Journal of the Egyptian Society of Parasitology, Vol. 55, No. 1, April 2025
J. Egypt. Soc. Parasitol. (JESP), 55(1), 2025: 137 - 150
Online: 2090-2549

A SYSTEMATIC REVIEW ON ARTHROPODS BITING MAN AND ANIMALS CAUSING ALLERGY AND TRANSMITTING INFECTIOUS DISEASES: IS IT RISKY TO EGYPT WITH CLIMATIC CHANGES AND IMMIGRANTS?

By

MAGDA H. RADY[1], SHAIMAA MAHMOUD FARAG[1], and AYMAN T. A. MORSY[2]

[1]Department of Entomology, Faculty of Science, Ain Shams University, Cairo 11566, and [2]Respiratory Care Technology Program, Applied Health Science Technology, MUST University, P.O. Box 77, Giza, Egypt

(Correspondence: [1]drmagsaradi@yahoo.com, [1]spodopteralittoralis88@gmail.com, and [2]ayman.morsy@must.edu.eg.)

Abstract

Arthropods may cause direct or indirect injuries, damages and/or infections of a variety. Mostly, however, they are important medically because of their mediation as a vector for a large number of diseases transmitted to human and animals**.** They are medical importance as biological vectors of pathogens (malaria and *Leishmania* parasites, viral hemorrhagic fevers, Lyme disease…etc.), passive carriers of pathogens (bites or feces), ectoparasites (ticks, fleas, blood-sucking, flies, lice…etc.), nuisance pests (bed-bugs, millipedes). But, not all the insects are harmful, others are essential to life on Earth. Bees and butterflies help plants produce seeds, ladybugs eat devastating pests and have even saved citrus crops, and centipedes control indoor bug population.

Key words: Arthropods, Man, Animals, Allergy, Diseases, A system review.

Introduction

Arthropods bites may be a minor nuisance or may lead to serious medical problems, as transmission of infectious diseases and risky allergic reactions that may be fatal (Gaig *et al,* 1999). Arthropods commonly bite humans include: 1- Mosquitoes, 2- Ticks, 3- Fleas, 4- Chiggers (Chigger bites), 5- Blackflies (genus *Simulium*), 6- Biting midges (*Culicoides* or no-see-ums), 7- Sandflies (genus *Phlebotomus*), 8- Bed-bugs (genus *Cimex*), 9- Kissing bugs (genus *Triatoma*) and 10- Lice (genera *Pediculus* & *Phthirus*).

Also, a small number of spiders species (Arachnids, Arthropods) symmetrical having four pairs of legs, using their chelicerae sharp fangs to bite insects, small arthropods, or man inject paralyzing venom, with mild or no effect on mammalian tissues, but few species have cheliceral muscles powerful to penetrate human skin (Swanson and Vetter, 2005). Besides, spider phobia (fear): Acarophobia, entomophobia or delusion is a disorder affecting humans believing that they are infected by insects, spiders, scorpion, ticks, mites, parasitic worms, bacteria, or other living organisms (Sabry *et al,* 2012). The bites of recluse spiders can become necrotic, or allergic reactions to contact with spiders (rather than bites) occur most often in response to tarantulas. Clinical diagnosis is based upon history and clinical presentation, but differential diagnosis includes infections, bites, stings of other arthropods, and the others more common are dermatosis and cultures in most cases (Al-Agroudi *et al,* 2016).

Review, Discussion and Conclusion

Reactions to the bites of mosquitoes, ticks, fleas, blackflies, bed-bugs and sandflies differed from insect stings, which inject venom into the victim and may cause reactions ranging from local irritation to life-threatening anaphylaxis (Abdel-Motagaly, *et al,* 2017). But, there is still insufficient evidence for the cross-reactivity between Athropods' salivary proteins from the blood-feeding insects and Hymenoptera venom allergens (Sturm *et al,* 2023). Besides, some people may develop symptoms as a result of contact with caterpillars and moths, in the absence of a bite or sting (Hossler, 2010).

Reactions types: Insect bites may result in local reactions, papular urticaria, or systemic allergic reactions, but rarely other forms of systemic reactions occur, such as the serum sickness (Engler, 2001).

Local reactions: The normal reaction to an

insect bite is an inflammatory reaction at the site of the punctured skin, which appears within minutes and consists of pruritic local erythema and edema. Symptoms usually subside within a few hours. Local reactions are caused by irritant substances concentrated in insect saliva of anticoagulants, enzymes, agglutinins, and mucopolysaccharides (Penneys *et al,* 1989). In some cases, a local reaction is followed by a delayed skin reaction consisting of local swelling, itching, and redness, with evolution to a vesicular, bullous, indurated, or rare necrotic lesion (Vassallo *et al,* 2005)

Immunocompromised patients, such as those with acquired immunodeficiency syndrome (AIDS), chronic lymphocytic leukemia, histiocytosis X disorders, and monocyte functional disorders, also develop severe local bite reactions (Wakimoto and Niitsu, 2005). In such patients, local reactions can progress to become necrotic or may be accompanied by systemic symptoms, including lymphadenopathy and fever (Asada, 2007).

Patients with delusional infestation (or delusional parasitosis) believed that they were bitten by an imaginary insect (Ahmad and Ramsay, 2009). Similarly, amphetamine and cocaine abusers with formication (a feeling that ants are crawling on the skin) can present with self-inflicted skin lesions from an imaginary infestation (Reunala *et al,* 1991).

Treatment: Insect bites should be washed with soap and tape water. Reduction of local edema may be induced with cooling (ice or cold pack). Topical creams, gels, and lotions, such as those containing calamine or pramoxine, decrease pruritus. Routine use of topical anesthetic and antihistamine preparations should be avoided because they sensitized the skin after sun exposure and induce allergic contact sensitivity (Demain, 2003).

Non-sedative oral antihistamines, such as cetirizine® (10mg once/day) and/or loratadine® (10mg once/day) help the troublesome itching patients. Sedative agent hydroxyzine, hydro-chloride or pamoate (10 to 25mg every 4 to 6 hours, when needed) help controlling pruritus in adults. Besides, H1 & H2 antihistamines may be used (Steen *et al,* 2004).

Concurrent use of oral H1 antihistamines and topical antihistamines applied over large surface areas should be avoided, as this combination can cause systemic anticholinergic toxicity (Matterne *et al,* 2019). The dramatic severe local swelling can be minimized by a brief course of the oral glucocorticoids (Priya *et al,* 2024).

Papular urticaria: Papular urticaria is a hypersensitivity disorder in which insect bites, most often by fleas, mosquitoes, or bedbugs, lead to recurrent or sometimes chronic itchy papules on exposed skin (arms, lower legs, upper back, scalp (Hernandez and Cohen, 2006). The papular urticaria cause predominantly in young children (2 to 10 years old), and the diaper/underwear areas, genital, perianal, and axillary areas are spared (Vidal *et al,* 2007). The 0.5 to 1cm lesions may be urticarial at syndromatic start, but persist and papular and/or nodular with time.

Diagnosis of the papular urticaria is clinically, although there may be a delay between the inciting bite(s) and the onset of lesions or insect bites may not be noticed at all. Usually only one child in a family is affected, a clue that infestation at home is unlikely. New lesions may appear sporadically, and renewed itching may reactivate older lesions, leading to a chronic and cycling disorder that might last from months to years (Hrabak and Dice, 2003).

Treatment: Management of papular urticaria includes selective and limited use of nonsedating antihistamines for pruritus, mid-potency topical corticosteroids applied to individual lesions, and reassurance, as they eventually resolves spontaneously (Stevens *et al,* 1996).

Systemic allergic reactions: Systemic allergic reactions to insect bites are rare, but do occur (Hassoun *et al,* 1999). Systemic allergic reactions could in response to the bite of *Triatoma* (Kissing bugs), mosquitoes, blackflies, deerflies, louse flies, horse-flies, ticks, and centipedes (Harada *et al,* 2005). The tri-

atominae species (151) are grouped in 17 genera and five tribes: Aberproseniini, Bolboderini, Cavernicolini, Rhodiniini, and Triatomini (Vieira *et al,* 2018). Only rhodniini and triatomini species are the significant vectors of *Trypanosoma cruzi* that causes American Chagas disease to humans and other mammals (Sutcliffe and Dotson, 2024).

The patients with mast cell disorders may be presented with severe systemic allergic reactions after the insect bites (Reiter *et al,* 2013). Reactions can result following insect bites, stings of Hymenoptera insects, and a variety of other triggers, which cause the spreading activation of mast cells with promin ent flushing and hypotension. In patients with hypotension in response to an insect bite or sting, a serum total tryptase can be screened for the mast cell disorders (Ruëff *et al,* 2009). Patients with tryptase levels above 5 to 8 ng/mL are at risk for the severe and/ or systemic reactions to Hymenoptera and insects, even in the absence of the systemic mastocytosis (Bonadonna *et al,* 2009). The commonest reactions to the stings are transient pain and redness at the site lasting a few hours (local reaction), and exaggerated swelling for a few days (large local reaction), but the most dangerous immediate reaction is anaphylaxis, which may potentially be fatal (Abdel-Rahman *et al,* 2015).

Treatment: Anaphylaxis associated with an insect bite must be early treated promptly with epinephrine (Potier *et al,* 2009). The patients who have experienced systemic reactions should be supplied with an epinephrine auto-injector and instructed in how and when to use it.

Allergy specialists would assess patient's clinical history to assure correct trigger for the allergic reaction diagnosis and/or sometimes the confirmatory testing was indicated (Oppenheimer and Nelson, 2006). Patients suffering from anaphylaxis should be treated with the epinephrine (Järvinen and Celestin, 2014)

Other systemic reactions: The patients may sometimes develop systemic reactions with no pathogenesis to insect bites that cause the minimal symptoms in most of them. Two Japanese patients with local skin reactions showed fever, fatigue, nausea, anorexia, and hepatosplenomegaly following the mosquito's bites, and sporadic reactions caused by factors unique to them (Palosuo *et al,* 1991).

Mosquito's bites: The most commonly occurring insect bites are inflicted by mosquitoes, of the family Culicidae (order Diptera). Genera *Anopheles*, *Culex*, and *Aedes* are usually responsible for human bites (Crisp and Johnson, 2013). Local reactions pain, pruritus, and erythema are typical after a mosquito bite. Common reactions include an immediate wheal-and-flare response that peaks at about 20 minutes and/or an indurated pruritic papule that peaks at 2 to 3 days and resolves over the ensuing days to weeks (Peng and Simons, 2004). Some people, particularly young children, can develop very dramatic swelling surrounding the bite site, which was accompanied by low-grade fever and cellulitis mistaken (Peng and Simons, 2007). Uncommon local reactions include ecchymosis, vesiculation, or blistering at the site. In many patients, the exaggerated local reactions improve with age and treated with prophylactic anti-histamines during summer season (Peng *et al,* 2004). The epstein-Barr virus-patients associated with lymphoproliferative disorders developed necrotic skin lesio ns at mosquito bites site (Cho *et al,* 2006). Also, children and pregnant women are mosquito magnets to be bite without any protection yet was markedly complicated, such as swelling, fluid-filled blisters, welts, impetigo, or lymphangitis (Morsy *et al,* 2023).

Systemic allergic reactions: Rarely, patients can develop classical anaphylaxis responding to mosquito bites, presenting with some combination of generalized urticaria, angioedema, wheezing, vomiting, hypotension, consciousness lost or other manifestations of risky anaphylaxis (McCormack *et al,* 1994). The commercially available whole body extracts for mosquito had limited diagnostic value with positive in only 25% of individu-

als with convincing histories of anaphylaxis patients (Peng *et al,* 2004). More specific recombinant salivary antigens were produced in research settings, and new diagnostic tests must be available (Simons and Peng, 2001).

The main diseases transmitted by mosquitoes include Barmah Forest fever, Chikungunya, Dengue, Dirofilariasis, Eastern equine encephalitis, Filariasis, Japanese encephalitis, Keystone virus, La Crosse encepphalitis, Malaria, Ross River fever, Rift Valley fever, Saint Louis encephalitis, Tularemia, Venezuelan equine encephalitis, Western equine encephalitis, Zika fever, Yellow fever, and West Nile virus as well as Buruli ulcer b*y Myobacterium ulecerans* (Wikipedia, 2025). But, mosquitoes don't transmit HIV, as virus neither survives nor replicates well in them, and blood from one meal don't go into the next host (Fradin, 1998).

Ticks: The primary concern with hard and/ or soft tick bites is disease transmission, although rare allergic reactions occur, but some tick bites appear to sensitize patients to allergens that can later cause food (specifically red meat) allergy (Commins and Platts-Mills, 2013).

Tick disease transmission: Ticks can transmit several zoonotic infectious diseases including: Anaplasmosis, Babesiosis, Bourbon virus, Colorado tick fever, Crimean Congo hemorrhagic fever, Ehrlichiosis, Hard tick relapsing fever, Heartland virus, Hepatozoonosis, Lyme disease (Borreliosis), Powassan virus, *Rickettsia parkeri* rickettsiosis, Rocky Mountain spotted fever, Soft tick relapsing fever, STARI, Theileriosis, Tularemia, 364D rickettsiosis and others (CDC, 2024a).

Ticks dated back to ancient Egyptian time when a dog mummy gave evidence of brown dog tick *Rh. sanguineus* significant infestation (Huchet *et al,* 2013). Up to date, about 52 tick species have been identified in Egypt, of Argasidae family eight soft tick species and of Ixodidae family 44 hard tick species (Abdelbaset *et al,* 2022).

Tick-borne diseases encountered in Egypt are Anaplasmosis, Babesiosis, Borreliosis, Ehrlichiosis, Rickettsiosis, Theileriosis (Saleh *et al,* 2016), and imported human Crimean Congo hemorrhagic fever cases (El Bahnasawy *et al,* 2012). Previously, *Trypanosoma* spp. was detected in guts of ticks collected from Beer El-Abd, Nakhel (El-Kady *et al,* 1988). Soft tick transmits Aegyptianellosis to birds, reptiles, and amphibians (Carpano, 1929). Also, Hepatozoonosis was identified in dogs heavily infested with *Rh. sanguineus* (Hindawy, 1951). The Quaranfil virus (QRFV) infects the pigeon squabs, and cattle egrets, and its antibodies were detected in children in the Nile Delta, who suffered from febrile illnesses (Taylor *et al,* 1966).

Allergy: The ticks' salivary proteins are allergenic to man and sometimes pet (Moneret-Vautrin *et al,* 1998). The bites of some ticks can cause systemic allergic reactions, such as the *Ixodes* tick, *I. holocyclus,* Australian paralysis tick, and European pigeon tick *Argas reflexus,* (Kleine-Tebbe, *et al,* 2006). Their bites are implicated in sensitizing patients to a carbohydrate determinant, the alph agalactosidase is found in the drug Cetuximab® as well as some edible red meats causing human allergic reactions such as with the tick bites (Commins *et al,* 2011). Patients with alpha-gal sensitization can severely react to cetuximab upon their first exposure, including anaphylaxis (Steinke *et al,* 2015). Exposure to an ecto-parasite bite particularly in children is critical in develo- pment of specific IgE antibodies underlying sensitization, and allergic reactions depend- ing on the activation of mast cells and basophils sensitized with IgE against the carbohydrate rather than protein (Patel and Iweala, 2020). Also, alpha-gal-related meat allergy is unusual in delayed onset between 4 to 6 hours after ingestion or can also impact speed and severity of conventional allergic responses to proteins (Rutkowski *et al,* 2000). Documented cases reported globally, were mainly predominantly in the United States, Canada, and Australia, with additional reports from the European Union, and Africa with up to 75 tick species, mostly hard ticks

are involved in causing life-threatening tick-paralysis (Deng *et al,* 2024).

In Egypt, Mosabah and Morsy (2012) reported for the first time tick paralysis in four hospitalized children of a family living in a breeding animals' farm at Giza Governorate rural area. The clinical pictures were confused with rabies, myasthenia gravis, botulism, and diphtheritic polyneuropathy. By visiting the farm recovered ticks were *Rhipicephalus sanguineus* on dogs, *Hyalomma dromedarii* on camels and *Hyalomma a. excavatum* and *Haemaphysali*s sp. on goats.

Blood sucking flies: Various flies cause allergic reactions and/or infectious diseases transmission. These are blackflies (*Simulium*), horseflies (*Tabanus*), deerflies (*Chrysops*), louse flies (*Hippobosca*) and sandflies (*Phlebotomus*) have been reported to induce the systemic allergic and inflammatory reactions (Hemmer *et al*, 1998).

Blackflies are implicated in both anaphylaxis and a late systemic syndrome characterized by fever, leukocytosis, lymphadenitis, and papular lesions (Decastello and Farkas, 2009). All members of family Simuliidae are the vectors of human onchocerciasis or river blindness (Muller and Horsburgh, 1987).

Horsefly females feed on pets, livestock, wildlife, and occasionally, humans. They are vectors of *Trypanosoma theileri*, and others such as *T. brucei*, *T. congolense*, *T. evansi*, and *T. vivax*. They can mechanical transmit agents causing African horse sickness, anthrax, bovine anaplasmosis, bovine besnoitiosis, bovine leucosis, equine infectious anemia, lumpy skin disease, and tularemia (Baldacchino *et al,* 2014). In Egypt, *Tabanus taeniola* and *Haematopota minuscula* were trapped on camels and equines at daytime from Aswan District (Morsy and Habib, 2001). Haridy *et al.* (2011) reported the first Egyptian human trypanosomiasis *evansi* case acquired from camels (50/300) naturally infected with *T. evansi* (Surra) in El-Basateen Governmental Slaughteredhouse.

Deerflies inflict painful bites sometimes with systemic anaphylaxis and *Chrysops* species transmit parasitic filaria *Loa loa* between humans (Padgett and Jacobsen, 2008).

Louse flies (*Hippbosca*) are vectors of blood parasites (*Bartonella* spp., *Besnoitia besnoiti* and *Corynebacterium pseudotuberculosis*) to humans and animals, and play a role in mechanical transmission of many diseases and their strong painful bites cause skin injuries, with sometimes anaphylactic reaction (Arafa *et al,* 2019). Hafez and Hilali (1978) in Egypt gave the detailed morphology and biology of *Hippobosca longipennis*.

Sandflies of *Phlebtomus* (Old world) and *Lutzomyia* (New World) are vectors of bartonellosis (Oroya fever and Verruga peruana) and three types of leishmaniasis. Morsy *et al.* (1990) reported four *Phlebotomus* species; *P. papatasi, P. sergenti, P. langeroni* and *P. bergeroti*. *P. papatasi* is a zoonotic cutaneous leishmaniniasis vector and *P. langeroni* is an infantile visceral leishmaniasis vector in Alexandria. El Sattar *et al.* (2019), by morphotaxonomic phlebotomine album reported nine *Phlebotomus* species; *P. papatasi, P. bergeroti, P. langeroni, P. orientalis, P. major, P. arabicus, P. kazeruni, P. sergenti,* and *P. alexandri.* Morsy *et al.* (1987) in the Nile Delta, the principal reservoir rodent is *Gerbillus pyramidum* and *Psammomys obesus* in Sinai (Morsy *et al,* 1996).

Also, stable flies in Egypt, *Stomoxys calcitrans* (L.) and *S. sitiens* Rond. are severe pests of cattle other domestic animals and man, taking blood voraciously and inflicting severe wounds in so doing (Hafez and Gamal-eddin, 1959). Stable fly's habit of interrupting feeding, and moving between hosts, would contribute toward efficiency as a vector of *Trypanosoma evansi* in the horses and camels (Coetzer and Tustin, 2004), also *S. calcitrans* was considered in RVF outbreak rapid spread (Turell *et al,* 2010), and as the possible mechanical WNF vector in South America and sub-Sahara Africa (Doyle *et al,* 2011).

Fleas: Fleas (Order Siphonaptera) are more than 2,500 species worldwide, with more than 300 species occurring in the United Sta-

tes, but few species attack man, such as the cat flea (*Ctenocephalides felis*), dog flea (*C. canis*), ground squirrel flea (*Oropsylla montana*), and Oriental rat flea (*Xenopsylla cheopis*), which bites cause discomfort, itchiness, and irritation (CDC, 2024b). In general, only 5 fleas' families and 25 genera are ectoparasites of birds; all other fleas parasitize mammals (Iannino *et al*, 2017).

Fleas' eradication in-doors without any animal vector involve insecticidal dusts or sprays, and by using vacuum cleaning (Bitam *et al*, 2010). Consultation with a veterinarian is advised if pets/animals are believed to be the source of the infestation, since direct treatment of the pet is usually required (Dryden, 2009). Fleas play a role in the transmission of several infectious diseases as a component of epidemiologic cycles that also included humans, animals, and birds (Youssef and Uga, 2014). Examples include plague (*Yersinia pestis*), bartonellosis, typhus, and tungiasis (Rust, 2005). However, *Tunga penetrans* was reported in Egypt, but the first tungiasis case was detected in a Saudi Arabian patient's dermis-fat graft in his anophthalmic socket (Galindo-Ferreiro *et al*, 2019).

In Egypt, flea (*Pulex irritans*, human flea), was also among the parasites that Eva found at El-Amarna in workmen's village (Panagiotakopulu, 1999). Egyptian fleas' fauna was reported from different aspects with so many authors perhaps by Hoogstraal (1956) up to Bahgat (2013). El Okbi *et al*. (1991) succeeded in diagnosing allergic flea dermatitis by locally prepared skin test extracted from fleas' saliva. Loftis *et al.* (2006) from 17 representative Egyptian Cities tested 987 fleas for their DNA from many pathogenic agents. They reported *Rickettsia typhi* in *X. cheopis* and *L. segnis* from rats trapped from nine cities. A spotted-fever group *Rickettsia* sp. similar to "RF2125" was detected in *E. gallinacea*, and two undiagnosed spotted fever group *Rickettsia* were identified in two *X. cheopis*. Also, novel *Bartonella* genotypes were detected in both *X. cheopis* and *L. segnis* from three cities, and *Coxiella burnetii* was detected in two zoonotic fleas.

As to flea index, Bakr *et al.* (1996) in Menoufia Governorate reported that fleas were collected from rodents were *Xenopsylla cheopis* (57.7%), *X. ramesis* (12.7%), *Pulex irritans* (12.7%), *Leptopsylla segnis* (11.3%), and *Ctenocephalides felis* (5.6%). The maximal flea index was (1.02) in spring season, and the minimal was (0.0) in winter with the overall index of (0.59). The highly infested rodent was *Rattus rattus* (0.65), *R. norvegicus* (0.62) and the lowest was *Mus musculus* (0.45). Mikhail *et al.* (2011) evaluated the flea index in five ecologically different Egyptian Governorates. They reported that the highest indices were (8.93 & 7.68), in Ismailia and Matrouh Governorates, the lowest ones were (1.09 & 1.68) in El-Fayoum and North Sinai ones, but the moderate flea index was (4.52) in Dakhalia Governorate. The highest number of fleas' index was recorded on *R. norvegicus* living in the easily dig barrows, but the lowest one was on the commensal *Mus musculus* and *Acomys cahirinus*. El-Bahnasawy *et al.* (2012) commented that the plague outbreak reported at the Libyan-Egyptian borders with the high rodents and fleas density in many Egyptian Governorates, mainly Matrouh must start a feasible control program to rodents and fleas and to raise awareness of the concerned authorities Also, zoonotic *Hymenolepis diminuta* and *Dipylidium caninum* is by ingest of infected fleas (Abdel-Hafeez *et al*, 2012). Barghash *et al.* (2024) suggested that the Capripoxvirus is adapted to *Ctenocephalides felis* predominated in Northern West Coast and *Ctenocephalides canis in* South Sinai Governorate, and may be transmitted to sheep and goats in different areas.

Biting midges: Biting midges of the genus *Culicoides* Latreille ((Diptera: Ceratopogonidae) are about 1,340 species of global distribution commonly identified by their unique wing pigmentation and macrotrichia pattern (Nagaty and Morsy, 1960). They are tiny gray/black, winged in-sects that are less than 3 mm in length. The term (no-see-um) due to the fact that people only feel the sharp burn-

ing bite, but not able to see the midge (Borkent and Dominiak, 2020). Females' require a blood meal in order to deposit the mature eggs, and typically feed at both dawn and dusk. The coastal areas and marshlands were preferred breeding habitats (Hill and MacDonald, 2011). Bites may result in small welts or localized allergic reactions in sensitive individuals (Chen *et al,* 2005). Among 220 Taiwnese subjects, local reactions were immediate (within an hour), followed by delayed, and isolated-delayed reactions consisted of pruritic papules or vesicles, which persisted from weeks up to months (Chen *et al,* 2011). Few patients suffered from systemic fever and lymphadenopathy (Yoon *et al,* 2005). Biting midges transmit filarial *Mansonella* species in South and Central America, as well as parts in sub-Sahara Africa and the Caribbean (Ta-Tang *et al,* 2018).

In Egypt, about eleven species of *Culicoides* were reported allover Egyptian Governorates (Morsy *et al,* 1989), but El-Hawagry *et al.* (2020), by the data compiled from both available literature and specimens collected from different Egyptian localities detected that the Sub-family Ceratopogoninae includes four tribes, seven genera and 38 species.

Lice are wingless insects (neither fly nor jump) can live on humans' skin and in hair, and cause itching. Three types are zoonotic: 1- Head lice (*Pediculus* humanus *capitis*) are worldwide distributed obligatory ectoparasite live on the scalp and hair head up to 30 days feeding on his/her blood several times daily, affected persons mainly children may be asymptomatic or may complain of scalp and/or neck pruritus (Ko and Elston, 2004). Scalp itching may lead to insomnia, impaired concentration at school or work, and excessive scratching (Mumcuoglu *et al,* 2021). Also, head lice caused cervical lymphadenopathy, particularly in the children with long hairs (Abdel Fattah *et al,* 1994). Pruritus occurs as an allergic reaction or even asthmatic bronchitis to lice saliva injected during feeding (Abou-Gamra *et al,* 1992). Children infested with pediculosis *capitis* don't need to be excluded from school (Frankowski and Bocchini, 2010). Nevertheless, their household members and close contacts should be examined for lice infestation. Besides, individuals who share bedding with the infested person should be treated prophylactically. 2- Body lice (*Pediculus humanus*) or homeless' body lice live in their clothes, but usually without any feelings (Boutellis *et al,* 2014). Pediculosis *humanus* serves as diseases vectors, such as epidemic typhus fever, epidemic relapsing fever, and trench fever, but *Bartonella quintana* can lead to endocarditis (Morsy and AlGhabban, 2023). 3- Pubic lice or crabs (*Phthirus pubis*) live on the pubic hair, eyebrows, eyelashes, armpits, beard or mustache, or other sites, which is known as pediculosis ciliaris and/or phthiriasis palpebrarum (Morsy, 2012). Female public lice lay up to 26 eggs (called nits) over a period of three to four weeks, which hatch in about one week (Leone, 2007). Crab is usually transmited during the sexual intercourse, and also via contact with fomites such as their cloths, towels, or linen is always possible means of infestation (Peterson *et al,* 2019). A little girl acquired ocular phthiriasis infestation from bath towels (Morsy and El Ghazali, 1999). A family doctor or nurse can diagnose pubic crab severe itching by examining at the genital area for lice and/or eggs which are usually deeply embedded (Paternotte *et al,* 2017). Crab differential diagnosis includes scabies, or scabietic burrows and erythematous papules in classic areas of involvement; such as web spaces of fingers, wrists, and genitalia (Morsy *et al,* 2003).

Centipedes are predatory venomous arthropods found in moist and warm climates of global distributions with reported human env venomation (Uppal *et al,* 1990). In Egypt, 2 *Scolopendra* species were reported, *Scolopendra canidens* Newport.1844 was in one location, but *S. morsitans* Linnaeus, 1758 was the more abundant (Mahy and Atlam, 2022). Most centipedes are generally venomous and can inflict painful bites, injecting their venom through pincer-like appendages usually

nocturnal (Ombati *et al,* 2018). Stings often affect victim extremities, and 1 or 2 small puncture marks may be seen that are always painful, erythema and edematous as well as symptoms of lymphadenitis, cardiac arrhythmia, and acute kidney injury (Otten, 2014).

In the USA between 1979 and 2001, six centipede bites were fatal compared to 1060 ones from bees, wasps, and hornets over the same time (Undheim *et al,* 2015).

There is no specific antidote for centipede venom. Mild centipede bites is straightforward and includes: a- Site irrigating to reduce the risk of infection risk, b- Ice packs as cold elevates the pain threshold, impedes nerve conduction, and vasoconstricts vessels to prevent tissue edema, c- Patients with pain are improved with submersion of extremity in hot water, as it may be due to denature any heat-labile venom toxins, but some patients have increased pain with hot water exposure, & d- A systemic, and local analgesia with lidocaine® at the bite site causes a significant relief (Chaou *et al,* 2009). Bites of centipedes, if the patient has no tetanus vaccination within the past 5 years, update tetanus vaccination (Brandehoff *et al,* 2014).

Among 94 patients presenting for emergency care in Sao Paulo, one-third required treatment for persistent or severe pain symptoms (Medeiros *et al,* 2008). Reported therapies include systemic analgesics, antihistamines, application of ice packs, immersion of the affected body part in hot water, and local injection of anesthetics (Balit *et al,* 2004). In a prospective study of 60 patients, subjects were randomized to one of three interventions: application of ice packs (15 minutes), hot water immersion (43 to 45°C, water bath for 15 minutes), or injection of ketorolac30mg (Chaou *et al,* 2009). Each therapy reduced pain, ice packs were the most practical and least invasive, but 3/22 patients assigned to hot water immersion had worsening of symptoms (Yildiz *et al,* 2006). Most centipede stings resolve without complications, but various sequelae were local infection and necrosis (Fung *et al,* 2011), rhabdomyolysis with renal failure, and anaphylaxis (Logan and Ogden, 1985), as well as myocardial infarction (Senthilkumaran *et al,* 2011). The bite must be differentiated from bites of spider, insect, tick, scorpion envenomation, and cellulitis or abscess (Washio *et al,* 2018).

Spiders: Their bites are uncommon medical events, since there are limited numbers of spiders' worldwide with fangs strong enough to pierce human skin, and most spiders bite humans only as a final defense when being crushed between the skin and another object **(**Fusto *et al,* 2020**).** Oliveira *et al.* (2005) reported that most spider bites lesions are caused by some other etiology; they can cause medically significant bites include the widow and false widow spiders (worldwide), recluse spiders (North and South America), Australian funnel web spiders (eastern coastal Australia), and Phoneutria spiders (Brazil). The acute spider bites most commonly causes a solitary papule, pustule, or wheal that may be superimposed by bacteria (Dominguez, 2004). Systemic symptoms could accompany envenomation of widow; funnel web, and Brazilian spiders, and less often, of the recluse spiders (Al-Agroudi *et al,* 2016).

Differential diagnosis: Several dermatologic disorders can present with scattered inflammatory papules that may resemble arthropod bites. Examples include: 1- Folliculitis: Superficial folliculitis is characterized by the small follicularly-based inflammatory papules and pustules, and a common skin condition that happens when the hair follicles become inflamed due to superimposed by bacterial infection. At first it may look like small pimples around the tiny pockets from where each hair grows (hair follicles), can be itchy, sore, embarrassing, spread and turn into crusty sores (Mayo Clinic, 2022). 2- Lymphomatoid papulosis: Lymphomatoid papulosis is a non-aggressive T-cell lymphoma with recurrent, spontaneously regressive papulonodular, and sometimes, necrotic lesions, always disseminated with the histologic features suggestive of a CD30-positive lymphoma,

and accounts up to 12% of cutaneous lymphomas (Toumi *et al,* 2023). Lesions are asymptomatic and may be crusted, necrotic, or hemorrhagic. Progression to mycosis fungoides, anaplastic large cell lymphoma, or Hodgkin disease may occur in some cases (Swerdlow *et al,* 2016). 3- Pityriasis lichenoides and varioliformis acuta: PLEVA, also called Mucha-Habermann disease, is not so common cutaneous inflammatory rash characterized by diffuse red-brown papules in various stages with a mica-like scale on the established lesions forming vesicles, pustules, and ulcers, and associated with pruritus or a burning sensation. This PLEVA rash tends to relapse and remit with variable duration for sometimes up to years (Bowers and Warshaw, 2006). Corticosteroids are the most common used as an adjunctive therapy, for patients with refractory disease; methotrexate may be an option, but for the refractory cases include Acitretin®, Dapsone®, and Cyclosporine® (Jiao *et al,* 2019).

Conclusion

Skin lesions that occur among returning travellers or introduced immigrants must be critically examined for the pathogenic infective organisms (viruses, bacteria, fungi, helminths, and/or protozoa). Most insect bites cause local inflammatory reactions that subside within a few minutes to hours without complications. But, more severe local signs and symptoms, such as papular urticaria, systemic allergic reactions, fever, and transmission of a disease-causing pathogen occur.

Mosquito bites can cause varying degrees of local swelling, papular urticaria in children, and rare systemic allergic reactions, including anaphylaxis. Also, mosquitoes are known vectors of many pathogenic agents.

Ticks bites are mainly of concern because they can transmit infectious pathogens.

Various blood sucking flies (*Culicoides*, *Phlebotomus*, *Stomoxys* and others) and also, human lice are capable of inducing systemic allergic reactions and/or transmitting infectious risky diseases.

Fleas' bites are usually only a nuisance, but children can develop allergy or papular urticaria, and bites can transmit infectious diseases.

Authors' contributions: All authors declared that neither have any conflicts of interest nor received any funds.

Authors' *declarations:* They equally shared in the data collection, wrote, revised the manuscript and approved its publication.

However, the ethical approval was not required.

References

Abdelbaset, AE, Nonaka, N, Nakao, R, 2022: Tick-borne diseases in Egypt: A one health perspective One Health 15, 100443 Available online 10 October 2022**.**

Abdel-Hafeez. EH, Ahmad, AK, Ali BA, Moslam FA, 2012: Opportunistic parasites among immunosuppressed children in Minia District, Egypt. Korean J. Parasitol. 50:57-62.

Abdel Fattah, SM, El Sedfy, HH, El Sayed, HL, Abdel Aziz, H, Morsy, TA, Salama, MM, Hamdi, KN, 1994: Seropositivity against pediculosis in children with cervical lymphadenopathy. J. Egypt. Soc. Parasitol. 24, 1:59-67.

Abdel-Motagaly, AME, Mohamad, HM, Morsy, TA, 2017: A mini-review on skeeter syndrome or large local allergy to mosquito bites**.** JESP 47, 2:415-24.

Abdel-Rahman, RZ, Mohamad, HM, Morsy, ATA, Morsy, TA, 2015: Allergic reactions caused by venom of hymenopterous stinging insects and the role of health care workers. J. Egypt. Soc. Parasitol. 45, 2:403-12

Abou-Gamra, EM, El Shayeb, FA, ElBanna, M, Farrag, AMK, Morsy, TA, 1992: Possibility of lice allergy among Egyptian patients with asthmatic bronchitis. J. Egypt. Soc. Parasitol. 22, 1:37-50.

Ahmad, K, Ramsay, B, 2009: Delusional parasitosis: Lessons learnt. Acta Dermat. Venereol. 89, 2:165-8.

Al-Agroudi, MA, Ahmed, SAM, Morsy, TA, 2016: Intervention program for nursing staff regarding approach to a patient with spider phobia and/or bite. JESP 46, 1:167-78.

Arafa, MI, Hamouda, SM, Rateb, HZ, Abdel-Hafeez, MM, Aamer, AA, 2019: Oedematous Skin Disease (OSD) transmission among buffaloes. Glob. J. Med. Res. 19:15-9.

Asada, H, 2007: Hypersensitivity to mosquito

bites: A unique pathogenic mechanism linking Epstein-Barr virus infection, allergy and oncogenesis. J. Dermatol. Sci. 45:153-8.

Bahgat, IM, 2013: Monthly abundance of rodent and their ectoparasites in newly settled areas, east of lakes, Ismailia Governorate, Egypt. J. Egypt. Soc. Parasitol. 43, 2:387-98

Bakr, ME, Morsy, TA, Nassef, NE, El Meligi, MA, 1996: Flea ectoparasites of commensal rodents in Shebin El Kom, Menoufia Governorate, Egypt. J. Egypt. Soc. Parasitol. 26, 1:39-52.

Baldacchino, F, Desquesnes, M, Mihok, S, Foil, LD, Duvallet, G, *et al,* 2014: Tabanids: Neglected subjects of research, but important vectors of disease agents. Infect. Genet. Evol. 28: 596-615.

Balit, CR, Harvey, MS, Waldock, JM, Isbister, GK, 2004: Prospective study of centipede bites in Australia. J. Toxicol. Clin. Toxicol. 42: 41-8.

Barghash, SM, Yassin, SE, Sadek, AM, Mahmoud, DM, Salama, MS, 2024: Epidemiological exploration of fleas and molecular identification of flea-borne viruses in Egyptian small ruminants. Sci. Rep. Jul 2; 14(1):15166. doi: 10. 1038.

Bitam, I, Dittmar, K, Parola, P, *et al,* 2010: Fleas and flea-borne diseases. Int. J. Infect. Dis. 14:e667-74.

Bonadonna, P, Zanotti, R, Pagani, M, *et al,* 2009: How much specific is the association between hymenoptera venom allergy and mastocytosis? Allergy 64:1379-84.

Borkent, A, Dominiak, P, 2020: Catalog of the biting midges of the world (Diptera: Ceratopogonidae). Zootaxa 4787:1-377. doi: 10.11646/zootaxa.

Boutellis, A, Abi-Rached, L, Raoult, D, 2014: Origin and distribution of human lice in the world. Infect Genet Evol. Elsevier B.V. 23:209-17.

Bowers, S, Warshaw, EM, 2006: Pityriasis lichenoides and its subtypes. J. Am. Acad. Dermatol. 55, 4:557-72.

Brandehoff, N, Vohra, R, Crebassa, L, Graham, EV, Ramirez, R, 2014: Centipede envenomations: Clinical effects and treatment. Clinical Toxinology Springer First Online: 01 January.

Carpano, M, 1929: Piroplasmosis in Egyptian fowls (*Egyptianella pullorum*). Bull. Ministry of Agriculture, Egypt.

CDC, 2024a: About Ticks and Tick-borne Disease. https://www.cdc.gov/ticks/about/index.html

CDC, 2024b: About fleas https://www.cdc.gov/fleas/about/index.html#:

Chaou, CH, Chen, CK, Chen, JC, *et al,* 2009: Comparisons of ice packs, hot water immersion, and analgesia injection for the treatment of centipede envenomations in Taiwan. Clin. Toxicol. (Phila) 47: 659-64.

Chen, YH, Lee, MF, Lan, JL, *et al,* 2005: Hyp ersensitivity to Forcipomyia taiwana (biting midge): Clinical analysis and identification of major For t 1, For t 2 and For t 3 allergens. Allergy 60:1518-26.

Chen, YH, Hwang, GY, Chen, PC, *et al,* 2011: Molecular cloning and immunologic characterization of fort 2: A major allergen from the biting midge *Forcipomyia taiwana*. Allergy 66:703-12.

Chaou, CH, Chen, CK, Chen, JC, Chiu, TF, Lin, CC, 2009: Comparisons of ice packs, hot water immersion, and analgesia injection for the treatment of centipede envenomations in Taiwan. Clin. Toxicol. (Phila). 47, 7:659-62.

Cho, JH, Kim, HS, Ko, YH, Park, CS, 2006: Epstein-Barr virus infected natural killer cell lymphoma in a patient with hypersensitivity to mosquito bite. J. Infect. 52:e173-80.

Coetzer, JAW, Tustin, RC, 2004: Infectious Diseases of Livestock. 2nd ed. Oxford: Oxford University Press.

Commins, SP, James, HR, Kelly, LA, *et al,* 2011: The relevance of tick bites to production of IgE antibodies to the mammalian oligosaccharide galactose-α-1, 3-galactose. J. Allergy Clin. Immunol. 127:1286-92.

Commins, SP, Platts-Mills, TAE, 2013: Tick bites and red meat allergy. Curr. Opin. Allergy Clin. Immunol. 13, 4:354-9

Crisp, HC, Johnson, KS, 2013: Mosquito allergy. Ann. Allergy Asthma Immunol. 110, 2:65-9.

Decastello, A, Farkas, R, 2009: Anaphylactic reaction caused by a horse-fly species (*Hippobosca equina*). Orv. Hetil. 150:1945-51.

Demain, JG, 2003: Papular urticaria and things that bite in the night. Curr. Allergy Asthma Rep. 3:291-8.

Deng, Y-P, Fu, Y-T, Elsheikha, HM, Cao, M-L, Zhu, X-Q, *et al,* 2024: Comprehensive analysis of the global impact and distribution of tick paralysis, a deadly neurological yet fully reversible condition. Clin. Microbiol. Rev. Dec 10; 37 (4):e0007424. doi: 10.1128/cmr.00074-24.

Dominguez, TJ, 2004: It's not a spider bite, its' community-acquired methicillin-resistant *Staph-*

ylococcus aureus. J. Am. Board Fam. Pract. 17, 3:220-6.

Doyle, MS, Swope, BN, Hogsette, JA, Burkhalter, KL, Savage, HM, *et al*, 2011: Vector competence of the stable fly (Diptera: Muscidae) for West Nile virus. J. Med. Entomol. 48, 3:656-68.

Dryden, MW, 2009: Flea and tick control in the 21st Century: Challenges and opportunities. Vet. Dermatol. 20:435-44.

El Hindawy, MR, 1951: Studies on the blood of dogs: VI. Hæmatological findings in some diseases caused by specific blood parasites: (a) *Babesia canis*; (b) *Hepatozoon canis.* Br. Vet. J. 107: 303-9.

El Okbi, LMA, Morsy, TA, El Shayeb, FA, Salama, MMI, Abo Gamrah, MMM, 1991: Fleas as an allergen in Egyptian asthmatic patients. J. Egypt. Soc. Parasitol. 21, 3:641-55.

El Sattar, SA, Kamal, HA, El Sawaf, BM, 2019: A morphotaxonomic album of phlebotomine sand flies (Diptera: Psychodidae) of Egypt. Egypt. Acad. J. Biol. Sci. (A Entomol.). 12, 4:57 -77.

El-Bahnasawy, MM, Sabah, AAA, Saleh, HA A, Morsy, TA, 2012: The tick-borne Crimean-Congo hemorrhagic fever in Africa, Asia, Europe, and America: What about Egypt? J. Egypt. Soc. Parrasitol. 42, 2:373-84.

El-Hawagry, MS, El-Azab, SEA, Abdel-Dayem, MS, Al Dhafer, HM, 2020: Biting midges of Egypt (Diptera: Ceratopogonidae). Bio-divers Data J. Apr 29:8:e52357. doi:10.3897/BDJ. 8:e 52357

El-Kady, GA, Makled, KM, Morsy, TA, Morsy, ZS, 1998: Rodents, their seasonal activity, ecto- and blood-parasites in Saint Catherine area, South Sinai Governorate, Egypt. J. Egypt. Soc. Parasitol. 28, 3:815-26.

Engler, RJ, 2001: Mosquito bite pathogenesis in necrotic skin reactors. Curr. Opin. Allergy Clin. Immunol.1:349-54.

Fradin, MS, 1998: Mosquitoes and mosquito repellents: A clinician's guide. Ann. Intern. Med. 128:931-8.

Frankowski, BL, Bocchini, JA, Jr, 2010: Council on School Health &Committee on Infectious Diseases: Head lice. Pediatrics 126, 2:392-403.

Fung, HT, Lam, SK, Wong, OF, 2011: Centipede bite victims: a review of patients presenting to two emergency departments in Hong Kong. Hong Kong Med. J.17:381.

Fusto, G, Bennardo, L, Del Duca, E, 2020: Spider bites of medical significance in the Mediterranean area: Misdiagnosis, clinical features and management Review**.** J. Venom Anim. Toxins incl. Trop. Dis 26. https://doi.org/10.1590/1678-9199-JVATITD-2019-0100

Gaig, P, García-Ortega, P, Enrique, E, *et al*, 1999: Serum sickness-like syndrome due to mosquito bite. J. Investig. Allergol. Clin. Immunol. 9:190-8.

Galindo-Ferreiro, A, AlEssa, D, Elkhamary, SM, Edward, DP, Galvez-Ruiz, A, *et al*, 2019: Tungiasis infestation of dermis fat graft in an anophthalmic socket. Saudi J. Ophthalmol. 33, 1:102-4.

Hafez, M, Hilali, M, 1978: Biology of *Hippobosca longipennis* (fabricus, 1805) in Egypt (Dipteria: Hippoboscidae). Vet. Parasitol.4, 3:275-88.

Hafez, M, Gamal-eddin, FM, 1959: On the feeding habits'of *Stomoxys calcitrans* L. and *S. sitiens* Rond., with special reference to their biting cycle in nature (Diptera: Muscidae). Bull. Soc. Entomol. d'Egypte, 43:291-301.

Harada, S, Yoshizaki, Y, Natsuaki, M, *et al*, 2005: Three cases of centipede allergy: Analysis of cross reactivity with bee allergy. Arerugi 54: 1279.

Haridy, FM, El-Metwally, MT, Khalil, HM, Morsy, TA, 2011: *Trypanosoma evansi* in dromedary camel: A case report of zoonosis in Greater Cairo, Egypt. J. Egypt. Soc. Parasitol. 41, 1:65-76.

Hassoun, S, Drouet, M, Sabbah, A, 1999: Anaphylaxis caused by a mosquito: Two case reports. Allerg. Immunol. (Paris) 31:285-91.

Hemmer, W, Focke, M, Vieluf, D, *et al*, 1998: Anaphylaxis induced by horsefly bites: Identification of a 69 kd IgE-binding salivary gland protein from *Chrysops* spp. (Diptera, Tabanidae) by western blot analysis. J. Allergy Clin. Immunol. 101:134-42.

Hernandez, RG, Cohen, BA, 2006: Insect bite-induced hypersensitivity and the scratch principles: A new approach to papular urticaria. Pediatrics118:e189-94.

Hill, CA, MacDonald, JF, 2011: Biting midges: biology and public health risk, Purdue University, Department of Entomology. http:// extensi-

si-

on.entm.purdue.edu/publichealth/insects/bitingmidge.html.

Hossler, EW, 2010: Caterpillars and moths: Pa-

rt I. Dermatologic manifestations of encounters with Lepidoptera J. Am. Acad. Dermatol. 62, 1: 1-10

Hrabak, TM, Dice, JP, 2003: Use of immunotherapy in the management of presumed anaphylaxis to the deer fly. Ann. Allergy Asthma Immunol. 90:351-8.

Huchet, JB, Callou, C, Lichtenberg, R, Dunand, F, 2013: The dog mummy, the ticks and the louse fly: Archaeological report of severe ectoparasitosis in ancient Egypt. Int. J. Paleopathol. 3:165-75.

Järvinen, KM, Celestin, J, 2014: Anaphylaxis avoidance and management: educating patients and their caregivers. J Asthma Allergy7:95-104.

Jiao, L, Liu, Y, Xiang, X, Xu, J, Ma, L, *et al*, 2019: A case of pityriasis lichenoides & varioliformis acuta pemphigoides successfully treated with methotrexate and corticosteroids. Dermatol. Ther. 32, 4: e12833.

Kleine-Tebbe, J, Heinatz, A, Gräser, I, *et al*, 2006: Bites of the European pigeon tick (*Argas reflexus*): Risk of IgE-mediated sensitizations, and anaphylactic reactions. J. Allergy Clin. Immunol. 117:190-6.

Ko, CJ, Elston, DM, 2004: Pediculosis. J. Am. Acad. Dermatol. 50, 1:1-12.

Leone, PA, 2007: Scabies and pediculosis pubis: An update of treatment regimens and general review. Clin. Infect. Dis. 44, 3:S153-9.

Loftis, AD, Reeves, WK, Szumlas, DE, Abbassy, MM, Helmy, IM, *et al*, 2006: Surveillance Egyptian fleas for agents of public health significance: *Anaplasma, Bartonella, Coxiella, Ehrlichia, Rickettsia*, and Y*ersinia pestis*. Am. J. Trop. Med. Hyg. 75, 1:41-8.

Logan, JL, Ogden, DA, 1985: Rhabdomyolysis and acute renal failure following the bite of the giant desert centipede *Scolopendra heros*. West J. Med. 142:549-54.

Mahy, MM, Atlam, AI, 2022: Phenotypic description of Egyptian endemic centipedes, genus *Scolopendra* Linnaeus, 1758 with a histological study of its venom glands. Zoomorphology. 141:273-81

Matterne, U, Böhmer, MM, Weisshaar, E, Jupiter, A, Carter, B, *et al*, 2019: Oral H1 antihistamines as 'add-on' therapy to topical treatment for eczema. Cochrane Database Syst. Rev. Jan 22; 1(1):CD012167.

Mayo Clinic, 2022: Folliculitis https://www.mayoclinic.org/diseases-conditions/folliculitis/symptoms -causes/syc-20361634

McCormack, DR, Salata, KF, Hershey, JN, Carpenter, GH, 1994: Mosquito anaphylaxis: Hyposensitization with whole body extracts. J. Allergy Clin. Immunol. 93:223-9.

Medeiros, CR, Susaki, TT, Knysak, I, *et al*, 2008: Epidemiologic and clinical survey of victims of centipede stings admitted to Hospital Vital Brazil (São Paulo, Brazil). Toxicon 52:606-14.

Mikhail, MW, Soliman, MI, Morsy, TA, 2011: The current status of fleas according to environmental changes in some governorates in Egypt. J. Egypt. Soc. Parasitol. 41, 1:199-213.

Moneret-Vautrin, DA, Beaudouin, E, Kanny, G, *et al*, 1998: Anaphylactic shock caused by ticks (*Ixodes ricinus*). J. Allergy Clin. Immunol.101:144-52.

Morsy, TA, 2012: Insect bites and what is eating you? J. Egypt. Soc. Parasitol 42, 2:291-308**.**

Morsy, TA, El Ghazali, SM, 1999: A four years old girl with phthiriasis *pubis* infestation. J. Egypt. Soc. Parasitol. 29, 2:893-6.

Morsy, TA, Al-Ghabban, AJ, 2023: Human lice infestation, diagnosis and treatment: A mini-review. JESP 53, 3:503-18.

Morsy, TA, Bebars, MA, Sabry, AA, Ahmed, MM, Abdel Fattah, SA, 1989: Studies on biting midges of the genus *Culicoides* in the Suez Canal Zone. J. Egypt. Soc. Parasitol. 19, 1:289-300.

Morsy, TA, el-Missiry, AG, Kamel, AM, Fayad, ME, el-Sharkawy, IM, 1990: Distribution of *Phlebotomus* species in the Nile Delta, Egypt. J. Egypt. Soc. Parasitol. 20, 2:589-97.

Morsy, TA, Habib, KhSM, 2001: Two species of tabanids (Order: Diptera) in Aswan District, Egypt. J. Egypt. Soc. Parasitol. 31, 2:429-32.

Morsy, TA, Sabry, AA, Rifaat, MMA, Wahba, MM, 1996: *Psammomys obesus* Cretzchmar, 1828 and zoonotic cutaneous leishmaniasis in Sinai Peninsula, Egypt. J. Egypt. Soc. Parasitol. 26, 2:375-81.

Morsy, TA, Abdel Rahem, MA, El Sharkawy, EMA, Shatat, MA, 2003: *Eucalyptus globules* (camphor oil) against zoonotic scabies *Sarcoptes scabiei*. J. Egypt. Soc. Parasitol. 33, 1:47-53.

Morsy, TA, Sallam, T.A, El-Shahat, SA, 2023: A mini-review on large local reactions to mosquito bites or skeeter syndrome to saliva, and others' saliva. JESP 53, 3:451-60.

Morsy, TA, Shoukry, A, Schnur, LF, Sulitzeanu, A, 1987: *Gerbillus pyramidum* is a host of *Leishmania major* in the Sinai Peninsula. Ann.

Trop. Med. Parasitol. 81:741-2.
Mosabah, AAA, and Morsy, TA, 2012: Tick paralysis: First zoonosis record in Egypt. J. Egypt. Soc. Parasitol. 42, 1:71-8.
Mumcuoglu, KY, Pollack, RJ, Reed, DL, *et al*, 2021: International recommendations for an effective control of head louse infestations. Int. J. Dermatol. 60, 3:272-80.
Muller, R, Horsburgh, RCR, 1987: Bibliography of onchocerciasis (1841-1985). Part II-Keyword Index, CAB.
Nagaty, HF, Morsy, TA, 1960: Report on a collection of biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae) J. Egypt. Publ. Hlth. Assoc. 35:27-34.
Oliveira, KC, Gonçalves, de Andrade, RM, Piazza, RM, Ferreira, JMC, *et al*, 2005: Variations in *Loxosceles* spider venom composition and toxicity contribute to the severity of envenomation. Toxicon. 45, 4:421-9.
Ombati, R, Luo, L, Yang, S, Lai, R, 2018: Centipede envenomation: Clinical importance and the underlying molecular mechanisms. Toxicon 154:60-68**.**
Oppenheimer, J, Nelson, HS, 2006: Skin testing: A survey of allergists. Ann. Allergy Asthma Immunol. 96, 1:19-23.
Otten, EJ, 2014: Venomous animal injuries. In: Marx JA, Rosen P, editors. Rosen's emergency medicine: Concepts and clinical practice. 8th ed. Philadelphia, PA: Elsevier/Saunders.
Padgett, JJ, Jacobsen, KH, 2008: Loiasis: AfrIcan eye worm. Trans. R. Soc. Trop. Med. Hyg. 102, 10:983-9.
Palosuo, T, Brummer-Korvenkontio, H, Lappalainen, P, Reunala, T, 1991: Immune response to mosquito bites: Characterization of mosquito saliva specific antigens and antibodies by immunoblot technique. J. Allergy Clin. Immunol. 87:300-8.
Panagiotakopulu, E, 1999: An examination of biological materials from coprolites from XVIII dynasty Amarna, Egypt. J. Archaeol. Sci. 26, 5: 547-51
Patel, C, Iweala, O, 2020: Doc, Will I Ever Eat Steak Again? Diagnosis and management of alpha-gal syndrome. Curr. Opin. Pediatr. 32, 6:816-24.
Paternotte, E, van Dulmen, S, Bank, L, Seeleman, C, Scherpbier, A, *et al*, 2017: Intercultural communication through the eyes of patients: Experiences and preferences. Int. J. Med. Educ. 8:170-5.
Peng, Z, Beckett, AN, Engler, RJ, *et al*, 2004: Immune responses to mosquito saliva in 14 individuals with acute systemic allergic reactions to mosquito bites. J. Allergy Clin. Immunol. 114: 1189-94.
Peng, Z, Ho, MK, Li, C, Simons, FE, 2004: Evidence for natural desensitization to mosquito salivary allergens: mosquito saliva specific IgE, and IgG levels in children. Ann. Allergy Asthma Immunol. 93: 553-9.
Peng, Z, Simons, FE, 2004: Mosquito allergy: Immune mechanisms and recombinant salivary allergens. Int. Arch. Allergy Immunol. 133:198-204.
Peng, Z, Simons, FE, 2007: Advances in mosquito allergy. Curr. Opin. Allergy Clin. Immunol. 7:350-8.
Penneys, NS, Nayar, JK, Bernstein, H, Knight, JW, 1989: Chronic pruritic eruption in patients with acquired immunodeficiency syndrome associated with increased antibody titers to mosquito salivary gland antigens. J. Am. Acad. Dermatol. 21:421-8.
Peterson, AR, Nash, E, Anderson, BJ, 2019: Infectious Disease in Contact Sports. Sports Health 11, 1:47-58.
Potier, A, Lavigne, C, Chappard, D, *et al*, 2009: Cutaneous manifestations in Hymenoptera and Diptera anaphylaxis: relationship with basal serum tryptase. Clin. Exp. Allergy 39:717-24.
Priya, G, Laway, BA, Ayyagari, M, Gupta, M, Bhat, GHK, *et al*, 2024: The glucocorticoid taper: A primer for the clinicians. Indian J. Endocrinol. Metab. 28, 4:350-62.
Reiter, N, Reiter, M, Altrichter, S, *et al*, 2013: Anaphylaxis caused by mosquito allergy in systemic mastocytosis. Lancet 382:1380-6.
Reunala, T, Lappalainen, P, Brummer-Korvenkontio, H, *et al*, 1991: Cutaneous reactivity to mosquito bites: effect of cetirizine and development of anti-mosquito antibodies. Clin. Exp. Allergy 21:617-22.
Ruëff, F, Przybilla, B, Biló, MB, *et al*, 2009: Predictors of severe systemic anaphylactic reactions in patients with Hymenoptera venom allergy: Importance of baseline serum tryptase-a study of the European Academy of Allergology and Clinical Immunology Interest Group on Insect Venom Hypersensitivity. J. Allergy Clin. Immunol. 124:1047-56.
Rust, MK, 2005: Advances in the control of *Ct*enocephalides felis (cat flea) on cats and dogs. Trends Parasitol. 21:232-40.

Rutkowski, K, Wagner, A, Rutkowski, R, Sowa, P, Pancewicz, S, *et al,* 2000: Alpha-gal syndrome: An emerging cause of food and drug allergy. Clin. Exp. Allergy 50, 8:894-903.

Sabry, AH, Fouad, MA, Morsy, ATA, 2012: Entomophobia, acarophobia, parasitic dermatophobia or delusional parasitosis. JEP 42, 2:417-30.

Saleh, MSM, Morsy, ATA, Ismail, MAM, Morsy, TA, 2016: Tick-borne infectious diseases with reference to Egypt. JESP 46, 2:273-98.

Senthilkumaran, S, Meenakshisundaram, R, Michaels, AD, *et al,* 2011: Acute ST-segment elevation myocardial infarction from a centipede bite. J. Cardiovasc. Dis. Res. 2:244-50.

Simons, FE, Peng, Z, 2001: Mosquito allergy: Recombinant mosquito salivary antigens for new diagnostic tests. Int. Arch. Allergy Immunol. 124:403-9.

Steen, CJ, Carbonaro, PA, Schwartz, RA, 2004: Arthropods in dermatology. J. Am. Acad. Dermatol. 50:819-24.

Steinke, JW, Platts-Mills, TA, Commins, SP, 2015: The alpha-gal story: Lessons learned from connecting the dots. J. Allergy Clin. Immunol. 135:589-94.

Stevens, WJ, Van den Abbeele, J, Bridts, CH, 1996: Anaphylactic reaction after bites by *Glossina morsitans* (tsetse fly) in a laboratory worker. J. Allergy Clin. Immunol. 98:700-8.

Sturm, GJ, Boni, E, Antolín-Amérigo, D, Bilò, MB, Breynaert, C, *et al,* 2023: Allergy to stings and bites from rare or locally important arthropods: Worldwide distribution, available diagnostics and treatment. Allergy 8, 8:2089-108.

Sutcliffe, AC, Dotson, EM, 2024: Laboratory maintenance and care of *Rhodnius prolixus* (Hemiptera: Reduviidae) and other Triatominae. J. Med. Entomol. 61, 6:1345-67.

Swanson, DL, Vetter, RS, 2005: Bites of brown recluse spiders and suspected necrotic arachnidism. N. Engl. J. Med. 352:700-8.

Swerdlow, SH, Campo, E, Pileri, SA, Harris, NL, Stein, *et al,* 2016: The 2016 revision of the WHO classification of lymphoid neoplasms. Blood 127:2375-90.

Ta-Tang, TH, Crainey, JL, Post, RJ, Luz, SL, Rubio, JM, 2018: Mansonellosis: Current perspectives. Res. Rep. Trop. Med. 18, 9:9-24.

Taylor, RM, Hurlbut, HS, Work, TH, Kingston, JR, *et al,* 1966: Arboviruses isolated from *Argas* ticks in Egypt: Quaranfil, Chenuda, and Nyamanini. Am. J. Trop. Med. Hyg. 15:76-86.

Toumi, A, Fazal, S, Noureddine Litaiem, N, 2023: Lymphomatoid Papulosis. StatPearls [Internet].

Turell, MJ, Dohm, DJ, Geden, CJ, Hogsette, JA, Linthicum, KJ, 2010: Potential for stable flies and house flies (Diptera: Muscidae) to transmit Rift Valley fever virus. J. Am. Mosq. Control Assoc. 26, 4:445-8.

Undheim, EA, Fry, BG, King, GF, 2015: Centipede venom: Recent discoveries and current state of knowledge. Toxins (Basel). 7, 3:679-704.

Uppal, SS, Agnihotri, V, Ganguly, S, *et al,* 1990: Clinical aspects of centipede bite in the Andamans. J. Assoc. Physicians India 38:163-72.

Vassallo, C, Passamonti, F, Cananzi, R, *et al,* 2005: Exaggerated insect bite-like reaction in patients affected by oncohaematological diseases. Acta Derm. Venereol. 85:76-82.

Vidal, C, Armisén, M, Bartolomé, B, *et al,* 2007: Anaphylaxis to Hippobosca equina (louse fly). Ann. Allergy Asthma Immunol. 99:284-9.

Vieira, CB, Praça, YR, Bentes, KLDS, Santiago, PB, Silva, SMM, Silva GDS, *et al,* 2018: Triatomines: Trypanosomatids, Bacteria, and Viruses Potential Vectors? Front. Cell Infect. Microbiol. Nov 16; 8:405. doi:10.3389/fcimb.00405.

Wakimoto, N, Niitsu, N, 2005: Lymphoid neoplasms associated with mosquito bites. Intern. Med. 44: 1118-24.

Washio, K, Masaki, T, Fujii, S, Hatakeyama, M, Oda, Y, *et al,* 2018: Anaphylaxis caused by a centipede bite: A "true" type-I allergic reaction. Allergol. Int. 67, 3:419-20.

WHO, 2024: Vector-Borne Disease. https://www.who.int/news-room/fact/sheets/detail/vector -borne-diseases.

Wikipedia, 2025: Mosquito-borne disease. https://en.wikipedia.org/wiki/mosquito/borne-disease disease se.

Yildiz A, Biçeroglu S, Yakut N, *et al,* 2006: Acute myocardial infarction in a young man caused by centipede sting. Emerg. Med. J. 23:e3-8.

Yoon, TY, Kim, YG, Kim, JW, Kim, MK, 2005: Nodal marginal zone lymphoma in associa tion with hydroa vacciniforme-like papulovesicu lar eruption, hypersensitivity to mosquito bites, and insect bite-like reaction. Br. J. Dermatol. 153:210-8.

Youssef, AI, Uga, S, 2014: Review of parasitic zoonoses in Egypt. Trop. Med. Hlth. 42, 1:3-14.