■ Professor Abercio V. Rotor describes in this article the interesting habits, composition and other ponderous secrets of a common household insect man may yet find with him to outer space.

THE COCKROACH: A LIVING FOSSIL

Almost simultaneously a litter of startled brown creatures scampered for the nearest "foxholes" as I switched on the kitchen light. These roaches seemed aware of their lowly state: rejected, they shunned the light.

Yet the cockroach is a common sight: it lives wherever man lives — from scout tents to millionaires' homes. In fact, wherever there is food and warmth, including rodent's burrows and hollows of trees and fallen logs. And only recently, inside television sets and cash registers, safely ensconced like mollusk in a shell. It lives on modest fare and humble circumstances, chews ketsup on clothes, trims papers and books, licks spills in chemistry laboratories, tries soap and paints and devours its molted skin and the egg capsule of its own species when starved. But with plenty of food, it gorges without any evidence of stomach ache. In fact, the cockroach is an insect goat with the gluttonous appetite of a goat. One species lives on wood, and like termites, harbors flagellates which convert cellulose into usable forms.

That late summer evening I caught a mother roach carrying an egg capsule half-protruding from the tip of her abdomen. I wrote on her glass-and-wire cage, *Periplaneta,* the generic name of the American species, the champion survivor and most popular of the 3,500 known species.

That morning I feared *Periplaneta* would deliver the capsule prematurely: she was clumsy and restless in her desire to escape. It is instinct to seek freedom in captivity. I first thought. Then I recalled her photo

sensitive nature. In no time, she found "safety" in between paper folds.

Being nocturnal undoubtedly accounts in large measure for *Periplaneta's* ability to survive. At night she reigns in the kitchen; stalks on clothes and piles; treads the floor and corridor with broad wings, or better still, with six powerful legs; scales garbage cans and drainage canals; surreptitiously, she even visits sleeping people to examine fingernails and food stains on their clothes.

Periplaneta has two compound eyes containing more or less a hundred lenses each, and permitting vision within 180 degrees. In addition, she has three simple eyes, each carrying a myopic lens. I wondered how I looked to my pet!

Steadily tapping and seldom erect are two antennae, nearly as long as her body. These are not comparable to a blind man's cane for they are highly sensitive to tactile and gustatory stimuli. They are also believed to stimulate sexual interest by rituous rubbing against those of her partner.

The morning sun peeped into the laboratory and my pet squeezed her way out like a stage character after the show.

The life of roaches is a colorful drama, dwarfing that of the cat's nine lives or that of the 3000-year old *Sequoia*. Roaches trace their ancestry to as early as the *Carboniferous* and *Permian* epochs of the upper Paleozoic era. Their evolutionary line parallel that of the ancient sharks, echinoderms, ammonites and the first reptiles. But unlike them, roaches have been virtually unchanged by evolution. They lived among the giant ferns and bryophytes which nearly covered the earth from pole to pole at a time when the world climate was uniformly warm and humid, and when this forest sank to become the coal and oil of today.

In the Mesozoic era, fifty million years later, the dinosaurs came. For more than a hundred million years, these goliaths ruled the world, and the cockroach

literally crawled the earth even then. *Periplaneta's* forebears felt the diastropic rising of the Andes, Alps, Rocky Mountains and Himalayas, precariously lived at the advancing edges of Sahara and other deserts or at the receding continental lines when polar ice poured into the ocean. When the reptile monsters completely vanished, a new community developed. As flowering plants and mammals found a safe foothold, *Periplaneta's* kin — the Arthropods — increased. But perhaps the most awaited moment was a little more than a million years ago when Man arrived. Since then, man became her indispensable benefactor.

Days later my pet was so completely motionless that I thought she was going to die. There were signs that she had fed on the banana which had lately attracted *Drosophila* flies. There were imprints of sharp mandibles which cut sidewise like axes. Even if there had been no food, my pet could have survived periods of starvation longer than other creatures. Without much visible ill effects, roaches can live about a month without food or water, two months on water alone, five months on dry food but no water.

Periplaneta no longer carried the egg capsule. The fetid odor, much alike the stink bug or skunk, was fresh and it reminded me of rice with black fruss grains. This . is another *Periplaneta's* protective mechanism: her aroma discourages potential predators.

I found the egg capsule securely glued to a corner. I transferred it into a suitable culture dish where I maintained proper temperature and humidity. After two weeks, newly-hatched nymphs swarmed. A latecomer treaded its way, wet, and curious about a new world. I counted fourteen healthy nymphs, almost exactly the same in appearance as their mother except for the size and the absence of wings. The offspring lived under copied conditions in the laboratory, growing by leaps and bounds every time they shed off their old armor. The nymphal phase is

known to be completed after 10 to 13 moltings.

Periplaneta died. Ants had dismantled her and left her armor. The wings were detached from the powerful muscles which moved them. The outer pair was tough and narrow but the inner pair which was broad, thin, transparent but profusely venated, was collapsible so it could be tacked neatly under the outer pair. The main body segments — head, thorax and abdomen — characteristically possesed by all insects, had been severed, their fleshy contents gnawed away. Not to be mistaken for the head was a broad triangular helmet partly covering the head and the base of the wings. Across it was a yellow band nearly touching the base, a distinguishing feature of the American species.

Three pairs of legs were all unusually long. Each leg had an additional segment, the coxa, like that of man and of higher animals. Partly for this reason, roaches are unbeatable in the insect world for instant starting and stopping, rapid dashing, abrupt swerving.

While our skeleton is internal and calcareous, *Periplaneta's* was external, like a medieval armor, flexible and many times more durable than bone. The exoskeleton protected delicate organs from injuries, aside from being a framework.

As a protective armor, the exoskeleton, made of a complex substance called *chitin*, can scarcely be improved upon. One of Nature's biological masterpieces, it protects the body from being soaked with water or from drying excessively and from disease organisms. Chitin is insoluble in acids, alkalies, other solvents and enzymes. It is probably the chief thing that enables the roaches to live in the greatest variety of conditions.

Today, cockroaches are cosmopolitan in distribution. Still discontented, they are headed for space. The Maderia species can beat the astronaut who can withstand only 1/100 of the radiation this species can tolerate. Man blacks out at 12 g's

(gravity pull) and suffers serious internal damage beginning at 18. *Periplaneta's* relative can withstand 126 g's for four hours while going nonchalantly about its business.

I discarded *Periplaneta's* remains and continued my research on her remaining children, looking back to more than 350 million years and pondering over their secrets as living fossil. — By ABERCIO V. ROTOR, *from The Manila Chronicle*

AVERSION FOR POLITICS

I have been brought up in politics and politicians are a strange breed. They live in a tight little community for which the world has less and less use. In the difficult period through which we are passing, it is not political maneuvers, however adroit, which will present solutions to our mounting problems. The real search should be for that which will cut across boundaries, transcend political ideologies and create conditions for the health, progress and happiness of the whole human race and not just a section of it. My aversion for politics grows and I realize more and more strongly that man's search today is not for the ending of his physical hunger alone — or for the means to raise himself to better conditions of living and greater comfort — his yearning goes far beyond these things. He longs for dignity, security, peace and above all for a purpose in life. — *Madame Vijaya Lakshmi Pandit*