The Hemifusome
An Undercover Agent in the Cell

Scientists discover a new cell organelle after 400 years of microscopy

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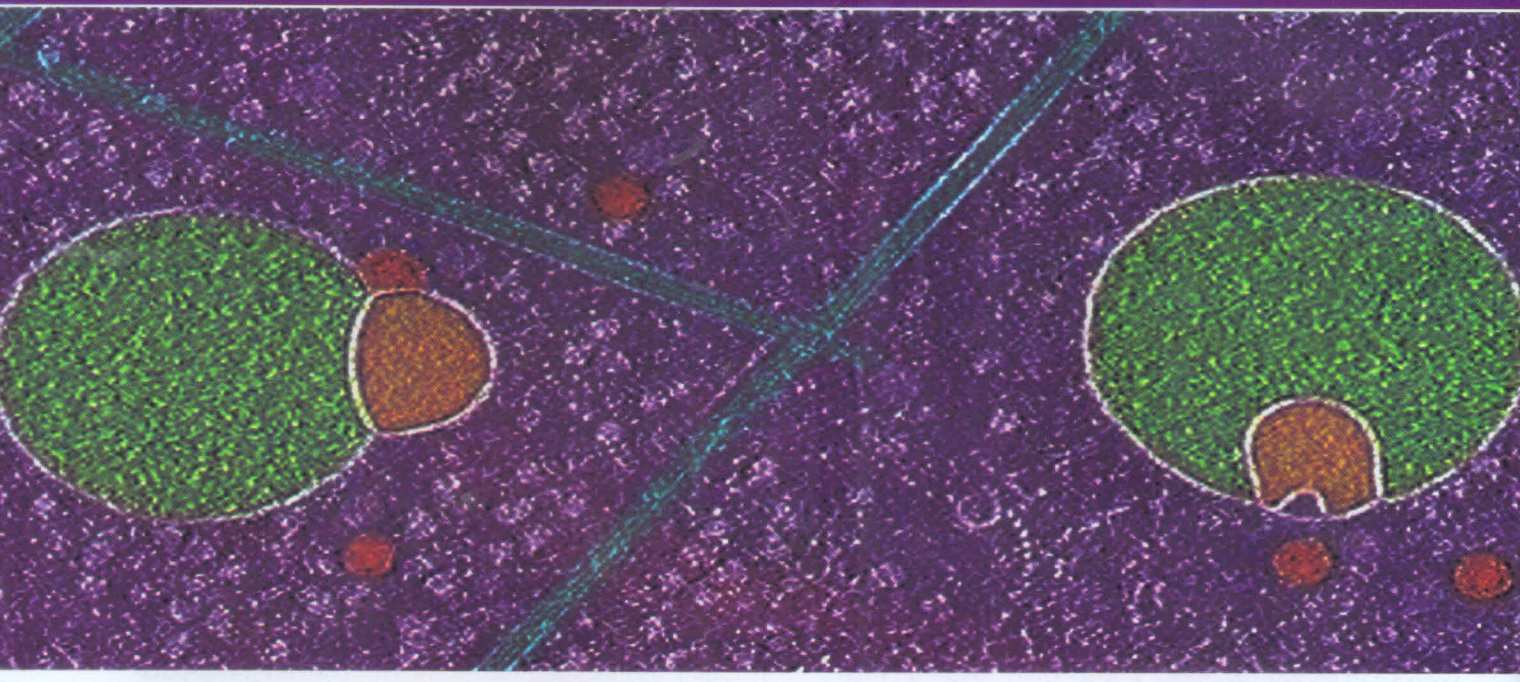

Direct Hemifusome(left) and Flipped Hemifusome (right), with the PNDs being tiny, deeply orange coloured blobs at the junctions of vesicles. Similar proteolipids are also found scattered outside the Hemifusome.

THE cell keeps its secrets. The number of mysteries hidden within our cells doesn't seem to be nearing zero anytime soon. A member of the cell family to tell us 'hello' now seems to be the "Hemifusome" (literally means half-fused), a structure inside the cell, a few months back reported to exist, escaping the watchful eyes of scientists since the discovery of the cell.

The cell is very much like a factory. There is manufacturing, packaging, sending materials around, trading with outsiders, waste disposal, a central authority to look after everything, etc. The central authority is the nucleus, which contains the DNA, the genetic material which has a say in "what happens where". The manufacturing is done by the ribosomes, which read the orders sent by the DNA to create proteins. These proteins are the true workhorses of the cell. They have the polymath-like ability to do everything from cell reproduction to sending signals telling your brain you're hungry. But a protein synthesised can't do everything right from its birth. It has to be packaged in small bubble-like structures called vesicles, which will then carry these proteins to wherever they're supposed to do their job. These vesicles are synthesised in other cell organelles apart from the nucleus and were once thought to be boring fat lumps. Of course, the centre stage back then was occupied by the all-famous DNA. It was only later that the fascinating realm of duties these vesicles performed was discovered. This entire system involving vesicles is considered as the Endosomal System.

It was relatively well known that these vesicles engage in a variety of circus acts like fusing with each other, tearing apart, getting engulfed, or getting eaten up by lysosomes, which destroy these vesicles. That's why these vesicles are also shape-shifters. But one thing remained a mystery. What exactly happens in that fleeting moment when they begin to change form?

And that was the question that researchers at the National Institute of Health and the University of Virginia tried to answer and stumbled upon some unknown structures. The Hemifusomes seemed to be formed when two different vesicles came together to fuse with each other. We know that the two vesicles have different origins because of their distinct sizes and the contents they have inside them. When they come together, they form a thin wall between them called the Hemifusome Diaphragm (HD), separating the two vesicles.

Researchers found two types of these Hemifusomes. One with a smaller vesicle looking as if poking out of the larger one