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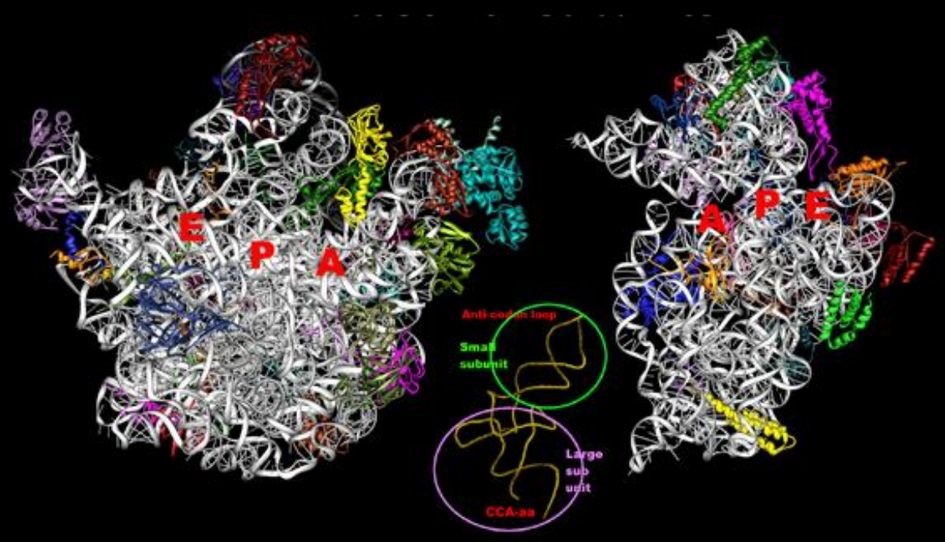

The amazing ribosome, its tiny enemies and hints about its origin

by Prof. Ada Yonath, NL
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Homi Bhabha Auditorium, TIFR, Homi Bhabha Road, Colaba, Mumbai 400005

The ribosome, the universal polymerase that translates the genetic code into proteins, possesses spectacular architecture accompanied by inherent mobility, which allows for its smooth performance. The site for peptide bond formation (PTC) is located within a universal internal semi-symmetrical sub-region that connects all of the remote ribosomal features involved in its functions. The high conservation of this semi-symmetrical region implies its existence irrespective of environmental conditions. Hence, it is likely that it represents the ancient ribosome.

Adjacent to the PTC is an elongated tunnel along which nascent chains progress until they emerge out of the ribosome. This tunnel possesses gating capabilities, may be involved in initial nascent protein folding, provides the binding site of the first cellular chaperone that encounters the emerging nascent chain, and hosts a major family of antibiotics. Crystallographic analysis of complexes of ribosomes and antibiotics targeting them revealed the structural bases for antibiotics action, synergism, selectivity, and resistance.

Ada Yonath is best known for her pioneering work on the structure of the ribosome. She received the Nobel Prize in Chemistry in 2009 along with Venkatraman Ramakrishnan and Thomas A. Steitz for her studies on the structure and function of the ribosome. She is the current director of the Helen and Milton A. Kimmelman Centre for Biomolecular Structure and Assembly of the Weizmann Institute of Science, Israel. She is also the recipient of the first European Crystallography Prize, Israel Prize for Chemistry, and Wolf Prize in Chemistry.

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