An assemblage of over 30 fossil teeth from an eight-metre Oligocene shark, *Carcharocles angustidens*, was unveiled at Melbourne Museum on 9 August, 2018. The Jan Juc area find was not only a national first, but also included unique evidence that ancient sixgill sharks (*Hexanchus* sp.) scavenged the predatory giant’s corpse on the seabed. The first tooth was found in 2015 in a boulder from the Jan Juc cliffs by a local teacher, Phil Mullaly, who subsequently contacted Museums Victoria. Phil is a keen fossicker along the Surf Coast, and has donated many fossils (including elements from whales, sharks, fish, invertebrates and amber) to the State Collection. Teeth belonging to *C. angustidens* were first distinguished by geologist Louis Agassiz over 180 years ago — since then, fossils have shown that it lived throughout the world’s temperate oceans for a period of at least 10 million years. But despite the species’ cosmopolitan abundance, associated dentitions of *C. angustidens* are incredibly rare. Phil’s find on the Surf Coast was only the third worldwide, and the first in Australia.

Reaching the boulder at Jan Juc required either wading around points or clambering over boulder debris for about a kilometre from the nearest access. As the silty marl gradually eroded with each high tide, Phil collected more than a dozen teeth, with complete roots and finely preserved serrations. We first visited the fossil site with Phil in December 2017. The ocean tides meant that we only had a few hours at a time before the site was swamped; nonetheless, more teeth were quickly spotted on the boulder surface. Hand tools were enough to clear away surrounding marl and isolate teeth for strengthening and collection. While investigating, two circumstances arose that surprised us. Firstly, there were many more fossil teeth preserved at this spot, beyond those already recovered by Phil. Most shark fossils are found as single teeth, with multiple teeth from the same animal found only rarely. Secondly, although the teeth we were finding belonged to *C. angustidens*, and were of comparable size to those already found, they were of very different condition.

**GIANT SHARK A MATTER OF TASTE**

**BY TIM ZIEGLER**

Food writer and MasterChef Australia judge Matt Preston (joined here by Erich Fitzgerald and Tim Ziegler) reckons sixgill sharks are good eating.
The teeth Phil had shown us earlier were complete, with bulbous roots and well-preserved enamel, and fairly impermeable to thin consolidant glues. Now, with the tide beginning to wash in and our time shortening, we found fragile, fragmentary teeth that comprised only a thin enamel shell. There was no root, and the blade of the tooth was hollow and infilled by marl. These teeth didn't match the aesthetic quality of Phil's early discoveries, but were scientifically exceptional. Importantly, the fragile replacement teeth could not have survived scattering, transport and accumulation at this point on the seabed. What we had were not the naturally shed teeth of an individual cruising the Bass Strait basin, but partially formed replacement teeth from further back in the jaw.

As we collected, excavated and prepared the *C. angustidens* fossils, we also periodically found smaller, low-slung sawblade-shaped shark teeth. These clearly belonged to a different species — specifically, the sixgill shark, *Hexanchus* — but were found amongst the teeth of the mega shark. Fossil remains at Jan Juc are not usually found grouped in one place. If the teeth had passed through the acidic gut of the *angustidens*, their blades would have been stripped of enamel. There are no signs of digestion, but several sixgill teeth are chipped and broken, and they all appear to be shed, adult teeth. Sixgill sharks still live in the ocean today, where they grow more than six metres in length. As adults, they spend more time in deep waters, where they have been observed scavenging the carcasses of whales. A carcass such as that of the *C. angustidens* would likely have attracted sixgills from kilometres away, with the normally solitary sharks tolerating large congregations as long as food was available.

The museum commissioned Peter Trusler to provide in-life depictions of the animals whose remnants we had found. This culminated in a minutely detailed reconstruction of *C. angustidens*, printed as an eight-metre (life-sized) wall panel in the Melbourne Museum foyer. The image of the shark in profile was so large it had to be displayed diagonally — even then, we couldn’t find a space big enough to fit the whole body. Peter also conceived a reconstruction of the giant shark in death, as it was stripped of flesh by the scavenging sixgills. This scene includes such characteristically Truslerian details as the defleshed vertebra of a toothed mysticete whale, fish known from the Jan Juc Formation, and the characteristic silt, mud, and shell debris of the strata.

The sawblade pattern of cusps on the lower teeth of *Hexanchus* sharks efficiently removes flesh from carcasses (P253894)

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