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## Responsive behaviour of decephalized centipedes that can survive without brain

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### Abstract

Centipedes belong to subphylum Myriapoda having segmented body and many jointed legs. They are considered to be highly venomous organisms with 30 to 354 legs. Word "Centi" means "hundred" but they don't have hundred legs in fact. It was beheaded by a blade on the floor. Semi-dead body was observed on the spot. Later on its body was transfer into a glass container. About 22 segment long 10cm Centipede with 21 pair of legs was the subject of this study. Centipede was beheaded by a sharp blade at its 7<sup>th</sup> segment. Cephalic segments along with 6 segments of trunk were removed ensuring that brain was completely removed from centipede's body. Both cut parts were keenly observed by researchers. This study unlocked an amazing fact about centipedes that a decephalized / beheaded centipede can stay alive for more than 14 hours if it is protected from the attack of ants or other predators. Even after removal of its head a centipede can move swiftly and find grooves / burrows to hide. This search is carried out by its touch-sensitive body, which was confirmed in this study. A beheaded centipede has ability to attack even without brain with its rear pair of legs as they include stick poisonous substance, which can be injected to the body of attacker.

**Keywords:** Centipede, decephalized, beheaded

### Introduction

Centipedes belong to subphylum Myriapoda having segmented body and many jointed legs. They are considered to be highly venomous organisms with 30 to 354 legs <sup>[1-3]</sup>. Word "centi" means "hundred" but they don't have hundred legs in fact. They are carnivorous their mode of nutrition <sup>[4]</sup>. There are more than 8000 species of centipedes exists throughout the world in a variety of habitats <sup>[5]</sup>. Centipedes are nocturnal in nature and mostly feed on earthworm's bodies <sup>[6]</sup>. Current study was designed to investigate the hard nature of centipede and beheaded centipede has ability to attack even without brain with its rear pair of legs as they include stick poisonous substance, which can be injected to the body of attacker.

### Materials and Methods

A fresh and active centipede was raked from its natural habitat at night time as they are nocturnal. It was beheaded by a blade on the floor. Semi-dead body was observed on the spot. Later on its body was subjected into a glass container.

### Observations / Experimentation

An experiment was conducted to analyze the behavior of a decephalized (Beheaded/ Severed Headed) centipede (*Scolopendra morsitans*). This experiment was performed in a lawn of a private residence in June, 2016. About 22 segment long 10cm Centipede with 21 pair of legs was the subject of this study. Centipede was beheaded by a sharp blade at its 7<sup>th</sup> segment (Figure-1/2). Cephalic segments along with 6 segments of trunk were removed ensuring that brain was completely removed from centipede's body. Both cut parts were keenly observed by researchers.

At the time of it's decephalization centipede was found more active as it as alive. But as it lost its eyes and antenna so it was unable to sense its way. Cut head along with segments was unable to locomotion but was showing movement. Centipede body was protected from the attack of ants eaten during the experiment. Right after beheading It turned its last segment of cut side towards ventral side to avoid any exposure of its wounded side and ran swiftly to until



**Fig 1:** measurement of decephalized centipede

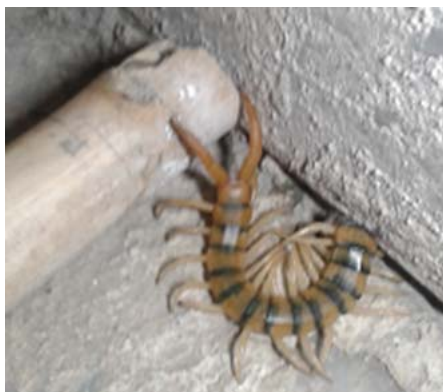


**Fig 2:** Active Decephalized centipede

It reached to a groove at near a wall, it tried to hide itself within the groove but as the groove was so small it was unable to hide itself (figure-3). Beheaded centipede was able to flip itself when it was put upside down. But it was unable to climb up the wall, as it comes across the wall it stopped on the spot. At 21<sup>st</sup> minute of decephalization centipede was touched with the stick, it showed a quick reaction and ran away from the stick realizing the danger even without a brain (Figure-4).



**Fig 3:** Decephalized centipede searching a groove  
Within a wall



**Fig 4:** Decephalized centipede giving

### Response towards stick

At 34<sup>th</sup> hour, head stopped movement and didn't show any response against attack of ants when they were released near the head. Ants started eating the head and soon head along with 6 more segments were finished by the ants. After 35<sup>th</sup> Minute of decephalization its legs started shivering indicating the abnormal flow of nerve impulse within the body. But very soon shivering disappeared. At 37<sup>nd</sup> minute of decephalization few ants were released near the beheaded centipede's body, which first attacked the wounded part of its body and then attacked its legs. Both of the attacks were actively defended by the centipede's body. It showed a very quick reaction to eliminate the ants from its body. At 40<sup>th</sup> hour when its body was touched with a stick; it attacked the stick with its sharp pointed rear pair of legs. At 83<sup>rd</sup> minute of its decephalization when few ants were released again near its body, when they tried to attack its body it showed reaction, even when ants touched the tip of its leg, it pushed the ants off by its legs specifically by rear pair of legs. At 85<sup>th</sup> minute it dropped its poop (fecal material) as normally as its body was complete and alive. At 88<sup>th</sup> minute it was active and defending itself from the attack of ants. This time it moved in reverse direction for couple of feet and stopped. When it was touched from backside it moved towards its front just like a normal centipede. All those activities were repeated several times till 172 minutes (almost 1 hour) of observation but it was as fresh as normal centipede. After 200 minutes of it's decephalization the centipede became slightly lethargic but the response towards the attack of ants was same. After that the Centipede was enclosed in a glass container along with few drops of water to maintain humidity. Next day i.e. after 844 minutes (almost 14 hours) the body of centipede was still moving. This time it was unable to walk or flip itself rather its legs were moving and showing slight irritability towards attack of ants. At 900<sup>th</sup> minute centipede died.

### Conclusion

This study unlocked an amazing fact about centipedes that a decephalized / beheaded centipede can stay alive for more than 14 hours if it is protected from the attack of ants or other predators. This type of behavior is never reported earlier in any scientific journal. Even after removal of its head a centipede can move swiftly and find grooves / burrows to hide it. This search is carried out by its touch-sensitive body, which was confirmed in this study. A beheaded centipede has ability to attack even without brain with its rear pair of legs as they include stick poisonous substance, which can be injected to the body of attacker, this behavior of centipede was also demonstrated by *Eisner et al in their study in 2005*. Beheaded centipede can identify its predators / enemy even without cephalic receptors i.e. Eyes, antennae and brain, in this reception of sensation, the key role was played by receptors of legs. Which repel the ants during attack on its body even at 14<sup>th</sup> hours of it's decephalization. It is suggested that there might be some nerve cells in the trunk of centipede which control the sensory stimulations alternative to the brain and make possible the survival of that centipede. Further physiological and anatomical studies are invited to be conducted on centipedes to know the exact cause of its survival even after removal of centipede's head.

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