

## Soft-part preservation in two species of the arthropod *Isoxys* from the middle Cambrian Burgess Shale of British Columbia, Canada

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More than forty specimens from the middle Cambrian Burgess Shale reveal the detailed anatomy of *Isoxys*, a worldwide distributed bivalved arthropod represented here by two species, namely *Isoxys acutangulus* and *Isoxys longissimus*. *I. acutangulus* had a non-mineralized headshield with lateral pleural folds (= “valves” of previous authors) that covered the animal’s body almost entirely, large frontal spherical eyes and a pair of uniramous prehensile appendages bearing stout spiny outgrowths along their anterior margins. The 13 following appendages had a uniform biramous design—i.e., a short endopod and a paddle-like exopod fringed with marginal setae with a probable natatory function. The trunk ended with a flap-like telson that protruded beyond the posterior margin of the headshield. The gut of *I. acutangulus* was tube-like, running from mouth to telson, and was flanked with numerous 3D-preserved bulbous, paired features interpreted as digestive glands. The appendage design of *I. acutangulus* indicates that the animal was a swimmer and a visual predator living off-bottom. The general anatomy of *Isoxys longissimus* was similar to that of *I. acutangulus* although less information is available on the exact shape of its appendages and visual organs. *I. longissimus* is characterized by extremely long anterior and posterior spines. There are now seven *Isoxys* species known with soft-part preservation, *I. acutangulus*, *I. longissimus* from the Burgess Shale, *I. auritus* and *I. curvirostratus* from the Maotianshan Shale of China, *I. communis* and *I. glaessneri* from the Emu Bay Shale of Australia and *I. volucris* from Sirius Passet in Greenland. The frontal appendages of *Isoxys* strongly resemble those of other Cambrian arthropods, characterized by a single pair of “great appendages” with a shared prehensile function yet some variability in length and shape.

**Key words:** Arthropoda, *Isoxys*, “great appendage”, Burgess Shale, Lagerstätten, Cambrian.

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