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Infestations with the Tiger Beetle *Myriochile melancholica* F. (Cicindelidae, Coleoptera) in the Student Hostel of Benha University, Egypt

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Abstract: Several cases of dermatitis were observed among students and workers in the new student hostel of Benha University, Benha, Egypt during the summer and fall seasons in 1996 and subsequent years. Males and females were equally affected. Age, occupation, race, food habits, drug-taking, type of soap or cosmetics used did not show any relationship to the problem. Clinical and laboratory investigations including urine, stool and blood analysis were all normal. The skin lesions started by burning and slight itchy erythematous patches that soon vesiculate with increased intensity of itching. Later, the lesions desquamate leaving hyper pigmentation. Strikingly, the lesions were bizarre shaped suggesting a contact with certain secretions produced by an insect. The most common body parts involved in all these cases were the neck, followed by arms, legs, face, chest and shoulders. The causative agent in all these cases were found to be the tiger beetle *Myriochile melancholica* F. (Cicindelidae, Coleoptera) which were seen in rooms especially during night crawling on the bare body parts of sleeping students. The highest number of insects and cases were recorded in the 2nd floor. The mechanism by which the insect provoke skin symptoms is still a matter of debate. So far, this is the first published report of an outbreak of dermatitis caused by tiger beetles and it is a good example for the effect of urbanization on human health.

Key words: Dermatitis, insect ecology, tiger beetles, *Myriochile melancholica,* Egypt

INTRODUCTION

Coleoptera constitutes the largest insect order, comprising more than 270000 described species. Beetles are second to Diptera in importance as invaders of the human body, dead or alive. Invasion of the living body (so called pseudoparasitism) by beetles or their larvae is called canthariasis or scarabiasis and many case histories have been reported in the literature[1]. Most invasions with Coleoptera appear to be accidental[2]. Several instances of beetles containing vesicating substances are known and while the incidence of human problems are normally quite minimal, special circumstances will bring out these insects in large numbers. If this occurs in heavily populated areas, the contacts between humans and these annoying beetles can cause a number of serious problems[3]. In certain cases, the affected community was evacuated to allow skin lesions to heal and the beetle plague to decline[4]. The medical significance of the vesicating Coleoptera, including Meloidae (blister beetles), Oedemeridae (false blister beetles), Staphylinidae (rove beetles) and Tenebrionidae (darkling beetles), has been reported and discussed investigators[3-14].

The Cicindelidae or tiger beetles (Coleoptera, Adephaga) is a common and widely distributed family all over the tropical and subtropical regions[15]. There are over 1500 species of tiger beetles worldwide. Adults can be recognized by having long sickle shaped mandibles, long legs, relatively large eyes, bright metallic colors. Adults are fast runners and flyers and are ferocious predators[16].

During the last few years, considerable number of students living in the student hostel of Benha University, located in an isolated rural area of Benha city, Egypt, developed dermatitis of unknown reason. The local physicians of the University hospital in Benha surmised these cases to contact with an unknown insect. The present work aims to investigate the reasons of these outbreaks and to suggest the appropriate control measures.

MATERIALS AND METHODS

The study area: The student hostel of Benha University is a new building, constructed in a rural area, in the city boundaries. Benha which is the capital of Qalubiyah governorate, is 40 km north of Cairo. The hostel is surrounded by agricultural lands, cultivated mainly with rice, cotton, maize in summer and wheat, clover, beans, in winter. The area is furnished with streams, canals and

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drainage systems containing stagnant water, fermented grasses and algae. The hostel consists of two adjacent buildings, for housing undergraduate students. Each building consists of four floors and was usually occupied by about 150 students during the period of study extending from the middle of September to the middle of June. Large light bulbs were fixed on the top margins of the buildings, to light the surrounding area. Windows were usually left open during summer nights, because of rising temperatures and lack of air conditioning systems.

A detailed medical history and clinical examination were conducted on patients by a specialist in dermatology. Laboratory investigations included the examinations of stools for parasites, urine for pus cells and protein and a full blood picture (including differential blood white cell counts). Interviews were made with residents to document skin lesions and sleeping locations. Age, occupation, sex, food habits, drug-taking, type of soap or cosmetics used. Upon questioning, students revealed that their rooms were infested by a plague of unknown beetles. All rooms and the surrounding community were inspected for three successive nights to search for beetles or any other causative agents. Tiger beetles were observed in many rooms and collected for further identification.

A light trap equipped with 100 watt bulb was set on the roof of a small, one story, rural house, 1 km away from the hostel. Every one week. The trap was operated and counted weekly, throughout one year period (from November 1997 to October 1998). The trap was operated at night. The beaker was emptied in the morning and the beetles were identified and counted.

RESULTS

Several cases of dermatitis were observed among students and workers in the new student hostel of Benha University, Benha, Egypt during the summer and fall seasons in 1996. The problem worsened towards the end of May 1997. The skin lesions started by burning and slight itchy erythematous patches that soon vesiculate with increased intensity of itching. Later, the lesions desquamate leaving hyper-pigmentation (Fig. 1). None of patients experienced fever, headache, arthralgia or nephritis. Males and females were equally affected and age, food habits, drug-taking, type of soap or cosmetics used did not show any relationship to the problem. Laboratory investigations included the examinations of stools, urine and a full blood picture (including differential blood white cell counts); the results were seemingly normal. Patients did not remember having any insect crushed or being bitten. The problem worsened towards the end of May 1997 (where 68 students have been affected). The hostel was closed by that time our investigations began after the end of the semester. In October, 1997, another thirty three students, who started their study in September, were also affected.

It was noticed that only exposed parts of the body were affected (Fig. 1 and 2). The most common sites of involvement in these cases (Fig. 2) were the neck (25.9%), followed by arms (22.4%). Legs and face were equally affected (20.7%). Chest and shoulders were poorly affected (6.9 and 3.4%, respectively). No lesions were found on other parts of the body. The highest number of cases were observed in the 2nd and 1st floors, where 19

Fig. 1: Dermatitis due to the tiger beetle *Myriochile melancholiaca* F.

and 13 lesions were observed, respectively. Only 9 and 4 cases were observed in 3rd and 4th floors, respectively.

The tiger beetle *Myriochile melancholica* F. (Cicindelidae, Coleoptera) was observed in many rooms of the hostel especially during the night, crawling on the bare body parts of sleeping students. Beetles were observed in all floors (Fig. 3). The highest number of insects were observed in the 2nd and 1st floors, where an average of 21.6 and 14.4 insects were observed, respectively. Only average of 10.8 and 3.2 insects were observed in 3rd and 4th floors, respectively. The highest number of cases and insects were recorded in the southern side of the building where rice fields were located, whereas the lowest number of cases was reported in the two internal sides of the building facing each other. According to the data obtained from the average monthly catches of beetles, throughout the period from November 1997 to October 1998, using the light trap (Fig. 4). It could be stated that *M. melancholica* was found from April to October. The highest beak of abundance was observed during July, August and September. In spite of the two beetles collected during November, beetles were not observed or collected throughout the period from December to April.

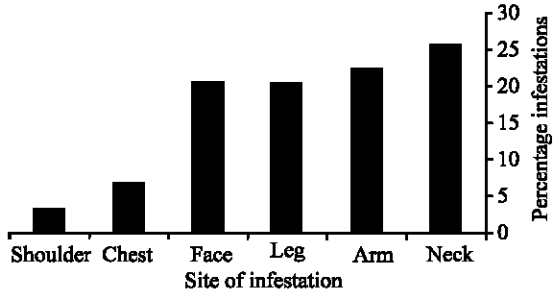

Fig. 2: Body regions infested with the tiger beetle *Myriochile melancholica* in the student hostel of Benha University, Benha, Egypt

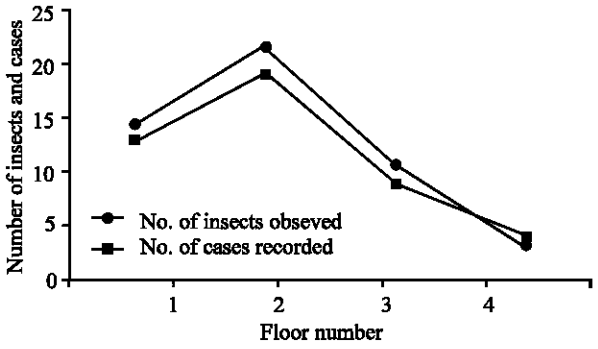

Fig. 3: Number of students infested with the tiger *Myriochile melancholica* in relation to the number of beetles observed in different floors of the students hostel of Behna University, Benha, Egypt

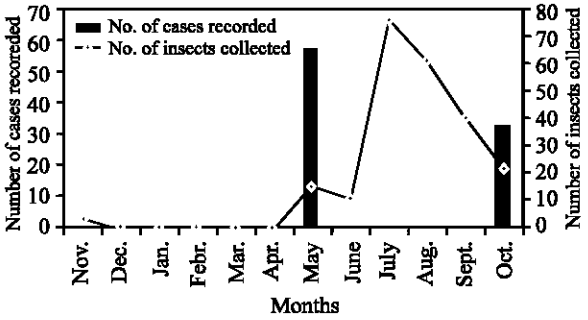

Fig. 4: Average monthly number of *Myriochile melancholica* collected using light trap and number of cases recorded in the student hostel of Benha University, Benha, Egypt

DISCUSSION

This is the first published report of an outbreak of dermatitis due to the tiger beetle *M. melancholica*. Beetles which cause cutaneous blistering belong to the Meloidae and Staphylinidae[7,17,18]. Many researchers[12-14,19-23] reported the role of *Epicauta* spp. (blister beetles) in causing skin blistering by the production of a vesicant fluid containing pederin and pseudopederin.

In some instances, it seems difficult to determine when clinical symptoms can be attributed to reaginic hypersensitivity and IgE antibodies and when the reactions are due to the non-allergenic components of venoms, arthropod secretory products, or the introduction of digestive or salivary secretions through mouthparts. In our study, we suspect that the reported cases of dermatitis, which were previously eluded diagnosis, were due to the tiger beetle. The final diagnosis of tiger beetle dermatitis was made for many reasons: The lesion usually resembles the accidental dropping of a caustic or hot liquid with minimal or no complaints and its bizarre shape suggest a contact with certain secretions. Clinical and laboratory investigations including urine, stool and blood analysis of patients were all normal; the presence of beetle in sufferers rooms in big numbers, crawling over the bodies of occupants; the positive correlation between the number of cases recorded and the number of insects observed; the presence of lesions on exposed parts of the body only. When rooms were protected from beetles by using simple mechanical ways, reducing the number of artificial lights and by conducting environmental sanitation measures, including fumigation with insecticides no new cases were recorded.

Extreme lightening and moisture had apparently driven the insects to rooms. This insect is normally a beneficial predator, but when the natural field habitats dry up during May, the hibernated beetles commonly leave in search of moisture and may invade the nearest place in the neighborhood. This may explain the outbreak of cases during May. Although, the highest beak of beetles' abundance was observed during summer months, no cases were reported because the hostel was already closed during summer holiday. In October and at the beginning of the study, a second outbreak occurred, followed by a sudden decrease of insects through December; where they completely disappeared. A similar pattern of tiger beetles' abundance was observed in Giza governorate, Egypt,[15]. The environmental conditions of the hostel area were ideal for the breeding of tiger beetles and provided ample opportunities for contact between the beetles and hostel residents. Rice fields in the surrounding area provided a good habitat for the growth of the natural population of this pest as well as other beetles[13]. The light around the student hostel attracted huge numbers of beetle during the summer season. This assumption is reached because most cases and higher abundances of the beetles were observed in the southern side of the building where rice fields and stronger illumination were found, whereas the lowest incidents of cases and beetles were reported from the side of internal walls of the building.

In the outdoor and indoor environments, minimal use of lighting and efficient screening can greatly reduce exposure. Intensive literatures stress the exacerbation of allergic reactions resulting from insects being attracted to and concentrated by lights in populated areas[10,12,13,24].

The mechanism by which tiger beetles provoke skin symptoms is still a matter of debate. Some earlier studies[25,26] are convinced that the irritant action of the insects is purely mechanical. Certain insect hairs contain water-soluble substance which is allergenic to tissues[27]. Tiger Beetles are fluid feeders and use what is called pre-oral digestion; i.e. digestive juices are regurgitated over the prey through the perforated mandibles and very quickly the tissues of the prey melt away into a liquid[16]. An earlier study[28] has reported a phospholipase material that is responsible for hydrolyzing fatty acids in this secretion. It was noted that when tiger beetles come in contact with the net, holes immediately appears. Beetles attracted to the hot and moist skin of sleeping persons, may and for unknown reason such as mosquito control insecticides, discharge their secretions which cause the hemolysis of the exposed skin. Intensive studies are still needed to isolate and identify the allergen and provide links between tiger beetles and the mechanisms of acute inflammation.

Dermatitis caused by tiger beetles and/or other insect species is a clear example of unplanned urbanization in which extravagant use of artificial lights, in addition to the disturbing measures of the natural environment can cause a lot of human complaints. The understanding of such condition and its clinical symptoms will help prevent misdiagnosis and consequently proper prevention and treatment could be achieved. In the meantime, the suggested preventive and control measures which are based on relevant knowledge of the behavior and reproduction patterns as well as spatial and temporal distributions of tiger beetles can lead to minimizing the chances of the outbreak possibilities in other areas sharing similar environmental conditions.

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