

Computer probes the protein world

The artificial intelligence program AlphaFold has predicted the 3-D structures of 992,000 different plant and animal proteins, including all of the 20,000 human protein molecules.

Proteins: Folded-up chains of amino acids



A cell contains **thousands of different proteins**, each with a unique function – and a unique structure

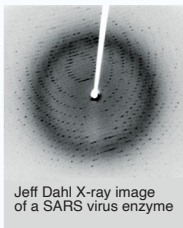
Each protein molecule is a 3-dimensional structure of smaller **amino acid molecules**

There are only **20 different amino acids**, the building blocks of proteins

Decoding protein structure

- 1** **The starting point** for working out a protein's structure is its single-file **sequence** of amino acids

Proteins from the same evolutionary family with similar sequences can have similar structures



Jeff Dahl X-ray image of a SARS virus enzyme

- 2** A few techniques can directly observe the protein's structure:

- An **X-ray beam** can produce images of crystallized protein molecules
- **Cryo-EM** uses an electron microscope to observe frozen protein molecules

- 3** **Structure prediction**, a recent technique that avoids laborious standard procedures, bases its computations entirely on a protein's amino acid sequence

