Your liquid crystal brain

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What does your brain have in common with handheld computer games? Discover ‘lyotropic’ liquid crystals (rather than the ‘thermotropic’ sort) - the ones found most commonly in nature.

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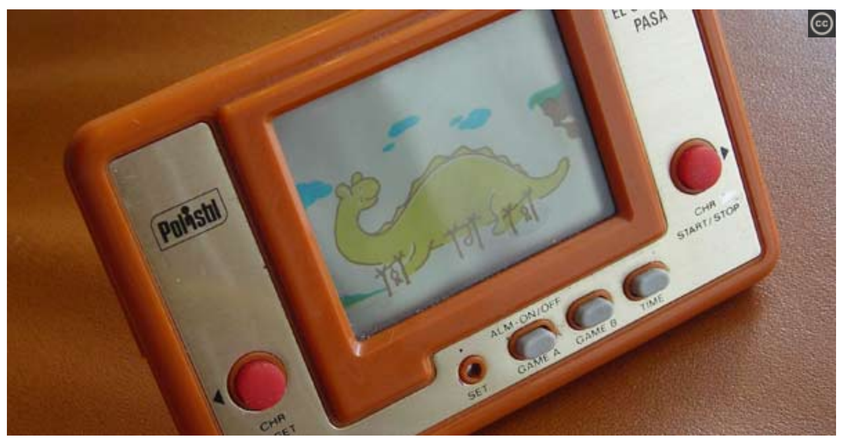
Ironically, despite the fact that humans only discovered liquid crystals around a century ago, and for some time assumed them a rare phenomena, much of life on earth has chemical compounds within it which can form liquid crystal phases. In fact around 30% of your brain is made of liquid crystals (apart from the stuff which is water).

Some diseases are related to liquid crystal phenomena including sickle cell anaemia.

In sickle cell anaemia the red blood cell structure formed by the liquid crystals is changed by a slight change in state of the liquid crystals. The cell becomes slightly less flexible.

This inflexibility can cause loss of fluids from the centre and the blood cell can whither and shrink. This shrinking creates the defining ‘sickle’ shape of the cell.



Early in the evolution of LCD displays: a 1980 computer game [Image: farnea under CC-BY-SA licence]

Some scientists are now concentrating on understanding how to build artificial structures made from lyotropic liquid crystal compounds. These structures, called liposomes, are like very simple biological cells (really these are very simple versions of an actual natural cell).

The first successful liposome was created by Alec Bangham in 1961. In 1974 Gerald Weissman began a very important series of experiments looking at how liposomes could carry ‘packages’ of material inside themselves.

These liposomes could then enter real, natural biological organisms carrying these packages - but acting on the outside in a similar way to a natural cell.

The future of liposome research could be very exciting, providing new ways of carrying treatments through ‘magic bullets’ which fool the body into believing they are a natural part of its processes and engaging directly with natural cell structures in extremely refined ways.

Lyotropic Liquid Crystals are a major research interest of Richard Templer who was featured in the OU/BBC programme *Quantum Leaps*.

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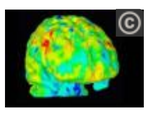

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