

### 3-4-16. Genomic Structure of the Luciferase Gene in the *Hotaria* Firefly

Young Su Choi<sup>1</sup>, Jin Sik Bae<sup>1</sup>, Kwang Sik Lee<sup>1</sup>, Iksoo Kim<sup>1</sup>, Jong Gill Kim<sup>2</sup>,  
Keun Young Kim<sup>2</sup>, Hirobumi Suzuki<sup>3</sup>, Sang Mong Lee<sup>4</sup>, Hung Dae Sohn<sup>1</sup>  
and Byung Rae Jin<sup>1</sup>

<sup>1</sup>College of Natural Resources and Life Science, Dong-A University,

<sup>2</sup>Department of Sericulture and Entomology, National Institute of Agricultural  
Science and Technology, RDA,

<sup>3</sup>Department of Natural History, Tokyo Metropolitan University,

<sup>4</sup>Department of Sericultural and Entomological Biology, Miryang National  
University

We describe here the complete nucleotide sequence and the exon-intron structure of the luciferase gene of the *Hotaria*-group fireflies, *H. unmunisana*, *H. papariensis*, *H. tsushimana* and *H. parvula*. The luciferase gene of *H. unmunisana*, *H. papariensis* and *H. tsushimana* spans 1,950 bp and is six introns and seven exons coding for 548 amino acid residues. Two different luciferase genes, F7 and Fc, in *H. unmunisana* were cloned and their sequences were determined. The deduced protein sequence of *H. unmunisana* luciferase gene F7 showed amino acid differences at 1 position with Fc, but identical to that of *H. papariensis* luciferase gene P1 and P2. Two different luciferase genes, S1 and S2, in *H. tsushimana* were determined. The deduced protein sequences of S1 and S2 were different from 1 position and 2 positions in *H. unmunisana* luciferase F7, respectively. Furthermore, novel luciferase gene in *H. parvula* F174 was cloned and compared with the known *H. parvula* luciferase gene. The major differences between the two *H. parvula* luciferase genes were two amino acids deletion in the N-terminal region of F174 and PV3 as compared with the known *H. parvula* luciferase with 548 amino acid residues, and amino acid differences were identified at 4 positions. Phylogenetic analysis confirmed the deduced amino acid sequences of the *Hotaria* luciferase genes to belong to the same subfamily, Luciolinae, demonstrating that *H. unmunisana* luciferase gene is more closely related to *H.*

*papariensis* and *H. tsushimana* than to *H. parvula*. We also analyzed COI gene of *Hotaria*-group fireflies. The deduced protein sequence of COI gene of *H. unmunzana* was identical to that of *H. papariensis* and *H. tsushimana*, but different from 3 positions in *H. parvula*. In conclusion, our results suggest that *H. unmunzana*, *H. papariensis* and *H. tsushimana* are very closed or, at least in luciferase and COI genes, same species.