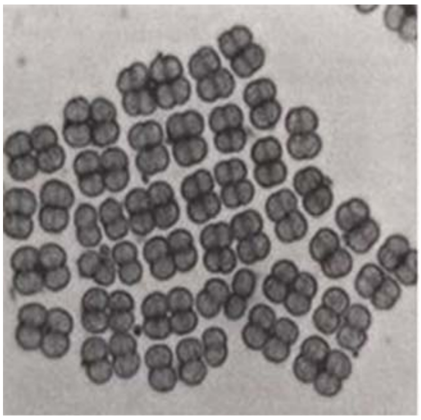
In this issue

Deinococcus radiodurans: a leader of super bugs

Deinococcus radiodurans – a Gram-positive, red pigmented, mesophilic, non-spore forming bacterium – has been isolated from diverse environments like canned meat, desert soils, radiation contaminated soils, radiation sterilized equipments and air 10 km above the Earth's surface. What sets it apart from other organisms is its unusual resistance to ionizing radiation like γ-rays, X-rays and to desiccation. The γ-radiation D_{10} for *Deinococcus* is 10 kGy, for *E. coli* it is 0.25 kGy and for humans it is 0.005 kGy. When organisms are subjected to γ-radiation, it physically causes double strand breaks (DSBs) in the genome and generates reactive oxygen species, which in turn can



damage biomolecules like lipid, protein, nucleic acids and eventually lead to cell death. The resistance to ionizing radiation is seen in but a handful of organisms notably amongst the Deinococci, the cyanobacteria like *Chroococcidiopsis* spp. and various fungi like *Filobasidium*. An early thinking was that DSBs are lethal and hence the ability to repair the breaks is crucial for radiation resistance. Genome sequencing showed that *D. radiodurans* R1 has a normal complement of DNA repair proteins and hence the question naturally arose as to how an ordinary repair complement could execute an extraordinary repair process. Molecular genetic experiments later showed that DSBs are repaired initially by the extended synthesis-dependent strand annealing pathway which involves non-reciprocal cross-overs and the involvements of some of the well-characterized DNA recombination and repair enzymes including RecJ, RecFOR, RecA, DNA pol I and DNA pol III, etc. were demonstrated. Question still remained unanswered whether these proteins have unique function, do they function better in a different micro-environment as in this bacterium, are there still uncharacterized proteins that play better roles in this process? Studies performed around these questions identified numerous proteins having some role in radiation resistance in this bacterium and the various hypotheses trying to explain the molecular basis of radioresistance have been laid down. Ironically, none could singly make other bacteria radioresistance. How can they, if this phenotype is an outcome of the coordinated excellence of several processes present together in this organism. A review by H. S. Misra *et al.* (**page 194**) outlines the different aspects of *D. radiodurans* and their possible roles in making this organism a super bug.

Ancient coastal transportation system around Navibandar

It has been a well established fact that in the past India had a systematic transport system from the 3rd millennium BC. Though an elaborate description in the literature and art on the means of transport during the historical period have been recorded, archaeological evidences are limited. The recent maritime archaeological explorations around Navibandar

yielded evidence of ferry/jetty points. And these points were well connected with the stone-paved roads. Interestingly, these roads have evidence of the use of bullock carts. Navibandar is situated on the eastern bank of the river Bhadar which joins the Arabian Sea about half a kilometre west of the village. The boats were used for ferrying people and cargoes from one bank to other of the estuaries and on the land bullock carts were extensively used to transport cargoes. The study by A. S. Gaur *et al.* (**page 190**) reveals the information on the transport system and also the technology of road construction existing during the medieval period. The discovery of stone anchor is the testimony of an active maritime tradition in the region. The iron cannons have been extensively reused for maritime purpose, particularly as a bollard on the jetty all along the Saurashtra coast. The evidence recorded during the present study suggests that Navibandar played an auxiliary role to Porbandar port in maritime activities during the medieval period.