

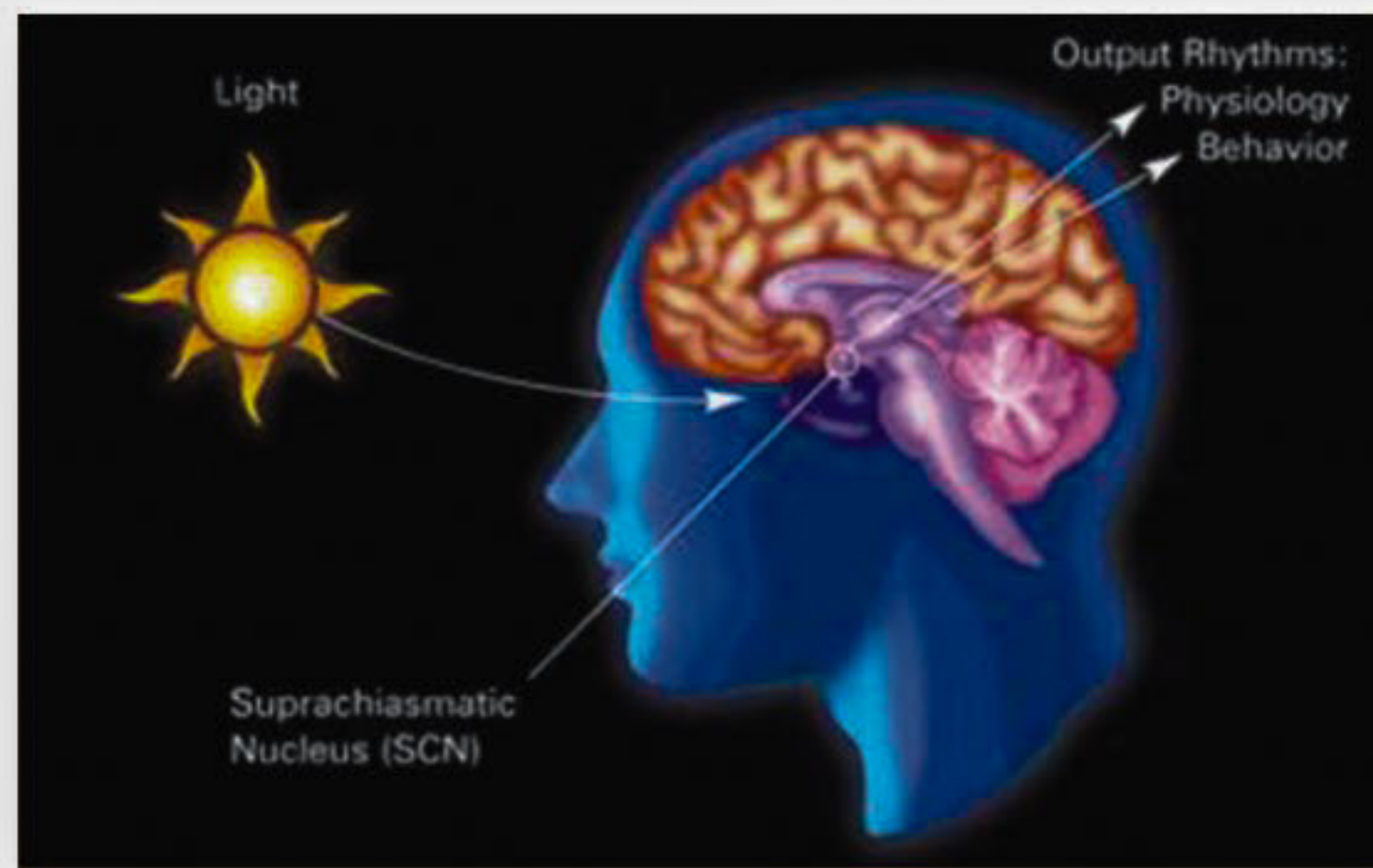
FILLING GAPS

The biological clockwork

MD. RIAJUL HOSSAIN

HAVE you ever noticed how beautifully your body mechanism is regulated and your daily life is scheduled? Well, everyone may not agree saying that they don't follow a specific routine for their daily life. Imagine, yesterday you woke up at 5 or 6 AM. If you do this consistently, no alarm is required to wake you at that practiced time. There is an alarm, virtually though, inside your body. In fact, there exists a biological clock, or more accurately clocks, in every living being, controlled and integrated by the brain where the master clock resides. The master clock, which is composed of SCN (Suprachiasmatic nuclei) cells, a group of nerve cells located in the hypothalamus region of the brain, makes a symphony, so that they are in synchronization, with the other clocks throughout the body and organs like in the esophagus, lungs, liver, pancreas, spleen, thymus, and the skin and thus creates and maintains perfect harmony.

Life on earth evolved in the presence of a daily cycle of day and night and thus the living organisms present today have obtained an internal rhythm that dictates different behaviors and body mechanisms at different times of a day. Controlled by the biological clock, humans, like most animals and plants, maintain certain biological

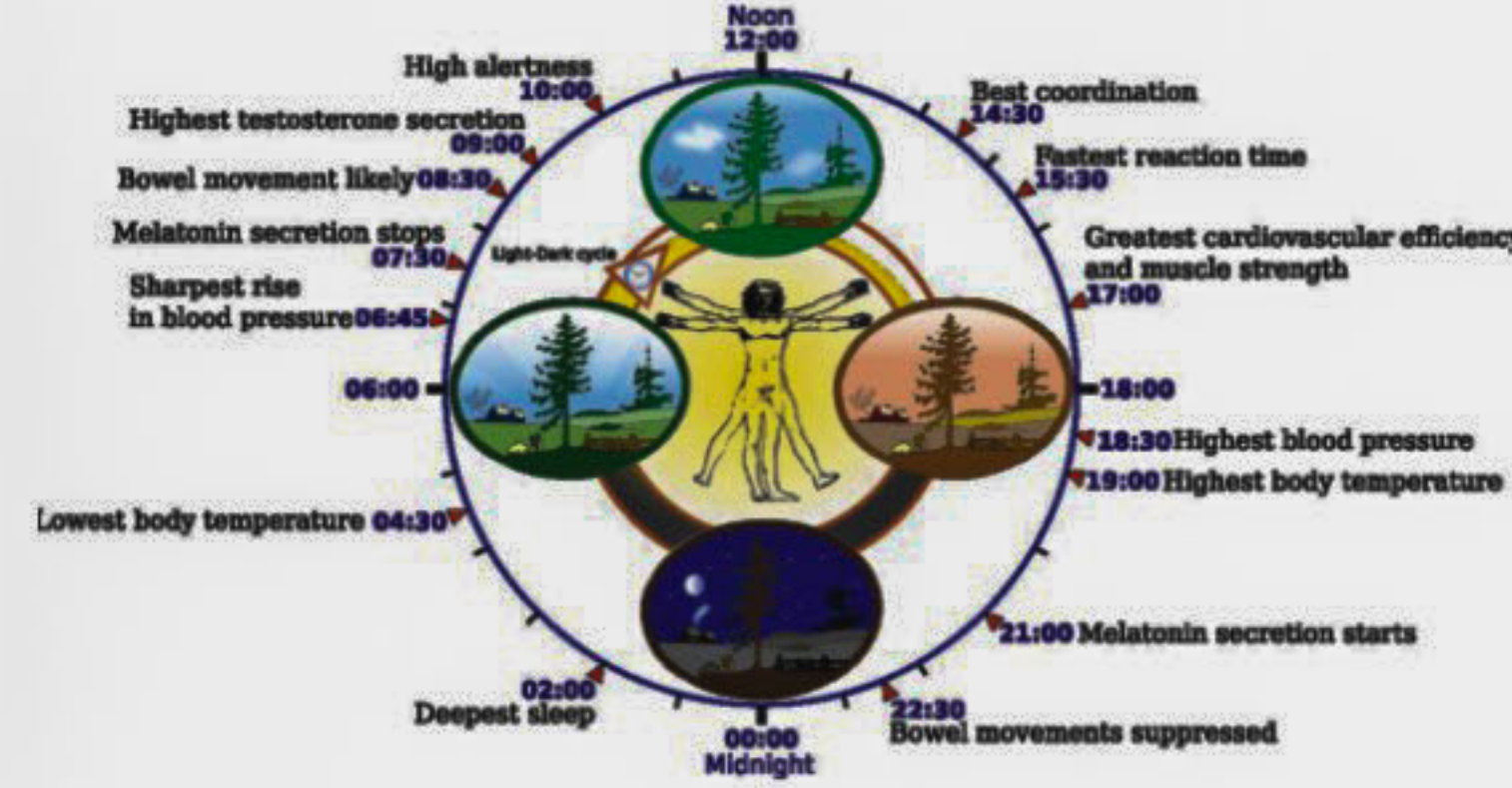


The master Biological clock is composed of SCN (Suprachiasmatic nucleus) cells, a group of nerve cells of the hypothalamus region in the brain.

rhythms known as circadian rhythms which work on a 24 hour time scale and to maintain this 24 hour day-night cycle, the biological clock needs regular environmental time cues or zeitgebers, like sunrise and sunset and temperature fluctuations during day and night, among which light cues are the most important to maintain a normal rhythm which can turn genes on or off that control the biological clock.

In 1971, Ronald J. Konopka and Seymour Benzer first identified a genetic component of the biological clock using the fruit fly *Drosophila melanogaster* as a model system. Molecular genetic studies indicate that the 24 hour period arises from a

system of interconnected feedback loops that control the transcription, the process of making RNA from genes, of a small number of "clock genes". In the body, the SCN cells, receiving neural cues, stimulate the pineal gland of the brain, which then release melatonin hormone and this hormone then carries the signal to the rest of the body in time with the biological clock. The detailed and precise study of biological clock is important because if the clock is disturbed, different types of illnesses may occur in humans like sleep disorders, bipolar disorder which is a category of mood disorders, jetlag, shift work disorders which affect people who frequently rotate shifts or work at night. According to a 2010



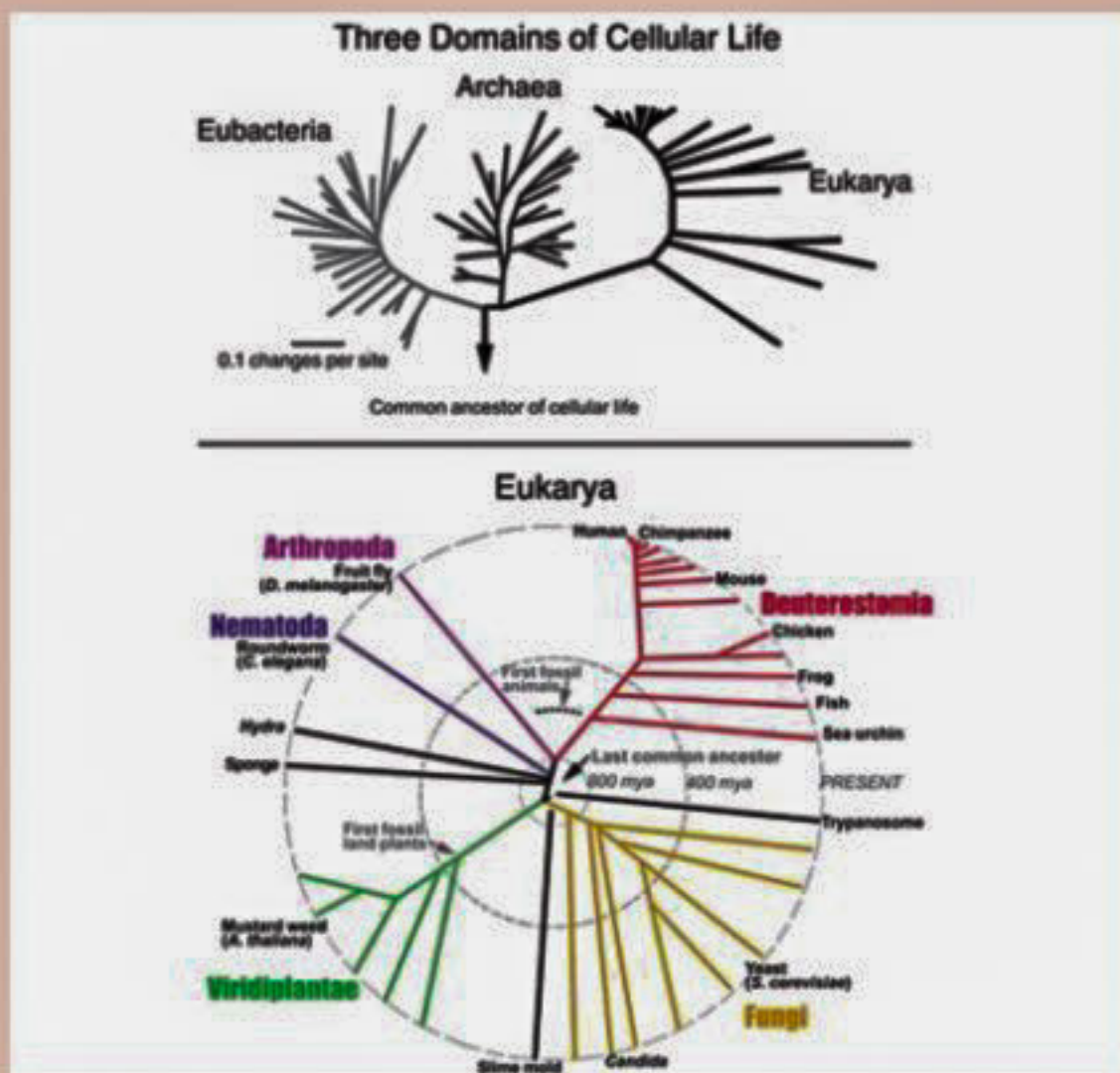
The Biological clock responds to various environmental cues, the zeitgebers, and oscillates to transmit the output signal throughout the body.

study carried out by the Light Research Center, disruption of the biological rhythms may affect performance and well-being in humans. Dr. Sara Mednick, Assistant Professor at the University of California, San Diego and author of "Take a Nap! Change Your Life" tells that, "If you look at the statistics right after we change our clock just for one hour, you see an increase in car accidents, an increase in heart attacks", which clearly shows the importance of a rhythmic biological clock, and harmony of the body with the environment. A number of studies have concluded that a short period of sleep during the day, a siesta, can decrease stress and improve productivity.

Although there are several treatment options for the disorders resulting from the disrupted biological rhythms like behavior therapy, light therapy and medications such as melatonin, a naturally occurring sleep aid, these are not enough to restore the rhythms to their normal state. Therefore, more research to understand the genes related to the biological clock can be useful to get a complete understanding of the biological rhythms which, in response to the environment, help us to eat, sleep and behave in a regular fashion.

The writer is a Lecturer in Biotechnology, BRAC University.

Evolution rewritten?



Biologists organize life forms into evolutionary or "family" trees

PALAEONTOLOGISTS are always claiming that their latest fossil discovery will "rewrite evolutionary history."

A team of scientists at the University of Bristol, U.K. decided to find out, through investigations of dinosaur and human evolution. Their study, published this week in the research journal *Proceedings of the Royal Society B*, suggests most fossil discoveries don't make a huge difference: they confirm, rather than contradict our understanding of evolutionary history.

This is especially true of the fossil record of human origins from their monkey relatives, the investigators found.

In other words, the researchers said, most discoveries of new fossil species simply fill in gaps in the fossil record that we already knew existed.

Source: World Science

HEAVENLY SIGHT

Blue lagoon

The turquoise lagoon of French Polynesia's Mataiva atoll stands out against the dark blue of the surrounding Pacific Ocean in an image taken by an astronaut on August 13.

The atolla ring-shaped island enclosing a central lagoon is part of the Tuamotu Archipelago, the largest chain of atolls on Earth. Mataiva is unique in that its central lagoon includes a network of ridges (white, center) and small basins formed by eroded coral reefs, according to NASA's Earth Observatory, which released the photo on August 30.

Forest (greenish brown) covers much of the outside perimeter of the six-mile-long (ten-kilometer-long) atoll.

Source: National Geographic

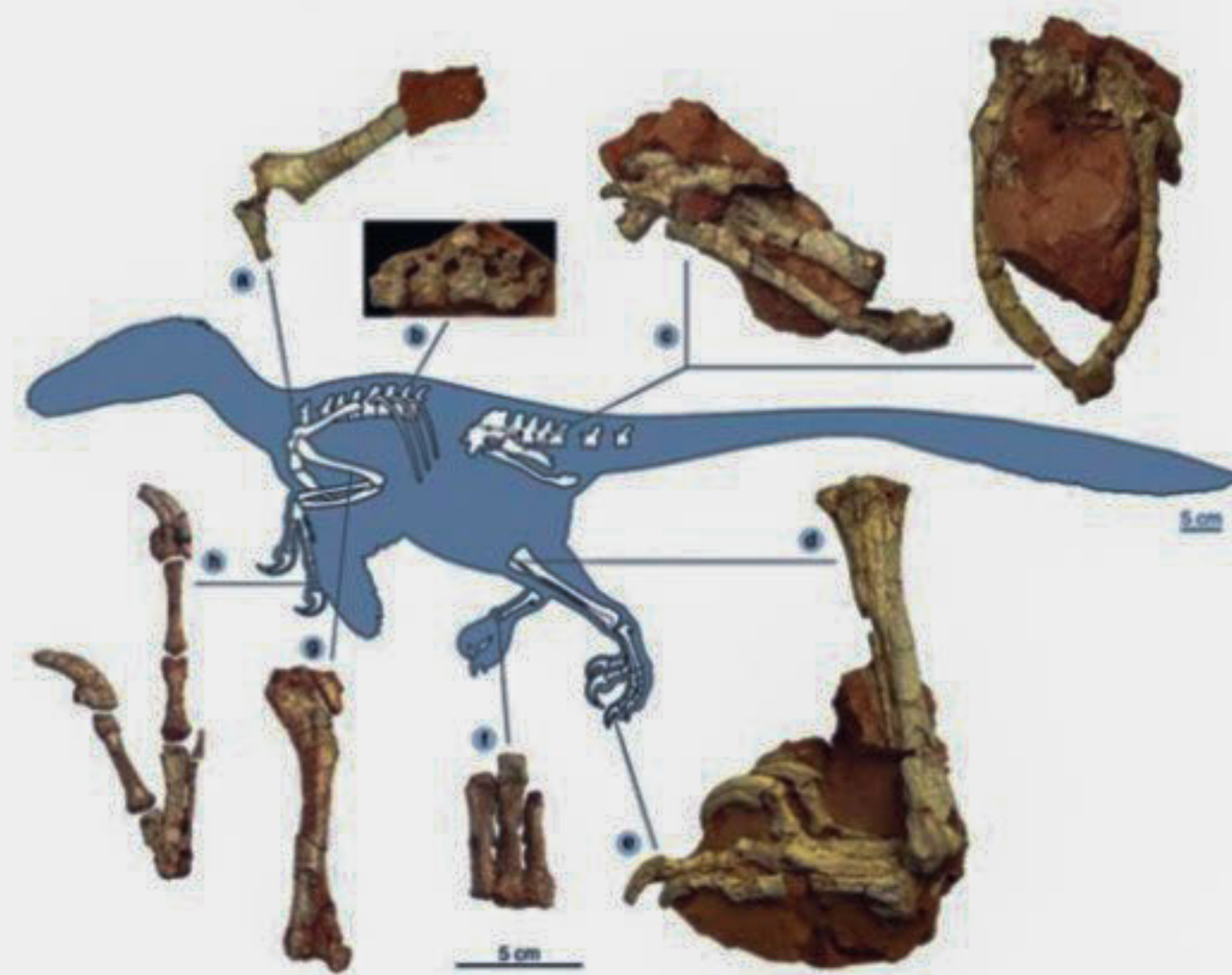


French Polynesia's Mataiva atoll.

Balaur bondoc: Dragon dinosaur

OBABUR RAHMAN

ONE of the questions that truly baffled paleontologists for generations is the ancient question: "What did the Late Cretaceous predatory dinosaurs in Europe look like?" And finally it seems, the recent discovery of the first reasonably complete skeleton of a meat-feasting dinosaur from the final 60 million years of the Age of Dinosaurs in Europe, is likely to shed answers to that long-standing question. Unearthed from a former floodplain near the city of Sebes, in central Rumania, the fossil in question is that of a stocky, two-clawed relative of Velociraptor, which paleontologists believe had twice as many giant stickle-like claws on its feet and happened to be more of a kick boxer than its notorious sprinter-like cousin. The partial skeleton of the predator (including leg, hip, vertebrae, arms, rib and tail bones), now called Balaur bondoc (Rumanian for Stocky Dragon) was unearthed by Geologist Matyas Vermir, a geologist at the Transylvanian Museum Society. It must be mentioned here that Balaur is a genus of dromaeosaurid theropod dinosaur. According to Dr. Mark Norell, chair of the Division of Paleontology, American Museum of Natural History, "We've all been waiting for something like this, and the wait has yielded an interesting surprise". It is believed that ancient predator was about 6/7 feet tall (1.8 to 2.1 meters high) and roamed between 72 million and 65 million years ago. And this was during the end of the Cretaceous period when much of the present-day Europe was covered in higher seas and when Romania was part of an island, archipelago. Based on the study of the fossils (details of which have been published in the August 30th edition of *Proceeding of the National Academy of Sciences*), the scientists believe that the creature had functional big toes with large claws. But the most interesting thing about this discovery is that this new species of carnivore had more than 20 features which strikingly make it unique since they are not shared by its nearest



relatives. According to Dr. Norell, "It is one of the most unusual and strangest dinosaurs I've had the privilege of working on in my entire career".

For starter, paleontologists explain that in addition to a large claw on its second toe, Balaur had another large claw on its big toe that could be hyper-extended, presumably to slash its prey! It is also believed that its feet and legs were short and stocky with bones fused together and large muscle attachment areas on its pelvis, which indicates that the dinosaur primarily exercised its strength, not speed. Besides, its hands were atrophied and some of the hand bones were fused together, making it difficult for the creature to grasp its preys. And this strongly suggests that, along with its legs and foot traits, that Balaur relied on its hind limbs to grasp and overpower preys. These features are not quite common with other dromaeosaurs.

After studying its anatomy, experts believe that, the Jurassic predator may have hunted very differently from other predators of its kind. In fact, Balaur might have been a better hunter than the deadly Velociraptor, with its enlarged pelvic muscles and two large and lethal claws. As for

the reason behind such distinctive features, scientists believe this is due to the "island effect". "Island effect" refers to the understanding that, island dwellers tend to be stranger and smaller than close relatives on continental land masses. This principle also suggest that, animals that are common to islands are often more primitive than their mainland relatives. Dr. Norell explains, "Because Balaur is related to dinosaurs like Velociraptor, it indicates that European island archipelago had a faunal connection with other parts of Europe, Asia and North America where this group of dinosaurs has also been found in similarly aged rocks. It also shows how pervasive island effects can be in producing truly unusual animals". Unusual or unique, whichever way one wants to put it, this research, funded by the Romanian National University Research Council, American Museum of Natural History and the U.S. National Science Foundation, clearly discovered that Balaur is indeed a new breed of predatory dinosaur. A very special one from anything paleontologists have ever known.

The contributor is a freelance science writer.

KICK-BOXER

NEW FOSSIL TROVE

Primordial bestiary

ONE of paleontology's most revered fossil sites now has a baby brother. Scientists have discovered a group of astonishing fossils high in the Canadian Rockies, just 40 kilometers from the famous Burgess Shale location.

A paper describing the find appears in the September issue of *Geology*.

Since its discovery in 1909, the Burgess Shale has yielded many thousands of fossils dating to 505 million years ago a period often called "evolution's big bang," when animals were exploding in diverse body plans. These soft-bodied critters scurried around on the sea floor, then were buried in mudslides and exquisitely preserved.

Burgess fossils appear in several outcrops, all within about 60 kilometers of Field, British Columbia, and all occurring in shale deposits of the Stephen Formation that are 270 to 370 meters thick. Now, a team led by paleontologist Jean-Bernard Caron of the Royal Ontario Museum in Toronto reports finding Burgess-like fossils in the valley of the Stanley Glacier in Kootenay National Park, where a much thinner part of the Stephen Formation that ranges from 16 to 160 meters thick is exposed.

"This new locality adds to our knowledge of the environments where these organisms lived and died and thus adds important context," says Peter Allison, a geoscientist at Imperial College London.

About half of the animal groups found at Stanley Glacier, such as trilobites, are found at other Burgess sites in different abundances. But the creatures unearthed also include eight taxa previously unknown to science. They include an unnamed worm; *Stanleycaris hirpex*, a segmented shrimp-like critter known as an anomalocaris; and an arthropod with big eyes dangling on stalks from its head shield.

Until now, paleontologists had thought one reason the Burgess fossils were so well preserved was because they settled in thick deposits at the bottom of an ancient ocean protected by a submarine cliff. But the Stanley Glacier fossils weren't formed in the presence of such a cliff, suggesting that creatures can be fossilized in amazing detail in other environments.

"We consider it likely that future exploration and study will continue to yield new taxa from the 'thin' Stephen Formation, which is exposed over a broader area regionally than the 'thick' Stephen Formation," the researchers write.

New discoveries are still emerging from the classic Burgess localities. In May, after studying new Burgess fossils from one of the original sites, Caron and colleagues reported new details on a creature that may be one of the earliest known relatives of octopuses, squid and other cephalopods.

Source: Science & News



Stanley Glacier, in the Canadian Rockies, is the site of a new fossil trove depicting the explosive growth of animal body plans some 500 million years ago.

REPTILIAN WAR

Toxic pythons

Southern Florida has a big problem on its hands thousands of them, in fact. A burgeoning population of invasive Burmese pythons has been gobbling up native wildlife in and around the Everglades.

Now evidence is accumulating that the snakes, which can reach more than 20-feet (6 meters) long and weigh upwards of 200 pounds (90 kilograms), are contaminated with strikingly high levels of mercury, and managers are urging python hunters to think twice before eating their quarry.

Scientists are now trying to figure out how these predators became such sinks for toxic mercury, though it may just be a sign of the metal pollution in the Everglades where the snakes now live.

Source: Live Science



An American alligator and a Burmese python locked in a struggle at Everglades National Park, USA.

DO YOU KNOW?

What is an elephant pearl?



Elephant pearls are not really pearls, however, they are categorised as one of the nine pearls. These are produced in the heads and the sockets of the tusks of some elephants. It was believed that when worn by kings, they proved highly sanctifying and bestowed children, victory and sound health. Even now, they are considered to bring good luck.