

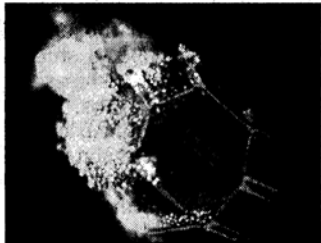
The New York Times

A Microscopic Tool That Was Inspired By the Human Hand

Using the human hand as a model, scientists at Johns Hopkins University and its medical school have developed a microscopic tool that might one day be used inside the body. The tool, a clawlike gripper less than a millimeter in diameter, could grab cells from tissue for a biopsy, for example.

Most microtools for use in medical applications are operated by tethers of some kind. But the mi-

crogripper, developed by Timothy G. Leong, David H. Gracias and colleagues and described in The Proceedings of the National Academy of Sciences, is autonomous —



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The gripper closed around tissue.

it can be guided by a magnetic field and actuated by warming or chemicals.

In a hand, jointed fingers are arranged around a central palm, and the fingers can bend to grasp an object. The researchers mimicked this approach in their design, with six "fingers" arranged around a hexagonal "palm." And just as in a hand, the microgripper's fingers have rigid metal "bones" connected by flexible joints.

The joints consist of two thin layers of metal, one of which is stressed. Ordinarily the stressed

layer would cause the bimetal strip to bend, but the strip is held flat and stiff by a layer of polymer. When this polymer is warmed or degraded by certain chemicals it becomes flexible, allowing the strip to bend and the gripper to close. (A video is available at nytimes.com/science.)

The researchers say that there are many hurdles to overcome in using such a device inside the body, but that the work represents "a step toward the development of biocompatible, minimally invasive, autonomous microtools."