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In this study, based on the obtained Nanopore sequencing data from the midguts of *A. mellifera* workers, a total of four genes (PGRP-3, PGRP-S2, PGRP-LC and PGRP-LB) and 19 isoforms associated with peptidoglycan recognition proteins (PGRP) in *Apis mellifera* were identified. RT-PCR and Sanger sequencing results confirmed the authenticity of expression and sequences of five isoforms of PGRP genes. The 5' and 3' ends of PGRP-3 were respectively elongated by 8 and 1 055 bp, while those of PGRP-S2 were respectively extended by 27 and 234 bp. The authenticity of AS events of PGRP-S2 was verified by RT-PCR. The isoform ONT.6350.2-encoded protein included a signal peptide and a PGRP structural domain, with an average hydrophilicity of -0.119. Additionally, the protein encoded by isoform ONT.6350.6 had an average hydrophilicity of -0.324, without signal peptide and transmembrane domain. PGRP-S2 from *A. mellifera* and *A. cerana* were clustered into a single clade on the evolutionary tree, indicative of the highest homology of PGRP-S2 between *A. mellifera* and *A. cerana*. The expression level of isoform ONT.6350.2 in the midguts of workers inoculated with *N. ceranae* was significantly upregulated at 2 days post inoculation (dpi) and 3 dpi in comparison with that in the un-inoculated midguts. Additionally, the expression level of isoform ONT.6350.6 in the midguts of *N. ceranae*-inoculated workers was significantly upregulated at 3 dpi and 4 dpi as compared with that in the midguts of un-inoculated midguts. Moreover, both ONT.6350.2 and ONT.6350.6 in the midguts of adult workers inoculated with *N. ceranae* exhibited an overall increasing expression trend at the stage of 1 4 d post inoculation as compared with that in the un-inoculated midguts. The results demonstrate that the isoform ONT.6350.2-encoded protein is a potential secretory protein, whereas the ONT.6350.6-encoded protein is a putative intracellular protein, both ONT.6350.2 and ONT.6350.6 are induced to activation in host response to the *N. ceranae* infection. Findings from this current work not only enrich the information about proteins encoded by ONT.6350.2 and ONT.6350.6, but also offer a basis for functional investigation of these two isoforms relative to *A. mellifera* PGRP-S2.