

THE FLY.

FROM time immemorial the fly has had an existence upon the earth ; a special and important mission to fulfill. It has been written a bore and pronounced a nuisance ; declared a pest, and gravely regarded a messenger of evil ; made a "Plague" and known as a scavenger ; adjudged an assassin and condemned as a malefactor ; used as an emblem in proverb and in prophecy ; and if not canonized, it is at least placed in the heavens, and we find it taking rank among the stars as a constellation. From the remotest antiquity to the present moment it has been an unchanged representative of its class, and yet it is to-day regarded with as little interest and as much contempt as when Young wrote that the immortal soul, when thrown into tumult by the varied and fitful scenes of earth,

"Resembles ocean into tempest wrought,
To waft a feather or to drown a fly."

Yet its part in the universe is scarcely less important to-day than when, by reason of its numbers, it "corrupted the land" in order to convey a great moral lesson to Pharaoh's hardened heart, and a convincing argument to his benighted understanding.

The profusion with which flies are distributed over the surface of the globe, causes them to fulfill two important duties in the economy of nature. On the one hand they furnish to insectivorous birds an inexhaustible supply of food, and on the other they contribute to the removal of all decaying animal and vegetable substances, and thus serve to purify the air which we breathe. Their fecundity, the rapidity with which one generation succeeds another, and their great voracity, added to the extraordinary quickness of their reproduction, are such as to warrant Linnæus in saying that three flies, with the generations that spring from them, would eat up a dead horse as quickly as could a lion. Certainly these little insects are worthy of our attention and study, from the part they play in the general economy of nature. Man has no more potent aid in the conservation of health and the mitigation of disease and suffering. By their agency are quickly removed the noxious

fluids of decaying plants and animals, which, if left undisturbed, would not only offend the senses, but would scatter broadcast the seeds of disease, and produce speedy and certain destruction of life. Among these the classes Diptera and Coleoptera, of which the fly and the beetle are the representatives, may be said to constitute by far the largest portion to which this office is assigned.

When we consider their relations to ourselves and other animals, they become, also, objects of fear and repulsion. Gnats and mosquitoes suck our blood ; the gad-fly and asylus attack our cattle. It is related of one species, that it attacks and ultimately destroys many of the wretched convicts who are sent to the penitentiary of Cayenne, in French Guiana, South America. When one of these degraded beings, who live in a state of sordid filth, goes to sleep, a prey to intoxication, this fly, *Lucilia hominivorax*, sometimes gets into his mouth and nostrils, lays its eggs there, and when they are changed into larvæ the death of the victim usually follows. Instances of a similar character are reported in some of our medical works, showing that the larvæ, under the favoring circumstance of filth, have attacked the living flesh and occasioned an agonized death in a short time. Who would suppose that one of the causes which render it so difficult to explore Central Africa, is a fly not larger than the house-fly ? The Tsetse fly (*Glossina morsitans*) is not dangerous to man, to any wild animals, nor to the pig, the mule, the ass, nor the goat ; but it stings mortally the ox, the horse, the sheep, and the dog, and renders the countries which it curses uninhabitable for these valuable animals. This sucker of blood secretes, in a gland placed at the base of his trunk, so subtle a poison that three or four flies are sufficient to kill an ox ; and yet a most remarkable feature is that man and wild animals, and even calves while they continue to feed upon milk, possess entire immunity from the effects of the poison. The *Glossina morsitans* abounds on the banks of the Zambesi and in other marshy situations. The African cattle recognize its ominous buz-

zing and manifest the greatest fear at this fatal sound. Dr. Livingstone, in crossing these regions, lost more than forty fine oxen in as many minutes by the bite of the Tsetse fly, notwithstanding they were carefully guarded and had been but little bitten.

But the common house-fly (*Musca domestica*) is a representative of the whole class, and being a constant companion in our dwellings, may with propriety be the special object of study. Unlike the butterfly and moth, the fly has but one pair of wings, the second being replaced by two appendages called bal-

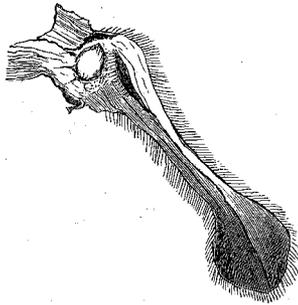


FIG. 1.—THE BALANCER.

ancers (technically halteres, Fig. 1), because they serve to regulate the flight. They are little membranaceous threads, placed one at the base of each wing near a spiracle, and terminated by a minute oval button, which seems capable of contraction and dilatation. The animal moves these organs with great vivacity, often when at rest and probably when flying. If either or both of these organs be cut off, the insect can no longer fly nor walk; hence it is supposed the poisers are connected with the feet, and are air-holders, and not improbably connected with respiration, by

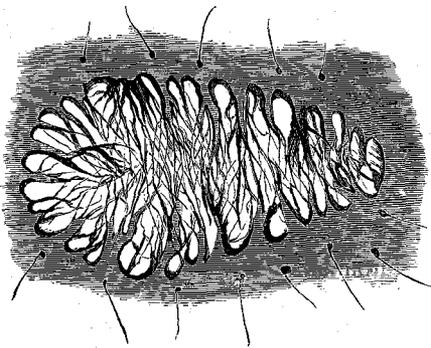


FIG. 2.—SPIRACLE OF HOUSE-FLY.

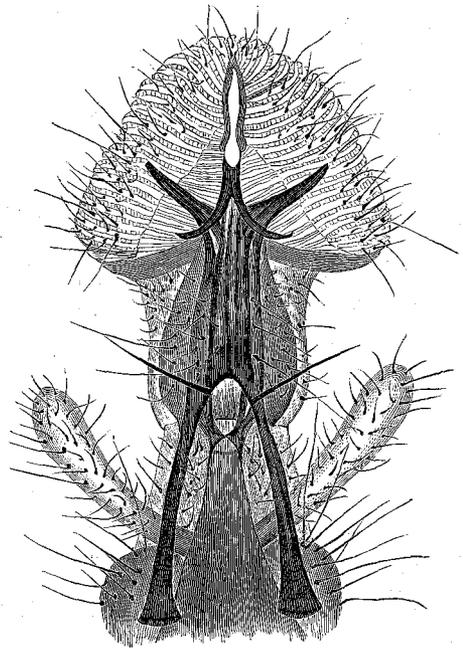


FIG. 3.—THE TRUNK.

opening and closing the spiracle in their vicinity. The respiratory apparatus of all insects is not by air-tubes communicating with lungs, as in the vertebratæ, nor by gills, as in the mollusks, but by stigmata, spiracles, or breathing-pores, located upon the surface of the body, which communicate with a system of minute air-tubes scattered everywhere throughout the body for the aëration of the blood. These spiracles (Fig. 2), while they open upon the surface, are guarded from the reception of dust, &c., by a net-work of fibres stretching from border to border, and so interlaced as to be efficient protectors.

Flies take their food by suction, either finding it or reducing it to a fluid state by secreting and throwing out a fluid from their trunks for this purpose. The mouth, or trunk (Fig. 3), consists of a sheath, a sucker, and one to four bristle-formed lancets, which at the same time that they pierce the food apply to each other so accurately as to form an airtight tube;—the last two named parts are retractile, and when withdrawn and hidden in the sheath may be forced out by pressing between the thumb and finger either the two sides or the upper and under part of the thorax, when the fly is forced to show its

trunk to its fullest extent. The lips—the extremity of the proboscis—are capable of closing in the middle, leaving an opening front and back; thus arranged, and acting with great rapidity in a hundred different ways, alternately lengthening and shortening, and becoming successively flat and convex, the mouth becomes a pump and the fluid rises by suction; the fly exhausting the air from the tube of its trunk, and the liquid at the opening going up through the influence of atmospheric pressure.

They feed principally upon fluids that exude from the bodies of other animals; sweat, saliva, and other secretions; they also seek vegetable juices, and may be seen in our houses to feed eagerly upon fruits and sweet substances. It is this passion that causes them to attack and occasion mischief to our books, by scraping off with their liplets the white of egg and sugar varnish used to give polish to the covers, &c., leaving traces of their depredations in the soiled and spotted appearance which it occasions. It is by means of these same organs also that the fly teases us in the heat of summer, when it alights upon the hand or face to sip the perspiration as it exudes and is condensed upon the skin.

The antennæ are of peculiar structure, and are the more interesting to study, not only because they present a great variety of forms, but from the probability that they are the organs of hearing for this class of insects. In our fly they originate in the front of the head, close together, and diverge as they proceed. They are jointed and densely covered with hairs, which decrease regularly in length

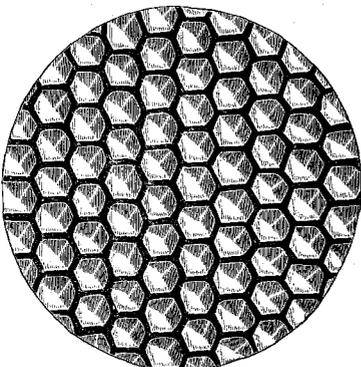


FIG. 4.—THE EYE OF THE FLY.

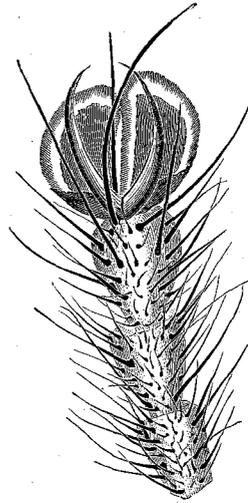


FIG. 5.—THE FOOT OF THE FLY.

from the base, making a wide and pointed plume.

While examining the proboscis you will not fail to observe two large protuberances upon the head, often covering nearly the whole surface;—these, the eyes, usually compound and consisting of many thousands, are constructed thus: each little hexagon of the eyelets, or ocelli, that compose the compound eye, (Fig. 4), is a perfect instrument of vision, consisting of the horny lens,—a six-sided prism, and an inner conical lens, which last is also compound, composed of two lenses placed together by their flat sides, and having different refracting powers. This arrangement enables all insects possessing mosaic composite eyes to see objects with more distinctness in proportion to the number of cones, since each cone will receive at least one direct ray of light from every object that is presented to the eye from the external world. The law of compensation, which is ever found throughout nature to maintain the balance between necessity and convenience, is nowhere more distinctly and beautifully exemplified than in the composite eyes of insects. The number of ocelli has been estimated at 7,000 in the house-fly, 12,000 in the dragon-fly, and 34,000 in the butterfly.

The principle upon which the fly can with ease, safety, and rapidity traverse the ceiling has long been the subject of thought and theory, and not until the microscope revealed the

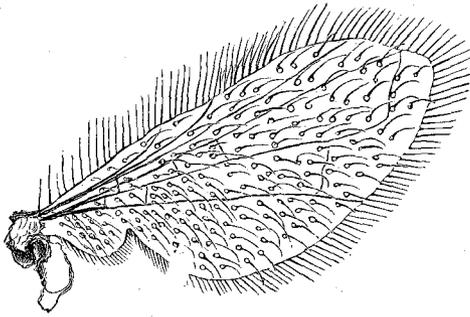


FIG. 7.—WING OF HOUSE-FLY.

structure of the foot could these marvelous movements be fully and confidently explained; a minute examination of this organ will unfold the principle as well as the wonderful wisdom and beauty of the arrangement. The foot (pulvillus), (Fig. 5), is a membranous structure, having seated upon its upper surface two claws, which are movable in every direction. Projecting from the lower surface are the organs which have been termed "hairs"—"hair-like appendages," &c.—These are the immediate agents in holding, and may be termed "tenent hairs," in allusion to their office. Fig. 6 shows the under surface of the fore-foot of the flesh-fly with tenent hairs *a* and *b* more magnified. It has been found by experiment that flies cannot walk without slipping upon glass when it is moistened by the breath or steam, or sprinkled with flour; and the frequent rubbing together of the under side of the feet, and backward and forth, along the whole surface of the hairs with which the tarsi are clothed, is not an operation of cleanliness or amusement only, but one of absolute necessity, in order to keep the *pulvilli* in a fit state for climbing smooth, verti-

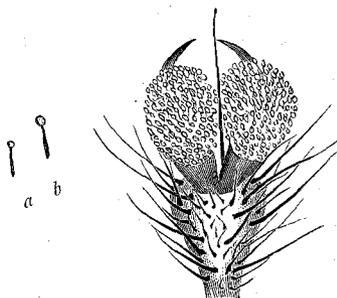


FIG. 6.—UNDER SURFACE OF THE FOOT.

cal surfaces; the hairs of the tarsi serving as a brush for this particular purpose.

In ordinary flight the house-fly makes about 600 strokes with its wings in a second, and is carried through the air about five feet in that brief time, but if alarmed the velocity can be increased six or seven-fold, so as to carry the insect thirty or thirty-five feet in the second. To accomplish this wonderful movement the wing (Fig. 7), must be adapted to the end; consequently we find it composed of two membranes of exceeding tenuity stretched upon a framework of nervures which have their origin in the trunk of the body and communicate with the air-vessels. The nervures are hollow, horny tubes, which divide and ramify

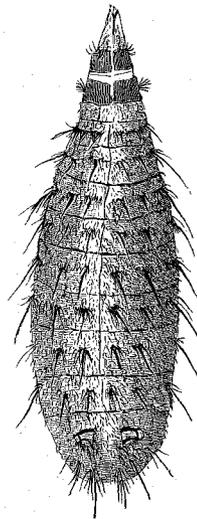


FIG. 8.—LARVA.

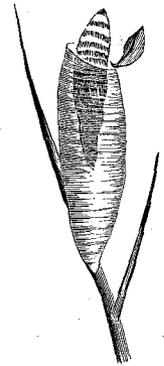


FIG. 9.—COCOON.

throughout the wing. They contain spiral threads, which appear to be air-vessels, analogous to the air-vessels in the wings of birds, and into which a subtle fluid is introduced at every voluntary expansion of the wings. Those insects that are longest on the wing, the dragon-fly for instance, have their wings most covered with nervures: the upper surface is also studded with hooked spines of the same horny texture.

Their reproductive power is enormous. A blue meat-fly (*Musca vomitoria*) will deposit in less than half a day, upon a piece of meat, not less than 200 eggs in irregular heaps of various sizes, and has been known to produce 20,000 living larvæ, and in twenty-four hours

each has increased its own weight above 200 times. The eggs are of an iridescent white color, and four or five times as long as they are broad. In less than twenty-four hours after the egg is laid the larva (Fig. 8) is hatched. As soon as it is born it begins to eat, and with the hooks and lancets with which it is provided, buries itself in the meat. These worms discharge no solid excrement, but produce a sticky liquid, which keeps the meat moist and hastens putrefaction. The larvae eat voraciously and continually, and arrive at full growth in four or five days. They now seek a retreat under ground and take no more nourishment until they are transformed into flies. In this retreat they assume a globular or oval form, disengage themselves from their skin, which becomes reddish-brown, shut themselves up in this box, closing it in every part, and strengthening it so as to secure themselves from the effects of the air and the attacks of other animals. In four or five days after, the cocoon (Fig. 9) is occupied by a white pupa, provided with all the parts of a fly. The fly is inanimate, and is like a mummy enveloped in its cloths, each member having its own special case or sheath. It emerges from the end of the cocoon where the head of the larva was placed. This end is composed of two half cups, placed one against the other, and which can be detached from each other and from the rest of the cocoon. It requires considerable strength to

raise these lids, or valves, and disengage itself from the swaddling-clothes in which it is enveloped. It raises the cup by a series of expansions and contractions of its body, and by butting against it with the head, and comes out gray, but in the course of three hours perfects itself, and assumes its ultimate color, at the same time unfolding its wings and other parts. The common flies deposit their eggs upon vegetables, and particularly on fungi in a state of decomposition, and on manure heaps, &c., and are essentially parasites, settling on both man and beast, to suck up the fluid substances that are diffused over the surface of their bodies. These insects are of great service, not only in a general sense, by taking up large masses and visible portions of matter, but their province being as well the consumption of decaying animal matter which is found about in quantities so small as to be imperceptible to most people, and is not removable by ordinary means, even in the best kept apartments during hot weather.

The popular notion is that the presence of large numbers of flies in any locality is a precursor of sickness; this phenomenon, rightly interpreted, would indicate that there is present an undue quantity of decomposing animal matter, which if left undisturbed would form a nidus for some form of disease. The flies, however, being attracted in proportionate numbers, these little scavengers become a saving element in the economy of life.

LUCKY PEER.

BY HANS CHRISTIAN ANDERSEN.

(Concluded from page 516.)

XI.

MADAM COURT expected Peer to visit her at her house, and he went there.

"Now you shall know my Court," said she, "and you shall make the acquaintance of my chimney-corner. I never dreamed of this when I danced in 'Circe' and 'The Rose Elf in Provence.' Indeed, there are not many now who think of that ballet and of little Frandsen. 'Sic transit gloria in the moon,' as they say in Latin. My Court is a witty

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fellow, and uses that phrase when I talk about my time of honor. He likes to poke fun at me, but he does it with a good heart."

The "chimney-corner" was an inviting low-studded room, with a carpet on the floor, and an endless lot of portraits for a book-binder to have. There was a picture of Gutenberg, and one of Franklin, of Shakspeare, Cervantes, Molière, and the two blind poets, Homer and Ossian. Lowest down, hung, glazed and in a broad frame, one cut out in