House fly as mechanical vector

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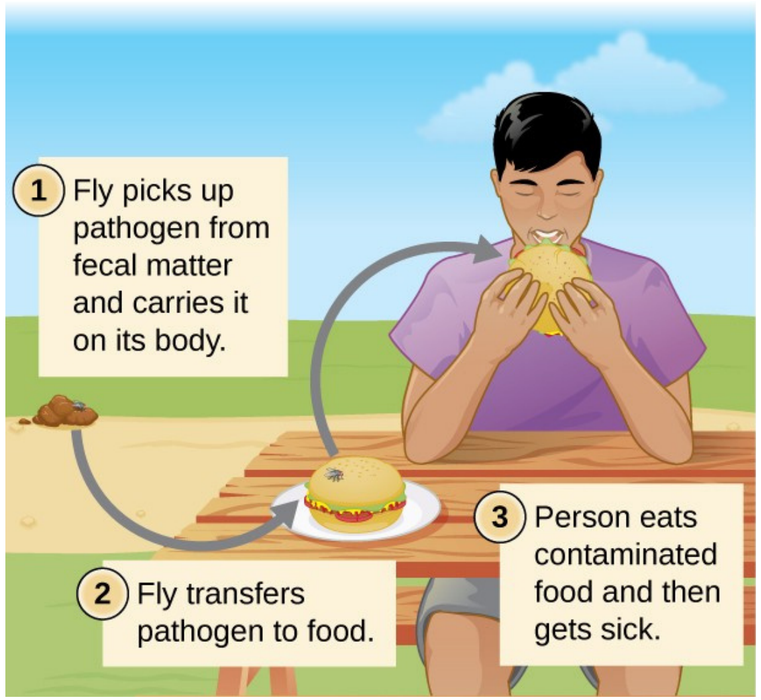
MUSCA (HOUSE FLY)

Scientific classification

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Diptera
Section:	Schizophora
Family:	Muscidae
Genus:	*Musca*
Species:	***M. domestica***

What is a mechanical vector



Diseases can also be transmitted by a mechanical or biological vector, an animal (typically an arthropod) that carries the disease from one host to another.

Mechanical transmission is facilitated by a mechanical vector, an animal that carries a pathogen from one host to another without being infected itself.

For example, a fly may land on fecal matter and later transmit bacteria from the feces to food that it lands on; a human eating the food may then become infected by the bacteria, resulting in a case of diarrhea or dysentery

• *Musca domestica*

Figure 2.1.
***M. domestica*, (WHO, 1997)**

Characteristics:

-6-7 mm long, grey color

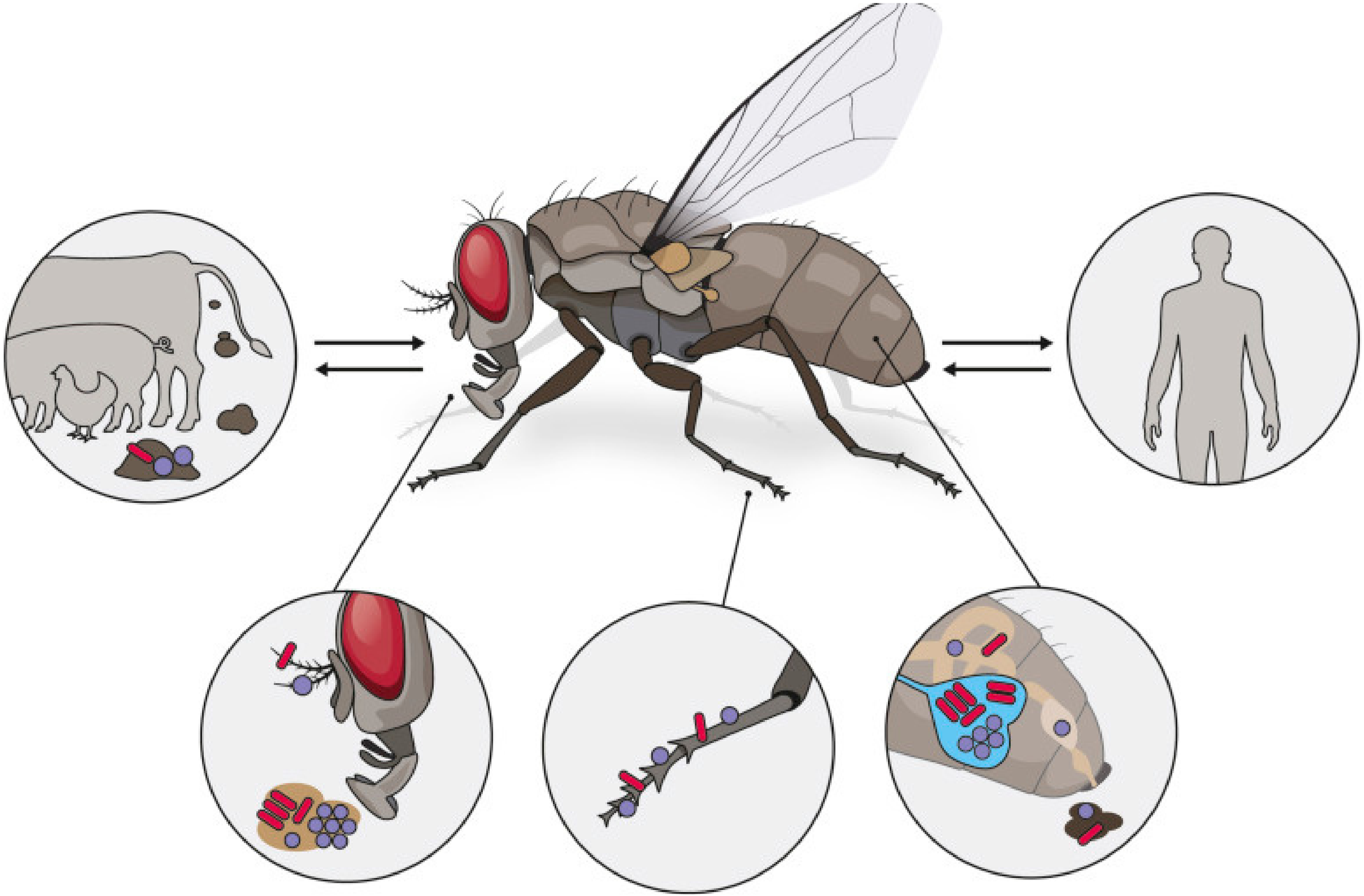
-marked by 4 dark longitudinal stripes

-breed in animal/human excrement or domestic organic waste

-land, breed, and feed on feces and human food

*RESPONSIBLE FOR:

- Infantile diarrhea
- Shigellosis diarrhea
- Dysentery
- Typhoid



Housefly as mechanical vector for Shigellosis

- Houseflies (Musca domestica) are mechanical vectors of Shigella organisms.
- Shigella bacteria cause an infection called shigellosis. Most people with Shigella infection have diarrhea (sometimes bloody), fever, and stomach cramps. Symptoms usually begin 1–2 days after infection and last 7 days.
- Seasons during which both flies and cases of dysentery are prevalent often coincide. Houseflies have an affinity for human excrement and, as documented by the bacteriologic culture of trapped flies, become contaminated with Shigella organisms following contact with infected human feces.
- Since houseflies cohabit with humans, they can readily contaminate food and eating utensils. With the advent of insecticides in the 1940s, intervention studies in the United States provided evidence of the role of the housefly in the transmission of shigellae. In towns that were exposed to fly-control measures, the density of flies and the prevalence of carriage of Shigella organisms, diarrhea, and mortality due to diarrheal disease among young children all markedly diminished as compared with the situation in control towns.
- Investigations that quantitate the importance of fly-borne transmission of Shigella organisms relative to other modes of transmission and that provide an evaluation of measures to diminish fly-borne transmission are warranted in developing areas.

Housefly as mechanical vector for Anthrax

- Anthrax is a disease of human beings and animals caused by the encapsulated, spore-forming, Bacillus anthracis.
- potential role of insects in the spread of B. anthracis to humans and domestic animals during an anthrax outbreak has been confirmed by many studies. Among insect vectors, the house fly Musca domestica is considered a potential agent for disease transmission.
- The house fly, Musca domestica, has long been considered as a potential agent for disease transmission, and bacteria have been isolated from feces, vomitus, external surfaces, and internal organs of this species . Structurally, the fly is well adapted for collecting pathogens. Its proboscis has a profusion of fine hairs that readily collect environmental detritus. Animal anthrax primarily affects herbivore ruminants, such as cattle, sheep, and goats, which are the most susceptible animal hosts. The disease occurs following ingestion of soil-borne anthrax spores.
- Human anthrax usually results from a cutaneous infection caused by the handling of infected animal products or, in rare cases, by ingesting or inhaling spores from contaminated animal products Anthrax spores may spread within a geographic region through water, insects, wild animals, birds, and contamination from body fluids of infected animals

Control measures

- Flies can be killed directly by insecticides or physical means such as traps, sticky tapes, fly swats, and electrocuting grids. However, they should preferably be controlled by improving environmental sanitation and hygiene. This approach provides longer-lasting results, is more cost-effective, and usually has other benefits.

- Improvement of environmental sanitation and hygiene Four strategies can be employed
- : — reduction or elimination of fly breeding sites
- ;— reduction of sources that attract flies from other areas
- ;— prevention of contact between flies and disease-causing germs
- ;— protection of food, eating utensils and people from contact with flies.

Control measures

Reduction or elimination of fly breeding sites:

- **Animal sheds, stables**

Solid concrete floors with drains should be constructed; dung should be cleaned out and floors should be flushed daily.

- **Poultry houses**

Where birds are kept in cages and dung accumulates below them, fans should be used to dry it; leaking water pipes should be repaired, dung should be removed and the floors should be flushed at frequent intervals.

- **Dung heaps**

Dung should be stacked to reduce the surface area and the zone in which the temperature is suitable for fly breeding.

- **Human excreta**

Defecation in the field, other than in latrines and toilets, may provide breeding places for flies (Musca sp). This is a common problem where large groups of people, e.g. refugees, stay together in temporary camps. Installation of proper latrines should be given priority. In the absence of proper facilities, people could be asked to defecate in a special field at least 500m downwind of the nearest habitation or food store and at least 30m from a water supply.

- **Garbage**

This breeding medium can be eliminated by proper collection, storage, transportation, and disposal (Fig. 6.8). In the absence of a system for collection and transportation, garbage can be burnt or disposed of in a specially dug pit. At least once a week the garbage in the pit has to be covered with a fresh layer of soil to stop breeding by flies.

Control measures

- **Reduction of sources that attract flies from other areas**

Flies are attracted by the odor emanating from breeding sites. In addition, they have attracted by-products such as fish-meal and bone-meal, molasses and malt from breweries, milk, and sweet-smelling fruit, especially mangoes. Attraction to waste can be prevented by cleanliness, the removal of waste, and its storage undercover. Industries using attractive products can install special exhausts for odors.

- **Prevention of contact between flies and disease-causing germs**

The sources of germs include human and animal excrement, garbage, sewage, infected eyes, and open sores and wounds. Measures to eliminate fly breeding also reduce contact between flies and germs.

Control measures

- **Protection of food, eating utensils and people from contact with flies**

Food and utensils can be placed in **fly-proof containers, cupboards, wrapping materials**, etc. Nets, and screens can be used on windows and other openings. Doors can be made **self-closing.** Doorways can be provided with anti-fly curtains, consisting of strings of beads or plastic strips that touch each other and prevent flies from passing through

Physical control

- **Physical methods**

Physical control methods are easy to use and avoid the problem of insecticide resistance, but they are not very effective when fly densities are high

1. F**ly traps**: Large numbers of flies can be caught with fly traps

2. **Sticky tapes**: Commercially available sticky tapes, suspended from ceilings, attract flies because of their sugar content. Flies landing on the tapes are trapped in the glue. The tapes last for several weeks if not fully covered by dust or trapped flies.

3. **Light trap with electrocutor**: Flies attracted to the light are killed on contact with an electrocuting grid that covers it

Chemical control

- Control with insecticides should be undertaken only for a short period when absolutely necessary because flies develop resistance very rapidly. The application of effective insecticides can temporarily lead to very quick control, which is essential during outbreaks of cholera, dysentery or trachoma.

Some of the insectisides are:

- bendiocarb ,
- dimetilan,
- methomyl,
- propoxur
- formaldehyde
- diazinon
- malathion
- trichlorfon