

## MYIASIS, ITS TYPES, CAUSES, AND THE RELATIONSHIP OF SOME BACTERIAL SPECIES TO ITS EVENTS / (ARTICLE REVIEW)

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### ABSTRACT

Myiasis is one of the most complex and interesting relationships that we see in nature, as it represents the relationship between small larvae of the order of Diptera and other creatures such as humans and animals. It is also considered an economic problem that causes heavy losses in livestock. And in both animals, where these larvae belong to three families 1. Oestridae 2. Sarcophagidae 3. Calliphoridae, feed on live and dead tissues, it has also been shown that wounds contaminated with bacteria, *Streptococcus* spp. *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas* spp., *Enterobacter* spp. و *Proteus mirabilis* are more likely to suffer from myiasis due to their ability to produce volatile organic compounds that are considered as stimuli for flies. Therefore, Artiana, in this scientific article, dealt with a brief and comprehensive review of myiasis, including the classification of its types, the classification of the larvae that cause it, and the bacterial infections associated with myiasis.

**Key words:** Myiasis , Medical insects, Diptera , Larvae , Bacteria

Received: 22 / 1/2021, Accepted: 28 / 2 /2021

### INTRODUCTION

The relationships between living things in nature are very complex. Important observations and constant observation allow us to understand this complexity. One of these relationships is the relationship between flies and backbone animals, and this relationship is either beneficial or harmful (Hall and Wall, 1995). In 1815 Kirby and Spence used the term *scholechiasis* to describe diseases caused by insect larvae to animals, then in 1840 Hope developed a new term, *Maiaiasis*, which means fly larvae invade human and animals body. While the terms *scholechiasis* and *canthariasis* were attributed to diseases caused by the insect orders *Lepidoptera* and *Coleoptera* respectively (Hall and Wall, 1995). The term *myiasis* was derived from the Latin word *muia* flies, which means disease (Sharma *et al.*, 2008), that affects humans and animals as a result of the invasion by *Diptera* larvae of the living and dead tissues of humans and bodies Liquid (Braverman *et al.*, 1994). Myiasis is a neglected disease that has major economic impacts on animals and humans ((Hall and Wall, 2016). The myiasis flies distributed in the tropics and arctic regions since ancient times until the present day, wide spread indicates the presence of a hosts variety from wild and domestic animals and even humans (Hassona *et al.*, 2014). The wounds resulting from a crack in the skin are accompanied by sores, abscesses, warts, and inflamed skin lesion (Luseba *et al.*, 2007). These wounds and sores on the skin are subject to infection, whether bacterial,

fungal or other organisms. It has been shown that wounds contaminated with bacteria are more likely to cause melanosis (Sotiraki *et al.*, 2010). The wounds resulting from a crack in the skin are accompanied by sores, abscesses, warts, and inflamed skin lesions (Luseba *et al.*, 2007). These wounds and sores on the skin are subject to infection, whether bacterial, fungal or other organisms. It has been shown that wounds contaminated with bacteria are more likely to cause melanosis (Sotiraki *et al.*, 2010). as some bacterial types are distinguished, including: *Proteus mirabilis*, *Pseudomonas auroginosa*, *Klebsiella spp*, *Streptococcus pyogenes*, *Enterobacter faecalis*, *E. Coli*. In addition to *Staphylococcus aureus*, its ability to produce volatile organic compounds that are considered as catalysts for flies, especially sulfur compounds (Kotze and Eloff, 2002). Female of myiasis flies attracted to the smell of infected wounds in animals and decomposed the organic materials and lay their eggs, these eggs hatch into larvae and the voracious larvae consume the tissues and decay It penetrates into healthy tissues causing deep injury. (Chaudhury *et al.*, 2010). The infection is rare in humans, however, 165 human cases of myeloma were recorded from 1914 to 2014 (Singh and Singh, 2015). The causative factors of myiasis, such as low socioeconomic status, poor hygiene, people with mental illness, drug addicts, and patients with no health care, the myiasis pathogenesis caused death due to septicemia without apparent any symptoms. The first reported case of wound dressing of *Lucilia sericata* larvae in Korea was previously reported (Cho *et al.*, 1999). The researchers reached the amplitude of the spread of myiasis in humans and animals in India, as 5 cases of wound necrosis were recorded, 2 in humans and 3 in cows, and all cases were infected with *Chrysomya bezziana* larvae. A case of auditory torsion of a 10-year-old girl in India with *Chrysomya megacephala* larvae reported (Singh *et al.*, 1993). (Yaghoobi *et al.*, 2005) reported a case of aural sedation in southern Iran with larvae of the green hero fly *Lucilia sericata*. The case of *Lucilia sericata* larvae was recorded in a 26-year-old man who was addicted to drugs. In Turkey, a case of auditory worsening of *Wohlfuhrtia mangifica* larvae, which affected a group of children suffering from chronic otitis (Yuca *et al.*, 2005), was recorded. In Iraq, specifically in Basra governorate, two cases of cutaneous spiral fly larvae were recorded for two girls, aged eight and four, due to a head lice bite that stimulated the female to lay her eggs on the small amount of blood and then grow into larvae that feed inside the scalp (Al-Rubiay, 1998), while the reported cases in animals were 8 of traumatic myiasis in 2006 and one case in 2009, the results indicate that the infection rate in sheep is the highest percentage in terms of the veterinary recipients compared to other animals in Iraq (Okaily *et al.*, 2016).

There is a type of myiasis in hospitals that lack hygiene called Noscomial myiasis or Noscomial infection which found in patients with skin ulcers, blisters or open wounds, recorded in diabetics, the weak and the elderly as a result of negligence hospital for the patients in terms of the smell of blood decomposed, cotton contaminated with blood and pus (John and Petri, 2006). The families Calliphoridae and Sarcophagidae were used to know the time of death of a person through the different stages of lineage development by taking the oldest larva present in the corpse and counting backwards to obtain the youngest larvae, which gives a rough estimate of death (Lord and Goff, 2003).

This article provides information on myiasis flies and their relationship of some bacterial species to the occurrence of infection effects this disease causes on humans and animals due to the economic and health, and intensifying efforts to control these insects.

### **Mystic classification**

There are two methods of classifying myiasis:

Ecological (Biological or Parasitological) method. This method depends on the relationship of the parasite to the host (Hall and Wall, 1995), The parasite's relation with the host is of two types: 1- specific myiasis, this type is divided into two types. A) obligatory parasitism, as the flies choose living organs or tissues only to lay their eggs or larvae. For example the forced flies as: *Wohlfahrtia magnifica*, *W. vigil* (Flesh flies), *Oestrus ovis* (Sheep bot fly), *Gasterophilus intestinalis* (Horse bot fly), *Hypoderma bovis* (Warble fly), *Dermatobia hominis* (Human bot fly or the Torsalo), *Chrysomya bezziana* (Old- world screw-worm) (Kenawy, 2008).

B) Facultative parasitism: Where flies lay their eggs or larvae on living and dead tissues in three levels, the primary level when the larvae are able to start to myiasis and the secondary and tertiary levels when the host nears death. Flies attack sore and rotting wounds, as they are attracted to foul odors, as for clean wounds and healthy skin, flies cannot attack them. An example of selective flies parasitism is *Lucilia spp.* (Greenbottle flies), *Calliphora spp.* (Bluebottle flies), *Sarcophaga spp.* (Flesh flies), *Piophilidae casei* (Cheese skipper), and *Tubifera tenax* (Rat-tailed maggot) (Wall and Shearer, 1997).

C- Accidental myiasis: where infection occurs to humans and animals by accident, by eating insect eggs or larvae with contaminated drink or food (Nagakura *et al.*, 1991).

Anatomical classification of myiasis This method is based on affected parts of the host's body, which was first proposed by Bishop in 1922 and this method was modified by James in 1947 and then by Zumpt in 1965 (Gour *et al.*, 2017). Among the types of myiasis, depending on the anatomical method:

\* **Sanguinivorous Myiasis:** For example are flies that cause hemophilia *Auchmeromyia luteola* (Congo floor maggot) (Calliphoridae) , *Chrysomya bezziana* and *Dermatobia hominis* (Oestridae) , where the flies larvae have a voracious or insatiable behavior the blood. They are exo parasites that cause myiasis of the forced type. (Dutta *et al.*, 2015).

\***Cutaneous (Wound, Traumatic, dermal or sub-dermal) Myiasis:** which is the most common type of myiasis (Visciarelli *et al.*, 2007). The fly larvae feed on animal tissues (the epidermis and subcutaneous layer), which are affected by shocks or wounds as the flies are attracted by The obligatory as well as the facultative parasitism and the flies that cause myiasis are followed two families: Sarcophagidae and Calliphoridae like, *Cochliomyia hominivorax*, *Lucilia sericata* and *Wohlfahrtia magnifica* (Gour *et al.*, 2017).

\***Furuncular (Warble) Myiasis:** is one of the types of skin myiasis and occurs as a result of the fly larvae penetrating into the healthy skin, causing a boil, abscess or nodule. The number of larvae per node varies according to the type of flies causing myiasis (Francesconi and Lupi, 2012). Severe itching, sensitivity, dermatitis, fluid leakage from the nodes, and nocturnal pain are symptoms of this type of myiasis (Mahal and Sperling,

2012). Among the types of flies that cause this type of myiasis: *Cuterebra sp.*, *Cordylobia anthropophaga*, *Dermatobia hominis*, *Wohlfahrtia vigil* and *Wohlfahrtia magnifica* (Robbins and Khachemoune, 2010).

**\*Migratory (Creeping) Myiasis:** this type of myiasis occurs when the larvae of the flies causing myiasis begin to migrate to a distant part of the host's skin, resulting in this migration of ulcerated epithelium, causing inflammation in the dermis layer (Gour *et al.*, 2017). As a *Hypoderma bovis* (Cattle bot fly) and *Gasterophilus intestinalis*. Humans accidentally and unintentionally become infected with this type of myiasis, but the larvae of this type of flies cannot complete their life cycle in human skin (Royce *et al.*, 1999).

**\* Cavity Myiasis:** This type of myiasis includes infection of the body cavity by dipterous larvae. This type usually takes its name from the anatomically affected area (Francesconi and Lupi, 2012).

**\*Ocular (Ophthalmic) Myiasis:** This type of myiasis occurs when the bipedal larvae invade the eye area of the host. The injury to the eye can be external, internal or orbital part. The injury can be exo, endo or orpital part of eye. Usually one larva is present inside the eye while 2-3 larvae have been recorded in the same eye (Jakobs *et al.*, 1997). As for the eye injury from the outside, it is limited to the superficial tissue injury of the eye (Verstrynge and Foets, 2004) and the symptoms of this type of myiasis are redness of the eyes, pain in the eye area, loss of vision (Georgalas *et al.*, 2011). An example is the flies that cause ocular myiasis: *Cuterbera spp.*, *Chrysomya bezziana*, *Dermatobia hominis* and *Lucilia spp.* (Francesconi and Lupi, 2012).

**\*Oral Myiasis:** was first described in 1909 and then described by Laurence in 1959. Oral nausea is linked to lack of oral hygiene (Lata *et al.*, 1996), alcoholism, aging, bad breath, mental retardation, and other clinical forms such as gum disease (Hassona *et al.*, 2014), (Gealh *et al.*, 2009). People who have a long opening of the mouth are at risk of developing oral myiasis (Sharma *et al.*, 2008). Among the symptoms of oral myiasis is swelling of the mouth, lips and gums with pain and a feeling of movement of larvae inside the mouth (Kamboj *et al.*, 2007). Examples of flies that cause oral myiasis: *Wohlfahrtia magnifica*, *Cochliomyia hominivorax*, *Musca domestica*, *Calliphora vicina* and *Chrysomya bezziana* (Hassona *et al.*, 2014).

**\* Aural (Otom) Myiasis:** Includes the injury of the outer ear or the middle ear with two-winged larvae, where the adult female lays her eggs or larvae around the ear cavity and that the widening of the outer ear canal helps to lay eggs or larvae (Uzum *et al.*, 2004). Although this type of myiasis is considered rare, 86.16% of 94 cases were recorded in a study conducted (Singh *et al.*, 1993). This type of myiasis has been reported in children under 10 years of age as well as in vulnerable individuals (Casanova *et al.*, 2010). Among the symptoms of this type of myiasis are itching, otitis media, pain in the ear, dizziness, poor hearing, bad smell from the ear, perforation of the tympanic membrane, bleeding from the ear (Werminghaus *et al.*, 2008). the best example of flies that cause auditory myiasis: *Chrysomya bezziana*, *Wohlfahrtia magnifica*, *Cochliomyia hominivorax* and *Chrysomya megacephala* (Francesconi and Lupi, 2012).

**\* Nasal myiasis:** This type of myiasis occurs when female flies that cause myiasis lay their eggs or larvae directly into the nasal cavity or in the vicinity of it while the host

sleeps (Aydin *et al.*, 2006). 70-75% of nasal myiasis was recorded in one study of myiasis (Arora *et al.*, 2009), and in another study 11.7% of nasal myiasis was recorded in children (Singh *et al.*, 1993).). Of the total of 252 patients with nasal angiosis, the percentage of patients older than 50 years reached 41.26%, and the reason was due to the low standard of living and lack of hygiene, and most of the cases were recorded in people suffering from atrophic rhinitis as out of 252 cases 97% were suffering from atrophic rhinitis ( Arora *et al.*, 2009). Patients with leprosy are more likely to have this type of myiasis, due to the loss of the ability to involuntarily sneeze, as well as ulcers and infection with atrophic rhinitis, in addition to the inability of patients to clean the nose properly due to deformities of the hands (Thami *et al.*, 1995). Examples of flies that cause nosebleeds: *Lucilia sericata*, *Oestrus ovis*, *Cochliomyia hominivorax*, *Chrysomya bezziana*, *Cephalopina titillator* (Camel bot fly), *Wohlfahrtia magnifica* and *Drosophila melanogaster* (Francesconi and Lupi, 2012).

**\*Intestinal (Enteric) Myiasis:** is a type of pseudomembranous myiasis, which is associated with the ingestion of food or water contaminated with fly larvae. The reason for the outbreak of this disease is poor socio-economic status, lack of hygiene, and contamination of water and food with fly larvae (Kun *et al.*, 1998). This type of myiasis is more common in animals than in humans, as the fly larvae take the alimentary canal of mammals from the pharynx to the outlet opening as a shelter and shelter for them. Any patient who sleeps with his mouth open is vulnerable to this disease, especially patients who are comatose or who suffer from mental illnesses. The disease varies from non-symptomatic cases, where the infection is determined by the presence of larvae in the stool of the infected persons to abdominal pain, nausea, vomiting, anal itching or rectal bleeding (Karabiber *et al.*, 2010). The symptoms may be confusing and confusing due to the presence of other parasites such as the Ascaris worm (fuentes Gonzalez and Risco Oliva, 2009). An example of the flies that cause intestinal myiasis is *Gasterophilus intestinalis* (Singh and Singh, 2015).

**\* Urinogenital myiasis:** This type of myiasis affects the urinary and reproductive system of females and males by the larvae of flies and it will be classified according to its anatomical location into two types of exo urogenital myiasis and internal genitourinary myiasis. Exo urogenital myiasis, which is similar to traumatic myiasis, affects more women than men, as lack of underwear, cervical cancer, urethral secretions, and sexually transmitted diseases (Wadhwa *et al.*, 2006) are all distinct factors that made the host vulnerable to myiasis. The external genitourinary system affecting the clitoris, vulva, and urethra (Kudur *et al.*, 2010). In males, the reported cases affected the penis and the cyst of the testicles and urethra, causing itching and pain in the area around the urethra (Saleh and El Sibae, 1993). 2. Endo urogenital myiasis, which is rare, occurs when larvae reach the internal genital organs, causing dysuria, and upon examination of the urine, albumin and leukocytes were seen upon examination of the urine (Wadhwa *et al.*, 2006). Examples of flies that cause urogenital myiasis: *Sarcophaga haemorrhoidalis*, *Wohlfahrtia magnifica*, *Fannia canicularis* and *Sarcophaga carnaria* (Francesconi and Lupi, 2012).

\* **Cerebral Myiasis:** This type of myiasis is rare, fatal, and the survival rates are low. Nevertheless, 9 confirmed cases have been recorded, (Cheshier *et al.*, 2007) in the front lobes of skull and causes high blood pressure with ascites. Head, impaired mind, and motor impairment (Francios *et al.*, 1987). Examples of flies that cause myiasis are *Hypoderma bovis* and *Hypoderma lineatum* (Francesconi and Lupi, 2012).

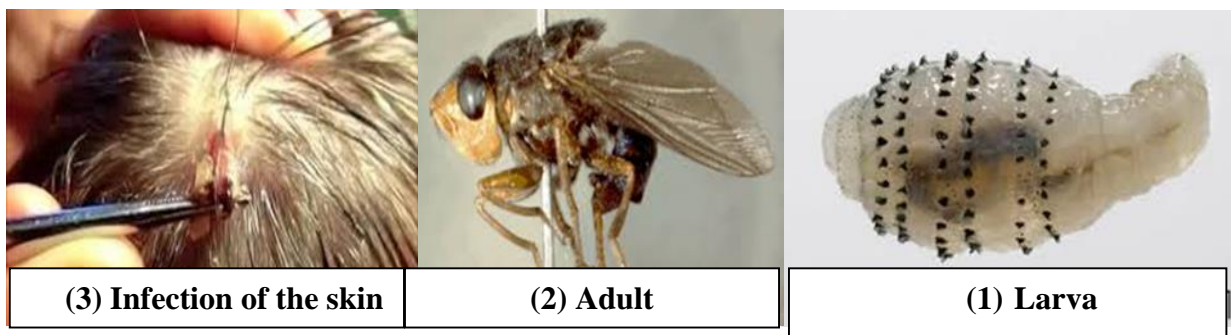
Diptera order currently includes more than 150,000 species of 10,000 genera belonging to 150 families. About 13 families include all the myostatic flies, are: Calliphoridae, Oestridae, Sarcophagidae, Muscidae, Gastrophilidae, Phoridae, Drosophilidae, Psychodidae, Stratiomyidae, Scenopinidae, Syrphidae, Piophilidae and Dryomyzidae (Singh and Singh, 2015).

Three families from the above families are the main causes of myiasis, and they are:

1. Oestridae; Contains 151 species belonging to 28 genera, and all their species are obligate parasitism.
2. Sarcophagidae; Includes 2000 subspecies of 400 genera
3. Calliphoridae; It is one of the most common families of the Diptera order contain 150 genera and about 1000 species. Some species of this family can be distinguished by the insect's metallic, green or blue body, while some other species are not clear. Members of this family perform many environmental services, including decomposition of dead animal bodies, assisting in the pollination process.

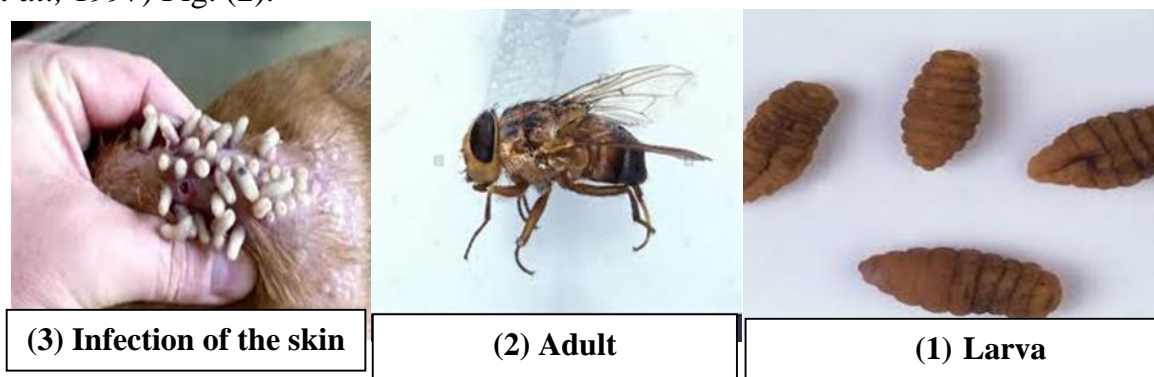
#### **Some examples of flies that cause sedation**

***Dermatobia hominis* (human skin nap fly):** This fly is of a large type, its length is about 12 mm, the chest area is blue to gray in color, while the abdomen area is short and broad, bright blue in color and has feathery arches, spread in the forests of Mexico, Central and South America, and the adults do not feed, but they get their needs from the stored food during the larval age. The insect attaches its eggs to one side of the body of any flying insect that visits the human or animal, such as the Stomoxys fly or the mosquito of the genus Psorophora. Caused by the mosquito while it is feeding, it settles under the skin in the tissues and feeds on blood, causing swelling with an opening through which the larvae breathe, causing severe pain to the infected host. The investigated of this insect is in the head, arms, armpits, thigh and buttocks, infects humans, dogs, cattle and birds. The larval stage period 5-10 weeks as it becomes 25 mm in length and the first larval instar the body of the larva carries thorns arranged in two dorsal rows and one abdominal row, the second instar larvae have a pear shape and for the third instar larvae ovoid and has stomata. Respiratory area as emerging from the mouth with hooks, then develop to pupal in soil. The life cycle of the insect takes 3-4 months (Zammarchi *et al.*, 2014). Fig. (1).



**Fig. (1): *Dermatobia hominis* fly (Villalobos et al.,2016)**  
**(1) Larva of *Dermatobia hominis* fly (2) Adult of *Dermatobia hominis* fly**  
**(3) infecting human skin**

***Cordylobia anthropaga* (tambu fly):** This insect belongs to the family of Calliphoridae and spreads in regions of Africa. Flies female started with laying of eggs in the soil contaminated with feces and urine, and the larva remains in the sand and upon the passage of the host of mammals, as humans, the larva attaches to host and penetrates the skin and grows formed bean-shaped bulge inside the host's skin with an opening in the middle through which the larva breathes through the respiratory stomata (Royce *et al.*, 1999) The growth of the larva and its increase in size leads to the enlargement of the swelling (the seed) and the exit of copious secretions from the wound, the larval ages need 8 days to be completed and Then they fall into the soil to turn into a virgin (Jakobs *et al.*, 1997) Fig. (2).



**Fig. (2): The tambu fly with its larvae and infestation (Sciencedirect.com)**  
**(1) Larva of tambu fly (2) Adult of tambu fly**  
**(2) infection of the skin**

***Calliphora hominivorax* (spiral fly in the New World):** It is larger than the domestic fly with a metallic bluish-green color, the face has a yellowish-orange color, Antenna from feathery shape. large respiratory stomata, and the body of larva is surrounded by spines in the form of wide ribbons, giving the larvae a wavy outline, and that is why it was called screw worms. This insect is found in North America and Brazil and attacks humans, and untreated infections lead to death. Its life cycle begins with the female



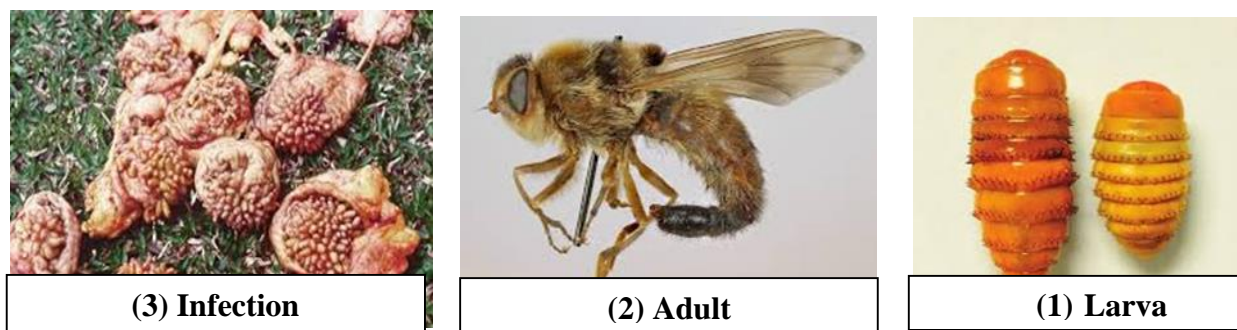
laying the eggs on the edges of the wounds, on the blood secretions, and on the reproductive openings of the animals. The eggs hatch to collect the larvae and feed on the wounds (Erdmann, 1987) Fig.(3).



**Fig. (3): The screwworm fly, its larvae and its presence in the wound (Figarola et al., 2001)**

(1) Larva of The screwworm fly (2) Adult of The screwworm fly  
(3) infection of the wound

***Gastrophilus intestinal* (horses stomach nodding):** This insect belongs to the Gastrophilidae family, which is an obligatory parasite. The insect has a length of 18 mm and resembles a honey bee. This insect is found in many regions of the continents of Asia and Africa. Its life cycle begins with the female laying eggs on the animal's hair in the neck, mouth, head and front legs, and when the animal licks some parts of the front body through the tongue, the larvae attach to the tongue and enter the stomach and remain attached to its mucous membrane, and after nine months to a year the larvae come out with animal feces and the larvae turn to virgins in the soil and after a while the virgins turn into adults and the cycle begins again (Atia et al., 2018) Fig. (4).



**Fig. (4): Cows stomach fly with its larvae and infestation (Atia et al., 2018)**

(1) Larva of Cows stomach fly (2) Adult of Cows stomach fly  
(3) infection of the stomach

#### **Bacterial infections associated with myiasis**

Most of the wounds contaminated with different bacterial types are associated with myiasis. These bacterial types can spread and reach the blood stream causing blood



poisoning and leading to the death of large numbers of livestock (Caballero *et al.*, 1996). There are skin infections of cattle with staphylococcus, where species of flies belonging to the order of Diptera lay their eggs around the infected wounds in addition to the presence of bacterial species on the outer surface of the body of the insect that is considered a natural flora but when it enters the wounds it turns into opportunistic bacteria causing infections and stenosis of wounds, whether for humans or livestock and most The normal flora belongs to the genus Streptococcus spp. *Staphylococcus aureus* (Caballero *et al.*, 1996). It is worth noting that the attraction of flies to wounds is due to the smells emitted from tissue decomposition by bacterial species that produce volatile organic compounds with distinctive odors. In a study of Zhu and collagueus in 2017 (Zhu *et al.*, 2017) , five bacterial species were isolated from wounds infected with myiasis, and they were all due to Gram-negative bacteria, they analyzed the organic compounds present in the wounds that cause odors emitted from them using GC technology and observed that the phenolic compounds emitted from *klebsiella pneumonia* (Taylor and Kiene, 1989), cresol compounds emitted by *Citrobacter freundii* and dimethyle, dimethyl disulphide, and trisulphide compounds produced by *Pseudomonas spp.* *Enterobacter spp.* (Liu *et al.*, 2016). These volatile compounds are produced from the bacterial metabolism, but in different proportions, as the synergistic bacterial species produce these volatile compounds in larger quantities than they do in isolation. The ability of the bacteria to attract insects is due to its ability to sense a quorum, including *proteus mirabilis*, as the strains belonging to this type produce substances that attract insects such as Phenyl Acetic Acid (PAA), Dimethyl disulphide (DMDS), Isobutyl amine (IBA) and Indole (IND), which is a secondary metabolite and derived from the amino acids phenylalanine, trptophan, methionine (Sasaki *et al.*, 2010). These amino acids are essential for the reproduction of insects, as they are a signal for both females and males for the purpose of mating, indicating that smells are a source of warning for all ages of flies inside these wounds (Chukwu *et al.*, 2012) where female flies that cause myiasis and carry eggs by placing them around wounds and hatching into larvae dig deep into the wounds and feed on tissues and body fluids in addition to contamination with positive and negative bacterial species for the cream dye, which is the main source of volatile organic compounds and causes odors that attract female flies that cause myiasis (Parker and Welch, 1992).

Moreover, these insects are considered one of the most important disease vectors for humans and animals because they carry germs on their outer surface or some parasites live inside them, such as the parasite that transmits malaria, and there are many studies in this regard to find out the relationship between insects and bacteria in the events of myiasis, as in a study of Caballero and others 1996, when they wrer able to isolate several bacterial types from sheep affected by myiasis caused by flies from the type *Cochliomyia hominivorax*, and he observed the dominance of the Gram-negative bacterial species, including *E. coli*, *Proteus spp.*, *Proteus mirabilis* compared to the positive types of *Staphylococcus aureus* with doveloment of infection. In another study conducted by Chukwa and others in 2012, which was conducted on pets, including dogs with cutaneous myiasis caused by *Cordylobia anthropophase* flies associated with infection

with other bacterial species, including *Staphylococcus aureus*, *E.coli* and *Corynebacteria spp.*

### Flies control

The first way in the control is to prevent and assist in eradicating the fly larvae before they can cause any harm, and it is called controlling the cause. The second method of control is to treat as soon as the injury occurs and take care of the injured person or animal.

### prevention

It includes the use of pesticides in the environment in which agricultural animals are raised. Organic phosphorous compounds or organic chlorine compounds may be used in spraying operations. One of the methods is also to eradicate the causative flies by using the sterilization method for artificially raised male flies, and then release them into the environment. The sterilized males compete with the fertile males that are naturally present in the environment to mate and fertilize the natural females, which leads to the laying of the natural females inoculated with the sterilized males with an unfertilized egg so that the eggs do not hatch and thus do not grow into larvae. To prevent circulating in humans, general hygiene and personal hygiene must be improved by washing clothes well in hot water and drying them away from flies, and ironing clothes well after drying to kill eggs and larvae, as the heat of the iron kills the eggs of flies (Zhu *et al.*, 2017).

### Treatment

The treatment is done as soon as the worm has formed the ventilation hole by covering the hole with a thick covering with Vaseline, which causes cutting off the oxygen to the larvae, forcing them to exit from under the skin to the surface, making it easier to deal. The fastest treatment option is to incise the wound and extract the larvae by applying pressure around the site of infection, and then clean and disinfect the wound (Zhu *et al.*, 2017).

التدويد (النغف) انواعه ومسبباته وعلاقة بعض الانواع البكتيرية باحدثائه / (بحث مراجعة)

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### الخلاصة

النغف Myiasis من اكثر العلاقات المعقدة والمثيرة للاهتمام التي نشاهدها في الطبيعة اذ يمثل العلاقة بين يرقات صغيرة من رتبة ثنائية الاجنحة Diptera ومخلوق اخر كالإنسان والحيوان كما يعتبر من المشاكل الاقتصادية المسببة خسائر فادحة في الثروة الحيوانية ، ينتج النغف عن غزو يرقات انواع من الذباب تابعة لثلاثة عوائل 1. عائلة النبريات Oestridae 2. عائلة ذباب اللحم Sarcophagidae 3. عائلة الخوتعيات Calliphoridae لأنسجة واعضاء جسم الانسان والحيوان على حد سواء حيث تتغذى هذه اليرقات على الانسجة الحية والميتة ، كما تبين ان الجروح الملوثة بالبكتريا *Staphylococcus aureus* ، *Streptococcus spp.* ، *Klebsiella* ، *Pseudomonas spp.* ، *Enterobacter spp.* و *Proteus mirabilis* اكثر احتمالية في الاصابة بالنغف نتيجة لقدرتها على انتاج مركبات عضوية متطايرة تعتبر كمحفزات للذباب . لذا ارتأينا في هذه

المقالة العلمية تناول مراجعة موجزة وشاملة لمرض النغف بما في ذلك تصنيف انواعه وتصنيف اليرقات المسببة له والاصابات البكتيرية المصاحبة للنغف.

**الكلمات المفتاحية:** التدويد ، الحشرات الطبية ، ثنائية الاجنحة ، اليرقات ، البكتريا

تاريخ تسلم البحث: 2021 / 1 / 22 ، وقبوله: 2021/2/28

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