

The White Sea, Northern Russia

Of all the places on Earth where late Neoproterozoic multicelled animals (that is metazoans) are known, some of the best preserved come from the Winter Coast (White Sea) region of Russia, and to a lesser extent from the Ural Mountains, Siberia and the Ukraine. These were first discussed in some detail and brought to world attention by Boris Sokolov and his colleagues in the late 1950's, making up a fauna called the Vendian biota.

Preservation is particularly excellent in the White Sea region, because fossils are preserved in fine clays for the most part, whereas those of the Flinders Range of South Australia and the deserts of southern Namibia are mainly in coarser sandstones.

Some of the more spectacular fossils from the White Sea include *Kimberella*, a possible mollusk, a snail precursor. More than 700 specimens of this small beast have been collected along the White Sea coast, and it is clear that this animal moved and used some sort of structure to extend beyond its main body mass to rake through the sediments, collecting food from the near surface. The marks left behind indicate a feeding structure like a radula, which snails use to graze with.

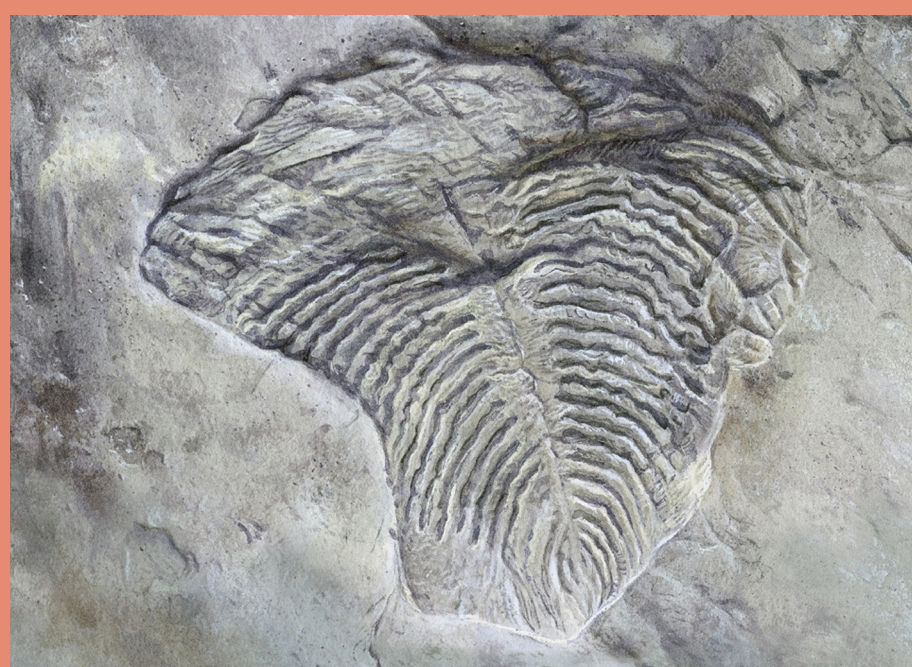
Yet another interesting animal is *Yorgia*, a segmented form that was likely quite flattened in life. *Yorgia* left a trail – likely a feeding trail. Mikhail Fedonkin, Andre Ivantsov and their crews have collected large slabs from the tall cliffs along the White Sea, and those slabs demonstrate clearly for the first time that the footprints left in the sediments were those of *Yorgia*. It appears that this species moved about on the algal and bacterial mats which covered the ocean floor, stopping for a time to soak up the nutrients and then travelled on to a new spot. The environment must have been so stable and undisturbed that these “feeding footprints” were left intact, and then an occasional sand avalanche from the shoreward slope above covered both the footprints and the *Yorgia* at the end of the trail! Similar trails have been observed for such forms as *Dickinsonia* in the Flinders Range of South Australia.

A more elegant form is the sea pen-like *Charnia*, which probably fed by its many polyps filtering food out of the sea water. Other animals, such as *Nemiana* and *Beltanelloides*, formed colonies on the sea floor at the base of the *Charnia* assemblage, and also may have filtered sea water for food.

It is the exquisite anatomical detail preserved in the claystones of the White Sea and Siberian assemblages that sets them apart from most other assemblages around the world and which offers detailed insights into the relationships of these soft-bodied organisms, the jewel in the palaeontological crown of Russia.



The cliffs of the Winter Coast of the White Sea, northern Russia where a biodiverse Vendian (Ediacaran Period) fauna has been recovered (P. Trusler).



From top to bottom: Winter Coast of the White Sea, northern Russia where much of the Vendian biota was collected (M. Fedonkin).

Reconstruction of *Kimberella*, a possible snail relative (M. Fedonkin).

Reconstruction of the colonial *Nemiana*, a possible coral relative (M. Fedonkin).

Yorgia, a segmented form which probably fed by soaking up nutrients from the algal and bacterial mats that covered the ocean floors 540 million years ago (P. Trusler).

Transport used to reach the White Sea locales, at a helicopter base near Arkangelsk, Russia (P. Vickers-Rich).