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Foreword

One of the reasons why we are interested in wasps is that wasps become nuisance pests when large number of them are getting close to human dwellings. This usually happens when social wasps start to build their nests during summertime. Even for solitary wasps, we may get stung if they are disturbed. Wasp stings may cause allergic problems to human and in serious cases, though not common, may lead to death.

Although wasps are threatening in many circumstances, they play vital roles in the ecosystem. They prey on many different kinds of insects, thus controlling the populations of many insect pests species. Many wasps are parasitic on a particular species, each of them are parasitic on a single species of beetles, caterpillars, spiders or even cockroaches etc. Their specificity in parasitic behaviour allows them to be considered as a very good biological pest control agent.



Good knowledge on wasps would allow us knowing how to control this group of insects only when necessary. This booklet gives an introduction to both social and parasitic wasp species found locally with emphasis on wasps that sting.



Introduction

Wasps are members of the order *Hymenoptera*. The scientific name of the order is derived from the Greek *hymen* (membrane) and *pteron* (wing). They come in many different types and sizes. Insects known as wasps consist of sawflies, parasitic wasps and the stinging wasps, which may cause nuisance pest problems to human beings. There are about 75,000 species of wasps recorded globally, most of them are parasitic. At least 30 species are commonly found locally.

Like other hymenopteran insects, wasps are characterized by having two pairs of membranous wings with smaller hind wings which interlock with the forewings by small hooks. Wasp undergoes complete metamorphosis, with four developmental stages in its life cycle. Larvae are usually legless with well-developed head. For social wasps, the adult wasps are of three forms: reproductive male, reproductive female and sterile female worker. Queens are reproductive females who found the nests and lay the eggs. All female wasps, sterile or reproductive, are equipped with a sting at the end of the abdomen used for defence or predation. The males are unarmed.

For female wasps, an ovipositor is always present which may be modified for different purposes like sawing, piercing or stinging.



Wasps belonging to the sub-order Aporita (Aculeata) of *Hymenoptera* to which bees and wasps are included, have ovipositor modified as sting which can inject venom into the body of human being or other animals. Venom, injected through the hollow sting, can paralyze or kill preys for defense, predation or egg-laying purposes. The function of that ovipositor is only for stinging and the eggs are deposited from the ventral part of the sting.



Figure 1: An enclosed nest of wasp



Figure 2: An unenclosed nest of wasp



Figure 3: Nest of solitary wasp

Wasps may build enclosed nest (Figure 1), unenclosed nest (Figure 2) or single individual comb (Figure 3).



The social wasps usually build papery nests as their shelter and nursery ground. The vespoid wasps like yellow jackets, hornets, and paper wasps use materials like "paper" fibers collected from dry wood and tree bark and mix them with saliva to build or fix their nests. Some of the nests are exposed with limited nest size and colony size. Some of them are, however, enclosed by an outer covering which forms a shelter for protecting the whole colony. In every nest of this type, there are one or more combs, each densely packed with arrays of cells. It may reach considerable size. In Hong Kong, wasp nests usually last for a few months and not to be used again by any other wasps next year. Empty used again by any other wasps next year. Empty nests are very often found high up the tree when leaves fall in winter and disintegrate gradually resulting from lack of maintenance by the worker wasps.

Parasitic wasps are mostly free-living, and they do not build very big nests. After laying their eggs on host animals, usually other insects, the adult wasps fly off in search of food source for themselves or other hosts for their larvae. The eggs are left in the hosts for development and hatching on their own.

Wasp species

Wasps are considered as urban pests at times when the nests of some social wasps are built too close to human dwellings. They are agricultural pests to apiaries at times when they prey on bees. Nevertheless, they play a vital role in the ecosystem. Wasps which feed on nectar would help pollination. For some parasitic wasps, the eggs are injected into the host and the larvae hatched out from the eggs would consume the bodies of preys or in a few cases, plant tissue. These parasitic wasp species could be used for biological control of caterpillars, scale insects or cockroaches. These species are beneficial in maintaining balance of the ecosystem. However, wasps could also be harmful insects as they may sting people, contaminate food, and cause economic losses. Being stung by wasp is one of the main reasons for most people's fear of this insect. Because of the venom injected by wasps, the result of wasp sting can lead to pain feelings, wound swollen, paralysis and death, though uncommonly.

Family: Argidae 三節葉蜂科

Argidae, commonly known as sawflies, is one of the large family of wasps. About 800 species are known worldwide and most diverse in tropical regions. They are phytophygous. Their larvae eat leaves of ferns, gynosperms and angiosperms, occasionally pith of figs or catkins. The insects of this family could be distinguished from other sawflies by the reducing antenna in males, which become elongated and shaped like a tuning fork. *Arge similis* (鬧羊花葉蜂) has been found at Sai Wan Ho of the Hong Kong Island.



Figure 4: Arge similis (鬧羊花葉蜂)

Family: Chrysididae 青蜂科

The common name of Chrysididae is cuckoo wasps. They have metallic blue or green color and usually with coarse sculpturing. Their abdomen is concave ventrally which allow them to curl up into a ball if being disturbed. Many of the species are external parasites. They are named as cuckoo wasp because this insect, like cuckoo birds, lay their eggs in the nest of unsuspecting host. *Chrysididae* species has been found at Tai Po. (Figure 5)



Figure 5: Chrysididae spp. (青蜂科)

Family: Eumenidae 蜾蠃蜂科

Eumenidae wasps are solitary insects and the size of adults are from small to large, 8-16mm, depending on species. The abdomen has a marked basal constriction and gaster black and yellow color-pattern. The ovipositors of females are not visibly protruding which have been modified as retractable sting. The larvae are legless or have vestigial legs and feed on prey supplied by the adults. *Delta esuriens* (姬黃錐華麗蜾蠃) has been found at Yuen Long. (Figure 6) *Eumenes arcuatus* has been found at Sai Kung. (Figure 7) *Delta pyriforme* (黃錐華麗蜾蠃) has been found at Sai Kung. (Figure 8)



Figure 6: Delta esuriens (姬黃錐華麗蜾蠃)



Figure 7: Eumenes arcuatus



Figure 8: Delta pyriforme (黃錐華麗蜾蠃)

Family: Evaniidae 瘦蜂科

Wasps in the family Evaniidae are black in color and have long shining antennae. They are so named as they have tiny stalked abdomen which is flicked up and down when the wasp walks. There is preference for the females to oviposit into cockroach egg cases (oothecae) and thus these wasps frequently found in houses and buildings. They are sometimes seen drinking nectar on flowers or searching through leaf litter for cockroaches' egg cases. Evania appendigaster (蜚蠊搜蜂) has been found at Chek Lap Kok. (Figure 9)



Figure 9: Evania appendigaster (蜚蠊瘦蜂)



Ichneumonidae is one of the largest insect family which comprises a very diverse and highly successful group. Many species in this family are important to be used as biological control agents to parasitize larvae and pupae of insect pests. The body size of Ichneumonidae wasps ranges from medium to large (3–40 mm long). They are yellowish to black in color, or patterned with black and brown or black and yellow. Majority of them have a long ovipositor, but do not sting despite they may sometimes have in 'stinging' posture. *Xanthopimpla* species has been found at Mai Po of Yuen Long. (Figure 10)



Figure 10: Xanthopimpla spp. (瘤姬蜂)