CHAPTER I

INTRODUCTION

THE terms "bee" and "wasp" probably do not, except to an entomologist, denote more than a very small assemblage of insects. The honey-bee and perhaps one or two species of bumble-bees on the one hand, and the yellow and black banded insects that cause such consternation at the breakfast table on the other, represent for most of us the sum total of personal acquaintance in this class of animals. It is therefore necessary at the outset to explain the sense in which we are here employing the two words which constitute the title of this little volume.

There is one feature, and that fortunately and not unnaturally impressed firmly on the popular mind, which is possessed by no other insects except the bees, wasps and their near relations the ants, and by which they may therefore at once be distinguished. This feature is the possession by the female of a sting furnished with a poison bag. Identification by means of this test is however not entirely satisfactory: in the first place the males cannot sting;

secondly, the test is difficult of application to the dead insect; thirdly, most of these stinging ("aculeate") insects are unable to pierce the human skin with their feeble weapon and so fail to give a conclusive answer to the question asked of them; while, fourthly, those provided with a sting sufficiently powerful to gain entrance to our own dermis produce results so unpleasant as to deter any but the most enthusiastic devotee from further enquiry in the same direction. Our readers will therefore pardon us, if, in order to save unnecessary pain and disappointment, we now proceed to enumerate a few of the more conspicuous structural characters by which collectively these interesting insects may be recognised and distinguished from others.

The members of the great Order Hymenoptera (membrane-winged), in which are also included the saw-flies, gall-flies and ichneumon-flies, possess as a rule four membranous and usually transparent wings which are destitute of scales (contrast the Lepidoptera, butterflies and moths), and are of but moderate size, the anterior pair being larger than the posterior (contrast the beetles, grasshoppers, earwigs, etc.). The areas, or "cells," into which the wings are marked out by the nervures or veins are not regular in size and shape, nor do they ever exceed twenty in the front or fifteen in the hind wing (contrast dragon-flies, may-flies, etc.). The disposition of the second

and third pairs of jaws (first and second maxillae) varies considerably and will be dealt with more fully later; but in all cases the first pair takes the form of well-developed mandibles adapted for biting. In that portion of the stinging (aculeate) section of the Order, with which we are here concerned, the antennae (feelers) of the males have thirteeen joints, while those of the females, whether "queens" or "workers," have but twelve. The ants are readily distinguishable from the other "stingers" by the presence of one or more irregular elevations ("nodes") on the upper surface of the "stalk" or "waist" by which the hindmost portion (abdomen) of the body is united to the middle region or "thorax." But it is no easy matter to distinguish between a "bee" and a "wasp" in the wide sense in which we are now using these words. Structurally, two diagnostic characters may be relied on, so far at any rate as British species are concerned: one lies in the shape of the hairs with which more or less of the body is clad; in "bees" some at least of the hairs are "plumose," i.e. provided with short lateral offsets like those on a sparsely fluffy feather of a bird; whereas in "wasps" all the hairs are "simple," i.e. destitute of offsets. The other is the widened condition of the metatarsal joint (see fig. 17) of the hind legs. Since a microscope of fairly high power is required to render the shape of the hairs visible, and

since in some male bees (*Andrena*) the enlargement of the metatarsus is indistinct, we are constrained to fall back on the habits of the insects in an endeavour to discriminate between them. The technical name for the "bees" is *Anthophila* (flower-lovers), and though many of the "wasps" frequent flowers and nourish themselves upon the nectar secreted by them, yet it is the fact that none but the bees provision their nests with the pollen of flowers, honey, etc. for the benefit of their offspring. All the "wasps," notwithstanding that when adult they feed upon plant products, supply their young with animal food, such as spiders, caterpillars, or the flesh of larger carcases. Here then we find a sure, though granted not an easy means of distinguishing between "bee" and "wasp": —the bee grub is nourished upon vegetable products collected by its mother or some other bee, the wasp grub is carnivorous.

The term "wasp" as here employed includes many species of insects other than the familiar yellow and black wasps that form large and often troublesome societies in late summer and early autumn. For convenience I use it to embrace the sand-wasps or digger-wasps (*Fossores*) of every description, as well as the solitary mud-wasps (*Odynerus*) and the social-wasps known to everybody. Members of these two last-named groups are easily recognisable by their habit of folding their fore-wing along its entire

length when in repose: the hinder half of the outstretched wing is, in repose, doubled underneath the front half, so that the front wing then exposes only half of its full width. For this reason the mud-wasps and the social-wasps are grouped together under the name *Diploptera* (double-winged). Since, however, it is not our object to present a treatise on the anatomical structure, but rather an account of the interesting and fascinating ways of merely a few of these remarkable insects, we will now pass on to consider the habits of some of the "diggers."

CHAPTER II

FOSSORES OR DIGGER-WASPS: POMPILID SECTION

FROM an evolutionary standpoint the insects of this section are the lowest of those with which we are concerned; and it is interesting to note here and there among their members evidences of a tendency towards the higher and more complex conditions that now obtain among the most advanced of the social-wasps or in the honey-bee. The majority of the "diggers" are energetic, fussy, bustling insects inhabiting for the most part sandy districts, such as the Surrey heaths, or sand-dunes of our coasts.

They are notoriously fine-weather insects, and love a place in the sun above all else: in fact in dull weather it is useless to expect to see any of them. In size and colour they present a great diversity; some are no bigger than ants, others attain a length of about an inch; some are uniformly black all over, others black and red, others black and yellow like the social-wasps. They all provide their larvae with "fresh" animal food; some store caterpillars, some beetles, some small species of bees, some grasshoppers, some two-winged flies, some spiders for the nourishment of their offspring. The prey of whatever kind it may be is not actually killed but is merely paralysed; so that it remains fresh and virtually alive until the grub of the digger devours it. The parent digger secures this inert condition of her victims by skilfully stinging one or more of the chief nerve centres and rendering them inoperative by her poison. The species are all "solitary," that is to say each nest, or rather burrow, is the work of but one female; and she alone is responsible for the welfare of the young. The various kinds make their burrows in all sorts of places; many dig holes in the earth, preferring a light soil for obvious reasons, others dig galleries into wooden posts or decaying tree trunks, or into bramble stems, straws and similar objects. So far as my own experience goes very few, not even the largest, have a sting sufficiently powerful to penetrate

the human skin, nor do they ever make any attempt to attack the observer, be he never so aggressive.

Some of the most interesting and most easy of observation among the digger-wasps are those known to science as the *Pompilids*: we have about thirty species belonging to this family, and fifteen of these are included in the genus *Pompilus* itself. The insects are rarely to be seen except in bright sunshine, for they hide underground or crouch motionless and difficult of detection when the sunshine passes away: the mere shadow of a passing cloud is quite enough to quench their activity for the time being. The majority are black, or black and red in colour; a few are black with creamy white spots. They all have long, wiry legs, whose first joint (i.e. that nearest to the body) or "coxa" is very large; the coxae of the second pair of legs actually meet each other in the mid-line underneath. The enlarged and closely approximated coxae are of great value to the insects when excavating their burrows. These nest-tunnels are often driven to a depth of several inches, and all the soil to be removed is brought to the surface by means of the enlarged and rather flattened coxae which act like hoe-heads beneath the body and drag the soil along the floor of the tunnel as the animal backs up to daylight from the dark recesses of her gallery: the close apposition of the middle pair of coxae ensures that very little soil slips between to

be left behind. Arrived at the entrance the Pompilid scatters her load by vigorous kicking with the hind legs; so vigorous indeed that often there may be seen a fine jet of sand streaming, like water from a syringe, to a height of an inch or so, out into the air from the mouth of the burrow.

The burrow completed, the wasp catches a few spiders, each species usually adhering to some one particular kind of spider, paralyses them and conveys them underground where they are destined to serve as food for the grub which emerges from the egg that she attaches to one of her victims.

One of the most abundant of these Pompilids, known as *Pompilus plumbeus*, occurs on nearly all our sandy coasts, and not infrequently at inland places, from June until autumn sets in. The female is black and about a quarter of an inch in length, the male rather smaller and grey in consequence of the fine hairs with which his black body is clad.

I have studied the habits of these fascinating little wasps both on the sand-dunes to the north of Yarmouth, and on those of Braunton Burrows in North Devon. Whenever the sun shone brightly these active creatures were to be seen scurrying restlessly about with all the airs of a busy man in a desperate hurry. Seldom flying further than a few feet they transact their affairs on *terra firma*; their long wiry legs doing more than their fair share of work. Now

and again a pause ensues in the bustling career, and the little creature digs furiously for a few seconds as though desirous of making a burrow; occasionally she halts and basks with outspread legs upon the warm sunlit sand. Some perseverance is needed if one wishes to witness the complete drama enacted; many a *P. plumbeus* will elude one's vigilance and with an extra rapid movement escape from observation. Let me narrate the events of one of my successful trackings:—having selected a specimen whose business-like demeanour seemed to promise a reward I followed on hands and knees her wild career through the tangled marram grass and over bare tracts of sands until at length, after much crawling and more perspiring, I tracked her to her burrow. As she neared home her excitement passed all limits, she leapt repeatedly a few inches in the air, and at last rushed headlong into the burrow; but no sooner in than out again and racing rapidly in all directions round the hole, taking, as I believe, the exact bearings of the spot so as to assist her in returning without waste of time. The survey completed, she dashed off: I rested by the burrow to await events. After about twenty minutes back she came, just put her head into the burrow, and was off again. I now followed her and found that about five feet away she had a spider which she had paralysed with her sting. She went straight from burrow to spider without any

hesitation as to direction, seized it by one leg, and walking backwards dragged her victim a foot or so nearer the hole: then once again she must satisfy her anxiety that all is right at home, and back she scampers to inspect her front door; off again to the spider, brings him another foot or so on the journey; again, is home quite safe? back once more to her victim; but she had left him on a sloping bit of sand, and he had rolled helplessly down a few inches; so "when she got there the cupboard was bare." I laughed outright to see the mute astonishment depicted in this ferocious little huntress when she did not find her spider where she expected :—she turned round, looked in every direction, waved her antennae to and fro, as though to say "Surely I left him here; this certainly is the place." However, she wasted no time, but made a cast round the spot and soon recovered her treasured victim and resumed her task of alternately dragging it along and inspecting her burrow. At last she had the spider at the door of her den, and then entering backwards she dragged it down after her very rapidly and disappeared. After waiting vainly for half an hour in hopes of her return, I rose to go, intending to return later in the day; but in getting up I loosened some of the fine wind-blown sand, and a petty avalanche swept down smothering the mouth of the burrow. With a grass-stem I did my clumsy best to re-open the hole,