24. EFFECT OF CLIMATE CHANGE ON MOTH SPECIES AND ACTIVITY IN GUERNSEY

Tim Sparks, Ian Woiwod [1] and Andrew Casebow

Figure 24.1 *Moth trap at Raymond Falla House in Guernsey.*

There are few groups of insects that are recorded on a systematic basis, the exception being moths.

Because most moths fly at night and are attracted to light they can be caught in a 'light trap', and for the past 33 years a light trap has been operated each night in St Martins. The moths that are caught are identified and a list of each night's catch is sent to Rothampstead Research Station, where the information is collated with data from other light traps operating throughout the British Isles. These results have been used to assess moth activity in terms of overall abundance, changes in timing (phenology), and changes in the species complement over time.

The relationship between temperature and moth activity

There are more regular continental visitors to Guernsey, and many more occasional Mediterranean visitors than in earlier years. Although a strong relationship with summer temperatures can be seen, there has been no overall increase in the numbers of moths caught on Guernsey. From this we may deduce that:

- warming temperatures have compensated for what might otherwise have been a decline in moths.
- more moths might be seen in the future.
- alternatively the total moth population might remain in balance as some species increase while others decline.

The relationship between temperature and moth numbers suggests that a 1°C increase in summer temperatures would increase numbers caught in this trap by about 300 moths, although this might just reflect greater moth activity at higher temperatures rather than an increase in moth populations (Figure 24.2).

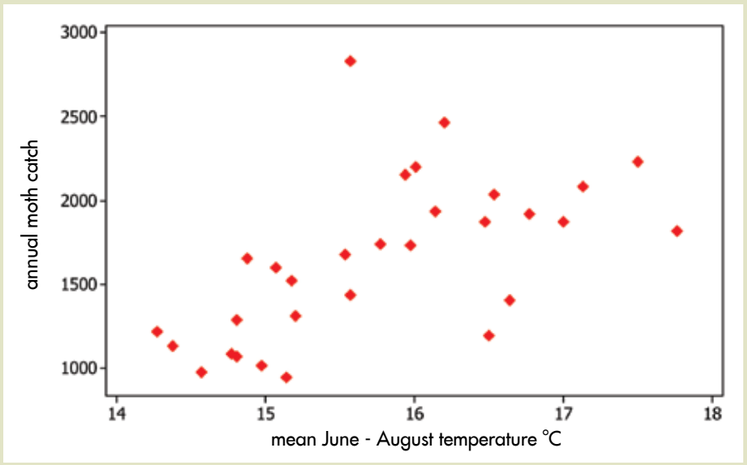


Figure 24.2 *Relationship between the mean June – August Temperature and the Annual Catch of Moths in the St Martins, Guernsey Moth Trap.*

Changes in the timing of moth flight dates

We have examined changes in the timing of moths by looking at the mean capture dates of nine common species in each year (Figure 24.3). Five of these species have been getting earlier over the last 33 years, and this change is greater for spring flying moths than summer flying moths. This is consistent with changes in a large number of insect species across the Northern Hemisphere. Change in the average of these 9 moth species is shown in the following graph. Overall, the mean flight period of these species has advanced by seven days, but varies between species from almost no change to thirteen days. The average flight period of the nine species is related to mean temperatures from January to September with a five-day advance in flight period for each 1°C warming.

We can conclude that both abundance and activity, and timing of moths on Guernsey, is influenced by temperature. There has already been significant change and both are anticipated to change further in the future.

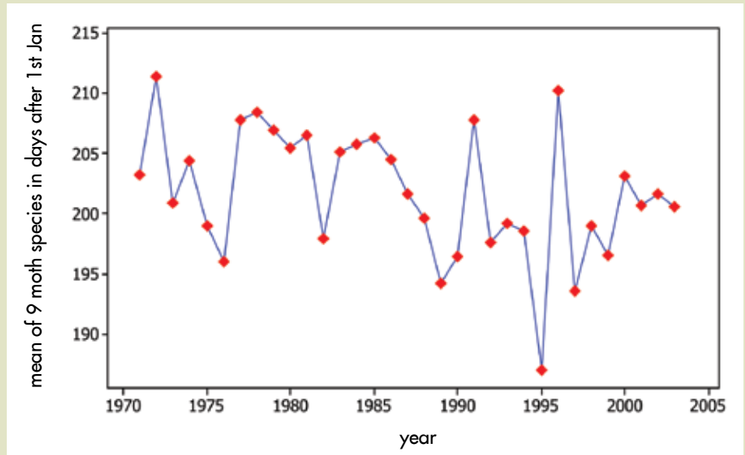


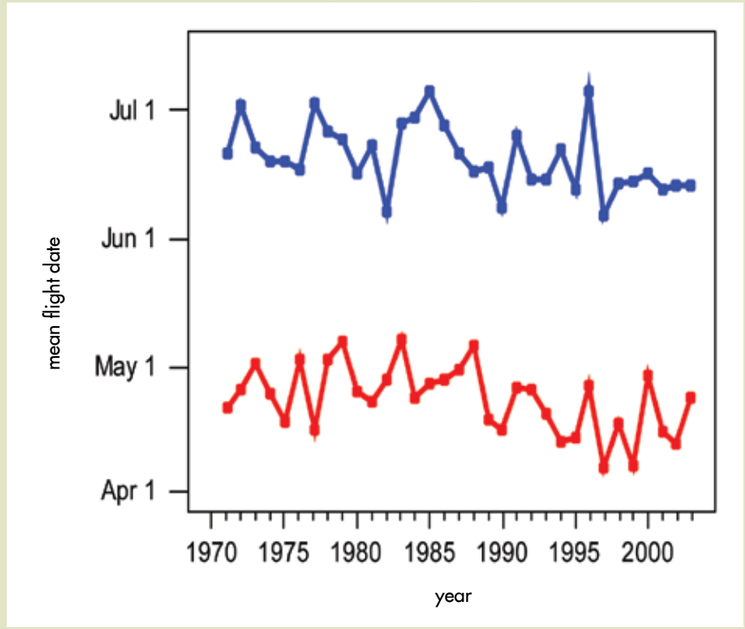
Figure 24.3 *'Mean flight time is getting earlier' (in days after 1st January) of 9 Species of Moths caught in Guernsey.*

Changes in two common species found in Guernsey

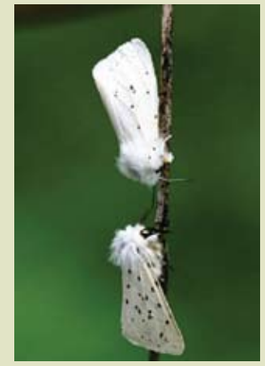
Two of our most common species are the White Ermine and the Hebrew Character Moth and are used here for illustration (Figure 24.4). The Hebrew Character Moth flies in March and April and its mean flight date has become 13 days earlier over 33 years. The White Ermine Moth flies from late May to July and its mean flight date has become 12 days earlier over the past 33 years.

References
1. Ian Woiwod is the co-ordinator of the Rothamsted Insect Survey UK network of light traps.

Figure 24.4 Common moth species comparison



Mean Flight Date in Each Year of the White Ermine Moth (blue) and the Hebrew Character Moth (red).



White Ermine Moth.

Hebrew Character Moth.