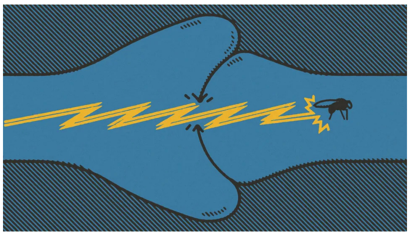
Leaders | Know a fly, know thyself? **Oct 3rd 2024**

A map of a fruit fly's brain could help us understand our own



A miracle of complexity, powered by rotting fruit

FOR BILLIONS of years, life was single-celled and boring. Even when it became multicellular and more interesting, it took the evolution of brains, and subsequent competition between them via the animal bodies they inhabited, to create the biodiversity that exists today. Greater complexity caused by brain-on-brain competition permitted better processing of information from special organs for vision, hearing, smell, taste and touch. This made for more cunning predators, more elusive prey and more demanding sexual partners. It also (because much physiology is regulated by the brain) allowed larger and more sophisticated bodies to evolve.

Even brainless plants owe a lot of their diversity to brains, for their lives are constantly shaped by their interactions, both beneficial and hostile, with brainy animals. Without pollinating insects there would be no flowers. Without grazing ungulates, grasses would not have evolved.

Since Homo sapiens appeared, brains have started to analyse themselves. And this week marks the publication of an important step towards the betterment of that understanding. Researchers have produced a complete map of the neurons in the brain of an adult fruit fly.

This map, called a connectome, traces the passage through the brain of the filamentary, data-carrying protuberances of almost 140,000 neurons and logs almost 55m connections between them. Earlier projects have mapped the nervous systems of a simple worm (300+ neurons), a fly larva (3,016) and the central part of an adult fly's brain (about 27,000). But this is the real McCoy, a complex, adult animal that can navigate in three dimensions, fight its rivals, evade its predators and warn its confrères of threats.

That is a tremendous achievement and is already helping researchers comprehend how flies' neurons collaborate to process sensory information and turn it into instructions for action. It should help them understand people, too. True, the brains of flies and humans operate differently; with more than 600m years of evolution separating them, they could hardly fail to. But what worked technologically to produce the fly connectome should, with a bit of scaling up and the application of enough dollars, work for vertebrates as well.

That will start with mice. But, eventually (with enough technological improvement and quite a lot more dollars) a human-brain connectome should be doable. If and when this happens, many questions that are intractable today, ranging from how to treat psychiatric diseases to what makes humans human, may be easier to answer.

Some human brains, however, are not content to leave it at that. These brains think the evolutionary trajectory of brains, far from having peaked with Homo sapiens, is only just getting going. For, besides self-analysis, another thing brains can now do is make simulacra of themselves. Having access to the way natural selection has built brains over the course of hundreds of millions of years will surely assist such efforts.

(467 words)

www.economist.com