

## Broad-host range Vector-Particle from thermal vents

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Although viruses or virus-like particles (VLPs) are common in aquatic ecosystems, VLP-host interactions and their involvement in gene transfer in the environment is as yet unclear. We have proposed that at least some of the widely distributed VLPs could be general gene transfer agents among a broad range of microbial host cells, and might function as a universal vector.

To elucidate such a broad host range gene transfer mediated by 'VLPs', the objective was extended to the geothermal and hydrothermal vents, and seamount boring cores. VLP (v) and cell (b) abundance per ml of water samples from Toyoha Mine A site (TYA) and Suiyo seamount (APSK 07) were: A site (-500 m level, 63.5C, v : 9.60E+8, b : 3.61E+6); APSK07 (28deg34.3'N, 140deg38.7'E, 1386 m deep, 250.5C, b : 5.33E+4, v : 2.52E+4). A boring core was obtained from APSK06 (28deg34.3'N, 140deg38.6'E, 1386 m deep), from which a hyper thermophilic Archaeon, *Thermococcus kodakaraensis* was successfully cultivated in sulphur supplemented medium in temperature range between 70 and 90C. VLP production was observed from *T. kodakaraensis*, whose abundances per ml at 480 h culture at 70C were: b : 3.61E+9, v : 3.46E+9.

Transduction experiments at multiplicity of infection of ca 0.2 - 0.3 using particles from TYA, APSK07 and *T. kodakaraensis* showed a plate efficiency on recipient *Escherichia coli* AB1157 of ca 76 % , ca 72 % and ca 89 % regardless of UV treatment of the particle. Gene transfer frequency of particles from TYA were: 1.1-2.6E-4cfu/particle, APSK07: 2.4 - 0.92E-5 cfu/particle; and *T. kodakaraensis*: 3.3 - 0.29E-6cfu/particle.

From these findings, we can infer that non-specific gene transfer by such particles may be a ubiquitous event in the natural environment. Such gene transfer particles might have mediated gene flux among phylogenetically diverse microbial communities since the early age of the Earth.

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