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NOTES
ON THE
HABITS OF COLEOPTEROUS INSECTS

BY G. P. GIRDWOOD, M.D.,
M.R.C.S.E., L.C.G. & S.L.C.

READ BEFORE THE NATURAL HISTORY SOCIETY
MONTREAL.

MONTREAL:
PRINTED BY M. LONGMOORE & CO.,
1867.
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NOTES ON THE HABITS OF COLEOPTEROUS INSECTS.

Mr. President, Ladies and Gentlemen—As we are in the habit of judging of a man by his works, so may we judge of the Creator of the Universe by his works, not that I mean we should sit in judgment upon the being, who was the author of all things and in whom we live and move and have our being, but that in examining and scrutinizing his works we may judge of the majesty and power, and wisdom of him who fashioned man in his own image. The study of natural history is but the study of the book of nature, and in truth the study of the Creator himself. The book of nature is divided, if I may use the expression, into three volumes, namely, the animal, vegetable, and mineral kingdoms, in all of which we find evidences of the vast resources, and forethought and wisdom of God.

We find these three divisions of this world mutually dependent upon one another and forming a harmonious whole.

We find a life in each, that life in each commencing in an individual unit so to speak, and passing by gradations, almost imperceptible, to more and more complex forms.

In the animal kingdom, which is the volume which we have to open to-night, we find all animal life commencing in a single cell, a spherical bladder of organized matter, yet matter, possessed of the same characters as we find in the mineral kingdom, and indeed borrowed for a time from that kingdom, and which, after passing through the various stages and transformations, developments and decay, constituting the phenomena to which we have given the term life, is again returned to the mineral kingdom from which it was borrowed, there to pass through other changes until it is again borrowed for some future individual.

All members of this animal kingdom pass through successive stages of progressive existence from this simple form of a sphere till they attain their full development as adult individuals of their species, perform their duties in the economy of nature, and pass away to make room for succeeding generations.

The whole animal kingdom itself exhibits a successive progressive development from this simple form to man. The race we in our classification put at the top of the tree.

Previous enquirers into this volume of the book of nature divided and classified this volume into leaves; these leaves are the different races of animals,—one of which forms the subject of the few remarks I am about to address to you tonight.

The classification of animals is according to the amount of their development. The articulated branch of the animal kingdom contains animals composed of simple rings more or less similar to one another, which contain and support the organs necessary to animal life.

According to the method in which this plan of structure is exemplified, articulated animals are divided into three classes. Those whose body is pervaded by air vessels, Insects.

Body without air vessels.

Thoracic region distinct from abdominal. Crustacea.

Thoracic region not distinct. Vertebrates.

The class Insects are again divided, by subordinate modifications in the plan of structure, into three sub-classes:

Head, thorax, and abdomen; distinct legs, 6 Insects.

Head, thorax usually agglutinated; legs, 8. Arachnida.

Head distinct; legs numerous. Myriapoda.

The first sub-class Insects alone occupy our attention at present.

The word insect, which denominates this sub-class, is derived from the Latin iumentum, and means cut into or notched. And is designed to express one of the chief characteristics of this group of animals, whose bodies are marked by several cross lines, or incisions.

The parts between these lines are called segments or rings, and consist of a number of jointed pieces more or less moveable in each other.

Insects have a very rudimentary brain. And instead of the spinal marrow of the higher orders
of animals, have a knotted cord extending from the alimentary brain to the hinder extremity of the body, and these filaments pass from this cord and from the brain, forming a nervous system.

Within their bodies they have numerous tubes through the walls of which air is supplied to the lungs and carried the air through their bodies. They do not breathe through their mouth, but through small holes placed along the sides of the body, called spiracles, usually none in number.

They have a heart, which, from the fact of their pairing off, seems to be susceptible of the influence of the mesoderm. This heart is an elongated structure of small tubes, of which we may say that there are two, the one on either side of the body, called aorta, usually none in number.

In the first period of infancy an insect is technically called a larva, a word signifying a mask, because therein its future form is more or less masked or concealed.

In the first period, which is much the longest, the insects are always without wings, pass most of their time in silent, grow rapidly, and usually shed their skins repeatedly.

In the second period they entirely lose their previous form, take no food, and remain at rest hidden away somewhere in a death-like sleep—this condition called the pupa, from a slight resemblance that some of them present to an infant in the cradle, as was the custom among the Romans.

At the end of this second period insects again shed their skin, and come forth fully grown and with few exceptions provided with wings. Thus they enter upon their last or adult state, wherein they do not increase in size, and during which the perfect form is the result of their kind.

This period is usually short, most insects dying immediately after their eggs are laid. In winged or adult insects, two of the transverse intervals of the abdomen are deeper than the rest, so that the body seems to consist of three principal portions. The 1st or head: the 2nd or middle portion Thorax or breast; the 3rd or hinder part the abdomen. The head supports the eyes, the mouth, and the antennae or organs of hearing. The eyes of adult insects, though apparently two in number, are composed, each consisting of a great number of single eyes, closely united together and incapable of rolling in their sockets.

Near to the eyes are two jointed members, the antennæ corresponding in situation with ears in other animals, supposed to be connected with the sense of hearing or of touch, or of both combined.

The mouth in different insects varies according to the food they live on, some being provided with a biting or chewing apparatus, while others are provided only with a sucking apparatus. The parts of the mouth are an upper and under lip, two nippers or jaws on either side moving sideways, and four or six little jointed members called palpi or feelers, whereby two belong to the lower lip, and one or two to each of the lower jaws.

The parts are altered and modified in different insects, and form a method of distinguishing one from another. Some are agglutinated to form a tube for sucking up food; in others, for piercing, and then sucking. The parts belonging to the thorax and the wings and the legs. The former are two or four in number, and greatly in form and consistence, in the situation of the wing, bones or veins, as they are generally called, and in their isolation or the manner in which they are closed or folded when at rest. The under side of the thorax is the breast, and to this are fixed the legs, which are six in number. The parts of the legs are the hip joint, by which the leg is fastened to the body; the thigh (or femur), the shank (or tibia), and the foot; the latter consisting of sometimes one joint only, more often of two, three or five pieces called tarsi, connected end to end, like the joints of a finger, and armed at the extremity with one or two claws.

The abdomen, or hindmost part of the body, and, as we shall see, the principal part, contains the organs of digestion and other internal parts, and to it belong the piercers and sting, where they exist.

An English entomologist has stated that, on an average, there are six distinct insects to one plant. This proportion is probably too large for this country. There are about 1200 flowering plants in this country, and we may estimate the number of species of insects at nearly 5000, or in proportion of to a plant. To facilitate the study of such an immense number, some kind of classification is necessary. The basis of this classification is founded upon the structure of the mouth; in the adult state, the number and structure of the wings, and the transformation. The first great divisions are called orders, of which the following seven are generally adopted by naturalists:

1st. Coleoptera: Beetles, insects with jaws and two thick wing covers, whence they derive their name; two membranous wings.

2nd. Orthoptera: Crickets, Grasshoppers, &c., with jaws, and par-ent wing covers; two membranous wings.

3rd. Hemiptera: Bugs, Locusts, &c., with a horned beak for suction, 4 wings, the upper one small and membranous.

4th. Neuroptera: Dragon Flies, &c., with jaws, and four netted wings.

5th. Lepidoptera: Butterflies and Moths, with a spiral sucking tube, and 4 wings, covered with branny scales.

7. Diptera: Musquitoes, Flies, Fles, &c., with a pair of hairy, shaggy proboscis, 2 wings only.

With this first order (Oleoptera) we have to deal. They have two membranous wings, concealed by a pair of horny cases or shells, meeting in a straight line on the top of the back and usually having a triangular or semi-circular edge, called the scutel, wedged in between their bases. Hence the name, signifying wings in a sheath. The horny covering is called elytron. The order Oleoptera is divided again, according to differences of formation, into 45 families, which are again subdivided into genera and species. These are distinguished from one another by various forms of the antennae, the mouth, the tarsi, &c.; but, independently of these, the different families have peculiar shapes, some of which I have had drawn so as to point out the characteristic shapes of these tribes of beetles. The food of beetles has been one means of classifying them; thus we have

Gedophaga, earth eating beetles.
Hydrophilidae, water beetles.
Necrophaga, death eaters.
Brachylepta, do do.
Lycorrhinae, dead wood, &c.
Serroni plant eaters.
Malacodermata, fire-flies, also plant eaters.
Heteronera, living on fungi and decayed wood.
Longicornea, boring beetles.
Phytophaga, living on live animals.

In this sort of classification we find the most brilliant coloured insects living upon flesh, either dead or living. In the nourishment of beetles something more than the mere preservation of the individual seems to have been desired, and in many instances it would appear as if some were created for the express purpose of consuming unhealthy organized material. Thus we find the carrion beetles beneficial to man by devouring noxious insects, and even carrion, destroying decayed animal substances which would otherwise prove a fertile source of unwholesome exhalations. In Egypt these beetles are very large and powerful, and numerous, and one was in ancient times of so much use that these people dedicated him. One of the dung beetles, an example still goes by the name of Scarabeus Sacer, whose conformation is beautifully adapted to the duties he has to perform in life; his strong limbs, and his great head, above the rest, and when they have made a hole deep enough the mass falls down into it, and then they shovel up the sand and cover it up, and lay their eggs, and have stored up a cellar full of food, adapted for their young, when they are hatched. Beetles which feed on leaves, wood, fruits and grain, are herbivorous, and are generally noxious to man; but here we find Nature's great doctrine of compensation fully carried out. If there be many genera of insects, principally the case among noxious butterflies, so prolific that if allowed they would devour all the vegetables, and so bring about a famine, we at the same time observe that the Great Ruler of the Universe has prevented their increase by making them food for others. But the enemies these insects have amongst their own order, they are the food of other orders, such as birds; and if we destroyed all the caterpillars, the beetles would devour the plants, and we should have our woods destitute of birds, and would welcome again these insects if they would bring back the birds with them.

The first division named, the Gedophaga, and represented by this cloddle basiliscus, are a repulsive, hunger set of fellows, very quick in their movements, lying in ambush under stones, and pouncing on their prey, which they grasp with their powerful claws in front of their mouth; others run over the sand, and are on the lookout for the larvae of other insects, which, lying in conceit until their sleep-like or pupa state is over, become an easy prey to their enemies; others again may be seen running up and down leaves and upon the fine fat caterpillar to satisfy his ever-viving appetite. They are splendid in colour; they fly very fast, but not far; they are difficult to catch, but well repay the trouble of taking. The elytra, or wing covers, may be made use of to adorn ladies' dresses, or the whole beetle may be used for the same purpose. No work of art can come in beauty with the creations of Nature.

The next order, the Hydrophilidae, represented by Brillius, are most useful to man; they inhabit for the most part the water but frequently fly about at night. I have taken many of them at night when sitting with my window open with a lamp watching on a summer evening for moths and any nocturnal visitor. They have nearly all a shining vegetable matter and the larvae of other insects whose young inhabit the water; they thus act as purifiers of that element, and at the same time prevent the too rapid increase of other insects.

The next tribe, the Necrophaga, represented by the Strophalus Marginata, are carrion eaters, and are useful to man in removing all sorts of filth. They may be found in the carcases of dead animals, and when disturbed run out in all directions. Some of these are so beneficial to man, that we find, in the old English Cheshire, a great many of them; and when they have found their food for themselves they fly away, to stick them, from which we may learn a good lesson, that in the midst of dirt we may keep ourselves clean.

The Brachyura, or fourth tribe, and the fifth tribe, Lamellidora, or flat-headed beetles, of which Staphylus Villusus and Sclerotanus Sacer may be taken as representatives, are considered with ophaga, for their habits are much the same, and may be called scavenger beetles. They are armed with strong jaws for separating the food. Amongst these we find one of the largest specimens of beetles; the larvae of these live underground, and feed upon such food as their protensors have been kind enough to lay up for them. Amongst the members of this class are to be found a family of beetles called Dermestidae; they live on decaying matter, but not always on decaying matter, for the grocers find great enemies in these little fellows; they are very ravenous, and eat a great deal; they have a peculiar taste for ham, in which I think a good many others will agree with them; but if the grocer finds an enemy, the anatomist finds a friend, and my friend Mr. Buckland used to keep a select stock of Dermestes for the purpose of cleaning his skull-tomes; they eat away all the flesh, and leave nothing but the bones. Some of these larger kinds of larvae were considered by the ancient Romans a great delicacy; and to this day in the West Indies, the inhabitants eat the palm worm, and I was assured by a friend who had been in the West Indies that the palm worm was a very fine fish, it is a disgusting looking, fat, white worm, with a
black head, from three to five inches long. They
use the cabbage palm (aecia
oleracea) and afterwards changes into a black
weevil two inches long, of which tribe I have yet
74.45
to speak.
New Zealand the larvae of a species of cock
chaffer is eaten after dinner as a delicacy, cook-
ed like marrow and eaten on toast. I dare say
they may be very good, and we have hitherto
authority for the eating of beetles, for I find in the
11th chapter of Leviticus and the 22nd verse, the
following words:— "Even these of them ye may
eat, the females of them, and all
beetles
after his kind, and the beetle after his kind, and
the grasshopper after his kind."
The sternest of buprestids come next. They
are of several kinds of beetle, often with brilli-
ant colours, intermixed there are many species
of them, they live on leaves of plants, and the
larvae penetrate the wood of trees, upon which
they live, and when this stage of life is nearly
completed they place themselves with the head
outwards, and when the transformation is com-
plete they have only a thin layer of bark to eat
through, and out they go, fully dressed, into the
sun. They are my fellows, these buprestids,
for when you approach them to take them
they fold all their feet together, and fall to the
ground, as if dead, and often you are disappointed
of your prize. They fly about by
day and secrete themselves in old stumps, &c.
night, the different kinds will come to the
several trees, the cherry, the potter, the butter
and.
The 8th division, the malacodermata are a class
of beetles, of great interest, and great beauty.
they are the lady flies, their elytra and skin gene-
 rally is much softer than that of other
beetles, they are vegetable eaters, and amongst them are
seen the vegetables, the Chinese blister fly as
they are called, the Spanish fly as it is called,
boles to a genus of this division, they do some-
mething in the way of devouring the plants that
they feed on, but are so useful that I think we
will forgive them this little injury they do us.
Heteroptera, the eighth division I have given,
are useful in removing leaf-feeding wood, and
in the peculiar family are specially useful, the
called the Bolltophus or fumus eater. They live entirely
upon the leaves, and amongst them are some very
strange shapes. With these we may take a
nearly allied class, the Elateridae, or spring
beetle, called by our neighbours the lightning
spring bug, represented by the Elater ocultanum;
so called from two large black spots on the
thorax resembling eyes. These beetles when held
given a peculiar spring, accompanied by a sharp
crash, and readily slip out of your fingers. Their
habitats is the bark of trees, or between the
bark and the woof. They do mischief to the
trees by seeping the bark from the wood.
The Longicornis, 9th on my list, are a very de-
structive set of gentlemen. They are for the
most part handsome fellows with long antennae.
It is difficult to know what they do with these
long horns. It seems as if they must be very
much in their way. Some of them are very
large. They lay their eggs in the bark of trees,
and then it seems the larva penetrate the
bark in different directions, causing those large
round or oval boles so commonly seen running
through the timber. They may be represented by
Monochromus confusus, of which Mr. Billings
says he has seen as many as one hundred on one
single pine tree. Together with these the wea-
Hovare a peculiar class of
beetles called Rhinoceros; from their carrying
a peculiar trunk on their heads, which aids them
in boring through the bark to deposit their eggs.
It is the bane of one of these that is eaten in the
West Indies. They are very destructive to the
fruits of trees, and one has been denominated
from his habitation the pea weevil (Bruchus Pial).
Mr. Harris, in speaking of this insect says:
"Few persons, while indulging in the luxury of
earn green peas, are aware of how many insects
they unconsciously swallow. When the pods are
carefully examined, small discoloured spots may
be seen with them, each one corresponding to a
similar spot on the opposite pea. If this spot on
the pea be opened, a minute, whitish grub, desti-
tute of feet, will be found there. It is the weevil
in its larval form, which lives upon the marrow
of the pea, and arrives at its full size at the time
that the pea becomes the crop. This larva or grub
then bores a round hole from the hollow in the
centre of the pea quite to the bull, but leaves
the latter and generally the term of the future spout
untouched. Hence these bugly peas, as they are
called by seedsmen and gardeners, will frequently
sprout and grow when planted. The grub is
changed to a pupa within its hole in the pea in
the autumn, and before the spring casts its skin
awalo, and becomes a beetle, gnaws a hole
through the thin bull, in order to make its escape
after it is fully grown, before the peas are planted
for an early crop. After the plants have flowered,
while the pods are young and tender, the peas within
them are beginning to swell, the beetle gather upon
them, and deposit their tiny eggs, singly, in the
pinnacles or wounds which they make in the
surface of the pods. This is done mostly during
the night or in cloudy weather. The grubs, as
soon as they are hatched, penetrate the pod, and
burrow themselves in the opposite peas and the
holes through which they pass into the seeds are
so fine as hardly to be perceived, and are soon
closed. Sometimes every pea in a pod will be
found to contain a weevil grub, and so great has
been the injury to the crop that the planters of the
neighbouring States that the inhabitants have
been obliged to give up the cultivation of this
vegetable. These insects diminish the weight of
the peas in which they lodge nearly one half,
and their leavings are fit only for the food of
swine. This occasions a great loss where peas
are raised for feeding stock or for family use, as
they are in many places. Those persons who
eat whole peas in the winter after they are raised
run the risk of eating the weevils also; but if the
peas are kept till they are a year old the insects
will entirely leave them. The pea weevil is sup-
poused to be a native of the United States. It
seems to have been first noticed in Pennsylvania
many years ago, and has gradually spread from
thence to New Jersey and other States, and is
now common in the south of Europe and Eng-
land. The insect is limited to a certain period
for laying its eggs; late sown peas, therefore,
escape its attack.

The larvae of these boring beetles, like the pea-
weevil, which inhabit trees, come near the surface
of the tree, and, of course, leave a hollow space
under the bark. The woodpecker, tapping with
his beak, finds out these hollow spaces, and
works away till he makes an opening, which he
fills with detritus, and when in search of,
affording us another example of the law of com-
penation in nature, and preventing the too
great increase of these destructive insects.

The last of my list are the phytophages, or
beetles who live on living things. They are rep-
resented well by the two species of the most beau-
fiful green beetle, with a brilliant
golden hue. They run up and down the plants,
and prey upon “aphids” - small green insects that suck the juice of the plant. This class of beetle is very useful in this way. The ladybirds belong to this order. They have been long held in estimation, and are called in Germany “lady-beetles” of the virgin, by the French, cows of the lord, or animals of the virgin. These have been recommended as a sovereign remedy for toothache. They are to be smashed up and put into the tooth, whether or not they are affections, I cannot tell; any one may readily try it for himself.

I have given you a few remarks about the mode of determining and classifying insects, and upon some of their lives and habitats, those who wish to collect these beautiful little animals, can do so readily. It is only necessary to supply yourself with a small wide-mouthed bottle of spirit of wine, a box of pins, a few pieces of cork and a cork-lined box to put your collection in. You will find the time spent is not wasted. It is a pleasant occupation in long winter nights to arrange them, and induces rambling amongst the woods in summer, whereby you will obtain a stock of health and strength. From their habits we may learn many useful hints; and in watching their habits and instincts, we may learn to appreciate the creations of an All-wise Providence.