Supplements for *Photobacterium phosphoreum* RL-1 culture medium to enhance the luminescence activity

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In an attempt to exploit bacterial luminescence in commercial use, we have isolated *Photobacterium phosphoreum* RL-1 from coastal marine sediment. We examined series of extracts that were prepared from various dried marine foods to maximize the luminescence activity of RL-1 in half strength of SWC medium (Hastings and Nealson, 1981). While extracts from either squid or shrimp increased the relative luminescence unit (RLU), those from seaweed had little effects. As dried squid and shrimp are known to be rich in amino acid and chitinous compounds, we further tested whether amino acids and/or chitosan would enhance RLU of the strain RL-1. Among amino acids tested, both cysteine and asparatic acid strongly enhanced the bacterial RLU, whereas arginine showed adverse effect on the luminescence. The effects of amino acids were independent on the isomeric forms (D-type and L-type). As a chitinous compound, chitosan enhanced RLU of RL-1. L-cysteine, L-asparatic acid and chitosan worked synergistically, resulting in the highest RLU of RL-1 at concentrations of 500 µg/ml, 300 µg/ml and 200 µg/ml, respectively. Increase in the luminescence activity by these compounds seems to be unique to *P. phosphoreum*, because none of the other isolates of luminous bacteria so far examined, including the genera, *Vibrio* and *Shewanella*, showed enhanced luminescence in the presence of the amino acids and/or chitosan.