were recorded on April 6 and April 15, 2021 by Poon Lai Ngo Celia in Wong Yue Tan, Tai Po, a new location record.

6. A *Vesta sinuata* was recorded on March 11 by Poon Lai Ngo Celia in Tai Po Kau Nature Reserve, a new location record.

7. *Rhagophthalmus motschulskyi* was recorded on April 17 by Poon Lai Ngo Celia in Wu Kau Tang, a new location record.

8. *Rhagophthalmus motschulskyi* was recorded on March 27 and March 31 in Mui Wo, the first record in Lantau Island.

9. Two probably undescribed firefly species were found.

Totally, 210 surveys were done from 2020 December to 2021 June, involving 23 separated sites, and total distance of survey is about 432km.

Further work

Hong Kong Firefly Redlisting Working Group was established in July, 2021, with 7 members coming from the Firefly Survey Team. The working group has started doing assessment of local firefly species and going to submit the assessments to IUCN Red List Authority.

DISCUSSION

Joining the Firefly Survey Team is a whole year commitment. Even under the strict legal requirements on social distancing, all the training events were successfully run and all the 34 teams members completed the trainings and passed the exam. For the firefly surveys, each members are required to do 5 or more surveys. At the end, only 2 persons were unable to fulfil the requirement. Number of surveys per head is $210/34 = 6.2$. The highest number of surveys done by

one person is 13.

Providing intensive trainings and assigning survey work is an effective way to diffuse knowledge and interest on fireflies to the public. It also brings more people to work for firefly conservation and research. The survey team has contributed substantial survey efforts for our better understanding of Hong Kong Fireflies.

The Hong Kong Firefly Survey Team should continue. Actually the Team 2021-22 was established in July 2021. In terms of the format, a number of questions are worth considering:

1. Should the survey formats and targets be more diversified or more focused?
2. Should the survey team last longer, for example 2 years?
3. Could the survey be done in ad-Hoc or task force format? A group of people trained for a specific survey purpose, for example transect count of a particular species. The commitment is less and last for a shorter period of time, but more focused and specialized on a target.

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FIGURES



Figure 1. The Hong Kong Firefly survey Team 2020-2021. Photo by author.



Figure 2. A mating pair of *Stenocladius* sp. Photo by Fung Chun-Sang.



Figure 3. Female *Stenocladius* sp. Photo by author.

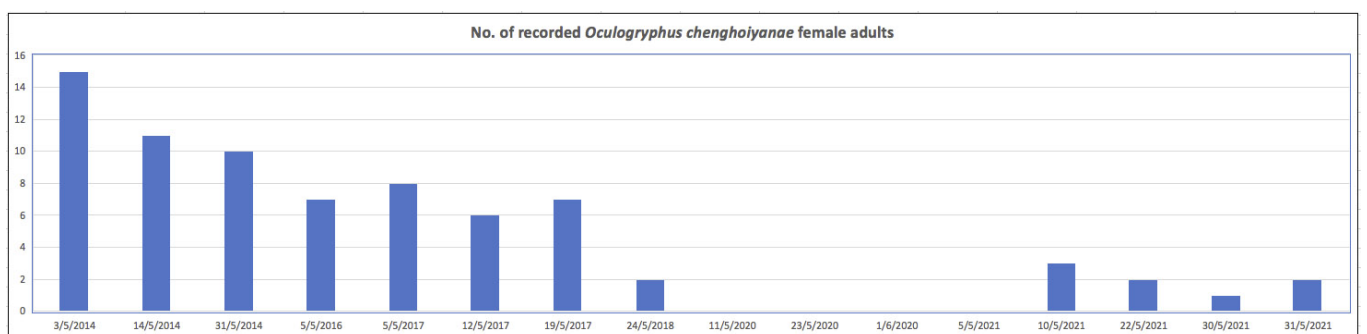


Figure 4. Number of recorded *Oculogryphus chenghoiyanae* female adults from 2014 to 2021.