ABOUT FLIES.

Some one has observed how little we know about our intimate friends; even those living under the same roof. The same remark will in a degree apply to that ever-present household companion, the house-fly. Wherever civilization penetrates, there go the honey-bee and the house-fly, twin adjuncts of the higher culture. And yet how little is known of the life-history of the fly; where its eggs are placed, where its young live, upon what they live, how they become flies, and how long they remain with us.

If we examine one of them, it will be seen that the fly has six legs, composed of a number of segments or joints freely movable upon each other; the toe or tarsal joints are five in number. To the last joint are attached two hooked claws, and if anyone will examine the fly's foot with the microscope he will detect between the claws a little cushion which is deeply cleft into two parts or flaps. The under sides of the flaps have very numerous peculiar hairs, which are bulbous at the end, and are called "tenent-hairs." These hairs are hollow, and secrete a sticky fluid. Each tenent hair is bent near the end, beyond which bend, says Tuffen West "is an elastic membranous expansion, capable of close contact with a highly polished surface, from which a very minute quantity of a clear, transparent fluid is emitted when the fly is actively moving.

Mr. West also adds, that when a fly is not making use of its cushions, as on a surface sufficiently rough to afford it foot-hold with its claws alone, these only are made use of.

As early as 1667 Hooke noticed the importance of the grasp gained by the claws when drawing against the strong, forward-pointing hairs situated on the base of each tarsal joint, whenever any projections or a yielding surface are afforded by the object on which the fly is walking. Hooke also believed in the existence of a "smoky substance on glass."

This, says West, has been considered a mistake, "and yet it is certain that glass very frequently undergoes a slow decomposition on its surface in a moist atmosphere, from the excess of alkali in its composition. Such a change is speedily produced in glass exposed to the action of the weather, as in our window-panes, and conveys the appearance as if a 'smoky substance' were condensed upon it.

"It has been proved by most careful observations, which may be readily verified by any one desirous of getting at the truth, that this tarnish does very materially assist a fly when in a weak state in maintaining its hold, and in freely moving upon the glass. To keep our windows clear for the admission of light, it requires to be constantly removed."

Opticians call a similar deposition of moisture the "sweating of glass."

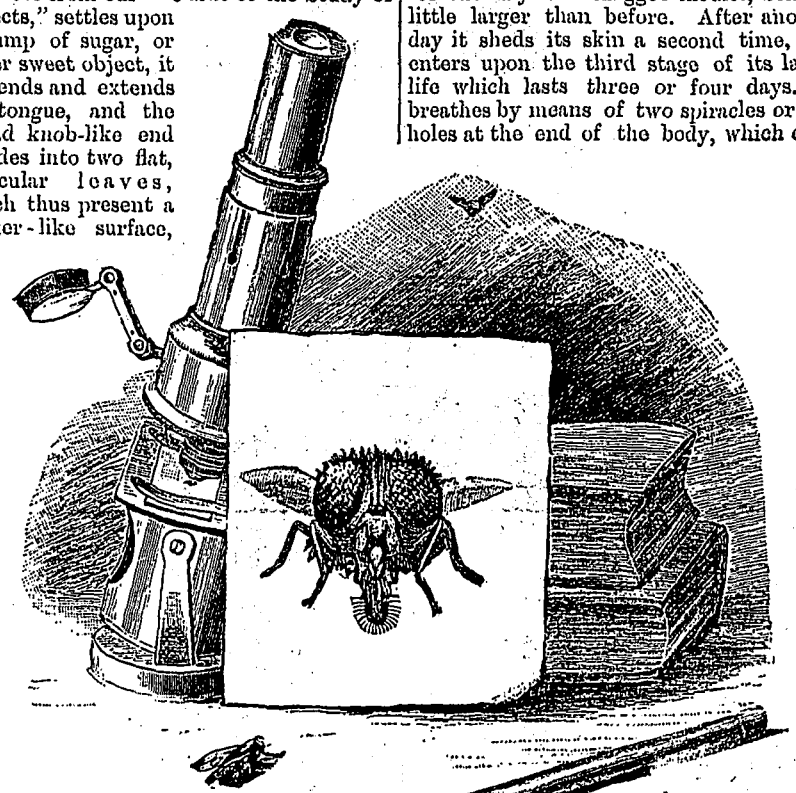
West farther describes the way in which the actual movements of the fly's foot are made. The cushions are set down on a smooth surface, perpendicular or horizontal, and the numberless tenent hairs applied to such surface: "a slight push forward of these, succeeded by a gentle draw backwards, at each application, removes the air between their soft, elastic expansions and their plane of motion, and thus a firm hold is gained. Access of air is prevented by the minute quantity of moisture which exudes from the expanded tips of the tenent appendages; and thus a vacuum is formed, on the same principle as in the 'atmospheric hat-peg,' the 'plate-holder' of the photographer, or the 'artificial gums' of the dentist. When the fly wishes to move a leg from its place of attachment, the claws are brought down and pressed against the surface; from their position they raise the hinder part of the pulvillus [cushion], where the tenent hairs are least developed, first, and so on forwards. If the claws were attached to the fifth joint, as it has been supposed, they could not act equally well in the way I have mentioned; and I think a fly when once stuck fast, if it had no claws, might remain so."

It should be noticed, as any one may do, that the fly, like all insects, moves the legs of each pair alternately in walking. After all, the pressure of the atmosphere is the main agent by which a fly is able to adhere to perfectly smooth surfaces. Flies are distinguished from most other insects by having but a single pair of wings; what corresponds to the second or hinder pair in other insects, being a pair of knob-like "balancers." The flight of the house-fly is most rapid in warm, sultry weather. We all know how busy and pertinacious their movements are in dog-day weather.

It has been found that a common fly when held captive moves its wings three hundred and thirty times a minute, whereas a honey-bee, whose powers of continued flight are much greater, moves its wings one hundred and ninety times in the same period. The wings describe a figure 8 in the air.

The buzz of the fly has been carefully studied by Landois. During flight the fly's buzz or hum is in a relatively low tone; when it is held so that the wings cannot move the buzz is higher in pitch, and it is higher still when the fly is held so that all motion of the external parts is prevented. The last mentioned is the true voice of the insect; it is produced by the breathing holes of the thorax. The buzz of the fly thus expresses the emotions of the creature; the low hum being one of contentment, the shrill excited buzz, one of alarm and disturbance.

When a fly alights upon our hand or face on a hot day it is for the purpose of lapping the perspiration from the skin. How this is done is a curious study. When the fly, to quote from our "Guide to the Study of Insects," settles upon a lump of sugar, or other sweet object, it unbends and extends its tongue, and the broad knob-like end divides into two flat, muscular leaves, which thus present a sucker-like surface,



A FLY'S HEAD.

with which the fly laps up liquid sweets. These two leaves are supported upon a framework of chitinous rods, which act as a set of springs to open and shut the muscular leaves. The inside of this broad fleshy expansion is rough like a rasp, and as Newport states, is easily employed by the insect in scraping or tearing delicate surfaces. It is by means of this curious structure that the busy house-fly occasions much mischief to the covers of our books, by scraping off the albuminous polish, and leaving traces of its depredations in the soiled and spotted appearance which it occasions on them.

The structure of the fly's tongue, and of the whole apparatus for taking its food, has engaged the attention in late years of some of our best anatomists of insects. Its structure is so complicated and difficult to understand, and labored anatomical descriptions are so dry, that we will not here describe it, but content ourselves with referring the reader for an excellent description of the fly's proboscis to Prof. Macloskie's article in the *American Naturalist* for March, 1880. Suffice it to say that the fly has not, as have beetles and grasshoppers, free jaws and accessory jaws for biting and tearing the food, but all the mouth-parts of other insects are represented by the fly's proboscis; the larger part of which is formed by the under lip; the enlarged and variously modified fleshy extremity of which forms a sucking organ. What little food is taken by the fly is fluid; sweet fluids are its favorite diet.

But whence come the swarm of midsummer flies, and how do they keep increasing through August? What becomes of them in the winter? How long do they live, and what of the manner of life of their young? Are the small flies the children of the larger ones?

So little was known about the early history of the house-fly that we once endeavored, and with fair success, to study its transformations. During August the house-fly is particularly abundant, and especially so in and about stables. On placing a fly in a bottle, she laid between six, p.m., August 12, and eight o'clock the next morning, one hundred and twenty eggs. They were deposited irregularly in stacks, lying loose in two piles at the bottom of the bottle. The next day several maggots, as the larvæ are called, were observed crawling about in the bottom of the bottle. Afterwards by placing a mass of offal in the sun, the flies came and laid their little white slender eggs, which hatched out, so that thousands of writhing maggots abounded in the mass. It was found that the young maggots hatched in twenty-four hours after the eggs were laid. At first they are but little larger than the eggs. After remaining in the first stage for one day the maggot moults, being a little larger than before. After another day it sheds its skin a second time, and enters upon the third stage of its larval life which lasts three or four days. It breathes by means of two spiracles or air-holes at the end of the body, which communicate with the air tubes in the body. There is also a spiracle near the head.

When about to transform into the pupa or chrysalis state, the body contracts into a barrel-shaped case, and turns brown and hard. This case is called the puparium, and within it the maggot becomes a pupa or chrysalis.

The house-fly, having as a maggot live a squalid existence, after a pupal sleep of from five to seven days, pushes off one end of its pupal case, and on emerging from the case, immediately runs about, though its wings are still small, soft and baggy, much as in the pupa. Soon, however, the skin becomes dry and hard; the fluid in the wings dries, and in a few moments the fly takes flight.

If in its winged state the fly is one of the most disagreeable features of dog-days, and people wonder why flies were ever made at all, it should be remembered that flies have an infancy as maggots, and the loathsome life they then lead as scavengers cleanses and purifies the August air, and aids in lowering the death rate of our cities and towns.

While most house-flies die on approach of winter, multitudes being attacked by a white fungus, their swollen dead bodies remaining on the wall or windows in October, a few live through the winter. While writing this article on the first warm day in spring, a few flies have for the first time made their appearance in our study. These will lay their eggs about stables in the late spring, and thus give rise to a swarm of maggots and August flies.—*A. S. Packard, Jr., in Youth's Companion*

CATS.

Margaret Maria Gordon, writing from Nice to the "Home Chronicle," says: "My father, Sir David Brewster, had a strong dislike to cats; he said that he felt something like an electric shock when one entered the room. Living in an old mouse-ridden house, I was at last obliged to set up a cat, but on the express condition that it never was to be seen in his study. I was sitting with him one day, and the study door was ajar. To my dismay pussy pushed it open, and, with a most assured air, walked right up to the philosopher, jumped upon his knee, put a paw on one shoulder and a paw on the other, and then composedly kissed him! Utterly thunderstruck at the creature's audacity, my father ended by being so delighted that he quite forgot to have an electric shock. He took pussy into his closest affections, feeding and tending her as if she were a child. One morning, some years afterwards, no pussy appeared at breakfast for cream and fish; no pussy at dinner, and in fact, months passed on and still no pussy. We could hear nothing of our pet, and we were both inconsolable. About two years after I was again sitting with my father, when, strange to say, exactly the same set of circumstances happened. The door was pushed gently open, pussy trotted in, jumped on his knee, put a paw on each shoulder, and kissed him. She was neither hungry, thirsty, dusty, nor footsore, and we never heard anything of her intervening history. She resumed her place as household pet for some years, till she got into a diseased state from partaking too freely, it was supposed, of the delicacy of rat-flesh, and in mercy she was obliged to be shot. We both suffered so from this second loss that we never had another domestic pet."

A NOTABLE BONFIRE.

This was seen in the streets of Ephesus, when bad books were voluntarily brought by their owners and burnt before all men. Thus should all pernicious literature be treated. It is flooding our country. Like the frogs of Egypt, it is "brought forth abundantly, and goes into the house and bedchamber and bed," and is read by servants, and masters, and mistresses, young and old. It is a plague that infests every place and everyone. Like the author of all evil, it wanders "to and fro on the earth and walks up and down in it," and is always seeking whom it may devour. It is insidious, hypocritical, plausible, and always destructive to body, mind, and soul. Its antidote is the Gospel, and all good books breathing the Spirit, inculcating the principles and teaching the lessons of the Gospel's author. The literature which he approves should be the only literature sanctioned, patronized, and read by the friends of Jesus and of humanity. All corrupt books, and books of even doubtful tendency, should be brought to the funeral pile, the places where they occupied fumigated, and the way left open for the entrance and the occupancy of the literature that will enlighten, purify, and bless. —*Selected.*

AN OLD SONG ANALYZED.—You all know the old "Sing a Song of Sixpence," but have you ever read what it is meant for? The four-and-twenty blackbirds represent the twenty-four hours. The bottom of the pie is the world, while the top crust is the sky that over arches it. The opening of the pie is the day-dawn, when the birds begin to sing, and surely such a sight is "a dainty dish to set before the king." The king, who is represented as sitting in his parlor counting out his money, is the sun, while the gold pieces that slip through his fingers as he counts them are golden sunshine. The Queen, who sits in the dark kitchen, is the moon, and the honey with which she regales herself is the moonlight. The industrious maid, who is in the garden at work before the king—the sun—has risen, the day dawn; the clothes she hangs out are the clouds, while the bird which so tragically ends the song by "nipping off her nose" is the hour of sunset. So we have the whole day, if not in a nutshell, in a pie.—*Anon.*