

PALEONTOLOGY

Fossils show large predator prowled Cambrian sediments

“Millennium Falcon” stirs up ideas about ecosystems at the dawn of animal life, 500 million years ago

By **Joshua Sokol**

In the summer of 2018, paleontologists hammering away at rocks high in the Canadian Rockies turned up hundreds of specimens of an unknown, but evidently hyperabundant creature. With a hand-size carapace that looks like it was sketched out in science fiction concept art, the diggers nicknamed it “the spaceship” (*Science*, 23 November 2018, p. 880). Now, they’ve given the creature its first scientific description and a name: *Cambroraster falcatus*—after the famed Millennium Falcon starship from *Star Wars*.

“It’s just such a bizarre-looking animal” says Joseph Moysiuk, a graduate student at the University of Toronto in Canada and first author of the study published this week in the *Proceedings of the Royal Society B*. “We thought we’d have a little fun.”

The ship was one of the largest known animals of its day to churn up the sea floor. It sailed in fleets over muddy ocean sediment, plying its unusual claws in the hunt for small prey.

Most fossils of the animal showed only hard parts. But one specimen preserved the entire creature: a carapace with two eyes peeking out from either side, trailed by soft, undulating flaps for swimming. “You so rarely get the whole body,” says paleontologist Allison Daley of the University of Lausanne in Switzerland, who did not participate in the research. “I was really excited when I saw this.”

The fossils come from the Burgess Shale, a formation that for more than a century has yielded a strange and world-famous menagerie living roughly 507 million years ago, during the first bloom of animal life on Earth. During this period, burrowing organisms and their would-be predators like trilobites began an evolutionary arms race that may have helped spur the explosion of new forms. But most creatures were small,

and no digging carnivores of this size had come to light.

Cambroraster had a round mouth lined with toothlike plates, fronted with comblike claws it could hold out like a basket. Its eyes sat in deep notches that give the carapace its signature “spaceship” look. Expedition leader Jean-Bernard Caron of the Royal Ontario Museum (ROM) in Toronto and Moysiuk place it in the radiodontans, a long-enigmatic group of extinct arthropods.

Radiodonts offer a glimpse of how today’s arthropods evolved their now-standardized body plan from stranger beginnings. The most famous radiodont is the free-swimming *Anomalocaris*, the Cambrian’s iconic meter-long apex predator. Others

in the group were filter feeders, and now *Cambroraster* shows that some scrounged the sea floor like modern-day horseshoe crabs. Given that radiodonts filled so many ecological niches, it’s “surprising they got out-competed,” says Harvard University paleontologist Joanna Wolfe.

In 2018, the ROM team unearthed dozens of separated carapaces and claws in single layers of shale,

suggesting *C. falcatus* individuals had congregated and then molted their exoskeletons, huddling together for safety or to reproduce, like some arthropods do today.

Back at the museum, the team found unrecognized or mislabeled “spaceships” in drawers and realized that *C. falcatus* lived at other Burgess Shale sites, too. Last year, a Chinese team published a fossil carapace with a similar shape from the 518-million-year-old Chengjiang biota. And paleontologist Liu Yu of Yunnan University in Kunming, China, is studying yet another Cambrian creature that he intends to assign to the genus *Cambroraster*. “I think this animal was widespread worldwide,” Liu says. ■

Journalist Joshua Sokol is based in Boston.



Cambroraster falcatus got its name from its spaceshiplike carapace.

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