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Millipedes of Medical Importance and Injurious Effects to Human from Contacts with Arthropod (Arthropoda: Diplopoda)

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Abstract

Millipedes or 'thousand legs' are small arthropods having two legs per body segment, typically between 80 and 400 legs in the individual. These are generally either black or else brown in shade, have round forms and when they walk their legs look to travel in a wave-like indication. Millipedes generally live in and forage on decaying leaves, decomposing wood and other types of wet rotting plant materials. Normally, their part is an advantageous one within ecosystem in serving to breakdown dead plant materials. But, while these become plentiful, they can harm to sprouting seeds, seedlings and developing fruits touching with the ground. Millipedes do not present any menace to humans; but, while sensing danger, they can discharge a filthy feeling liquid that might cause skin annoyance, which must be wash away instantaneously. While troubled they do not bite, however certain species give out a defensive fluid that can burn the eyes or irritate to skin. Millipedes do not leave behind any symbols to let see that anybody have an infestation and the only actual symbol is to locate pests themselves. In fact, they do not bite, sting or transmit disease and millipede's key defensive tactic is to bend up into a tight coil once troubled. Even though there are no poisonous millipedes, they do have defensive glands that yield a foul liquid when the millipede is attacked. This self-protective liquid can be annoying, particularly if it comes to be in eyes. Certain persons might have an allergic reaction to it. Selected millipedes' protective sprays comprise hydrochloric acid that can injury or darken to human skin and upset eyes. Others dangerous substances in millipede's venom are organic acids, hydrogen cyanide, cresols, phenol, benzoquinones and hydroquinones (in specific millipedes). The venom that millipedes discharge retains away maximum of hunters. Various big millipede species might through these venoms as much as 80 cm (32 inches) faraway. Touching to these exudations might cause allergic reactions in certain persons. On the way to escape these dangers, do not collect up a millipede with naked hands, and afterward handling a millipede, rinse hands carefully with water and soap until any residue or odour is disappeared. Since millipedes are not venomous, they are more irritation than a risk to peoples. Millipedes likewise seldom need to be controlled as they do not cause a notable harm indoors and pose a least health danger. Those that are wandering indoors can be picked up and released back outdoors or swept outside. Closing of cracks and other openings towards the outer sides aids to prevent millipedes from entering to indoors, and typically, indoor pest invasions are ended within a few days.

Keywords

Millipedes, Thousand Legs, Venom Gland, Hydrocyanic Acid, Poison Gland

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1. Introduction

Millipedes are commonly termed ‘thousand-leggers’ for the reason that they have a lot of legs (two pairs per body segment) and they eat moist decaying organic substance like foliage. Maximum millipedes live outside in humid cool spaces such as mulch, leaf litter, manure heaps or under stone or wood. Occasionally, millipedes may walk into a house by error in the spring or fall, generally after full rains or times of drought, but, they are not individuals to be afraid of. Millipedes are generally visible in and round parks, and can be observed moving into homes. Contrasting to insects that have three evidently distinct body fragments and three couples of legs, they bear several body segments and many legs. Resembling to insects, they fit into the largest assemblage in animal kingdom, as arthropods that have jointed legs and bodies, and no backbone. Their bodies are concealed with a shell-like casing so-called an exoskeleton [1].

Millipedes are occasional common pests that at times enter to constructions mainly when the climate goes dry and hot. Although millipedes occasionally enter to building in huge numbers, they do not sting, bite or spread diseases, nor these infest food, clothing or structurally dry sound wood. Millipedes differ both in size and colour. The utmost common species that occupies constructions is the ‘garden millipede’ that is about one inch-long and brownish-black in colour. Even though millipedes are every so often called ‘thousand leggers,’ they really have far less legs, however every body segment has two couples of very tiny legs. While upset, millipedes habitually coil up into a ‘C’ form and stay immobile. They creep sluggishly and defend themselves by discharging of cyanide-like substance, which has a disagreeable smell. Close relatives of the millipedes are the centipedes and certain persons confuse millipedes with centipedes that appear slightly alike. Centipedes have merely single couple of legs for each segment of body and legs are generally lengthier than those of millipedes. Centipedes as well have a habit to travel nearly more rapidly than millipedes. Certain types of millipede species have repugnatorial glands, however from these glands no any of the exudations are identified to be damaging to humans. Millipedes neither sting nor bite and differ from below 1/2 inch up to 3 inches in stretch. While troubled, they characteristically twist up into a close-fitting ring and keep on frozen. Their diet is rotting biological material and therefore, they are generally found in blossom beds that comprise foliage mould and other organic straws. Sometimes, millipedes wander in huge numbers from flower beds along foundations into houses or porches. They can be controlled by spraying with insecticides on the window sills and foundation walls [2, 3].

Most millipedes hold self-protective glands, in the form of integumental sacs structured segmentally alongside the body length, from that they release various toxins such as hydrogen cyanide, 1,4-benzoquinones, quinazolinones, phenols and alkaloids. Any person who has touched millipedes, predominantly the great 1,4-benzoquinone-discharging fellows of orders Spirosteptida and Spirobolida, can emit their secretions in abundant quantities in response to even a slight irritation. However, astonishingly, hunters are discouraged by these liquids [4]. The millipede *Polyxenus fasciculatus* (Polyxenida: Diplopoda) secures itself against ants by usage a pair of hair clusters at its hindmost. When an ant attacks, the millipede flexes its back end toward the ant and wipes the tufts against it. As the ant attempts to remove the tufts, it entangles itself more, becoming immobilized. Ants severely filthy may continue to entangle and die. Maximum millipedes have chemical defences; polyxenids, has a substitute of having a mechanical deterrent [5].

Maximum of millipedes arise in varied shades, based upon the geographic locality. Desert millipedes have dark brown bodies and the hazardous ones have a yellow bright orange or bright orange tan. Certain have red stripes or black stripes on their margins. Desert millipedes custom the most varied coloured arthropods and they arise in several dissimilar shades and consist of a distinctive line of a rare giant millipedes that live in desert rather than the usual tropics atmosphere. The bright coloured millipedes regularly luminous at night to inform hunters for forthcoming risk if come close. Black/ brown millipedes are submissive, live in shelter in rotting bushes, trees and from time to time found in inhabited backyards. The brightly coloured red/ white millipedes species have uncommon anosmatic dyeing that actions as a self-protective mechanism to inform predators about lethal materials discharged while touched. On occasion, specific millipedes walk from their damp living dwellings into home environment; however, they generally decease rapidly for the reason that of the dry situations and deficiency of diet. Seldom, huge numbers of millipedes wander, often uphill, as their foodstuff resource declines or their active dwellings turn into either too dry or too wet. They can drop into swimming pools and die [6].

Primarily, millipedes spend the winter as adults and place their eggs in wet plant material in the spring. Some individuals can live for many years. Millipedes are appealed to cool, dark and damp atmospheres, which are rich in biological material, for instance, compost piles, severely mulched flower beds or shrub, soil below stones and logs or decaying logs. They generally go overlooked for the reason that they live in these comparatively concealed habitations. Millipedes are scavengers, primarily nourishing on decaying

shrubbery, however seldom they can harm soft-stemmed floras in orchards. Foremost annoyance harms typically happen when the situations become too dry and hot, and millipedes travel in search of dampness. Large numbers of them may congregate in wet areas such as around in-ground swimming pools where they may crawl and fall into the water. Extremely wet conditions where soils become water-soaked as well, force them to outward and upper ground, where they often end up on concrete foundations, siding and slabs. Millipedes can likewise wander in the fall, probably in exploration of locations for overwintering. Whole of these actions bring about millipedes occupying crawl places, basements and other parts of constructions. Common points of entrance comprise door edges (particularly base of garage doors, sliding glass doors), extension joints and holes of concrete block walls. Much indoor detection of these pests typically means that they are breeding in huge numbers outdoors in lawn, or under leaf litter, debris or covering near to the foundation. Millipedes do not stay alive indoors for more than a small number of days (more possibly just a few hours) in case these can discover appropriate damp situations. Millipedes pass maximum of their period by nourishing on rotting plant material. Occasionally, they catch their way into home environment, however might rapidly expire owing to deficiency of wetness. Sometimes, millipedes wander in large numbers, but while this takes place these may be very problematic to control [7, 8].

Even though there are plentiful species of millipedes found, yet three species generally seen are common millipede, bulb millipede and greenhouse millipede. The greenhouse or garden millipede (flat-backed millipede) as the name implies is often plenty in greenhouses, however also found in potted houseplants and could live in damp areas outdoors. The garden millipede is dissimilar from the more common millipedes by being reasonably flattened from top to bottom and lighter shaded. Flat-backed millipedes have small ridges or flanges alongside the edges of each body segment [9].

2. Differences Between Millipedes and Centipedes

Because of their related shapes, millipedes could be confused with wireworms and other soil-dwelling beetles. However, wireworms are click beetle larvae, more flattened from top to bottom, have only 3 pairs of legs and halt below the soil surface. Owing to the nonexistence of stinging provisions, millipedes employ self-protective secretions permitted to defend themselves from hunters. These discharges are formed by their segmental protective glands and millipedes as well coil the body as a protection tool [10].

Centipedes or ‘hundred-legged worms’ and millipedes or ‘thousand-legged worms’ are the close relatives having multi-segmented bodies and many legs. Both worms respire through spiracles and have no direct copulatory structures. However, several variances occur among millipedes and centipedes. Centipedes are land-dwelling arthropods fitting to class Chilopoda, flexible arthropods and flattened dorsoventrally. Millipedes fit into class Diplopoda and are more stiff arthropods divergent by their subcylindrical shape. As a replacement for having four legs for each body segment, centipedes have two legs for everybody segment. Once it comes to guard, centipedes have fangs that are poisonous, and they are skilled of giving a horrible bite to any probable hunters. A millipede cannot carry a good bite due to having weak jaws, and thus as an alternative it coils into a ball shape and secretes a filthy liquid from pores of its body. As centipedes are poisonous, they are generally intensely coloured as a threatening to hunters. Millipedes are normally not as colourful. As a final point, millipedes have round bodies, contrasting to centipedes, which have even bodies. While most centipedes are recognized for their rapidity, millipedes move sluggishly and can burrow [11].

In actuality, millipedes and centipedes as well differ in diet; primarily millipedes are detritivores and herbivores, and centipedes are carnivores. Carnivorous centipedes destroy their victim by inserting them with venom. Primarily, millipedes forage on rotting biological material and they may consume leaves and roots of seedling vegetation, and surviving on decaying and dead plant matter, together with timber or cellulose material. Ecologically, millipedes are valued as mediators of soil nutrient cycles and microbial decomposition [12]. There are other few body structures that differentiate a centipede from millipede (Table 1).

Table 1. Dissimilarities among Centipedes and Millipedes.

Body features	Centipede	Millipede
Head appendages	Long threadlike antennae, a pair of small mandibles and two pairs of maxillae	Short elbowed antennae, a pair of robust mandibles and a single pair of maxillae
Pairs of legs for each body segment	1	2 or 4
Last legs spread backward	Surely	Not so
Moves quickly	Certainly	Not accordingly
Likely to bite	Of course	No biting
Claws	A pair of poison claws	No poison claws

3. Life Cycle of Millipedes

Millipedes cannot breed in the house and most of millipedes found indoors walk in by error. Millipedes pass the wintertime as adults by hiding in sheltered localities. Maximum male millipedes have minor genital accessories named gonopods, through that they transferal spermatophore straight to the genital opening of female. One millipede really usages a 'tool' in sperm transmission; male circles a faecal pellet, dwellings a droplet of sperm on it and by means of its legs, permits the pellet back alongside of its body to a point opposed to female's genital opening. Corresponding body projections are then used to insert the sperm into female and the pellet is throw down. Males of common bark-inhabiting millipede Polyxenus deliver sperms by revolving thin threads on which they place sperm drops and then they build two parallel thicker threads on which they keep a pheromone to attract female. This chemical and tactile assistance system bases the sperm to turn into attach to the female's vulva (external part of female's genital organs). Males feed the sperms not chosen up by females and refill these with new sperms. Adult millipedes overwinter in the soil and eggs are laid in clutches beneath soil surface or below rotting organic material. Fresh millipedes, which hatch from eggs look like to slight and smaller forms of adult millipedes. Young grows steadily in dimension by adding legs and segments as they develop. Development and growth take place in moist spaces with decomposing plant material. The immature millipedes become mature in 2 to 5 years and carry on to live for many years afterward [13, 14].

4. Damage Caused by Millipedes

Generally, millipedes are harmless; they do not forage upon furnishings or building structures and cannot sting or bite. But, millipedes can be irritating as accidental intruders in houses and other structures while they transfer into buildings overnight. Millipedes are commonly found in the basement, garage or lowermost levels even though they can walk into other portions of house. Millipedes in gardens, greenhouses and potted plants can be irritating, however they do not forage on the floras unless the plant is previously decayed or damaged [15].

Millipedes neither sting nor bite to persons, but certain millipede species have repugnatorial glands, however none of the discharges from these glands are recognized to be damaging to persons. Their diet is rotten organic substance and hence they are generally observed in flower beds that comprise foliage mould and other organic coverings. Seldom, millipedes transfer in huge numbers from flower beds into houses or porches. They can be managed by spraying of window sills and foundation walls with insecticides. Millipedes when threatened can give out alkaloid-containing haemolymph from their joints. This could be irritation to the skin and causes skin injuries, often in specific circular forms [16].

5. Few Common Millipede Species

Most of millipedes are cylinder-shaped and trek their movement. Majority of these live in damp forests and humid shaded bushes or gardens. The class comprises myriapods common to a lot of orchards, such as *Julus* (on occasion spelled *Iulus*) *terrestris*, is a 25 mm (1 inch) long species built-in Europe and hosted into North America, and smooth-bodied forms sometimes termed as wireworms. Certain millipedes have lack of eyes and are brilliantly coloured; a model is greenhouse millipede (*Oxidus gracilis*) about 25 mm long. One of the most conspicuous and common forms is the black-and-red *Narceus americanus* of southeastern U. S. afforests, nearly 100 mm (4 inch) in length. The giant African millipede (*Archispirostreptus gigas*), is the prevalent lengthy species, attaining size up to 280 mm (11 inches) and is native to subtropical Africa [17, 18].

5.1. Wood Millipede *Cylindroiulus caeruleocinctus* (Wood)

The *Cylindroiulus caeruleocinctus* is a millipede species of the family Julidae in the order Julida. This is a big millipede, 20 to 30 mm long and kidney shaped. It has a faint intermingling of brown-black colour with brass-like boundaries on the segments. On the telson, it has no any rearmost pointing. This is generally found near built-up regions with leafy plant life comprising small-forested areas and bushy compounds along with parks. It often dominates in open habitations specifically grassland, and on limestone and chalk in several areas. However, it as well takes place in small woods and hedges, although very seldom in timber land. Common in gardens, parks, waste places, cemeteries and arable land, and above much of its choice, it is intensely synanthropic. Its favourite diets are broadleaves, tracked by grass and moss. It both aestivates and hibernates at some penetration in the topsoil and displays a noticeable movement topmost in the spring and a slighter one in the autumn. Principally, it is a lowland species, but there are several records of attacking to crops by this species [19].

5.2. White Legged Snake Millipede *Tachypodoiulus niger* (Leach)

Variously known as white-legged snake millipede or black millipede *Tachypodoiulus niger*, is exactly related to other

species, for instance, *Cylindroiulus londinensis* (Leach), from that it can be steadfastly differentiated by looking over shape of telson only. This millipede develops upto 25 mm, and has a stripy look with pale brown segments and darker spots alongside the margins. The eye region has a light tail end and a black facade across eyes. It generally hides in woodlands, damp gardens, foliage waste and decomposing wood. Snake millipedes forage on decaying plants. The tube-like black body bears its divergent white minute legs. It has a sharp rearmost projection pointy away from telson. Its black build and contradictory white legs (about 100 of them) make it probable to identify white legged snake millipede. It as well has a swollen rearmost segment, is particularly common on limestone and chalky soils, exists below bark, in moss or in leaf litter, and forages on detritus encrusting and algae. It is best lively from one hour later day's end to one-hour earlier sunrise, though it as well come to be active in the late afternoon during summer. Hunters of *T. niger* comprise other centipedes *Lithobius forficatus* (Linnaeus) and *Lithobius variegatus* (Leach) and hedgehogs [20].

5.3. Striped Millipede *Ommatoiulus sabulosus* Linnaeus

This species of the family Julidae in order Julida is a cylinder-shaped, fat and brown millipede recognized simply by the ginger stripes alongside to its segmented body. It is one of the biggest millipede species with conspicuous bright longitudinal bands on the dorsal surface. It is generally found during the day in sandy areas and enjoys hiding at the top of trees and below old logs or inside of walls. This has a wide habitation range, together with open areas such as fields, meadows and roadside edges as well as leaf-litter of forests of pine, oak and beech trees, and sandy soils. Millipede *O. sabulousus* occasionally exists in large numbers and mass migrants, for the period of which they may enter to homes and in such circumstances are considered pests [21].

Millipedes on the food chain are not exactly high and in the usual backyard, they are victim for a number of diverse animals. Birds, raccoons, shrews, possums, toads and badgers may entirely eat millipedes if they are capable to catch these in the filth. These animals can certainly consume large crowds of millipedes when they catch them on the soil. In several circumstances, bigger animals such as badgers may go afterward full-grown millipedes with easiness. Young millipedes are particularly at risk to being hunted by other animals. Ground beetles, spiders and even large ants can consume crowds of young millipedes [22].

6. Some Essential Millipedes

The giant millipede fits into the order Spirostreptida of class Diplopoda. Maximum of these individuals live in tropical along with arid coastal areas as well as the coastlines, in damp bushy parts and generally observed for the period of raining time of year. Larger millipedes grow up to about 12 inches lengthy. Maximum of these alive up to five years and these forage on decomposing plant materials. Giant African millipede technically recognized as *Archispirostreptus gigas*, is one of the biggest millipedes on sphere. It grows upto (67 mm) 2.6 inches in circumference and (38.5 cm) 15.2 inches in length. Averagely, it has 256 legs, although the leg numbers differ according to each individual. Altogether, millipedes are not poisonous; however, several species have glands, which create venomous liquids when heartened. They annoy the skin and may cause a long-lasting skin mark. The giant millipede mostly dwells in the wetlands, is black and lives maximum up to 7 years. Giant millipedes acquire free cleaning facilities from small mites in interchange for free meals and protection, thus a distinctive symbolic relationship exists among the two animals. Mites like to creep on exoskeleton of millipedes and among their minute legs [23].

6.1. Giant African Millipede *Archispirostreptus gigas* Kraus

Giant African millipede *Archispirostreptus gigas* (family: Spirostreptidae, order: Spirostreptida, class: Diplopoda) has nearly only 300-400 legs. Amongst the prevalent 10,000 millipede species, these millipedes are larger arthropod and range from 4 to 12 inches lengthy, have a rounded body, categorized by a segmented body, and generally dark brown and black in colour. Beginning at the top of their head, giant African millipedes have simple eyes called ocelli and two antennae. They moreover have a maxilla or single mouth and head segment does not devise any legs [24].

The giant African millipede has body somewhere from 30 to 40 segments, with four legs per individual segment. Altogether, this increases to a total of upto 400 legs per millipede. Nearly each segment of their body as well has two pairs of internal organs. As a replacement for breathing with lungs comparable to mammals, millipedes take breaths by minute pore-like holes called spiracles situated below the length of their body. For the reason that of this distinct breathing alteration, if a millipede becomes excessively damp, it may possibly sink [25].

The African rain forest is a habitation with full of life and great level of biodiversity, having numerous plants and animals. With that various animal neighbours, giant African millipedes have to protect themselves against several hunters. Small mammals, birds, various reptiles and frogs can target upon millipedes. With these possessions, giant African millipedes have a little protection tools to aid in defend them from becoming somebody else's delicious diet. First,

millipede can bend into a firmly curled ball. Its exoskeleton is prepared up of calcareous dorsal plates, which act as body protective covering, and when combined with the 'duck and cover' curled technique, it can aid to defend millipede from being chosen up and passed away. Second, the millipede discharges a liquid (termed repungnatorial fluid) from every body segment that tastes and odours filthy to possible hunters. This mixture discourages the hunters and causes them to consider double about intake of a millipede as food [26].

The giant African millipedes affection to dark warm dwellings on the rain forestry flooring. The common top hiding dwellings comprise areas nearby to decaying timber and holes where they can coil up and hide. Millipedes are a kind of creature so-named a detritivore, nourishing on dead and decomposing biological material within their habitation. This biological material might be things such as rotting plants, logs and trees. The whole things of these substances are rich in nutrients for a millipede and form maximum of their food. As soon as eaten, millipedes leave their droppings or wastes along the forestry flooring. These faeces are filled of supportive nutrients and act as new dirt for the atmosphere [27].

This specific species of millipede is nightly, meaning they arise out to feed for diet and walk around the forestry at night and they creep along the rain forest surface seeing for decaying mater to forage. The giant African millipedes may similarly use the time by digging into a harmless dwelling to rest during daytime periods. Millipedes feed on a diversity of produce like cucumbers, lettuce, grapes, zucchinis, apples, yams and much more. Veggies and fruits are scattered with an additional nutrient named as chitin that actions as a vitamin to aid millipedes live fit. Communique among millipedes is vital and giant African millipedes have lowly sight, thus their sense of touch appears to show an essential part. They can sense with their antennae and their legs could perhaps communicate by odour as well. This specific millipede species is not recognised to voice or make sound; however only the sound of hundreds of legs stirring across the forestry floor can be felt [28].

Breeding and generating further millipedes is an essential portion of life in the rain forestry. While the period arises to breed, a male giant African millipede winds round a female millipede. A few weeks later, the female lays hundreds of eggs in a hole on the ground. Afterward around three months, those eggs hatch, creating a large clutch of baby millipedes, which are white with simply a limited segments and approximately three pairs of legs. After birth, the offspring moult their exoskeleton in the first 12 hours and at least 7 to 10 further periods moulting take place as they develop over some years. For each time they moult, these get fresh segments and legs. As soon as a millipede hatches, there is no parent participation, and it is up to the fresh millipede to locate shelter and food [29].

Giant millipedes have two key styles of defence if they sense in danger: bending into a tight coil by exposing only the tough exoskeleton and emission of a nauseating fluid from minute opening on their body. This liquescent can be dangerous if bring into mouth or eyes. For the reason that of this protection, *A. gigas* is one of the scarce invertebrates that driver ants Dorylus (Hymenoptera: Formicidae) are unable of taking them as victim [30].

Likewise, species release lethal watery secretions or hydrogen cyanide gas through microscopic holes along the margins of their bodies as a secondary defence. Certain of these materials are caustic and can hurt the exoskeleton of ants and other insect hunters, and the eyes and skin of bigger hunters. Lemurs have been detected purposely nauseating millipedes in order to polish the chemicals on themselves, actually to resist insect pests and probably to create a psychoactive influence. As far as humans are concerned, the main effect is typically discoloration, however other things may as well comprise pain, local erythema, itching, oedema, eczema, blisters and rarely broken skin. An eye contact to these discharges causes common eye irritation and possibly more severe effects like keratitis and conjunctivitis [31].

6.2. American Giant Millipede *Narceus americanus* Palisot de Beauvois

The American giant millipede *Narceus americanus* (Spirobolida: Spirobolidae) has a grey exoskeleton with red banding, develops up to 10 cm and takes a cylinder shape, contrasting to even sized flat-shaped millipedes. They are black or dark red-brown with a red line on the margins of every segment. They have two couples of legs on the segments, instead of a couple on every segment. But, the first four fragments bear a single couple of legs and the successive abdominal segments have two couples of legs. These arthropods can be found in forest, agricultural, suburban and urban areas. With a permeable exoskeleton, they are prone to drying out and usually seek out high-humidity habitats. Similar to their African partners, American giant millipedes consume rotting plant material, stay too long in underground soil or decaying logs and arise to the exterior in spring for mating. When in danger, they occasionally coil up or discharge a harmful fluid that comprises large quantities of benzoquinones, which can cause dermatological burns [32, 33].

6.3. Flat-Backed Millipedes

The order Polydesmida formulae the biggest kind of millipedes, with almost 3,500 species. The word flat-backed millipede is derived from the tips on wholly body segments.

These millipedes differ in size ranging from 3-130 mm. They comprise minor pairs of legs from the lower body sectors and have no eyes. Maximum adults of the larger polydesmids have 19 or 20 rings, whereas juveniles may have from 7 to 19 rings. Flat-backed millipedes are generally established in decaying foliage, which moreover makes up for much of their food requirements. Polydesmids are much common in leaf litter, where they burrow by opening with the frontal end of the body. Many of the larger species display bright colouring shapes, which warn to hunters of their poisonous discharges for that all the millipedes are described to create poisonous liquid secretions hydrogen cyanide [34].

The greenhouse or garden millipede (too called flat-backed millipede) is frequently plentiful in greenhouses (as the name indicates), but may live outdoors in damp areas and is as well found in potted houseplants. Millipedes typically reappear at night and hide below dark decomposing matters throughout the day where it is wetness. They are inoffensive individuals and certain folks are fond of them and have a preference to keep them as house or garden pets. Garden millipedes have little impact on our social or agricultural comfort. They do not bite and their defensive discharges cause no or little damage to humans [35].

6.4. *Apheloria virginiensis* Drury Millipede

The *Apheloria virginiensis* (Polydesmida: Xystodesmidae) millipede is from time to time also called the black and gold flat millipede. This is recognized by its distinct semi-flattened shape, and black body by yellow and orange highlights. This should not be touched as it is known to release a cyanide compound as a defence when threatened, so avoid contact when possible. It is suggested that anyone should rinse hands after handling this creature as the poisonous compounds it discharges are venomous and can cause risky irritation if rubbed into the eyes. The *A. virginiensis* helps as a host to parasitic fungus *Arthrophaga myriapodina* that causes infested individuals to climb on an elevated spot earlier to death. Generally, *A. virginiensis* is a forestry occupier, however for houses and outbuildings that edging these regions, it may create its way occasionally inside. If anyone of these millipedes ventures inside a constructing, it should be eradicated or removed to escape accidental future contact [36].

7. Poisonous to Humans

Certainly, millipedes can be frightening looking creatures with their long wriggling bodies, sometimes intimidating exoskeletons, numerous segments and almost countless legs. While millipedes defend themselves like other animals they do not bite. Instead, millipedes can curl up into a ball when they feel endangered. In some instances, they can emit a fluid toxin from their glands to fight against predators such as spiders, ants and other insects. Some millipedes can spray toxin a couple of feet away if they detect a threat. Aside from predators, humans can also come into contact with this toxin. For example, if anyone is to pick up a millipede that has coiled in defence, there might be noticed a brownish tint to skin after putting of the millipede back down. The toxin from the millipede's glands is primarily made up of hydrochloric acid and hydrogen cyanide. These two substances, respectively, have a burning and asphyxiation effect on the millipede's predators. In large quantities, the toxin is harmful to humans, too, however, the quantity millipedes emit is so small that it cannot poison to people. Millipedes bite toxin is nauseating, causing itching and burning of skin, and mostly when by mistakenly rubbed into the eye, causes swelling, redness and pain of cornea or conjunctiva. Millipede burns are a cutaneous situation caused by certain millipedes that secrete a lethal fluid, which causes burn or brownish pigmentation when it comes into contact with the skin [37, 38].

Possibly, while millipedes are not recognized to infest food or pass on diseases, nearly all millipedes are furnished with self-protective mechanisms to retain hunters such as birds at away. If threatened or disturbed, millipedes typically curl up until the risk has passed. But, millipedes can as well trigger glands that spray or secrete a foul-smelling acidic toxin. This material can create irritation, burning and allergic reactions in some individuals. Extraordinary caution should be taken to retain this venom away from the mouth, nose and eyes. If anyone is suspected or may be having an adversarial reaction to a millipede's defensive fluid, then be sure to consult a general practitioner [39].

While the liquid millipedes emit is not toxic to humans, it is possible to have skin irritation or even be allergic reaction. If anyone is allergic to millipedes, there might be noticed the following symptoms after handling them; blisters or hives, redness, rash and itchiness or burning. Millipedes defensive secretions usually cause simply minute mark on skin, however the discharges of certain tropical species can cause itching, erythema, pain, blisters, eczema, oedema and cracked skin occasionally. An eye exposure to these exudations causes common irritation and possibly more intense effects such as keratitis and conjunctivitis, which is pretended millipede burn. Its first aid involves thoroughly flushing of the affected part with water and additional management is intended at get rid of the localized effects [40].

The infected person can wash the liquid off his hands, but it still might stain temporarily. Venomous discharges of millipedes should be washed from the skin with huge

quantities of water and soap. An ice cube enclosed in plastic and a thin cloth is placed on a centipede bite that generally releases the pain. If a skin reaction grows, a corticosteroid cream should be applied. Eye harms should be flushed with water (wash down) instantly. Certain kinds of millipedes discharge an injurious constituent (toxin) wholly above their body when they are endangered or touched them crudely. Contrasting to centipedes, millipedes do not sting or bite. The venom that millipedes discharge retains away to many hunters. Certain big millipede species are able to spray these venoms as much as up to 32 inches (80 cm). Touching with these discharges can cause allergic reactions in certain persons. The injurious substances in millipede venom are organic acids, hydrogen cyanide, hydrochloric acid, cresols, phenol, benzoquinones and hydroquinones (in specific millipedes). If the millipede toxin gets on the skin, symptoms may include, itching or intense burning, blisters and staining (skin turns brown). If the millipede venom catches in the eyes, signs may comprise, swelling of membrane lining eyelids (conjunctivitis), swelling of the cornea (keratitis), and tearing, pain and spasm of eyelids, or blindness (rare). Vomiting and nausea may happen if anyone comes into dealings with a huge volume of millipedes and their venoms [41].

Various millipedes create quinones in their self-protective discharges, which have been stated to cause brown discoloration of the skin. After exposure, utmost signs normally go away in 24 hours. A brownish marking of skin can continue for months. Severe responses are mostly realized from interaction by tropical millipede species. The position could be further severe if the venom becomes inside the eyes. Exposed blisters might grow to be infested and need antibiotics treatment. Home care may comprise, wash of the open region by plenteous of water and soap, do not practice alcohol to rinse the region, rinse eyes with abundant of water (for at least 20 minutes) if somewhat toxin becomes in these, and acquire medical helpfulness immediately [42].

Site of millipede bite on the forehead results in diffuse swelling involving on the entire forehead, and upper and lower eyelid with bridge of the nose. An angioedema (swelling area of lower layer of skin and tissue just under skin or mucous membranes) can affect with major manifestations on the face involving forehead and eyelids due to a millipede bite, or with mild manifestations on side of the face, which respond to antihistamine therapy. Swelling is tender on palpation and there may no pus or serous discharge. Based on history and clinical features, intraoral examination due to bite mark of the millipede angioedema while seen on the fore head region may reveal generalized dental fluorosis and initially caries lesions in teeth [43].

8. Management of Millipedes

Millipedes controls are targeted at keeping of millipedes out of doors or decreasing their numbers at the source. Gaps, cracks and other entry points around doors and windows, and in foundation walls must be closed if promising. Eradicating of biological material such as plant dead leaves and mulch from or against the house may be helpful, and moist situations around the house foundation should be amended. Insecticides are of incomplete advantage in controlling millipedes owing to the sheltered areas where they originate and due to the lengthy expanses they migrate. In warm climate when millipedes are vigorously wandering, residual insecticides can be useful in a 5 to 20 feet extensive barrier around building to decrease entrance. If practical, as well spray spaces where the millipedes likely to create. Full application will help in control, however, dependence on chemical control only is often insufficient. The control treatments might be systematically applied in such a way as to get the insecticide down to soil surface [44-49].

During certain times of the year, millipedes migrate lengthy expanses (differs with the meteorological conditions, however commonly in spring or fall). Hence, actions close to the house may have no influence. Certain sources of millipedes such as crop reserve program fields and woodlands can create particularly huge numbers of millipedes that enter from expanses of 50 feet or more. The indoor usage of household insecticides delivers a slight advantage. Millipedes that walk indoors generally expire in a short time because of the dryness, and spraying of crevices, cracks and room edges is not very useful. Vacuuming or sweeping up of the intruders and leaving them outside is the most useful decision [50-53].

Control of greenhouse millipedes needs finding the source of the incursion. Check them below damp areas and benches, and in houseplants. Millipedes exposed in the summer may initiate outdoors below mulch and leaves, in window pits and similar sites. `If houseplants are infected, the owners may adopt to remove the plants, and for plants wish to save eliminate any soil-covering straw or moss and permit the potting soil to dry out as much as plant can survive between watering. The soil exterior, cracks alongside the edges of pot and the area between pot and bowl can be sprayed with a houseplant insecticide to further aid for eliminating millipedes. Typically, pesticides are a temporary way out to a durable problematic. Importance must be located initially on decreasing of settings and entrance points advantageous to millipede raids. A millipede should have very high moisture levels to live; therefore, dropping of the damp in home will aid to create it greatly fewer good-looking to millipedes. Moreover, clean patches of rotting wood, leaves and grass,

and cover all probable entrance spots that the pests can practice to come into homebased. The utmost real durable step for decreasing entrance of millipedes (and several further pests) is to decrease extra dampness and hiding dwellings, particularly nearby to the foundation [54-57].

Beside the base, heavy accumulations of mulch, leaves, boxes, grass clippings, stones wooden, boards and related matters positioning on ground be removed and basically retain these 6-12 inches far from wall. Avoid water from gathering close to the base in lower ground floor walls or in creep material. Retain downspouts and gutters free of rubbish and practise either perforated pipe or splash guards to decrease puddling. Houses with miserable drainage might require having foundation drainage system fitted, adjacent ground sloped or contoured to send on external water far from foundation. Close openings and cracks around basement, outside foundation wall, windows and sills of doors. Extension gaps and joints must as well be closed alongside the bottommost of basement walls on internal to decrease pests entrance and wetness from outside [58-60].

Use of insecticides alongside baseboards and further internal living parts of house do not actually halt millipede incursions. Just the once indoors, millipedes come to existing rooms, kitchens, etc., and shortly expire from a deficiency of moistness. Eliminate these with a broom or vacuum cleaner. Uses of insecticide outside can aid to decrease interior incursion of these and other pests. Treat alongside foundation vents, crawl space doors, entryways, utility opening and underneath siding. Insecticides applied alongside unfinished basements and inner foundation walls of moist creep places might benefit for the time being. But, amending of such wetness problematic is faraway further essential in checking of millipede and other complications. Dust formulations could work fine in certain parts, however, these will wash away easily during heavy rains and should not be used in parts where pets and children come into interaction with the chemicals. Boundary sprays may as well aid, however are seldom 100% operative in preventing of millipedes when treating outdoor areas [61-65].

Eliminating of damp hiding dwellings nearby the home will discourage or kill millipedes. Outdoors, this comprises eradicating of rotting leaves and grass, and rotting wood from nearby the foundation of houses will furthermore remove millipedes diet resources. If an unnecessary dampness is there in basements or sub-floor creep places, proceed actions to dry out these parts. To depress millipedes in orchard regions, decrease straw and other organic material, and escape too much humidity. Remove all logs, trash, stones, bricks, boards and other objects from everywhere of the structures. Retain grass closely cut down close to the structure, and cut shrubberies and drooping tree twigs away from the structure that can offer a route to the roof. Stock garbage containers in a setting that retains them above ground level and never bring firewood inside the structure unless it is positioned directly on the fire. Plug leak holes in brick or stone covering structures with steel wool, pieces of nylon scouring pad, copper mesh or small squares of screen wire. Use sealant around roof space, pipes and any other cracks into the structure. Care for window screens in good renovation and make certain they fit securely in the window casing [66-70].

As a matter of routine, there is one set of hunters, the larvae of beetles in family Phengodidae, which forages on millipedes. The phengodid beetle *Phengodes laticollis*, larva nourishes on the millipede, without risky contact to the repulsive benzoquinones typically emitted by millipede from its protective glands when threatened. By means of its hollow sickle-shaped mandibles and outwardly adding gastric liquid, phengodid larva subdues millipede by piercing the integument. The sharply infusion paralyzes to millipede, which by this means is prohibited from liquidating its glands. As phengodid then swallows watery systemic matters of dead millipede, the millipede's benzoquinones keep on safely restricted to glands and prohibit from dispersing into the body cavity of millipede by the glands' invulnerable cuticular lining. At the finish of meal only the millipede's glandular sacs and skeletal armour stay uneaten. Scrutiny of such castoff sacs displays these to hold benzoquinones in quantities matching with those existing in full glands of alive millipedes [71].

Even though worm-like and apparently harmless, phengodid larvae are greedy predators proficient of killing millipedes bigger than themselves has been described for *Zarhipis integripennis* phengodid. One fly, Spirobolomyia sp., recognised to be parasitoids of millipedes *Floridobolus penneri* in fact can be appealed by the millipede's quinones. It congregates in sums upon a *F. penneri* soon afterward the millipede has been made to release secretion [72].

9. Conclusions

Millipedes scattered globally, are members of the arthropods in class Diplopoda and normally clustered with few other classes such as Myriapods. About 10,000 species consume and live in rotting plant material; certain harm to living plants, and a small number are scavengers and predators. Their head comprises simple eyes (ocelli), antennae and distinct maxilla only. Their stretch varies from 2 to 280 mm (0.08 to 11 inches). Certain millipedes can be many centimetres lengthy with their several legs and these small individuals can be very threatening. The distinguishing feature of group is occurrence of diplosomites double trunk segments designed

from the combination of two segments. The totality of segments as well differs, fluctuating from 11 to more than 100 in specific species. They have as several as 200 couples of legs; two pairs on each diplosomite excluding for the first segment (head) that is legless and the succeeding three segments, which each comprises one pair of legs. Besides, each diplosomite (except for the first four) comprises two pairs of internal organs (two pairs of heart arteries and two pairs of ganglia). Entirely, however one order of millipedes is armoured with calcareous dorsal plates. In protection, these do not bite; most fold head initially into a tight loop with exoskeleton visible and several discharge a strong poisonous gas or liquid from lateral glands. Millipedes live in spaces that are moist and in well-established turfs and they can flourish in the thatch (dead mater among new grass and soil underneath). Homeowners frequently find them in flowerbeds, particularly if the organic matter is dense otherwise there are heaps of dead foliage. Even though they do not bite, various millipedes protect themselves in a different mode. They create an unpleasant-smelling fluid from glands on their margins. Experts think this fluid is poisonous to small animals, spiders and insects. The fluid can cause slight blisters on the skin of persons who effort to grip certain sorts of millipedes. Close up of openings to the outside and other cracks aids to stop millipedes from arriving in the house. On the way to escape these dangers, do not pick up a millipede with naked fingers and that wandering in the house can be cleaned up out or picked up and released back to outdoors. The present article is only for information and do not practice it to manage or treat a real toxin acquaintance. If anyone or somebody has suffering with a millipede's contact, request to local emergency number or local poison control centre.

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