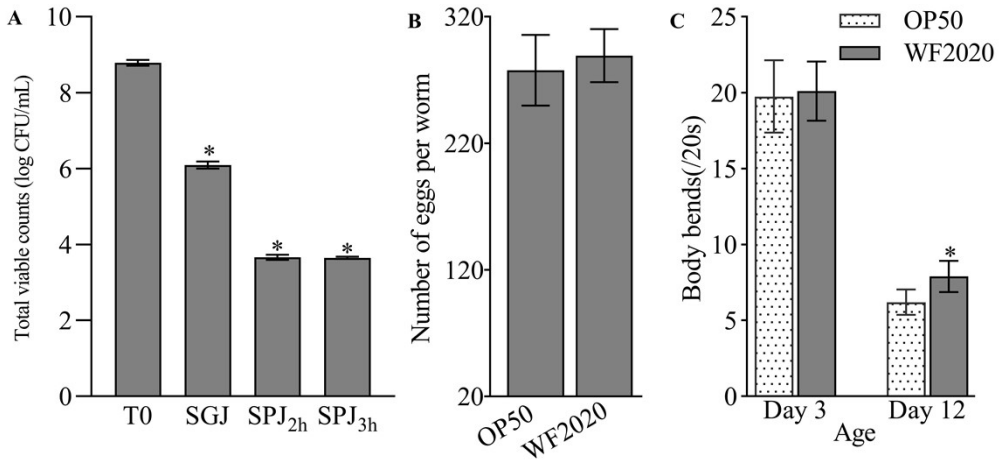

Fig S1. Survival capacity of WF2020 in gastrointestinal conditions (A) and effect of WC2020 on egg laying (B) and body bends (C) in *C. elegans* N2, respectively. For the tolerance to gastrointestinal conditions, 3 mL of overnight bacterial suspensions were centrifuged and the corresponding pellet was diluted 1:1 in a sterile electrolyte solution simulating salivary juice (Simulated Salivary Juice, SSJ), composed of 6.2 g/L NaCl, 2.2 g/L KCl, 0.22 g/L $CaCl_2$, 1.2 g/L $NaHCO_3$ pH 6.9 and lysozyme with a final concentration of 100 mg/L. The mixed suspension was incubated for 5 min at 37 ℃. Subsequently, the sample was diluted 3:5 with Simulated Gastric Juice (SGJ) containing 6.2 g/L NaCl, 2.2 g/L KCl, 0.22 g/L $CaCl_2$, 1.2 g/L $NaHCO_3$ pH 2.5 and 3 g/L pepsin, and incubated for 1 h at 37 ℃. After incubation, 1 mL aliquot of the sample was serially diluted and plated, in triplicate, onto LB agar. The remaining sample was diluted 1:4 in Simulated Pancreatic Juice (SPJ) consisting of 6.4 g/L $NaHCO_3$, 0.239 g/L KCl, 1.28 g/L NaCl, 0.5% bile extract, 0.1% pancreatin at pH 7.2, and incubated for 3 h at 37 ℃. At 2 and 3 h incubation times, 1 mL aliquots were withdrawn, serially diluted and plated on LB agar. In parallel, control samples were treated with Phosphate Buffer Saline (PBS) and subjected to the same procedure. For

egg laying and body bends, L1-stage worms incubated on the NGM plates supplemented with a suspension of 100 μL of 4.4×10^{10} CFU/mL WF2020 or OP50 cells. 20 worms on day 3 and 12 were randomly selected and used for the detection of egg laying (B) and body bends (C). The data of egg laying from three independent experiments were shown. Error bar: SD from replicates. Asterisked bars in each bar group differ significantly from those unmarked ($p < 0.05$).

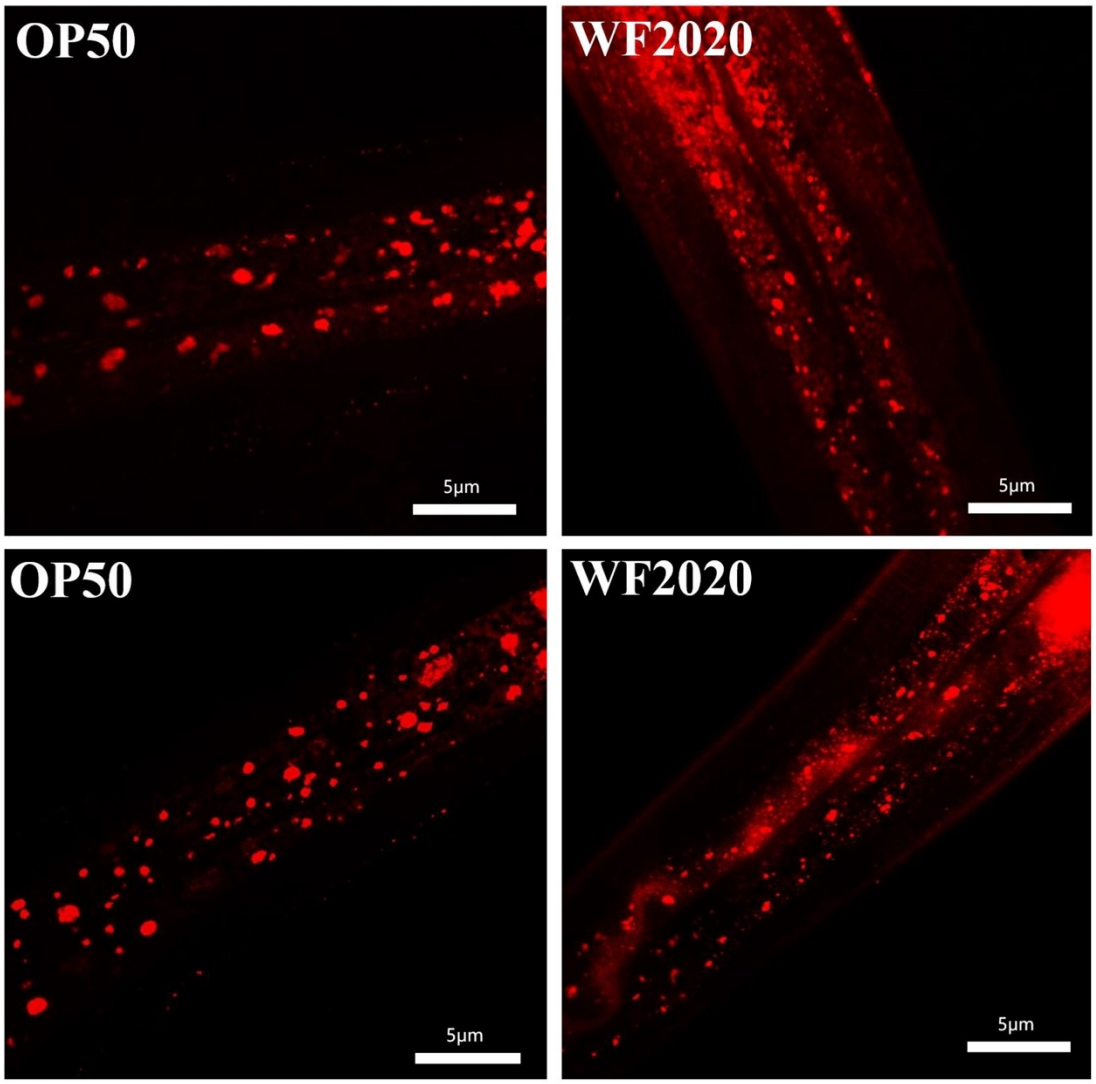

Fig S2. Effect of WF2020 on mitochondria using Mito-Tracker Red CMXRos staining. L1-stage worms incubated on the NGM plates supplemented with a suspension of 100 μL of 4.4 × 10^{10} CFU/mL WF2020 or OP50 cells. After a 3-day incubation, worms were selected randomly, washed, resuspended in PBS buffer (pH 7.2) supplemented with 4% paraformaldehyde, stained with Mito-Tracker Red CMXRos staining dye at 25 °C in the dark for 6 h, and observed under a confocal laser scanning microscopy (LSM700, Carl Zeiss).

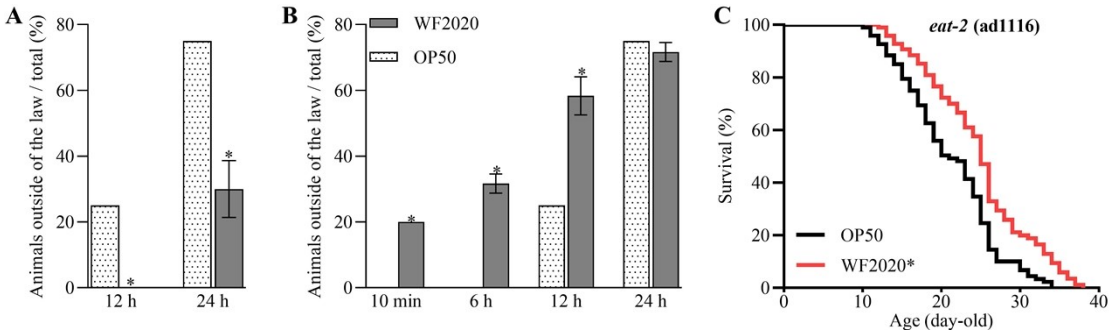

Fig S3. The preference of *C. elegans* N2 for OP50 and WF2020 (A-B) and effect of WF2020 on worm lifespan in *eat-2* mutants (C). Briefly, 30 μL of bacterial suspension of OP50 or WF2020 (4.4×10^{10} CFU/mL) was dripped onto the center of NGM plates and incubated at 20 ℃ for 24 h. L4-stage worms fed with OP50 were placed on the NGM plates supplemented with OP50 or WF2020 plaques (A) and L4-stage worms fed with OP50 or WF2020 from L1 stage were placed on the NGM plates supplemented with OP50 plaques. During the incubation, the number (N) of nematodes leaving the plaques at 10 min, 6 h, 12 h, and 24 h were recorded to calculate the avoidance index according to the formula: Avoidance index=$N_{outside}/N_{outside}+N_{inside}$.

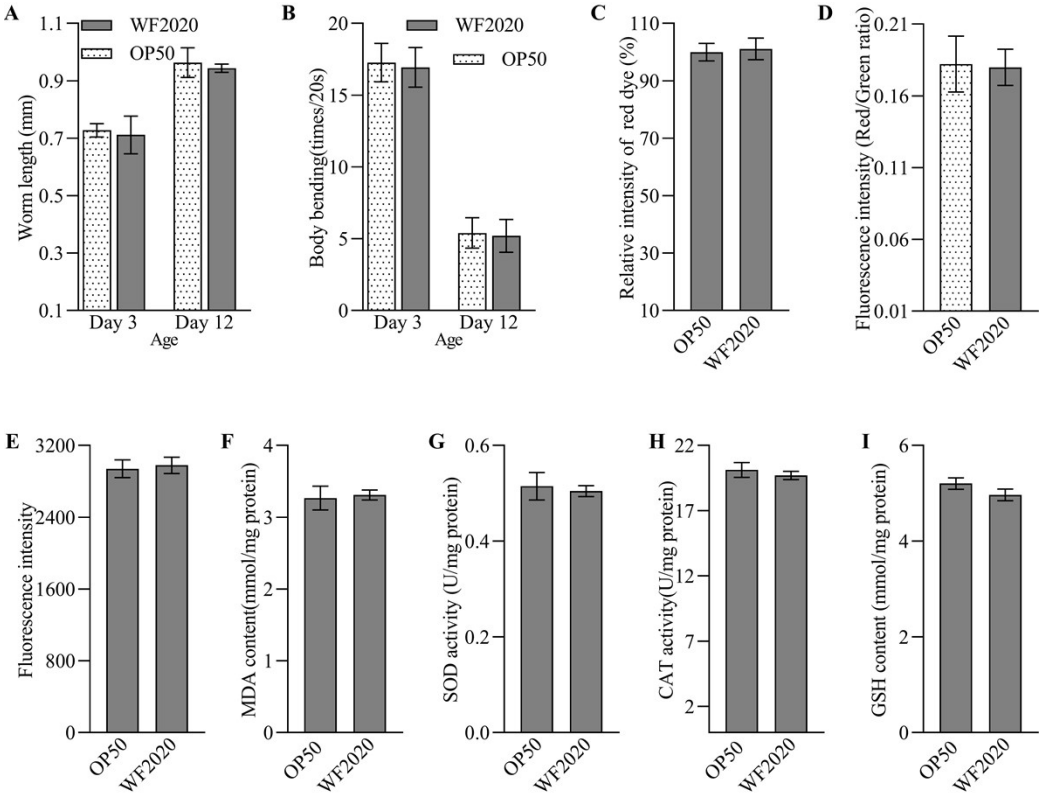

Fig. S4 Changes in body length (A), body bending (B), lipid accumulation (C), mitochondrial membrane potential (D), ROS production (E), MDA content (F), SOD activity (G), CAT activity (H), and GSH content (I) of *pmk-1* mutants caused by WF2020. L1-stage worms incubated on the NGM plates supplemented with a suspension of 100 μL of 4.4×10^{10} CFU/mL WF2020 or OP50 cells.

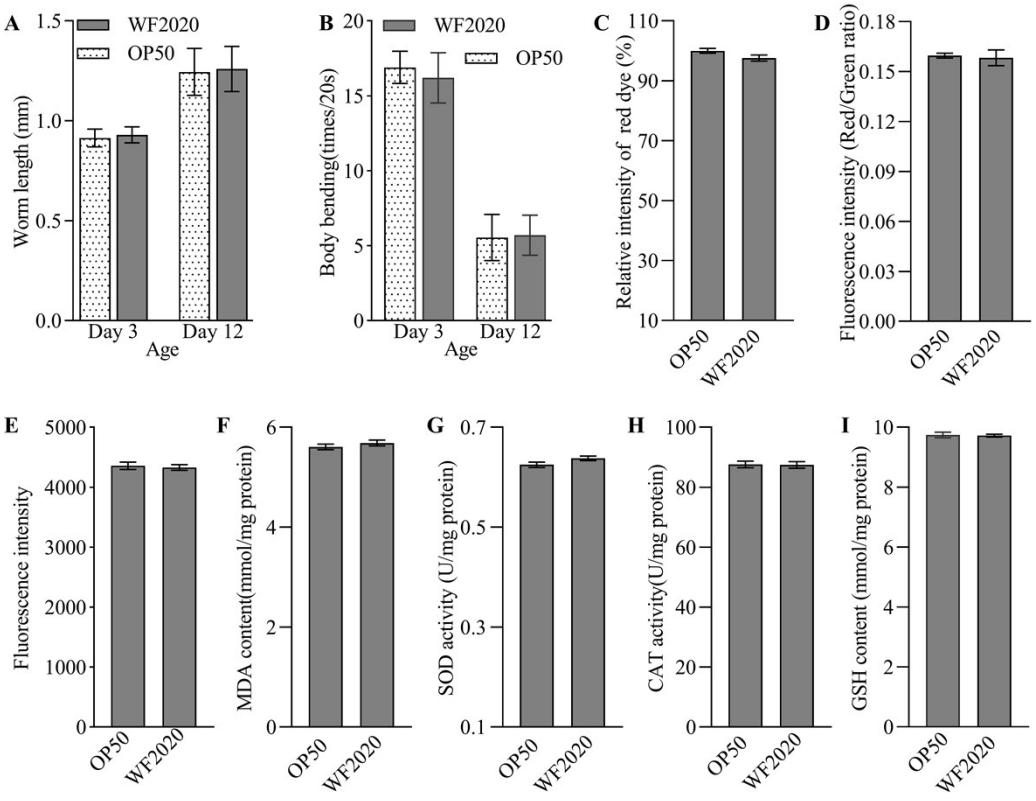

Fig. S5 Changes in body length (A), body bending (B), lipid accumulation (C), mitochondrial membrane potential (D), ROS production (E), MDA content (F), SOD activity (G), CAT activity (H), and GSH content (I) of *jnk-1* mutants caused by WF2020. L1-stage worms incubated on the NGM plates supplemented with a suspension of 100 μL of 4.4×10^{10} CFU/mL WF2020 or OP50 cells.

Table S1 The primers used for qRT-PCR

Gene	Sequences (5'-3') of paired primers
sek-1	GCCGATGGAAAGTGGTTTTA / TAAACGGCATCGCCAATAAT
pmk-1	CCGACTCCACGAGAAGGATA / AGCGAGTACATTCAGCAGCA
nsy-1	AGTTCCAATAGTTCAAGT / CTCTCATTCCATCAAGTA
jnk-1	AGAAGCGTGGAAGAGGATCA / ATCCAAAGAGACAGCGTCGT
jkk-1	ATTGATGGCTGTGAAGACTAT / AATATCCGTAACTGGTGACAA
ced-1	CCTATACTCTCGTCAATCAG / TTATTCTCCAATTCTTCTTCTTC
ced-2	CATTATTTGATTGAAAGAGGAG / CATTATTTGATTGAAAGAGGAG
ced-3	ACGGGAGATCGTGAAAGC / AGAGTTGGCGGATGAAGG
ced-4	AGTCACTCGCAATGGCTCT / GCTGATGAACGACGGAAT
ced-5	GATACCAGAAGAACACTCAA / CATCTCAACACATTCAACAA
ced-6	GATTGTTGGATGGATTGG / ACCGAATGGATTATACTCA
sod-1	CGTAGGCGATCTAGGAAATGTG / AACAACCATAGATCGGCCAACG
sod-2	CTTCAAAACACCGTTCGCTG / CAGTGGAACAAGTCCAGTT
sod-3	TTCAAAGGAGCTGATGGACACT / AAGTGGGACCATTCCTTCCAA
sod-4	TTGGGACGCGGTACTTCAG / GCAAGTCGGCTTCCAGCAT
sod-5	GCCTCTTCGGAGCGAACA / TCTCGATCGACGTGGACAAC
ctl-1	CGGATACCGTACTCGTGATGA / CCAAACAGCCACCCAAATCA
ctl-2	TCCGTGACCCTATCCACTTC / TGGGATCCGTATCCATTCAT
ctl-3	GCGGATACCGTACTCGTGAT / GTGGCTGCTCGTAGTTGTGA
gst-5	TTCCTACAAGTTGACCTAC / AGTGACTCTATTATCCTCGTA
gst-6	AACATTCTGGCATCTAATC / AACATTCTGGCATCTAATC
gst-1	TACCTACAAGAACGGAGA / AACACCATCAAGAGCATT
gst-13	ATGAACAGAAGGATAAGG / CAAGAATCACTGGATAATC
gst-15	AAGAGCAAGTCAGGTTAT / TGTCCTTCATCATCATCA
gst-20	ATCAAGCCATACTATTAC / GGTTCTCATATTATCACA
gst-27	GATATTGTGATTGTGGAATG / ATCGCATATACCTTCTCT
gst-36	GATATGATTGCTGAAGTTAT / TCTCCTTGAAGAATTGTT
gst-23	TACTACGAATTGAGAAGTTGTT / GTGAGGATGAGGTGAATATC
gst-44	GTTTGAAGAAGCAGAAAGTC / AAGAAGGAATGTTAGCCAATA
gst-9	CTAGAAGTTGATGGAAGACA / AACACGATAATCCTTGAATTG
gst-22	AAACAATGGAAGAAGTGAAG / CTTGAGATTCGTCAGAGTAT
gst-34	TCATTCCGTCCATTGCTTTA / TCCGACAAGATACTCCGATT
gst-41	TACATCCGTCTTCTACTAATTG / TTTCTTGCCCATCAACTTTA
gst-35	AAGATAACAAGTCAGGATTC / CTGGTCTGTTCTTAATGTAA
gst-11	TTGTGGCATGTGTTGAGGAT / GCTGATGAACGGAATGATTGTG
gst-26	CGATATTGTAGTTGTGGAGT / ACTTCTTGATAGCTGGAATC
gst-12	TCACCAAGGAAGTTATCAAT / CATTCAGGAATCCAAAGTTT
gst-14	AAACCTGCTATGGATGTGTA / TTGAATGTTGTCAGCGATAT
gst-3	AACATCCGAGAAGAAGTTAT / GTCAAATTATCAGCAATCACTA
gst-2	GAGGATTAGGTGAAGTCATC / ACTCCATCAATCTCCAATAC
gst-31	TTGAAGACATCCGAATCATC / GATTGCAGTAGATTGAGGAA
fat-1	GTTCAATCCAATTCCATTCT / AGATTCCAGAGATTACACAT
fat-2	CATCACTTCTTCTTCACCAA / AACCAGTTATAGTTGACTTCTC
fat-3	TCTTGGATGGTATATTACTTCTG / TGATGAGTGTTATGCTTGTC
fat-4	TGGTGAAGAAGCACGATCAG / AAGCAGAAGATTCCGACCAA
fat-5	TGCGATTATATCTAAACAGTTC / CACAAATAAAGCGACATTCT
fat-6	CTTGTGCTGCTTCATTCTTCC / GAAGTTGTGACCTCCCTCTCC
fat-7	ACCCGTGGATTCTTCTTCACT / TAACGGAATGTTCCAGCTACG
lipl-1	CATCTCACTCGGCATTCT / ACTATCTTGTCCAGTAACTTCTAA
lipl-2	GCAGGAACTTCTACTCAA / AATCATATTCTGGTGGTGTA
lipl-3	AGTAAGGAGAATAAGAAGA / ATTGTAGTCAGTGAAGTA
lipl-4	TTGGAGTGATGATGATTG / AATGTAAGTGGTTGTAGTT
lipl-5	TGAGATGGCTACCTATGA / TCGTTAGAGTTCCTTGTG
lipl-6	AGTTCCTGACCAACAATA / GTGTGCTAAGTATATTCCAA
lipl-7	TGTTCAATCAATCAAGAGTT / TCCATCAGTTCCATAATCA
pept-1	TCCATCATTGTAGTCATCAC / CGTCCTCTTCATCAGTTG

nlp-15	CTCATTGTTCTTCCTGAATC / TTTATTGAATGCTCCGAAAC
nlp-30	AACTTCTTCAATTCTGATTCTC / GTATCCACCATATCCTCTTC
nlp-26	AACTTCTTCGTGATCTTCTC / TTCCATTGAATCCTCCTCTT
nlp-34	TTCTTCATTGTCCTTCTCCTC / ATCCTCCGTATCCTCCGTAT
nlp-35	TGTCAGTTCATTCATTGTGTT / ATGTTGGAGGTATTGTGGAG
nlp-43	AATCTACCTTCTACCTTCTA / TTATTCCTCATTCCTTCTTC
nlp-36	CATCTTCTTCGGAGTCCTCT / AGCTTCATGTCGATGTTCTT
nlp-79	ATGGCTCTCGTTTTACTTAG / GATTCGTGACATCTTTGGTA
nlp-82	TAATCATCATCCTGCTCATCT / GAATTGTGAACCTCCTCCTA
nlp-76	TCATACACCGTCAAAGTCAA / GTTCTACATTGCCAGAGTCA
nlp-9	TAATCACAACGCCAATTTATTC / AAGTAAACTGGGTACGATGA
nlp-41	AATACTCGTTGTGCTCTG / AACTGTTCTCATATCCATC
nlp-3	TCTGCTCCCTATGAATTTAG / TATCTCTTCTCCTCAGTGAT
nlp-17	GTTCAGCAAGTCAATTCTCT / TCCGATTCTCATCATGTTTG
nlp-69	CCGACAACTCATATTATTATC / ATAACAATATTTCCGCCTAT
nlp-39	CATCTTCTTCGGAGTCATTG / GTTGTCAGCTTGAAAGTTTG
nlp-81	CTTCAATTTTCTCCCTGCTCATT / AATCCACCTCGTCCACTGA
nlp-46	TTCTGGTACTGTTGGTTCTC / ATTGCGATGTTTCGTTTCAT
nlp-61	TTCTTGCCTTCATCCTCATT / ACCACTTCTTTTCCATTCCA
nlp-66	TATTGTCTTCCTTGCTACACTTC / ATGAGTAGACGGATCAAAGC
nlp-28	ATTCTGATTCTCGTCTTCCT / TCCATAGCCTCCATACATTC
nlp-1	GCATGTCTTCTTGTGATAGC / CATTCTGAAAGCGTTTGGAT
nlp-52	GCGTATATTCTCGACTATGA / CTGCTTATAGAGACCATAGAA
nlp-14	CTTTGGATGGTCTTGATGGA / GAGTTGAGGGCTCTTTTATC
nlp-33	TTCTTCTAGTTGTGCTTCTCT / AGTGTCTTCTTCTCCATCCA
nlp-25	GAATAATGGAGGTGGATATG / CAACTTCTGTTCCAATTCTA
nlp-42	GCAAGTAGTCACACTTCTCG / TCCCAACTGATTCCATTCTG
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nlp-80	TTCTTCTCTTGTGTATTCTGT / TCCGATAAGTAGTGGATGTA
nlp-60	TTCTTCATCTTCCACATTCAT / AGGTAATCTTCCAACAACAG
nlp-55	ATTATTATGTTGAGCAGTTACCA / TGCGATATGAGTTGATGTCA
nlp-21	GGAAGAGCATTCGGAGACAT / TTAGAACACACCAAGACGATC
nlp-13	AATGGCATACAGTCAAGGTA / ATAATTCTCCGATCATACAAGTC
nlp-71	ATTGTTCTCGTCATCGTTCA / TTTGGTCGGAGCATTTCTAT
nlp-16	GAAGCGTAGTGTAGATGAAC / TTGTGTACTTCTCTTCTGATG
nlp-8	GATAGAATGGATAACAGTGA / CGAAGAGTAATGATTGATTC
nlp-62	ATAAATCAGGAAAGCATAGC / TTCAATTATCTCAACACGAC
nlp-11	TTGTTGGATATTGGCAAGAG / AAAGCATTCTCAAATTGGTAAG
nlp-73	TACGACTATGACGCCAACCA / TTGAGTCTGAGCATGAAGGAG
nlp-38	GTGTGTTGGGATGGAATAAG / TTCAGTTGTGTAATCGTCAT
nlp-24	TTCTCCTTCTCTTCGTTCTTG / ATATCCTCCATAACGTCCAC
nlp-5	TTCCTCGGTCAGATTCCAAT / CATTCCTCCAAGAGTGTCAA
nlp-58	TCTCCAAATGTTCTGTGATG / TCCACTTCGTTTGTATTGAG
nlp-37	CCAAGATCACAAGGAAACAT / TTGAGAATATGGTTCACTACTT
nlp-47	ATCAATGGACCAAGAAGAGA / TACTCGGTAAGACGTTGTTG
nlp-18	ATTGTCTACTTCCTCTCGTT / TTCTCTTCGTCACTTCGTTT
nlp-68	GGTTTTATTGTTCAGCCTGT / GAGGAGGAGGAAGTGAGAAC
nlp-50	CTTCTTGCTGTCTCTTATGG / CTCAATCCTTCTGTCCTCTT
clec-61	TATTGTCGCAGTTGTAGATA / TAGGTTACAATTCCGATTCT
clec-76	AATGACAACCACTACAATAGAA / AAGTAACAGATTGGCTTGAA
clec-9	GAACTTTAACCAAATCAATCCA / TATCCATAGGCAGAGTAACA
clec-54	CACGAACAATTCAGTAACTT / TGCTCTGTATAGGAATCATAG
clec-16	AATACTCCAGTCAATCATAG / TTAATGTAGAACTTCCAGAT
clec-42	CGAATTATTGGATTGATGGA / ATGGTAGAGAAGTATCACAA
clec-17	ATGGATTCACTCTACTCAAC / ATGGCTTGTTCATCATTAAC
clec-60	AATGGAGGATTGACAAGTAT / GTGATTGGTATTGGTTAAGAT
clec-15	TTAATATGGCTCGGATTGTA / GTTAATACTCCTTGTGTAGAATA
clec-70	CTTGATTATGGTAGCAGTTC / GCATTGGTATAAGGATTGTT
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clec-13	TTAATATGGCTCGGATTGTA / GTTAATACTCCTTGTGTAGAATA

clec-72	ACATTCAGCAATTCCTATCT / ATAACATCCAGCACATTACT
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lys-3	CATCAACTCAACAAGGTCTG / ATTCTTCGCACTTCTAATCATAT
lys-8	GCAAGAGGAATAACAATCAG / TCGTAGTAGGAAGTGTAGAT
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hsp-60	CCGTCCATTGGTTATCATTG / ATATCCTTGAGCGTGTTCTT
hsp-12.6	GAGATGGAGTTGTCAATGTC / AACGAGTAATGTTACGAGAG
bar-1	CATGGTAGTCCGCGACTTGT / CGAGAATTGACCAGCTCCAGA
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