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**Remarkable sharks from the Early Devonian  
Campbellton Formation, New Brunswick, Canada**

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In 1892 A.S. Woodward (Natural History Museum, London) described two “chondrichthyans”, *Diplodus problematicus* and *Protodus jexi*, based on teeth from the Early Devonian Campbellton Formation, New Brunswick, Canada. In 1893 R.H. Traquair (Royal Museum of Scotland) renamed *Doliodus problematicus*, which he reaffirmed was chondrichthyan and noted the selachian nature of the *Protodus jexi* tooth was “proved beyond doubt”. Despite Woodward’s and Traquair’s chondrichthyan claims, from the mid-20th century both were placed into *Acanthodii*. Taxonomic challenges in identifying both *Doliodus* and *Protodus* have largely been resolved placing both species once again as early chondrichthyans.

The Campbellton Formation unconformably overlies the Val d’Amour Formation that is U-Pb dated 407.4 ± 0.8 Ma and contains miospores suggesting an early Emsian to early late Emsian age, older than about 398 Ma. Recent stratigraphic studies of the former formation suggest a coastal deltaic setting for the vertebrate beds. The sharks shared their habitat with cephalaspids (*Yvonaspis* spp.), placoderms (*Phlyctaenius* spp.) and acanthodians (*Mesacanthus semistriatus*, *Cheiracanthus? Costellatus*, and *Ankylacanthus incurvus*). Large eurypterids (*Pterygotus anglicus*), ostracods, and mollusks are also part of the assemblage.

In 1996 a well preserved, relatively complete, *Doliodus problematicus* was recovered, armed with about 60 functional teeth, most in situ. It represents the earliest undoubted chondrichthyan in which an intact dentition can be investigated. CT-scanning and 3-dimensional imaging has shown the dentition in remarkable detail. The specimen also has a relatively intact braincase as well as pectoral fin spines previously thought to be absent in all sharks, but a characteristic element in acanthodians.

*Protodus jexi* has been identified by its teeth that exhibit a range of morphologies. The largest are dagger-like in shape with finely serrated cristae and an anteriomedial labial ‘blood-draining’ groove suggesting an active predator. It probably had a clutching-penetrating or puncturing dentition and supports the interpretation of the species as a predator, or an opportunistic scavenger. *P. jexi* would presumably have been able to attack (or scavenge on) and

penetrate the armour of contemporary cephalaspids and placoderms, other various scaled fish such as acanthodians, perhaps even pterygotid eurypterids.