

Cloning and sequence of thioredoxin gene of *Salmonella typhimurium* LT2

Hirokazu Kotani and Kazuo Nakajima

Bioproducts Development Center, Takara Shuzo Co. Ltd., Seta 3-4-1, Otsu, Shiga 520-21, Japan

Submitted December 20, 1991

DDBJ, EMBL and GenBank accession no. D10015

Thioredoxins are ubiquitous small hydrogen carrier proteins that participate in a wide variety of biochemical reactions (1–3). Especially, thioredoxin also functions as an essential subunit of the bacteriophage T7 (3) and serves an essential function in filamentous bacteriophages f1 and M13 assembly (2). Using the essential property of thioredoxin in filamentous phage assembly, we selected the M13 phage which contains a functional thioredoxin gene (*trxA*) from a *Salmonella typhimurium* LT2 library, and can grow on the thioredoxin deficient strain, *Escherichia coli* A-179 (*HfrC* λ^+ *trxA::Ton5*).

DNA prepared from *S.typhimurium* LT2 was partially digested with *Sau3AI*, ligated with M13mp18 RF DNA digested with *Bam*HI, and transfected to *E.coli* A179 competent cells. One of these phages was designated M13STTRXA which contains about 2.5 kb inserted DNA. To determine the localization of thioredoxin gene, several deletion clones were isolated and tested for the ability of plaque forming on *E.coli* A179 (Figure 1). The thioredoxin gene was located in the *Kpn*I-*Nsp*V fragment as indicated in Figure 1. To analyze the thioredoxin gene, the 1.5 kb of *Kpn*I-*Bam*HI fragment of M13STTRXA1 was sequenced (Accession no. D10015 in DDBJ, EMBL and GenBank). The cloned DNA has the complete thioredoxin gene and the N-terminal region of *rho* gene. The deduced amino acid sequence of thioredoxin from *S.typhimurium* LT2 is completely identical

with that from *E.coli*. The sequenced region has the same gene organization and high homology (>90%) with the corresponding region of *E.coli* (4).

REFERENCES

1. Lim, C.J., Fuches, J.A., McFarlan, S.C. and Hogenkamp, H.P.C. (1987) *J. Biol. Chem.* **262**, 12114–12119.
2. Russel, M. and Model, P. (1983) *J. Bacteriol.* **154**, 1064–1076.
3. Modrich, P. and Richardson, C.C. (1975) *J. Biol. Chem.* **250**, 5508–5514.
4. Matsumoto, Y., Shigesada, K., Hirano, M. and Imai, M. (1986) *J. Bacteriol.* **166**, 945–958.

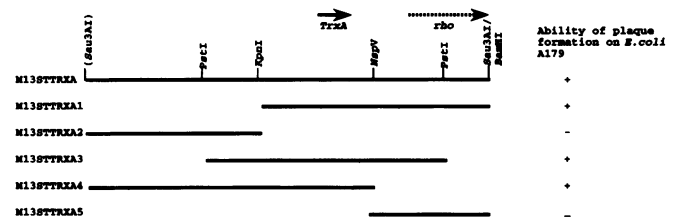


Figure 1. Restriction map and localization of *trxA* gene region. Solid bars show the DNA inserts in the deletion clones indicated. The ability of plaque formation on *E.coli* A179 is shown at the right.