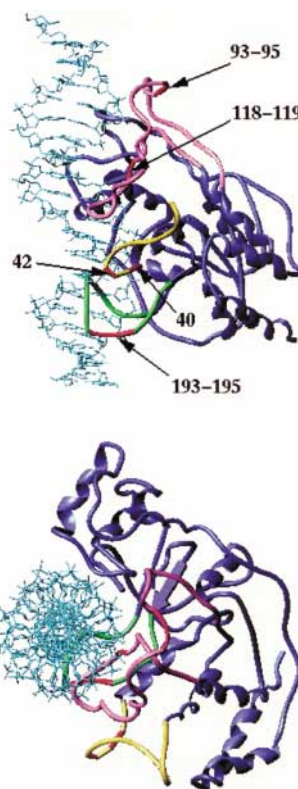


considered to be the prototype of eukaryote. Their DNA replication systems seem to be more simplified and stabilized, compared with the eukaryotic systems. Since the thermostable proteins are more suitable for the structure analysis due to their easy crystal formation than the mesophilic counterparts from eukaryote, the structural information will greatly contribute to comprehend the molecular mechanisms of DNA replication and repair systems effectively working in eukaryotic cells. The thermostable proteins involving DNA replication and repair are also useful as biological tools to develop new biotechnology.

Flap endonuclease-1 (FEN-1) has important roles in DNA replication, repair, and recombination. FEN-1 has dual activities such as 5' flap endonuclease and 5'-3' exonuclease. We have already reported the substrate specificity of FEN-1 from *P. horikoshii* (phFEN-1). Recently we succeeded to solve the molecular structure of a mutant phFEN-1 to a resolution of 3.1 Å. According to the molecular structure, 45 different mutants on one large loop and four small loops of phFEN-1 molecule were constructed and investigated their functions. Consequently, the substrate recognition mechanism of the molecule was elucidated in details as shown in Fig. 1. The facts will largely

contribute to the structure/ function analysis of eukaryotic FEN-1s involving human counterpart.



The modeled complex of phFEN-1 with DNA. (A) The small loops 1 and 2, and the large loops are colored yellow, green, and pink, respectively. The numbers indicate the major DNA binding sites on the loops. DNA is colored light blue. (B) The side view of (A).

## Information and Communication Technology

# A Tele-operated Humanoid Robot Drives a Lift Truck!

New abilities of humanoid robot to realize proxy drives of a construction machine are developed. We use the tele-operated humanoid robot HRP-1S developed in Humanoid Robotics Project of METI of Japan. The proxy driving of an electric lift truck by HRP-1S was demonstrated at ROBODEX2002 as shown in the figure. It shows us that a humanoid robot can expand its capability by using machines designed for the human. The use of a tele-operated humanoid robot has a possibility to make all machines tele-operated without any modifi-

cations and do also incidental tasks instead of the human.



Teleoperated humanoid robot drives a lift truck

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