

Name:

Title: Benefits of Cockroaches

Purpose: To explain to my classmates some of the benefits of cockroaches.

Thesis: Although they are generally considered pests, in some instances, cockroaches can also be beneficial.

Preview: It is two of the benefits of cockroaches that we'll examine today, namely the environmental benefits that cockroaches have in the wild and the research benefits that they have in the laboratory.

Organization: Topical

Date:

Introduction:

I. Every morning brightly colored exterminator trucks poured into suburbia like tanks coming ashore at Normandy.

II. Technicians donned moon suits and slung flamethrower-like tanks to their backs to enter the combat zones of kitchens and baths.

A. But theirs was a lost cause.

B. The roaches thrived on their powders and gases and liquids.

C. Even the old standby, the shoe, proved ineffective because these roaches were masters of land and air.

III. Mike Mullane, a shuttle astronaut who related this battle with cockroaches in his autobiography, *Riding Rockets*, also recalled the following incident when one of the undefeated cockroaches made an appearance at an astronaut party.

A. The hostess cornered the four-inch long intruder and screamed a triumphant obscenity "as she aimed her toe at it" (Mullane 40).

B. "But, as her foot came down, the monster spread its wings and launched itself straight at her face" (Mullane 40).

C. "She screamed and fled, flailing her arms as if her hair were on fire" (Mullane 40).

E. "Meanwhile, the victorious roach broke off its attack and settled on the mantle" (Mullane 40).

F. "For the rest of the party it remained on that mantle... daring anybody to attack" (Mullane 40).

1. "There were no takers" (Mullane 40).

2. It just sat there like a wart on the party.

IV. And that, in a nutshell, typifies the way that I thought about cockroaches: warts on society.

V. But, before you decide to exterminate cockroaches from the earth, you might want to consider their benefits.

VI. It is two of those benefits that we'll examine today, namely the environmental benefits that cockroaches have in the wild and the research benefits that they have in the laboratory.

(Stepping outside, you will find that cockroaches have a significant impact in their environments.)

Body:

I. In the wild, cockroaches live everywhere in the world except the poles, and, while they may seem like a pest, according to 2008 update of the Woodland Park Zoo's website, fewer than one percent of all cockroach species are considered pests to humans; moreover, cockroaches serve an important role both as recyclers and as part of the food chain ("Madagascar Hissing Cockroach").

A. In his book, *What Good Are Bugs?*, Gilbert Waldbaur writes that up to ninety-five percent of vegetation eventually dies and has to be recycled in some way (295); cockroaches help this process by feeding on decaying plant matter (305).

1. For example, in tropical forests, cockroaches are partially responsible for eating, and thus decomposing, the layer of dead vegetation covering the ground.

2. According to the previously cited Woodland Park Zoo website, without these cockroaches, not enough of this vegetation would be recycled ("Madagascar Hissing Cockroach").

3. "Decaying vegetation would smother tropical forests" ("Madagascar Hissing Cockroach").

B. As part of the food chain, cockroaches provide a food source for various birds and small mammals; additionally, they themselves feed on other, smaller creatures.

1. In some cases, this predatory nature of the cockroach has even been beneficial to humans.

2. For example, the January 2008 edition of *Agricultural Research* discusses an ongoing study of an Asian cockroach, which is beginning to establish itself in the southern United States (Flores).

a. This cockroach could potentially benefit cotton farmers by preying on pests without harming the plants.

b. Although this is not a solution to the problem of cotton pests because the cockroach is itself a pest to humans in a domestic environment, it is a helpful function of the cockroach.

(Stepping back indoors, into the laboratory, the benefits of cockroaches soon become apparent.)

II. Cockroaches are primitive, but their design has served them well for 300 million years, through the dinosaurs, through the ice age, and, through all that time, they've changed little.

A. Professor emeritus Dr. Frank M. Carpenter of Harvard University observed in the January 1981 issue of *National Geographic* that cockroaches are "the only insects to have lasted so long with so little change" (Boraiko 134).

B. They have had little need for change; in the same *National Geographic* article, entomologist Dr. Fred A. Lawson noted that cockroaches are "undeniably well engineered" (Boraiko 137).

C. Engineers working on mobile robots evidently agree with Dr. Lawson because cockroaches are one of the animals they study when designing new robots.

D. A laboratory for studying these cockroaches is something like a twisted cockroach gym.

1. Cockroaches are run in mazes, on treadmills, up walls, all to gain some insight into cockroach locomotion, and the reason for this is that cockroaches are fast with quick reflexes and great balance.
2. Cockroaches are actually extremely fast.
 - a) In their book, *Cockroaches: Ecology, Behavior, and Natural History*, Bell, Roth, and Nalepa write that some species of cockroach are capable of going fifty body lengths per second (Bell, Roth, and Nalepa 18).
 - b) By that measure, cockroaches are, in fact, four times faster than the cheetah (Bell, Roth, and Nalepa 18).
3. This is where the cockroach treadmill comes in.
 - a) As reported in the July 2005 *International Journal of Robotics Research*, when running a cockroach on a treadmill scientists look at things such as the force each leg exerts on the ground and the order that cockroaches put their legs down.
 - b) And they have found some interesting things (Kaliyamoorthy, Quinn, and Zill).
 - 1) For example, cockroaches generally move with a tripod gate- meaning that three of their legs are in contact with the ground at all times which is good for balance.
 - 2) When they are going all out, however, some cockroaches run just on their hind two legs.
4. Another aspect of the cockroach that scientists are eager to copy is the roach's quick reflexes.
 - a) Insects like cockroaches have only a small brain in their heads.
 - b) But, spread throughout their bodies, they have smaller ganglia, or clumps of nerve cells, which function as a first response, thus allowing the cockroach to react quickly.
5. Finally, cockroaches also have an excellent system of balance as demonstrated in an experiment conducted in 2002 and discussed in the previously cited book *Cockroaches: Ecology, Behavior and Natural History* (Bell, Roth, and Nalepa 18).
 - a) Scientists attached a small cannon to the back of a cockroach and then startled the cockroach into running.
 - b) While the cockroach was running, the cannon was fired sideways.
 - c) Within one step, the cockroach had regained balance and was back on course.

E. According to many sources, including *The Journal of Experimental Biology* and *BioScience*, scientists have used all this information gained from studying cockroaches to design robots that can climb walls, navigate rugged terrain, and keep their balance through it all (Goldman et al. and Ritzmann et al.).

(Coming back home, one is again faced with the possibility of having cockroaches in the kitchen or even as an extremely unwelcome guest at a party.)

Conclusion:

I. But, while they may be repulsive party-crashers, in the wild and in the lab, cockroaches are invaluable.

II. So you can continue the domestic warfare against the cockroach, but remember that outside the home, cockroaches are far from being a wart on society; in fact, cockroaches are an important addition to the world of insects.

Works Cited

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