

20 March 2019

**Green Power “Solar Terms Butterfly Survey” unveils the Relation  
between the Papilionids’ Behaviour and Solar Terms**

**Green Power** have been carrying out the **Solar Terms Butterfly Survey** for 14 years since 2005. Recent study revealed pattern of five widely distributed Papilionids, including Paris Peacock (*Papilio paris*), Red Helen (*Papilio Helenus*), Common Mormon (*Papilio polytes*), Great Mormon (*Papilio Memnon*) and Spangle (*Papilio protenor*) corresponding to different Solar Terms. **Matthew Sin, Senior Environmental Affairs Manager of Green Power**, remarked that the beautiful Papilionids are generally large and brightly coloured and easily observed. The butterflies are also widely distributed in the countryside as well as urban parks in Hong Kong. It would be the perfect time tomorrow (21 March) for butterfly watching as Spring Equinox is the first peak season of the Papilionid family!

Summarizing data from the past 14 years of butterfly surveys, **Matthew** pointed out that there are three peak times for the five Papilionid butterfly species: Spring Equinox (end of March), Grain-in-Ear (early June) and Frost’s Descent (end of October). Surprisingly, while Grain-in-Ear records the highest number, butterfly populations usually drops drastically from beginning of July through end of September. This is quite different from the common belief that “a hotter weather will see a larger number of butterflies”.

According to **Matthew**, Papilionids are quite temperature dependent. When temperature drops below 16 degrees Celsius, it is hard to spot any members of the family. Therefore, the first peak time of the year to see these butterflies is Spring Equinox when the weather gets warm. It takes at least 29 days or longer for the eggs to turn into adult butterflies, which have a lifespan of a couple of weeks. The death of the first batch of butterflies will mean a slight decrease in population. But then a new generation of adults will join in after eclosion. In theory, a wave form will be displayed on the population graph. However, when the average temperature reaches 29.5 degrees Celsius, the overall number of Papilionids will decline. The butterflies reappear in large scale after Frost Descend around end of October when the average temperature is about 27 degrees Celsius. When it gets down to below 20 degrees Celsius, the population will plummet again. **Matthew** remarked that some Papilionid species have a long period of pupation that lasts three to four months in mid-summer or deep winter,

when the adult population is in decline. The delay in eclosion may be an adaptation to the unwelcoming weather.

**Matthew** highlighted that Hong Kong is home to a rich number of Papilionid butterflies, which is in turn food of many animals and birds in particular. The Papilionid family is important in the local food chain. Data from the Hong Kong Observatory shows that in recent years marked by climate change, the number of Very Hot Days (with maximum temperature above 33 degrees Celsius) increased while the number of Cold Days (with minimum temperature below 12 degrees Celsius) decreased. We may see a longer pupation period of Papilionid butterflies in summer and a shorter pupation period during winter. The change in pattern is likely to affect other species that rely on the butterflies for food.

Nonetheless, we need a long period of monitoring of ecological and other impacts of climate change. **Matthew** said that Rutaceae species—the food plants for larvae of the Papilionid family including all kinds of Citrus spp. (such as round kumquat and lemon), *Zanthoxylum nitidum*, *Zanthoxylum avicennae* and *Melicope pteleifolia*, are all widely distributed in Hong Kong. At the same time, the five Papilionid species are listed as Very Common species in the Hong Kong Biodiversity Database of the Agriculture, Fisheries and Conservation Department. Therefore, the Papilionid butterflies can be used as indicator species to monitor the impact of climate change on local species. **Matthew** made a final remark that temperature may only be one reason for the decline in Papilionid populations, natural enemies and diseases are other possible factors. Hence further studies will be needed.

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### **About Solar Terms Butterfly Survey**

Green Power launched the Solar Terms Butterfly Survey – the first of its kind in Hong Kong – in 2005. Shing Mun Country Park and Tai Po Kau Nature Reserve were selected as the butterfly hotspots for long term collection of butterfly data. Since ancient time, the 24 solar terms have been used by traditional farmers in China to forecast weather and crop harvest in times of seasonal changes. Our butterfly survey records butterfly species and number at different solar terms regularly to analyze changes and variation.