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Research Highlights

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DNA purification: Separation at a stretch

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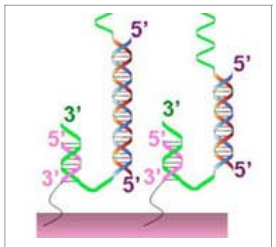
Long DNA molecules can be separated on the basis of their length by pulling them off a surface when stretched under the influence of an electric field



DNA molecules are being studied for applications ranging from genetic fingerprinting to the possibility of making a biologically inspired computer that doesn't require traditional semiconductors. With such goals in mind, it is necessary to separate DNA strands on the basis of their length. Conventional methods have a number of limitations, however, including the maximum length of molecules that can be separated.

Now, a team of researchers in the USA have used electric fields to separate long double-stranded DNA molecules. Di Gao and colleagues[1] (#B1) from the University of Pittsburgh and the University of California, Riverside in the USA immobilized long DNA molecules on a glass slide through short DNA anchors attached to its surface. This sample was then put between two conducting plates in a chamber filled with a buffer solution. Application of an electric field stretches out the long DNA molecules, resulting in forces that break the hydrogen bonds linking them with the shorter strands connected to the substrate. Because the force is proportional to the length of the DNA, the longer molecules are detached first.

In this way, Gao and co-workers were able to separate so-called lambda-DNA — a standard length of viral DNA containing 48,502 base pairs — from human DNA comprising about 100,000 base pairs. Significantly, this simple and highly efficient method should, in principle, have no upper limit on the length of DNA that can be separated.

REFERENCE

1. Gao, L., Wu, J., Gao, D. & Wu, J. Separation of long DNA molecules through cleavage of hydrogen bonds under a stretching force. *Appl. Phys. Lett.* **91**, 113902 (2007). | **Article** (http://dx.doi.org/10.1063/1.2784967) |