

The province is on the border and is itself divided by mountains. The rocks here are part of an immense package of sedimentary rocks to the west of the core of the continent. Throughout time shallow seaways have covered and retreated from the land, leaving a mix of marine and terrestrial deposits. During the Mesozoic era the mountains began to form. Rocks to the west were pushed upwards and eroded by exposure. Material gradually washed down towards the east and collected in a shallow, basin-like seaway.

To the north are the oil sands, where she was found. A town sits on the very edge of the sands, its small population is mostly employed within the oil and gas industry. In recent years it's been swept by wildfires, and residents have to periodically evacuate. Crews digging for fuel here sometimes unearth large fossils by accident.

Just over a day's drive along the mountains and you cross the border. Others like her are buried there, although the last find was over a hundred years ago. Since then all that's catalogued is plant matter, fish teeth and scales.

On private land, fossils can be collected or sold as the individual or family wants, whereas here you would face a fine and a year in prison. Commercial collectors often negotiate leases for access with landowners and keep whatever they find to sell. Journals refuse to publish studies of those specimens as they might be sold on or refused for further study at any time. Some bodies effectively disappear from being found that way.

At the oil sands a crew member noticed his digger hitting against an unusually hard patch of rock - this was her lower back and hind legs. Commercial digging had to stop in the south-east quarter of the quarry while we applied for an excavation permit from the Ministry of Culture, Multiculturalism, and Status of Women. All in all, the handover process from the company took months. She was fenced off and covered over with a tent in the meantime.

In cladograms she appears at the end of repeated splits of a family tree. Some of those that came before and after her within her sub-order are familiar from films, children's stories and prize displays.

Her sub-family, however, is an awkward grouping of species. The lack of quality specimens produces patchy research with a knock-on effect to classification. Regular lowland flash-floods often mixed up their remains with debris and other animals, dumping them in jumbled graves. Their bodies are usually pieced together from multiple dig sites, comparison and guesswork.

She fell, sank to the seafloor and was buried whole within a day. Her head shows most of the characteristics used to distinguish her sub-family: distinctive bony deposits fused to the roof of her skull, rings of them on the neck, shoulders, even her eyelids.

The weight of her armour and her size kept her down on all fours in life. She would have absorbed damage rather than running from it as her ancestors did. Some of the osteoderms at her shoulders grew huge keratinous spines over them. The proportion of keratin to bone makes the domestic cow her closest contemporary analogue.

She's been allocated a dry number for cataloguing, but she's not got a nickname yet. Some get named after quarry sites, others after a landowner. She might be named after one of us. The sex of the body is unknown, and so in keeping with tradition here (boats, cars and so on) she's regarded as female.

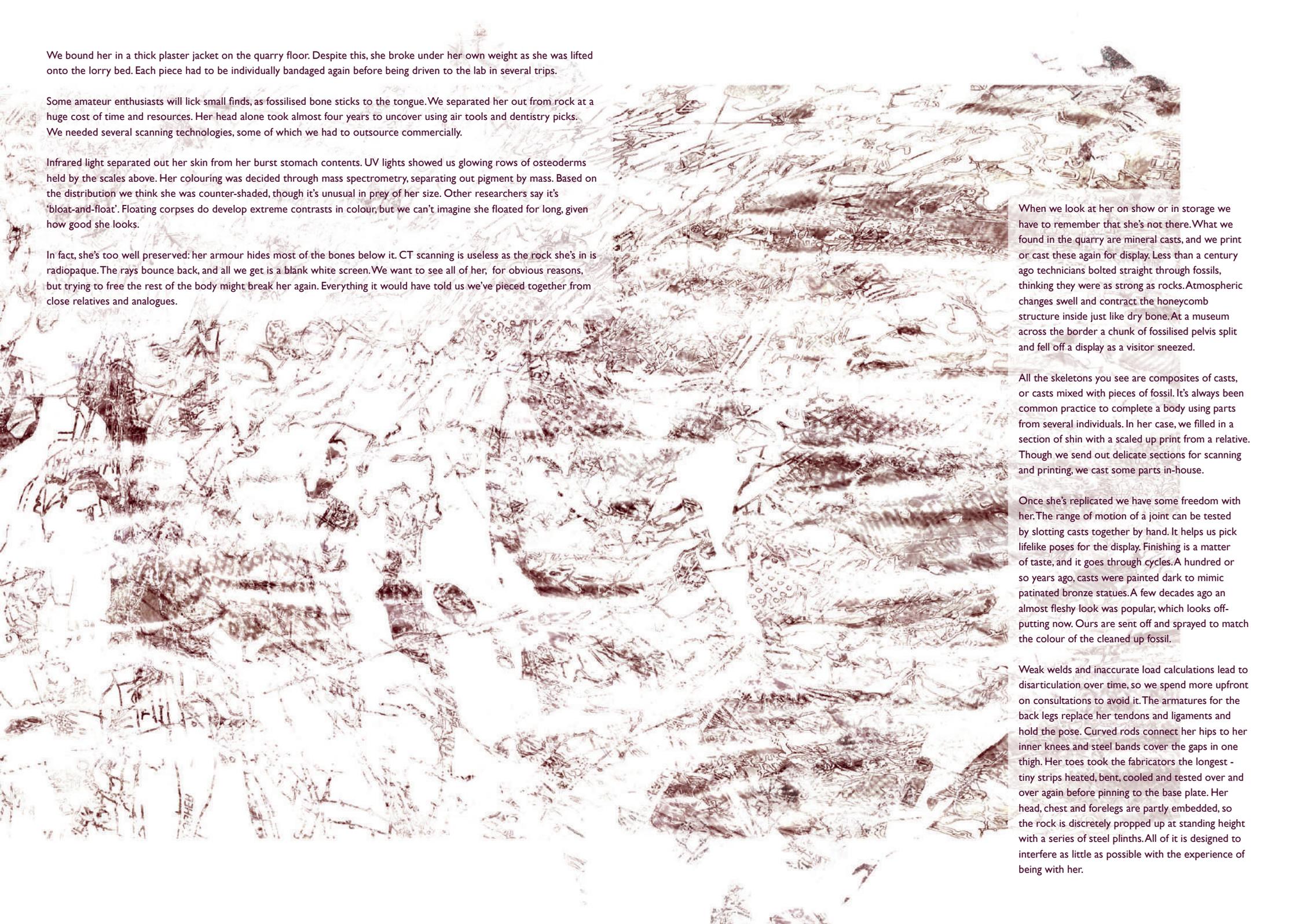


We bound her in a thick plaster jacket on the quarry floor. Despite this, she broke under her own weight as she was lifted onto the lorry bed. Each piece had to be individually bandaged again before being driven to the lab in several trips.

Some amateur enthusiasts will lick small finds, as fossilised bone sticks to the tongue. We separated her out from rock at a huge cost of time and resources. Her head alone took almost four years to uncover using air tools and dentistry picks. We needed several scanning technologies, some of which we had to outsource commercially.

Infrared light separated out her skin from her burst stomach contents. UV lights showed us glowing rows of osteoderms held by the scales above. Her colouring was decided through mass spectrometry, separating out pigment by mass. Based on the distribution we think she was counter-shaded, though it's unusual in prey of her size. Other researchers say it's 'bloat-and-float'. Floating corpses do develop extreme contrasts in colour, but we can't imagine she floated for long, given how good she looks.

In fact, she's too well preserved: her armour hides most of the bones below it. CT scanning is useless as the rock she's in is radiopaque. The rays bounce back, and all we get is a blank white screen. We want to see all of her, for obvious reasons, but trying to free the rest of the body might break her again. Everything it would have told us we've pieced together from close relatives and analogues.



When we look at her on show or in storage we have to remember that she's not there. What we found in the quarry are mineral casts, and we print or cast these again for display. Less than a century ago technicians bolted straight through fossils, thinking they were as strong as rocks. Atmospheric changes swell and contract the honeycomb structure inside just like dry bone. At a museum across the border a chunk of fossilised pelvis split and fell off a display as a visitor sneezed.

All the skeletons you see are composites of casts, or casts mixed with pieces of fossil. It's always been common practice to complete a body using parts from several individuals. In her case, we filled in a section of shin with a scaled up print from a relative. Though we send out delicate sections for scanning and printing, we cast some parts in-house.

Once she's replicated we have some freedom with her. The range of motion of a joint can be tested by slotting casts together by hand. It helps us pick lifelike poses for the display. Finishing is a matter of taste, and it goes through cycles. A hundred or so years ago, casts were painted dark to mimic patinated bronze statues. A few decades ago an almost fleshy look was popular, which looks off-putting now. Ours are sent off and sprayed to match the colour of the cleaned up fossil.

Weak welds and inaccurate load calculations lead to disarticulation over time, so we spend more upfront on consultations to avoid it. The armatures for the back legs replace her tendons and ligaments and hold the pose. Curved rods connect her hips to her inner knees and steel bands cover the gaps in one thigh. Her toes took the fabricators the longest - tiny strips heated, bent, cooled and tested over and over again before pinning to the base plate. Her head, chest and forelegs are partly embedded, so the rock is discretely propped up at standing height with a series of steel plinths. All of it is designed to interfere as little as possible with the experience of being with her.