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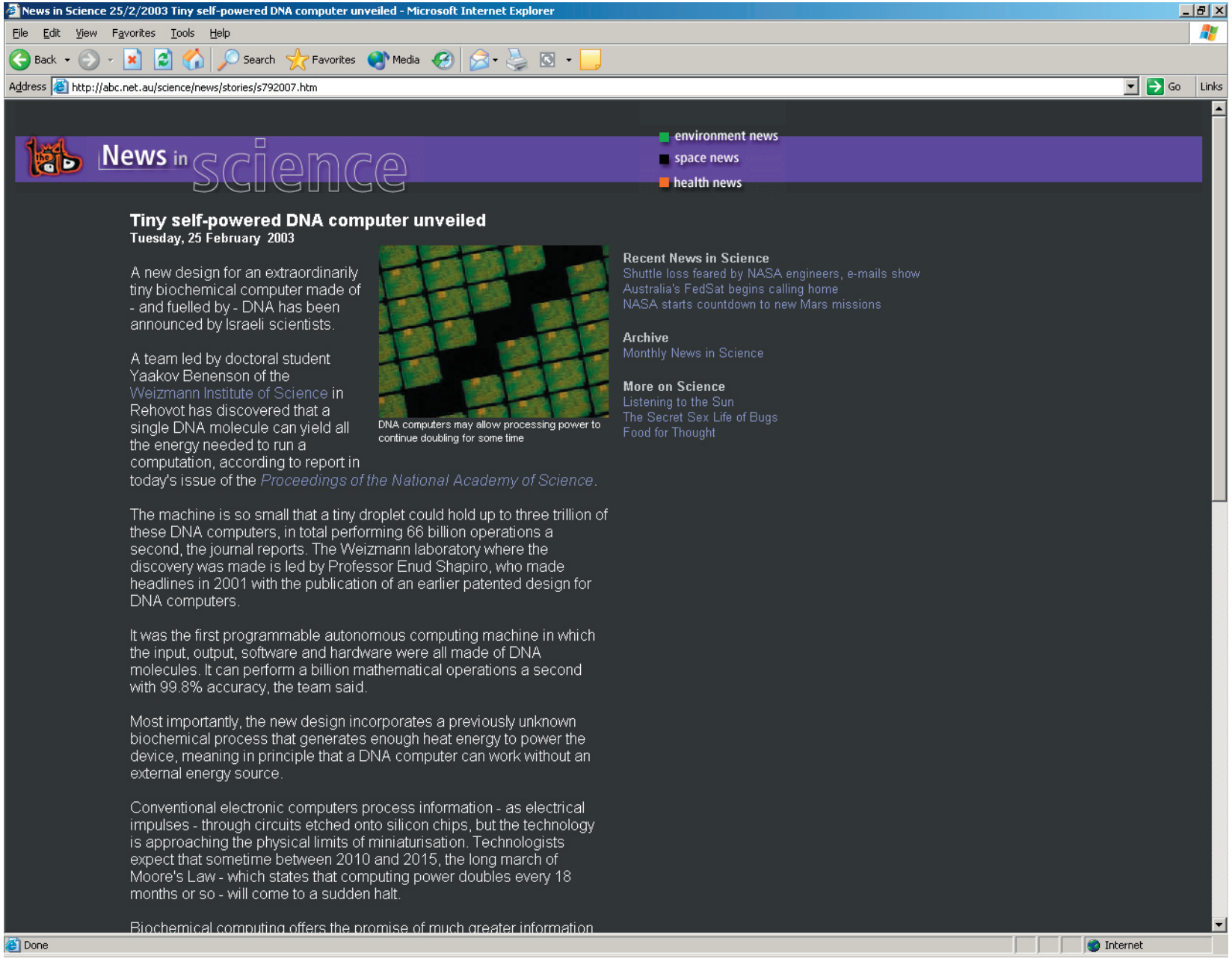

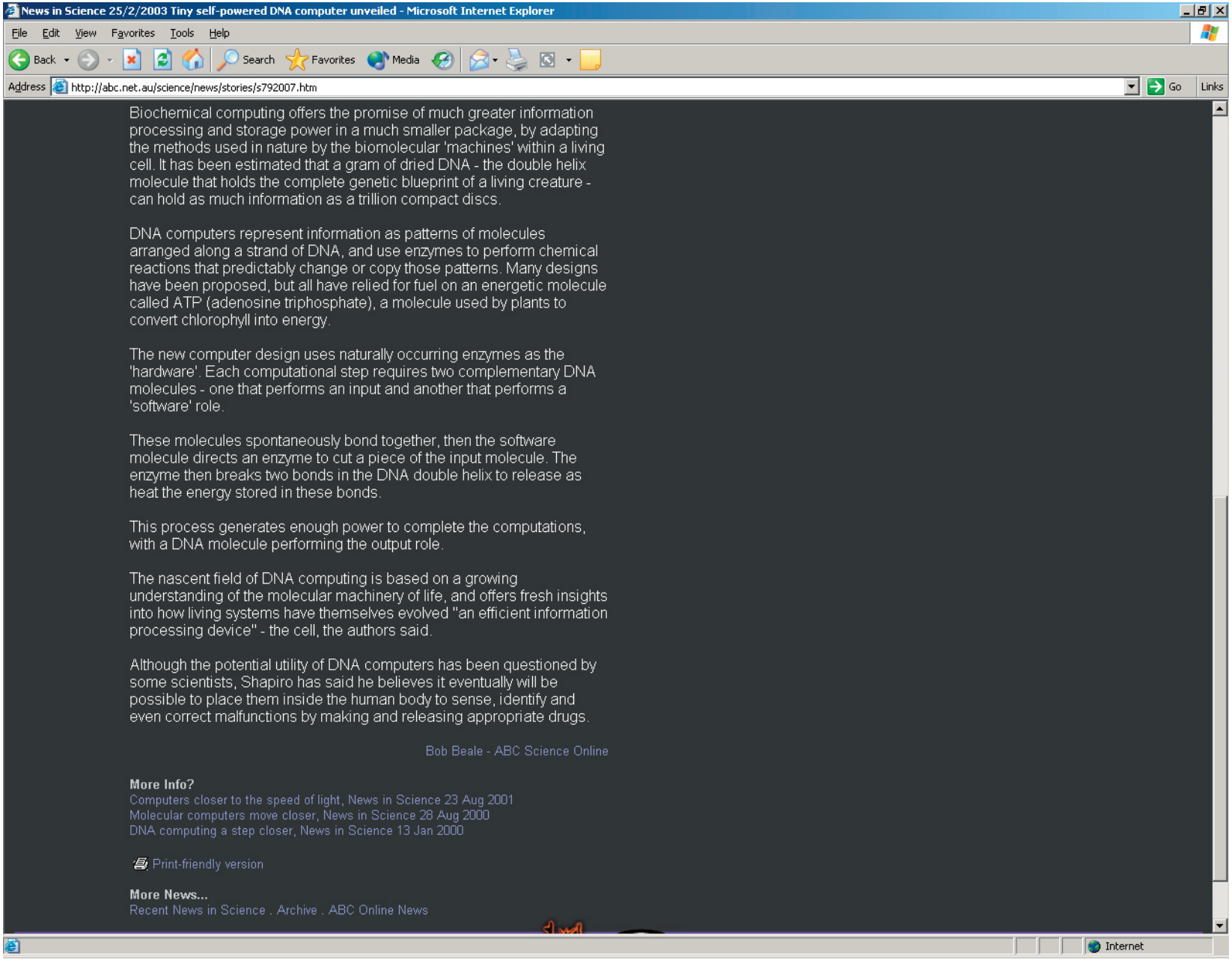
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Biochemical computing offers the promise of much greater information processing and storage power in a much smaller package, by adapting the methods used in nature by the biomolecular 'machines' within a living cell. It has been estimated that a gram of dried DNA - the double helix molecule that holds the complete genetic blueprint of a living creature - can hold as much information as a trillion compact discs.
DNA computers represent information as patterns of molecules arranged along a strand of DNA, and use enzymes to perform chemical reactions that predictably change or copy those patterns. Many designs have been proposed, but all have relied for fuel on an energetic molecule called ATP (adenosine triphosphate), a molecule used by plants to convert chlorophyll into energy.
The new computer design uses naturally occurring enzymes as the 'hardware'. Each computational step requires two complementary DNA molecules - one that performs an input and another that performs a 'software' role.
These molecules spontaneously bond together, then the software molecule directs an enzyme to cut a piece of the input molecule. The enzyme then breaks two bonds in the DNA double helix to release as heat the energy stored in these bonds.
This process generates enough power to complete the computations, with a DNA molecule performing the output role.
The nascent field of DNA computing is based on a growing understanding of the molecular machinery of life, and offers fresh insights into how living systems have themselves evolved "an efficient information processing device" - the cell, the authors said.
Although the potential utility of DNA computers has been questioned by some scientists, Shapiro has said he believes it eventually will be possible to place them inside the human body to sense, identify and even correct malfunctions by making and releasing appropriate drugs.
Bob Beale - ABC Science Online
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Molecular computers move closer, News in Science 28 Aug 2000
DNA computing a step closer, News in Science 13 Jan 2000
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