Mother Wasp builds mud-house and stores food: Mud-Nest Building Wasps of Sri Lanka

Wasps, bees and ants are insects that are common in and around most homes and home gardens. According to scientific classification, all of them are members of the Order Hymenoptera. Females of the Order Hymenoptera are well known for their nasty habit of stinging anyone that provokes them or crosses their path. Of the different Hymenoptera, wasps are by far are the largest in size, the most abundant and diverse with a world fauna of over 100,000 named species. Wasps are well known for their prey hunting behavior and the diverse nesting habits. A study carried out by the late Krombein and co-workers of the Smithsonian Institute, USA, identified 459 species of wasps in 153 genera and 16 families from Sri Lanka. However, the nesting habits of only a few of local wasps are known.

Introduction

Wasps make nests in a variety of places, and construct nests of many different shapes and sizes using a variety of substances. The wasps that nest in the ground and dig straight burrows in soil are called the 'digger wasps'. Those that build above ground nests out of paper like substance formed by mixing plant products with their salivary secretions are called 'paper wasps'. Wasps that build nests using mud or clay are called 'potter wasps' or 'mason wasps'. Certain other wasps do not construct nests but nest in hollows of twigs, in crevices of trees, rocks and in pre-existing cavities in man made structures.

Of the many types of nest building wasps, the most conspicuous and commonly seen are the mud nest-building wasps. Even more conspicuous are the mud nests they build. Mud nest building wasps are solitary nesters where individual females build nests by putting pellets of mud or clay together forming differently shaped structures. These female wasps build mud nests in order to lay eggs and raise their young. In appearance, mud nest-building wasps are like any other wasp in having a narrow slender waist in the middle of their body. Their legs are exceptionally long and bear spines. Typically they are black with yellow or orange coloured markings. The female wasps prefer to build their nests in our homes and other buildings we frequent and hence are familiar to most of us. Among these mud nest building solitary wasp species there are only males and females and not queens or workers. The males and females together visit flowers to feed on pollen and nectar and to mate. It is the mated female wasp ready to lay eggs that do the work of nest building and provisioning for the young. Furthermore, each female wasp builds her own nest independent of others.

Construction by the Female

The construction of a mud nest by a wasp is a pleasure to watch. It has to be observed quietly and patiently, as any disturbance would force the wasp to abandon the nest and look out for another nesting place. Mud nest building is carried out during day time when the sun is out. A female wasp ready to build a nest frequents muddy places. She carries a droplet of water to a particular site and mixes it with dry clay or earth using her mandibles. The wasp's saliva helps to bind and strengthen the dried mud and she uses her mandibles to roll it into a mud ball. (These architectural wasps sometimes collect wood fibers, sand grains to cover the mud nest). The female wasp then flies to the nest carrying the mud ball in her mouth between her mandibles, sometimes aided by the front legs. At the site that she has selected for building the nest, she smashes one mud ball against another with her mouth and forehead until the nest is built. Mud nest building wasps spend untold hours carrying countless balls of mud to construct their nests. Female wasp may take 1-3 days to complete a nest. She works during day and rests some where else at night. If she cannot finish the nest before sunset, she will seal the unfinished nest temporarily. The next day she continues nest construction.

During nest building a single room or cell is initially constructed. Prior to the deposition of an egg, the cell is provisioned with prey, which becomes food for the young. Thereafter, an egg is deposited and the cell is sealed. Immediately another room or cell is constructed in the same manner adding to the earlier cell. It continues in this manner until the required number of cells or rooms specific to each wasp species is constructed. The nest thus constructed would have a linear row of brood cells

(rooms) separated by mud partitions. As each egg inside the nest cells hatches, the wasp larva that emerges consumes the food (spiders or caterpillars) provided and grows until the provision is used up. The mature larva then pupates in a silken cocoon spun by it inside the nest cell of the mud nest. The new wasp that emerges from the cocoon chews its way through the mud walls of the nest and comes out. The newly emerged adult wasp is now ready to fly off and fend for itself. Each female may construct more than one nest during her lifetime.

Not a learned behaviour

The ability of mud nesting wasps to construct a specific nest type is due to their innate or inbuilt species specific behavior pattern which they have inherited and are expressions of their genetic make up. Nest building in wasps is an inborn behavior pattern and not a learned behavior. It is amazing how a stereotyped behavior pattern can lead to complex nest building using mud as the raw material. Furthermore, since the mud nests built by wasps are species specific, the nature of the mud nest could be used in identifying the nesting wasp species.

If you happen to open up a recently built mud nest you will find wasp larvae together with some spiders or caterpillars. If the mud nest is old and has a hole in it, it is an empty nest where the wasps that developed inside the nest have completed their life cycle and have left the nest. On opening up such a nest left over provisions such as hard parts of spiders or caterpillars and shed skins of wasp larvae are seen.

These mud nesting wasp species commonly referred to as 'Kumbala' by locals are characterized by the differently shaped mud nests they construct on varied surfaces in buildings. As these mud nests are a conspicuous sight in most buildings including homes, housewives consider these wasps as nuisance. Further, the nests are in unoccupied houses and buildings mud nests of wasps were not found inferring that difficult to remove. However, some householders consider it a good omen to see a potter wasp at work in their home.

Shape of nest relates to wasp species

Mud nest building wasps so far identified from Sri Lanka belong to 3 families of the Order Hymenoptera. The families are; Eumenidae, Sphecidae and Crabronidae. During a recent study seven species of mud nest building wasps belonging to these three families were recorded from houses and other buildings. They are *Delta flavopictum* ("Rankumbala"), *Delta maxillosum*, *Paraleptomenes mephitis* and *Subancistrocerus sichelli* of the Family Eumenidae, *Pison rugosum* and *Pison argentatum* of the Family Crabronidae and *Sceliphron madrasplatanum* of the Family Sphecidae. The mud nests built by these 8 species of wasps have a characteristic shape. According to shape and architecture their nests fall into 3 distinct categories namely, single pot shaped nests, clump of pot shaped nests and tubular shaped organ pipe nests. In addition certain mud nests consisted of a series of globular shaped nests connected together.

The potter wasps are named for the pot shaped mud nests they build which are round or jug shaped with a narrow neck and resemble miniature pottery. Each female depending on the species constructs a single pot or a series of pots whose size, curvature and the nest surface are different.

A pot shaped nest with a wide curvature and smooth surface is built by *Delta maxillosum* (Fig 1). Female *Delta maxillosum* is dark brown in colour with yellowish orange legs and antennae (Fig 2). It constructs 5-6 pot shaped nests placed at equidistance along a straight line. The entire nest is lined with mud where not only the sides of the nest but even the base of the net is of mud. Hence, the mud nest of *Delta maxillosum* is completely enclosed.

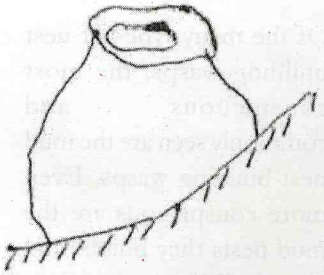

Fig 1 A sketch to show the external appearance of a mud nest of *D. maxillosum*

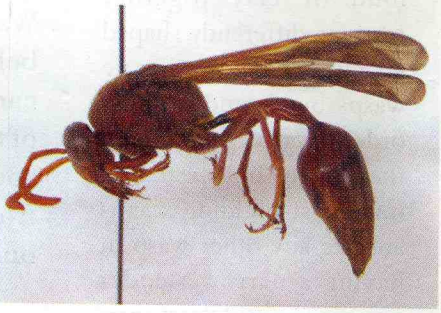

Fig 2 Adult *D. maxillosum*

Mud nests consisting of number of pots attached to one another, that may look like an elongate or an irregular clump of mud (Fig 3) is

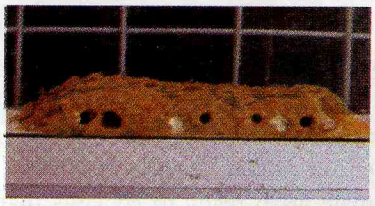

Fig 3 An elongated form of mud nest of *D. flavopictum ("Rankumbala")*

constructed by *Delta flavopictum*. This "Rankumbala" is a well-known mud nester having a dark black body marked with yellow patches and bands of yellow around the stout abdomen (Fig 4). It usually builds its nest at a corner of a wall. A series of pots attached together are constructed by a single female. After completing one nest the female introduces the prey, lays an egg and seals the pot. Thereafter, another pot shaped nest is similarly built on top of the first nest. This procedure is continued until a series of pots are completed. If the space at the site of nest construction is limited, females construct a nest that appears as an irregular clump of mud. Both these forms of nests consist of 2-8 cells arranged parallel to one another. However, very rarely a nest with a single pot, which may be confused with that of *D. maxillosum* is constructed by *D. flavopictum*. Such mud nests can be seen in places where space is very much limited. The base of the nest is not lined with mud but the nest lies on a ring of mud unlike that of *D. maxillosum*.

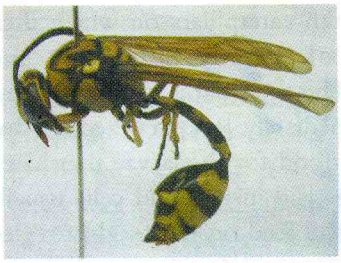

Fig 4 Adult *D. Flavopictum ("Rankumbala")*

Identify Sri Lankan mud-nest builders

Tubular shaped (organ pipe) mud nests are built by the three species, *P. mephitis*, *S. sichelli* and *S. madraspatanum*. Each nest consists of several tubes arranged parallel to each other. Mud nests consisting of 2-3 tubes, 2 cm long and 0.5 cm wide arranged in one plane is built by *S. sichelli*. The completed tubular nest adheres to the substratum (Fig 5). Each tubular nest includes 2 cells of two different lengths separated by a mud partition. The short cell of one tube lies parallel to the longer cell of the adjacent tube. The female *S. sichelli* is a small wasp 5-6 mm in length. A few yellow spots are present on the thorax and a yellow band at the most anterior corner of the abdomen. Wings are hyaline (Fig 6).

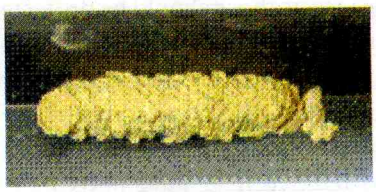

Fig 5 A single completed tube of a mud nest of *S. sichelli*

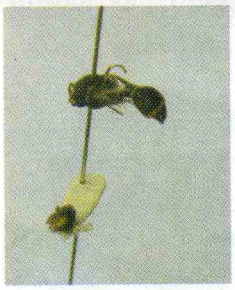

Fig 6 *S. sichelli*

Mud nest consisting of 3-5 tubes held together is constructed by *P. mephitis*. The tubes usually lye parallel to each other except when more than 4 tubes are present. Then the fourth tube lies at right angles to the parallely arranged tubes (Fig 7). The curved opening of the tube is directed away from the substratum unlike that of *S. sichelli* nest. The nest consists of two equal sized cells about 7 mm long and a smaller cell of 4-5 mm length (part of the nest that curves away from the substratum) (Fig 8).

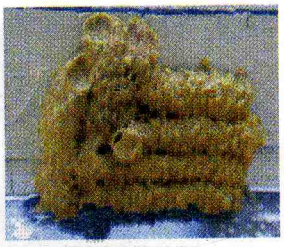

Fig 7 A mud nest of *P. mephitis*

Fig 8 Adult *P. mephitis*

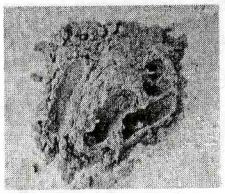

Fig 9 An exposed mud nest of *S. madrasplatanum*

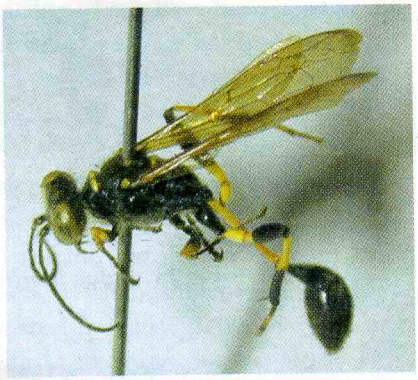

Fig 10 Adult *S. madrasplatanum*

Mud nests consisting of 2-5 tubes arranged parallel to each other is constructed by *S. madrasplatanum* (Fig 9). Each tube represents a single cell which is oval in shape. The tubes are larger than that of the previous two species and may be arranged in one or two plains. The female is a very slender, black wasp with a thread like waist. The petiole connecting the thorax with the abdomen is yellow. Wings are hyaline with a brownish tint (Fig 10).

Mud nests found within grooves or carvings of buildings seen as an irregular shaped clump of mud are constructed by *Pison* spp. The two species of wasps of the genus *Pison* use spiders as food for their young. A globular shaped mud nest having a wavy surface is constructed by *Pison argentatum* (Fig 11). The female is black in colour with silvery pubescence and the wings are hyaline (Fig 12). Mud nests consisting of irregular shaped cells with a pebbled surface are constructed by *Pison rugosum* (Fig 13). Adult of this species is also similar to the adult *P. argentatum*. (Fig 14).

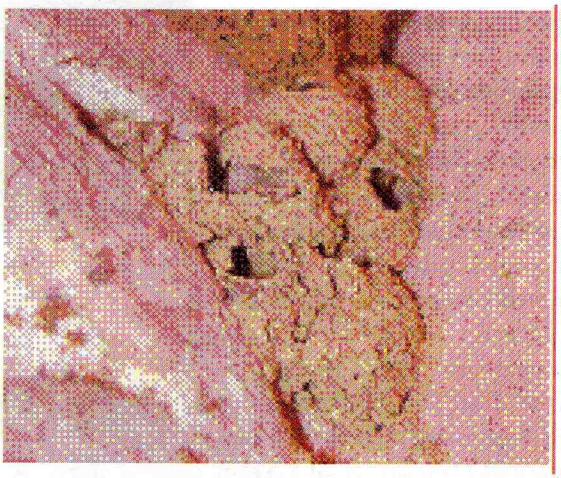

Fig 11 An exposed mud nest of *P. argentatum*

Fig 12 Adult *P. argentatum*

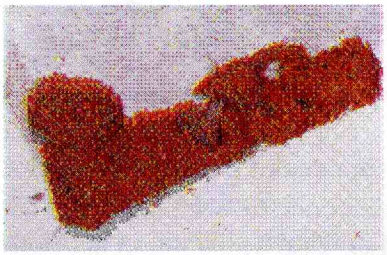

Fig 13 A mud nest of *P. rugosum*

Fig 14 Adult *P. rugosum*

The mud nests of the 7 species of wasps examined were provisioned with different prey types. Wasps such as *Delta* spp., *P. mephitis* and *S. sichelli* of the Family Eumenidae provisioned their nests with caterpillars on which their larvae fed. Members of Family Sphecidae and Crabronidae use spiders. The prey that is caught is stung. The prey is not killed immediately, but paralyzed, so that the prey remains as fresh food for the larvae that hatch out of the eggs. The eggs laid inside mud cells usually hatch in 2-3 days and larvae feed on the food provided by the mother wasp.

Mud nesting wasps are our friends

During a study mud nests of wasps were found in both concealed and exposed surfaces of buildings. The nests of *Delta* spp. and *S. madrasplatanum* were evident only in concealed locations. Nests of *S. sichelli*, *P. mephitis* and the two *Pison* spp. were found in exposed locations receiving direct sunlight. It is noteworthy that in abandoned houses no mud nests of wasps were found. It is interesting to note that these wasps prefer to build their nests admits human activity.

Although the mud nests of wasps may clutter the walls and other surfaces of buildings and homes these wasps carryout a beneficial service. They hunt caterpillars that feed on our vegetable crops. Caterpillars on Lady's fingers ("Bandakka") are favourable prey of mud nest building wasps with which they provision their nests to feed their young. Furthermore, these wasps should be admired and encouraged as both males and females pollinate flowers while feeding on pollen, so crops and wild flowers benefit. Hence, they are valuable insects those should be protected by us, especially from our use of chemicals in the environment. After watching mud nest building wasps at work that involves commitment, dedication and hard work of the mother wasp towards raising another generation, we find it very hard to remove their mud nests in the name of good house keeping. The more we come to know about this fascinating group of insects, greater is our appreciation of their multi faceted role in the nature.

Thilini C Weeraratne
A science graduate and a research student for a postgraduate degree
- Dept. of Zoology, Univ. of Peradeniya.