THE *NonLTR-1_LVa* NON-LTR RETROTRANSPOSON FROM THE FIRST SPECIFIC PATHOGEN-FREE (SPF) SHRIMP *Penaeus vannamei* PRODUCED IN THE UNITED STATES IS SIMILAR TO A RETROTRANSPOSON PUTATIVELY ASSOCIATED WITH ABDOMINAL SEGMENT DEFORMITY DISEASE (ASDD) OF FARMED *P. vannamei* FROM THAILAND

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Abdominal Segment Deformity Disease (ASDD) of farmed Pacific white shrimp *Penaeus vannamei* from Thailand was suggested associated with a partial non-long terminal repeat (non-LTR) retrotransposon sequence (NLRS) (KC179708, 4,101bp; Sakaew et al. 2013). ASDD was initially associated with the presence of viral-like particles seen by electron microscopy in ventral nerve cords of affected shrimp. Using the NLRS probe, in situ hybridization signals were detected in abdominal-ganglion neurons of ASDD shrimp's distorted abdominal muscles, but not normal shrimp. ASDD appeared related to inbreeding and long-term use of eyestalk-ablated female broodstock used in commercial hatcheries, and increased prevalence in mysis stage offspring from those broodstock.

A search in the Rebpase database (www.girinst.org) revealed that KC179708 represented part of the representative full-length of this non-LTR retrotransposon family, designated as *NonLTR-1_LVa* in Repbase [Bao 2015, Repbase Reports 15(4), 1579]. Nucleotides 3-4,101 of KC179708 shows 96.9% identity to nucleotides 1,974-6,062 of *NonLTR-1_LVa* consensus sequences (6,180bp), a young non-LTR family reconstructed from multiple members of only 2% divergency from the consensus. *NonLTR-1_LVa* was characterized in the genome of the first SPF *P. vannamei* domesticated by the breeding program of the US Marine Shrimp Farming Program (USMSFP) maintained in Kona, Hawaii, USA. *NonLTR-1_LVa* contains 50% CGs, two ORFs, and conserved protein domains like R1-I-EN from superfamily EEP (exonuclease/endonuclease/phosphatase) and reverse transcriptase (RT, RNA-dependent DNA polymerase) from RT-like superfamily.

Homology searches using the whole genome sequence databases in Genbank identified multiple copies of *NonLTR-1_LVa* in five penaeid species. It is an intrinsic part of penaeid shrimp genomes, comprising a significant part of the whole genome. In the genome sequence of muscle DNA from a male *P. vannamei* farmed in China, breed Kehai No. 1 (assembly ASM378908v1, 1.86 Gb), more than 250 loci are found inserted with relatively young copies of *NonLTR-1_LV*a (<95% identity to its consensus), excluding 4 times more loci with insertions of older *NonLTR-1_LVa* or of its sibling families. *NonLTR-1_LVa* was found in *P. vannamei* transcriptomes from various developmental stages (nauplii, mysis, postlarvae) and adult tissues (hepatopancreas, muscle, eyestalk, testis, ovaries), with no major increase in expression in ovaries after eyestalk ablation. It remains to be determined if the expression of *nonLTR-1_LVa* increase the incidence rate of ASDD.