

Devonian arthrodire embryos and the origin of internal fertilisation in vertebrates

Nature 457, Feb 26th 2009

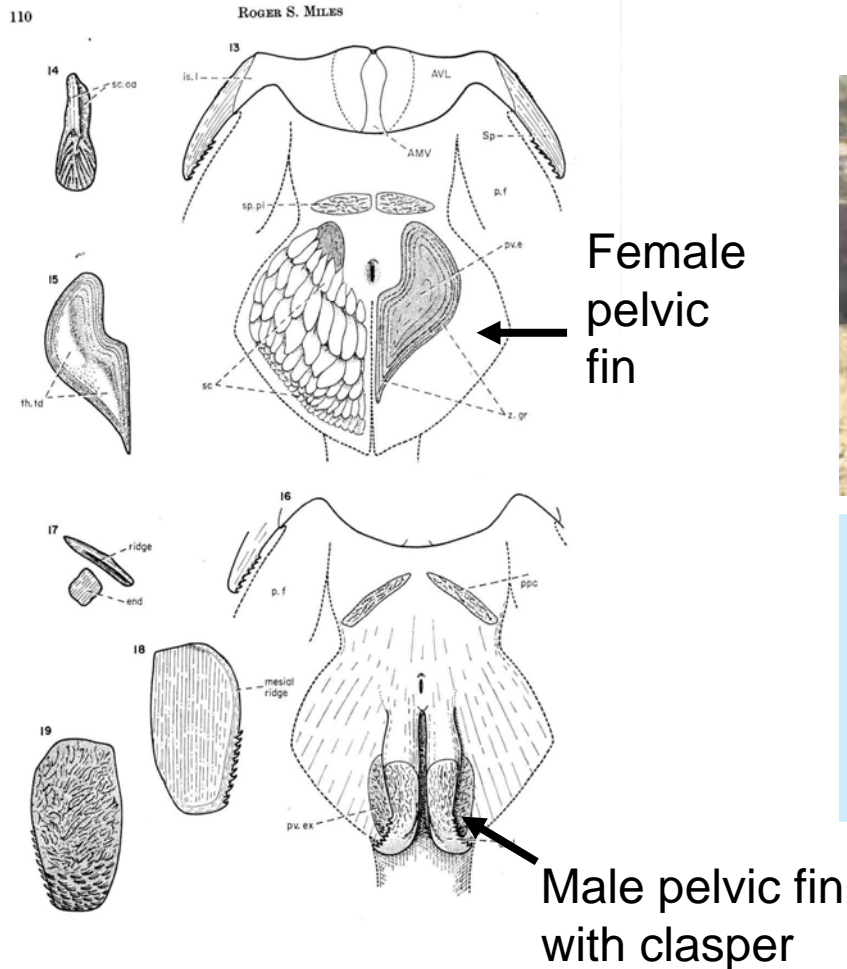
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Western Australia*

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Museum, London*



Ptyctodontid placoderms, like the mother fish, had sexual dimorphism

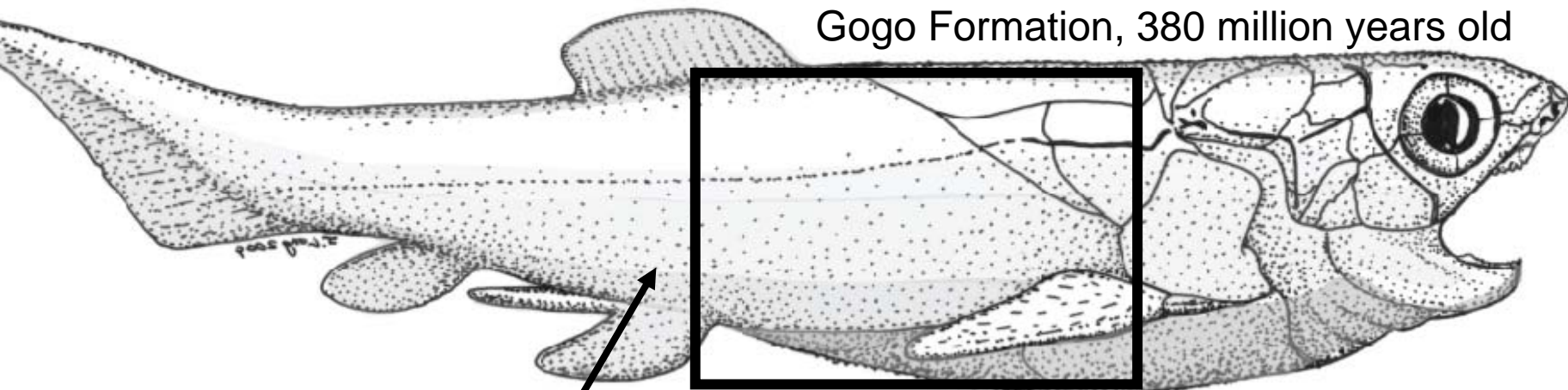


New evidence from the mother fish showed these fishes gave birth To live young

(Long et al 2008, *Nature*)

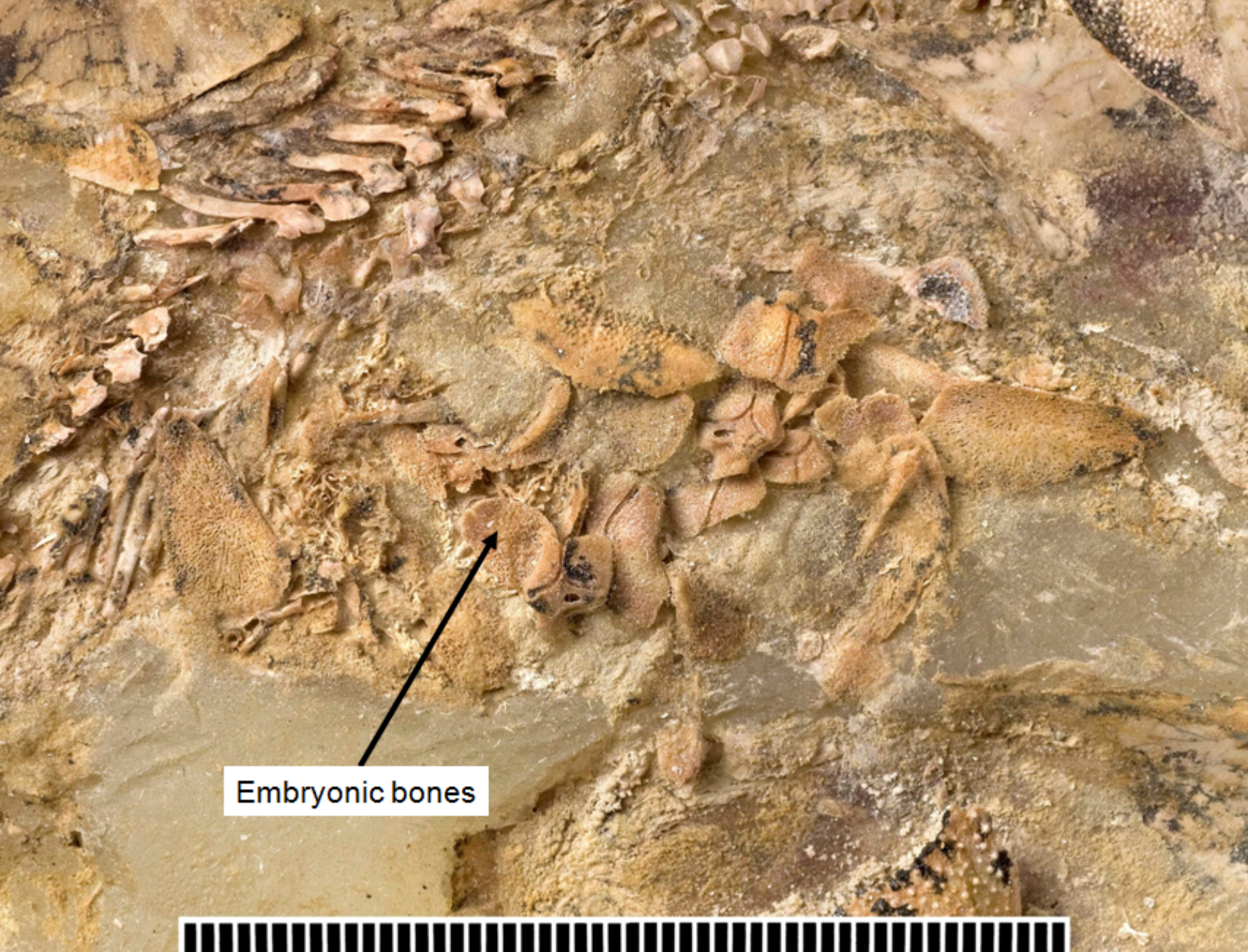


The arthrodire *Incisoscutum ritchiei*
Gogo Formation, 380 million years old



Embryonic bones





Embryonic bones



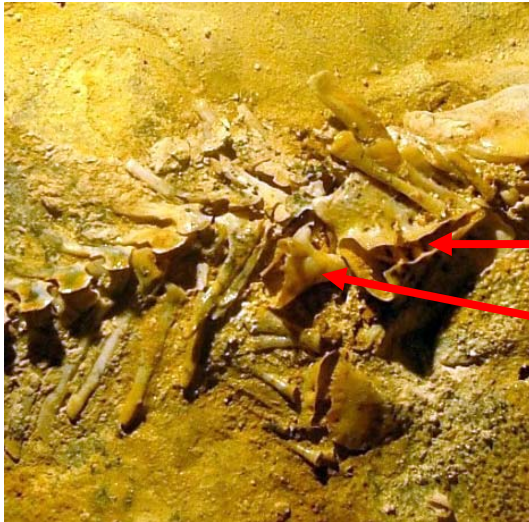
The new evidence of embryos showed

- That arthrodires, the largest group of placoderms, had internal fertilisation

But the many hundreds of arthrodires in Museum collections around the world showed no evidence that they had sexual dimorphism.

So how were they doing it?

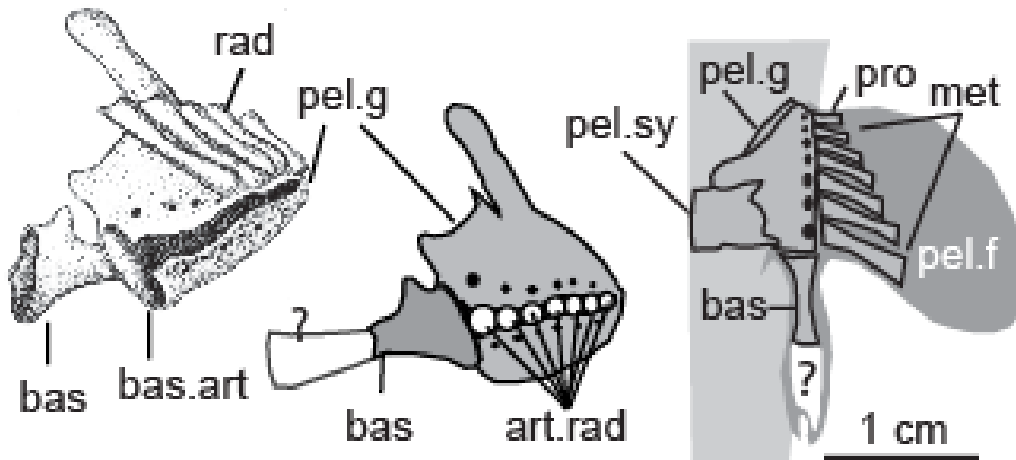
A new study of the pelvic fins of arthrodires was carried out



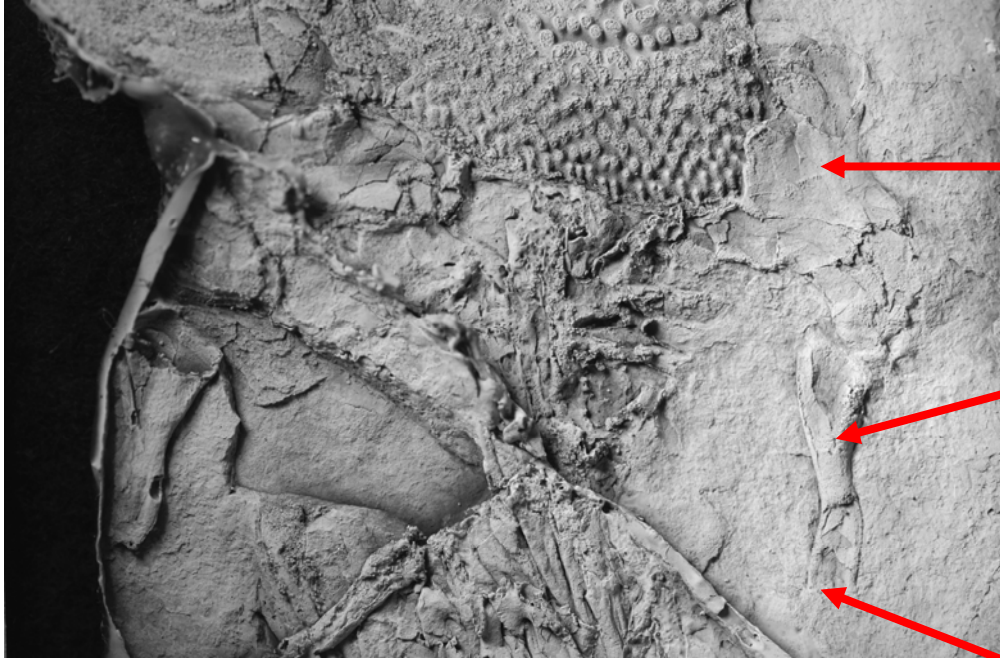
1. *Incisoscutum* (Gogo Fm, W.Australia)

Pelvic girdle

Basipterygium



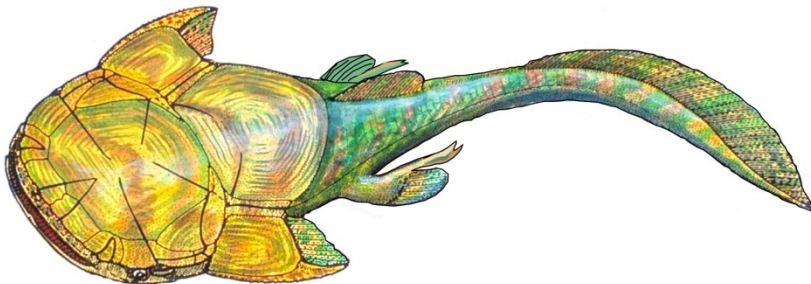
Austrophyllolepis, Mt Howitt Victoria (385 mya)



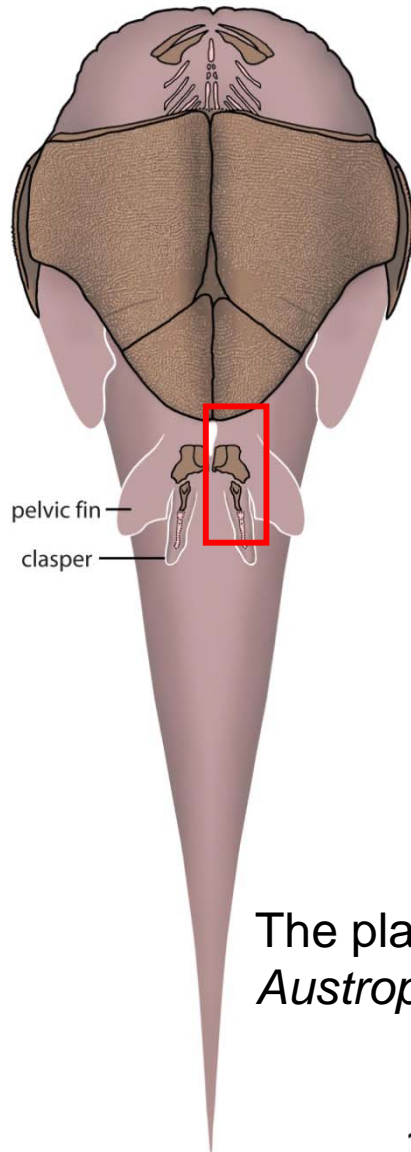
Pelvic girdle

Basipterygium

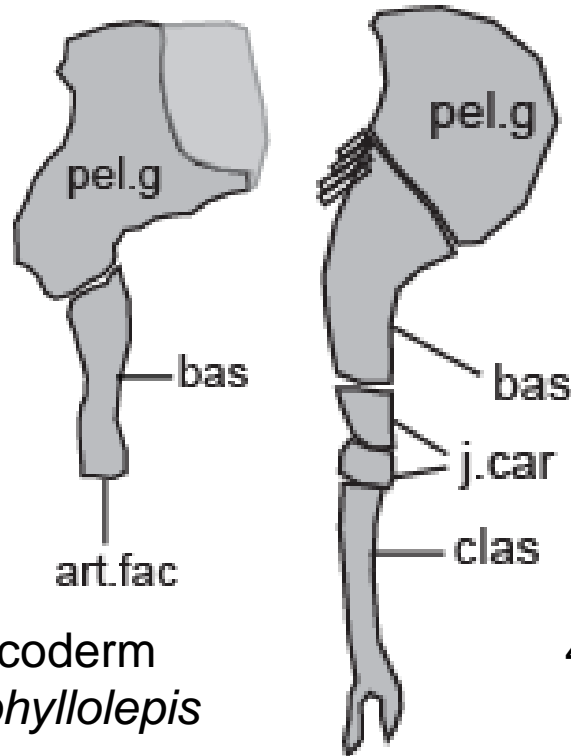
Facet for an additional cartilage



Arthrodires and sharks- mating similarity



|
1 cm



1. Arthrodires, like sharks, had internal fertilisation

2. The pelvic fins had long lobes for copulation

3. This shows that sexual Intercourse was more widespread in early vertebrates than previously thought

4. Complex reproductive strategies evolved early in vertebrates and may have driven evolutionary radiations