

Poisonous Insects.

Walter R. Ballard.

The

o-

kin.

s

/

ed

in-

n-

/

o

e

-

n-

n-

n-

n-

n-

n-

n-

n-

n-

n-

n-

n-

n-

n-

n-

Outline

- A. Introduction.
- B. Classes of poisonous insects.
 - 1. stinging insects.
 - 2. biting insects.
 - 3. stinging larvae.
 - 4. insects with poisonous secretions.
- C. Arachnida
- D. Myriapoda.

Poisonous Insects,

The poison of insects is for the purpose of protecting them from their enemies and of securing food either for themselves or their larvae. The subject is important to us at present in its relation to the higher animals. Either from accident or in the performance of ordinary work, many persons become painfully conscious of the irritating effect of insect poisons. A knowledge of those species which are poisonous would in many cases preclude much of the suffering from this source. The present article is simply an attempt to compile the literature on the subject in a convenient form. Unfortunately the literature is much scattered and largely inaccessible, so that at best this work can be only incomplete.

Poisonous insects may be classed under four general heads, viz; (a)

those with a sting, which is a modified ovipositor connected with a specific poison gland, (b) those with a modified salivary gland with a poisonous secretion connected with a piercing beak, (c) those, the larvae of which have the body surface covered with hairs modified into sharp bristles which produce a nettling, or urticating effect when coming into contact with the skin of human beings, and (d) certain insects which discharge from their bodies fluids which produce a burning or blistering effect upon the skin.

a.) In the first class are included the bees, wasps, stinging ants, and certain other Hymenoptera. As a general rule it is only the females which possess the stinging apparatus. In the honey bee and other bees the poison apparatus consists of two poison glands whose secretion passes by a

single more or less convoluted efferent duct into the large poison-sac, and thence by the excretory duct, which is enlarged at the base of the sting, by the same passage as the eggs. According to Carlet, the poison apparatus of bees consists of two kinds of glandular organs of which one kind secretes a feebly alkaline fluid, the other an acid product. The poison becomes most effective when both fluids are mixed. The resultant venom is always acid. The alkaline gland in bees and all poisonous Hymenoptera is strongly developed but becomes vestigial in those forms which sting their prey to serve as food for their larvae. Bordas has found both the alkaline gland and the acid gland in a hundred species of Hymenoptera, including not only Aculeata, but also Ichneumonidae and Tenthredinidae. They may therefore be safely said to be of general

occurrence. The acid gland consists of three parts, the glandular portion, the reservoir for the poison, and the secretory canal. The alkaline gland is an irregular tube, with a striated surface and without a reservoir. In most Hymenoptera there is still a third gland, which is unpaired, granular, rectangular or lanceolate, with a short, filamentous duct which opens beside the orifice of the alkaline glands.

The poison in ants, wasps, and bees consists of two substances, formic acid and a whitish, fatty, bitter residue in the secretion of the glands. The corroding, active formic acid is the essential part of the poison.

The Hymenoptera are divided into two sub-orders, the Boring Hymenoptera, Terebrantia, and the Stinging Hymenoptera, Aculeata. In the first division the caudal end of the female is furnished with an organ, the ovipositor,

which is fitted for boring a hole into which an egg is to be placed, and also for conveying the egg into this hole. The form varies greatly in the different families. In the second division the ovipositor is modified into a sting and is connected with a poison gland. It is a compound organ composed of essentially the same parts as the borer. This distinction between the Terebrantia and Aculeata is, however, not very closely defined. Among the former there are some families capable of inflicting slight wounds, while on the other hand some of the Aculeata do not sting. Among the Boring Hymenoptera, Bordas has met with well developed poison glands in forty species, including that of *Tenthredo* and *Empyctus*, as well as various genera of *Ichneumonidae*. In the various species of *Ichneumon* there have been found three kinds of glands opening into the base of the sting. The

first two correspond to the acid and alkaline glands of bees and wasps, and the third is situated between the two lateral muscular bundles which attach the base of the sting to the last abdominal segment. The poison reservoir is recognized by its yellow color and diaphanous and striated appearance. It is situated on the left of the hind intestine a little in front of the rectum. The possession of these glands and the evident attempt of many of the Terebrantia to defend themselves by means of their sting indicates the possibility of their being at one time stinging insects. As far as any reference has been found such characteristics have been retained only by the Tenthredinidae and the Ichneumonidae.

The most of the Aculeate families have a well developed stinging apparatus, some of which produce very serious

wounds. No specific reference to the stinging powers of some families of this group has been found, so they have not been included in the list.

Some of the Chrysididae on occasions use the ovipositor as a sting, though it is capable of inflicting only a very minute and almost innocuous wound.

Of the super-family Formicina, the typical ants, Formicidae, have the poison glands well developed, but do not possess stings. The queens and workers of both Poneridae and Myrmicidae, however, are armed with stings.

The females of the velvet ants, Mutillidae, sting very severely.

In most forms of Hymenoptera which sting their prey, their victims are simply paralyzed. In this way they are kept from decomposition until the larvae can use them for food. Among these are the Pompilidae which includes some of the largest known Hymenoptera. In this group also comes

a number of species of Sphecidae, the thread-waisted wasps. Others are the Larridae, Bembecidae, Nyssonidae, Philanthidae, Mimesidae, Pemphredonidae, and Crabronidae.

The Eumenidae sting, but are not nearly so dangerous as the yellow jackets which they resemble in many ways.

The male members of the family Vespidae do not sting, but their close resemblance to the workers affords little protection from this fact. The sting from a maddened hornet is quite severe and experience soon teaches one not to disturb these insects unduly.

Among the Apidae are found the common bumble bee and the honey bee. Both of these sting severely but are usually goodnatured until disturbed. Several cases have been reported of persons dying from the effect of stings

from a swarm of honey bees. They are usually persons of nervous temperament who are markedly susceptible to the action of certain medicines. It is a well known fact that persons handling bees become immune to their poison, the stings having little effect upon them.

B.) The second division includes certain bugs of the order Heteroptera and many of the dipterous insects. Many, if not most bugs, seem to instill a drop of poison in the punctured wounds they make, but, on account of its small amount, or because they seldom attack the higher animals, they would hardly be considered in the class of poisonous insects as ordinarily designated. In many of those insects possessing piercing beaks, cephalic glands have been found which are supposed to be the source of the poisonous secretion. Loey has found these glands well developed in the family

Nepidae. The epithelial or secreting cells are eight-sided. When these insects are irritated a secretion is freely thrown out around the base of the beak which when introduced into the body of an insect produces death very quickly.

The backswimmers, Notonectidae, possess sharp and powerful beaks which are capable of inflicting painful stings. Great care is therefore necessary in collecting these insects.

In the United States there are five species of the Reduviidae which may attack man, giving poisonous bites with their piercing beaks. The common terms applied to them are pirate bugs, kissing-bugs, etc. The Eastern species are *Opsicoetes* (*Reduvius*) *personatus*, *Melanolestes picipes*, and *M. abdominalis*. The Southern and Western forms are *Rasahus biguttatus* and *Conorhinus sanguisugus*. The bite of these bugs is specific.

ally poisonous, but the great inflammation which so often occurs is doubtless due to the entrance, into the circulation, of germs of putrefaction, since these bugs are attracted to dead animal matter.

The common bedbug, *Acanthia lectularia*, seems to instill into the punctures made by its beak a poison which is peculiarly irritating to many people.

That the mosquito injects poison into the wound, it makes has been proved by Macloskie, who discovering fine droplets of a yellow oily-looking fluid escaping from the end of the hypopharynx, afterwards detected the poison glands. The poison is diluted by the secretion of the salivary lobes, and the two efferent ducts, one from each set of glands carry forward and commingle the venomo-salivary products in the main duct. The stream is then carried by the main

duct to the reservoir at the base of the hypopharynx. All the subfamilies, with the exception of Corethra, have a piercing proboscis.

The greater number of the family Chironomidae are harmless. There are, however, certain minute species of the genus *Geratopogon* which are extremely annoying on account of their bites.

Some of the ants which do not possess stings are capable of injecting formic acid into wounds made by biting.

C.) The poisonous insects of this group are confined to the larvae of certain moths, especially of the families Limacodidae, Bombycidae, and Saturniidae. There seems to be some difference of opinion regarding the source of the urticating effect from the spines of these larvae. Some are of the opinion that the poisonous principle lies in the tissue of

the spine, while others claim that the spines are hollow and filled with a poisonous fluid secreted at their base. In certain species the latter view has been proved satisfactorily. The poisonous secretion is formed in a single large, or several smaller specialized, hypodermal cells, situated under the base of the spine. In the finer spines of a large tubercle there appears to be a differentiation of the hypodermal cells into two kinds, the large basal, deep-seated, setigenous cells, and the poison-secreting nuclei situated nearer the base of the setae. The spines are filled with poison and, breaking into bits in the skin of the hands or neck, cause great irritation. Hardly more than two dozen species of larvae have this power to produce a nettling sensation. Professor Riley, as *State Entomologist of Missouri*, states in his *Fifth Annual Report* that he is acquainted with fifteen larvae in-

habiting the State of Missouri, whose spines have this urticating power. They belong mostly to the slugworms or Conchiliform larvae. The following is the list as he gives it. *Lagoa crispata*, *L. opercularis*, *Euclea paenulata*, *Euc. querciti*, and two other undetermined larvae of precisely the same structure, *Parasa chloris*, *Phobetron pithicium*, *P. hyalinum*, *Adoneta spinuloides*, *Monoleuca semifascia*, *Empretia stimulea*, and *Acronycta pylinoides*.

The Buck or Maia moth, *Hemileuca maia*, larvae are dangerous only when full grown. The effect of the sting is a reddening of the punctured parts and the early appearance of raised, whitish blotches. These are replaced by purplish spots which do not disappear for several days. The urticating properties of the Do-moth larvae, *Automeris io*, are keener than in *Maia* and

consequently cannot be handled with the same impunity.

In Europe everyone is familiar with the irritating properties of the hairs of the gregarious processionary caterpillar, *Cnethocampa processionea*, and of the so-called yellow tail moth *Liparis auriflua*.

Mr. G. M. Levette is authority for the statement that the larvae of *Pseudohazis eglanterina* also possess this irritating power.

Orgyia leucastigma and *Euproctis chrysorrhoea* have true stinging larvae. The ability of the larvae of *Pyrharctia isabella* to sting is also well proven, *Anisota stigma* has been reported, but, although the spines produce slight tingling sensations, it can hardly be classed with the stinging larvae.

D.) This division includes certain insects which secrete various obnoxious fluids. The blister beetles, *Meloidae*,

constitute a well known example. The oil which exudes from the joints produces a blister when applied to the skin. They are much used in medicine for making blister-plasters. The beetles are killed, dried, and pulverized and the powder thus obtained is made into a paste. The species most commonly used is a European one, known as the Spanish fly, although any of the American species of related genera are equally efficacious.

The family Paussidae have the power of discharging, in an explosive manner, a volatile, caustic fluid from the anus. This fluid, according to Loman, contains free iodine.

The various species of Brachinus, Bombardier beetles, eject a bad smelling fluid consisting largely of acetic acid which produces on the skin a burning sensation and forms red spots which pass into brown.

Some of the larger Carabidae, if roughly handled, spit to a considerable distance an acrid, caustic, stinking liquid which is capable of causing considerable pain.

A correspondent of Insect Life, reports that he has discovered that the red-humped apple worm, *Oedemasia concinna*, has the power to emit quite a quantity of strong hydrochloric acid which is decidedly corrosive to the skin and easily perceptible in the atmosphere. This power was noticed only in the older larvae and then only when suddenly disturbed. It is a well known fact that many of the Philodontid larvae closely allied to the *Oedemasia concinna* have the power of ejecting from glands between the head and the first segment such an acid or vapor.

Some of the Arachnida and the Myriapoda are included here as being

closely allied to the insects. Because of their resemblance to insects they are often mistaken for them. The most venomous of these groups are found in the tropics.

Among the Arachnida the true scorpions, *Scorpiones*, possess a large poison sting at the end of the post-abdomen.

Of the crab spiders, *Mygalidae*, the deleterious effect of the venom of *Mygale avicularia* has been proved sufficiently to render it likely that, if employed upon young birds, it might kill them. *Mygale Klugii* is much dreaded in the eastern Andes as being extremely venomous.

Latrodectus malmignatus (Fam. Therididae) possesses the dangerous power of inflicting a poisonous wound that kills small insects instantaneously and affects larger animals seriously, man himself having sometimes

succumbed to the stroke.

Of the Gamasids, Argas (Ornithodoris) Talage, found in Guatemala, has a very irritating bite.

In the true spiders the mandibles consist of two segments, a strong basal one and a claw-shaped, terminal one, at the tip of which a poison gland opens. It is by means of these organs that they kill their prey. The belief in the popular mind that the bite of the spider is highly venomous is probably not well founded in fact. Many of the supposed cases of poisoning from the bite of spiders can be traced to other causes.

Among the Myriapoda many species of centipedes (Ord. Chilopoda) are quite venomous. The poison glands open through the claws of the first pair of legs which are bent forward so as to act with the mouth parts. These creatures abound in all sections

of the United States. Those found in the North are comparatively small and rarely, if ever, inflict serious injury to man, but the larger species which occur in the warmer regions are extremely dangerous.

The genus *Scolopendra*, which includes chiefly large exotic species, can inflict a painful and poisonous bite with their powerful nippers. The genus *Crematida*, or *Scutigera*, is also reputed very poisonous.