

Brigitte Weidlich

The discovery of over 500 million year old small fossils in southern Namibia, are today supporting scientific research of living organisms that dwelled on mega-continents like Gondwana, Pangea and Rodinia. Namibia's southern mountain ranges near Aus provide fascinating fossil finds – witness to dramatic happenings like the Cambrian Fauna Explosion eons ago. Renowned international scientists are currently researching these fossils. Would you like to know more? Read on.

How it began

Back in 1908, two German geologists in the erstwhile German South West Africa (now Namibia) discovered interesting fossils belonging to what is today known as the 'Ediacaran biota'. Geologists Paul Range (1879-1952) and Hans Schneiderhöhn (1887-1962) showed the fossils to Georg Gürich (1859-1938). Gürich was a geologist and palaeontologist. Their findings were made public for the first time in 1929, during an international geological congress in Pretoria, South Africa. One of the Namibian fossils Gürich named *Rangea schneiderhoehni*, in honour of his two colleagues. Specimens of these beautiful fossils, which are over 550 million years old, can be viewed at the National Earth Science Museum in Windhoek. These fossils remained mostly unnoticed for several decades until the 90's, when they suddenly became world-famous.

Then unbeknown to Range, Gürich and Schneiderhöhn, these fossils and the rock sequences of Namibia would later help support the theory of the continental drift, developed a century ago by Alfred Wegener, a German geophysicist and meteorologist. Wegener first published his findings as an article in 1912 and then as a book 1915. He based his continental drift theory on similarities of geological formations and flora in West Africa and the eastern parts of South America. Only decades later was his theory supported.

Continental drift

Wegener argued that all five continents of our time formed one supercontinent some 600 million years ago and Gondwana was its southern part. Gondwana started breaking away from the super-super continent Rodinia and then itself broke up some 200 million years ago. South America, Africa, Antarctica, Australia, India, Arabia and some other bits were separated.

Ancient ocean deposits

Several ice ages or snowball/slush ball earth periods occurred on our planet around two billion years ago until some 560 million years ago. The melting ice caused flooding and formed shallow continental shelf oceans in low lying areas, including in southern Namibia in the Nama Sea, the geologist Nicole Grünert explains in her book 'Namibia – Geological Wonderland'. Rocks - now preserved as sandstones, siltstones and limestones - host the fossils of many of the primitive organisms that lived in these shallow seas – and here in these Namibian rock layers at our doorstep is where our fossil-finds become so exciting and significant.

Tourists often wonder why in several parts of southern Namibia there are so many flat mountains, exposing horizontal geological layers of sediments and volcanic ashes, as well as ancient reefs. Fossils in these rocks show that a rich biota once inhabited that erstwhile Nama Sea, writes Grünert. Fossils, sometimes only their imprints, have been preserved in the rocks of what geologists call the Nama Group. These are sediments of the Nama Sea deposited when southern Namibia was submerged. The Nama Group area has in recent years drawn the attention of international scientists.

Similarities with Australia, China, Russia

In 1946, imprints of soft-bodied organisms were discovered in Australia's Ediacara Gorge north of Adelaide. They had some similarities to those discovered 1908 in Namibia by Range and Schneiderhöhn. Some of these were leaf-shaped, simple fractal branching organisms only found in a few places worldwide like Russia, China, Newfoundland, Canada, Iran and Saudi Arabia. Ediacara fossils were also discovered, but only later.

These organisms lived for the most part in the shallow sea(s) and many had the leaf-like shapes like the *Rangia schneiderhoehni*. There were others with a tubular construction such as *Ernietta* known from southern Namibia.

All shapes and sizes

Some had shapes like today's sea-pen, but they did not have the detailed construction of this group. They lived between 630 million and 540 million years ago - the Ediacaran period. The Cambrian period followed the Ediacaran period. Something very spectacular happened over the next ten to twenty million years - the Cambrian Explosion.

Big bang: the Cambrian Explosion

What scientists call the Cambrian Explosion involved the sudden development of more complex organisms that can be classified as true animals, “from which all present [animal] life forms, including humans, can be traced”, writes Grünert in her book.

Obviously, geologists and palaeontologists were the drivers for the understanding of this massive shift in the biota from the Precambrian to the modern Phanerozoic time.

Farm Aar and the region around Aus in southern Namibia hosts the most significant Ediacaran fossil sites in Africa and is one of only a few sites worldwide with such a diversity of species from enigmatic life forms to true animals.

Australian scientist Patricia Vickers-Rich, has led several field research expeditions to southern Namibia for this purpose, the most recent one in December 2017.

“The question is when and how did animals really appear on earth? The Cambrian Fauna Explosion seems to be the starting point. That is what our research is about,” she told Gondwana News Online during her recent field research in Namibia. Vickers-Rich is Professor of Palaeobiology at Swinburne University of Technology and Professor Emerita at the School of Earth, Atmosphere & Environment at the Monash University, both in Melbourne. She has penned many scientific publications.

Dramatic revolution

“The Ediacaran-Cambrian transition marks a key point of one of the most dramatic geo-biological revolutions in earth history with the advent of skeletons and complex behavioural systems of organisms – in short the Cambrian Explosion,” she explains. “This transition is spectacularly well preserved and exposed in southern Namibia in a pile of thick sediments,” says Vickers-Rich. “The fossil-bearing layers in southern Namibia have trace fossils and body fossils, which are profoundly important for understanding the events that led to the explosion.”

One of them is the *Namacalathus hermanastes*, representing one of the oldest organisms, along with *Cloudina*, which laid down hard shells, the latter reported on in Namibia by Gerard Germs (1972) and *Namacalathus* by US-scientist John Grotzinger in 2000.

And then there is the *Ernietta*, reported on first by Hans Pflug in 1966, a bag-shaped organism quite variable in size, some forms of which probably lived half buried in the sandy seabed of the Nama Sea. The top of the organism branches into two fan-like parts and the whole

organism had the same double-walled tubular structure as seen in some other Nama forms such as Pteridinium. “Interestingly, some of the Ernietta fossils we have found in Namibia are three-dimensional, part of their inner body is filled with sand,” says Vickers-Rich.

International heritage site

On the Farm Aar Geo-Park in southern Namibia several different sorts of fossils have been found. Researchers from around the globe, in cooperation with the Namibian Geological Survey in the Ministry of Mines and Energy applied to Namibia’s National Heritage Council to list the area as a national heritage site. This was approved in 2014. Plans are underway to have Aar and the Fish River Canyon listed as a World Heritage Site. Vickers-Rich is currently putting together such a proposal to UNESCO. This area has been a major focus for two UNESCO International Geoscience Programme projects – IGCP493 and IGCP587.

Plans are proceeding rapidly to establish a Heritage Museum in Aus. This will include not only the palaeontological/geological history but also the long human history, to be managed by members of the local community, which will attract more tourists. School children of southern Namibia in particular will be involved through field trips and awareness campaigns.

“This is to stir interest among the youth so that Namibia will have more local scientists in future as well as jobs for the teaching and tourist sectors”, says Vickers-Rich.

The building for this Museum has been secured and outfitting will begin in cooperation with the local community, the local school, and other institutions in Aus during June 2018.

The research in southern Namibia and other countries was supported from 2003-2016 by two UNESCO IGCP projects and the National Geographic Society. Donations allow continuation of the research into what is regarded as the ‘Cradle of Animalia’ – the origin of the modern animals we know, including us.