

I KNOW WHAT TRILOBITES ATE

BY TERRANCE M. ALLEN, S.C.E.

General Characteristics of Trilobites and Their Geological Time on Earth

In the Animal Kingdom trilobites are identified and placed into the Phylum: Arthropoda (Greek: *arthro*=joint, *pod*=foot). Trilobites (Greek: *tri*=3, *lobos*=lobe; Latin: *ites*=fossil), known only from fossil remains, existed hundreds of millions of years before the archaic arachnids and insects, ammonites (extinct marine mollusks) and nautiluses, and the ancient fish, amphibians, reptiles, dinosaurs, birds, mammals, and humans. Like today's insects, the trilobites' chitinous exoskeleton, which was molted or shed at intervals for growth and possibly regeneration, formed a jointed body and limbs. They usually possessed multifaceted compound eyes and antennae, and many had external spines and/or projections. The segments of the trilobite body were divided by longitudinal furrows on the dorsal (top) surface into three lobes. Their size ranged from less than one-mm (1/32-inch) to one-meter (39-inches) or more in length.

Trilobites made their grand entrance into the Cambrian seas during the "Cambrian Explosion" of life on Earth; no life existed on the terrestrial lands as yet. These primitive arthropods dominated the oceans during the Paleozoic Era living from the Early Cambrian Period to the Late Permian Period (544 to 250 million years ago). They disappeared from the planet Earth at the time of the great "Permian-Extinction." To date, fossils of nearly 15,000 different species of trilobites have been identified. Trilobites too, like all life on Earth, evolved from more primitive arthropod ancestors which also are preserved in the fossil record.

Trilobites were marine or sea-living invertebrate animals. They are more closely related to insects, crustaceans (pill bugs, sow bugs, and land crabs), and horseshoe crabs. Some could roll up into a ball like a pill bug or an armadillo concealing their soft underbody and appendages. Their hardened exoskeleton, sometimes armored with sharp defensive spines, provided protection against predators such as *Anomalocaris canadensis* and Eurypterids (aka: sea scorpions), or even each other. Large, now extinct, Nautiloids up to 30-meters (90-feet) in length, related to today's surviving cephalopod mollusk *Nautilus*, also would have fed on trilobites. In the latter period of their earthly reign, the sometimes outlandish spines that evolved over time also provided them protection from the huge predatory fish that flourished in the Devonian seas.

Trilobites Were the First Organisms to Develop Eyes

Although the earliest trilobites were blind as they swam in the darkness on the sea floor, via evolutionary law, mutations and/or adaptation, these aquatic bilateral animals were the earliest life forms or organisms on Earth to develop eyes and possess vision for detecting movement. These visionary miracles may



Trilobite *Flexicalymene meeki* feeding on two Brachiopods (only one visible)

have developed from a single crystalline lens made of calcite over light receptive cells such as those found in flat worms, earth worms, and sea stars (aka: star fish).

Resembling a "honeycomb" pattern, these calcite crystalline lenses formed into a set of eyes. Through adaptation and genetic modifications and the reproduction of the dominate keen-sighted survivors, the opposing eyes situated on opposite sides of the median lobe of the trilobite body evolved over time on the cephalon (head) of the early trilobites. Although the eyes became characteristically different for individual species, the trilobites set the standard for the compound eyes found on almost all arthropods.

The ancient trilobite *Xandarella sp.* had bilateral symmetric prominent eyes probably brought on through visually-guided predation and/or foreseeable evasion from other predators. The eyes of the trilobite *Phacops* were of the same design as today's extant insects, especially those of the Strepsipteran, *Xenos peckii*, a small beetle-like insect known as a twisted-winged parasite. The "bug-eyed" trilobites were now also able to scuttle over the sea floor looking for something to eat. Today, the majority of all arthropods, like the trilobites, possess bilateral compound eyes, including all insects, except for the primitive proturans along with a small number of species of other primitive groups and some cave dwelling insects.

What Trilobites Ate

Foraging or scavenging in the sand or silt of the sea floor, trilobites probably fed on smaller organisms and plankton and other sea plants. New evidence suggests they even fed on brachiopods (*), aka: "lamp shells." [New fossil evidence: two brachiopods being eaten by a trilobite, *Flexicalymene meeki* (Foerste), discovered and extracted by T.M. Allen (February 2008); from rock collected in Cincinnati, Ohio, U.S., from the Upper Ordovician, 443-441 MYO (Million Years Old).] Or, like modern day insects, spiders, and other arthropods, trilobites sometimes probably preyed upon and ate others of their own kind.

(*)**Note:** from the Cambrian Period to Recent times, brachiopods were, and are, marine invertebrates with bivalve shells. Although barely surviving the "Permian-Extinction," today, living or extant species of brachiopods are rare.

Descendants (?) of Trilobites

Usually oblong and flattened, trilobites were shaped more like today's cockroaches, which too have fossil records dating back over 300 million years B.P. (Before Present). But unlike their extinct relatives the trilobites, today cockroaches successfully continue living on Earth in almost every environment. Scientists have discovered fossilized remains of insects dating back to 392 to 420 million years B.P. Hence, insects, crustaceans, and other arthropods may have evolved from early forms of trilobites. Insects, including cockroaches, would have lived concurrently during the trilobites' prevalence for 170 million years.

Like pieces of a puzzle, fossils and their associations are valuable scientific specimens and are indicators and direct evidence as to the history and evolution of life on Earth.

Paleoentomologically yours, Terrance M. Allen, S.C.E.



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Entomologist, Arachnologist, Practicing Paleoentomologist, and Factotum Naturalist; In his home laboratory with 50k insects, spiders, and related arthropods, and over 2k fossils.

Photo by Don Meuchel, May 21, 2014

History Summary for Terrance M. Allen includes:

Northwestern School of Taxidermy: Certificate & Diploma in completion of the Study of Taxidermy.

Long Beach City College and California State University Long Beach: Associate in Science and Bachelor of Arts Degrees with a Major in Entomology.

State of California Dept. of Health: Certified Technician in Mosquito Control.

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Inventor: Insect Collecting Allen Aspirator, Fruit Fly (Medfly) Fruit Collection/Detection Stacking Bucket, Intense-Biased-Survey Medfly Detection Program. ♦