PublisherInfo		
PublisherName	:	BioMed Central
PublisherLocation	:	London
PublisherImprintName	:	BioMed Central

Structure of a biological propeller

ArticleInfo		
ArticleID	:	4016
ArticleDOI	:	10.1186/gb-spotlight-20010316-02
ArticleCitationID	:	spotlight-20010316-02
ArticleSequenceNumber	:	87
ArticleCategory	:	Research news
ArticleFirstPage	:	1
ArticleLastPage	:	2
ArticleHistory	:	RegistrationDate : 2001–03–16 OnlineDate : 2001–03–16
ArticleCopyright	:	BioMed Central Ltd2001
ArticleGrants	:	
ArticleContext	:	130592211

Kenneth Lee
Email: kenlee_fr@yahoo.fr

The flagellum, the organelle that enables bacteria to swim, consists of a long, thin filament that is rotated at hundreds of revolutions per second by a motor embedded in the cell surface. The filament is essentially a tube made up of 11 protofilaments arranged as a helical supercoil. By switching between left- and right-handed helical twists (the L and R states, respectively), a bacterium can switch between 'running' and 'tumbling' (reorientating) motions. In the 15 March Nature, a team led by Keiichi Namba of the Protonic NanoMachine Project and Matsushita Electric Industrial Company, Kyoto, Japan, provides an insight into how filaments are able to switch helical states (*Nature* 2001, **410:**331-337).

Each protofilament contains thousands of copies of the protein flagellin, aligned one of top of another. Namba and colleagues crystallized the protein and analyzed its structure at atomic (2Å) resolution. Flagellins of both the L and R states crystallized only into the R state. To simulate the slightly longer L protofilament, the authors used a computer program to gradually stretch their R-type protofilament images. At one point, an abrupt change in conformation was seen in a local feature of the structure. Samatey *et al*. suggest that this may be the key event in switching.

This molecular switching mechanism will be of interest to nanotechnologists who are trying to develop tiny propeller-driven biomolecular devices that could move around the body repairing cells and dispensing drugs.

References

1. Samatey FA, Imada K, Nagashima S, Vondervist F, Kumasaka T, Yamamoto M, Namba K: Structure of the bacterial flagellar protofilament and implications for a switch for supercoiling. *Nature* 2001, 410:331-337., [http://www.nature.com/nature/]

2. Protonic NanoMachine Project, [http://www.jst.go.jp/erato/project/npnm_P/npnm_P.html]