

# Early Cambrian crown-group crustacean analysis

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## Introduction

Crown-group crustaceans (Eucrustacea) are common in the fossil record of the past 500 million years back to the early Ordovician period, and very rare representatives are also known from the late Middle and Late Cambrian. With phosphatized cuticle and three-dimensional completion of soft parts, 'Orsten'-type fossils, which are typically tiny embryos and cuticle-bearing animals, provide detailed morphological and phylogenetic information on the early evolution of metazoans.

## Reagents

Recover materials from residues obtained by 5% acetic acid digestion of carbonate nodules from black shales.

## Procedure

1. Collect fossiliferous carbonate nodules sandwiched in black shales.
2. Dissolve the nodules in dilute (5%) acetic acid solution to obtain insoluble residue.
3. Pick up tiny fossils from the residue under a stereomicroscope.
4. Examine and photograph via a scanning electron microscope.

## Anticipated Results

We used this method and reported an Orsten-type crustacean *Yicaris dianensis* gen. et sp. nov. from the Lower Cambrian of China on the basis of exceptionally preserved material of several growth stages. The limb morphology and other details of this new species are markedly similar to those of living cephalocarids, branchiopods and copepods and it is assigned to the Eucrustacea, thus representing the first undoubted crown-group crustacean from the early Cambrian. Its stratigraphical position provides substantial support to the proposition that the main cladogenic event that gave rise to the Arthropoda was before the Cambrian. Small leaf-shaped structures on the outer limb base of the new species provide evidence on the long-debated issue of the origin of epipodites: they occur in a set of three, derive from setae and are a ground-pattern feature of Eucrustacea. The early Cambrian occurrence of this trait is of potential significance to the hypothesis of the emergence of winged (pterygote) forms within euarthropods.

## Figures



Figure 1

A three-dimensionally preserved crown-group crustacean from the Lower Cambrian of China. It represents an early larva about 0.46 mm in length with paired eyes (rightmost), simple head shield and highly diversified appendages.

## An epipodite-bearing crown-group crustacean from the Lower Cambrian

by Zhang XG, Siveter DJ, Waloszek D and Maas A  
Nature (12 August, 2007)