

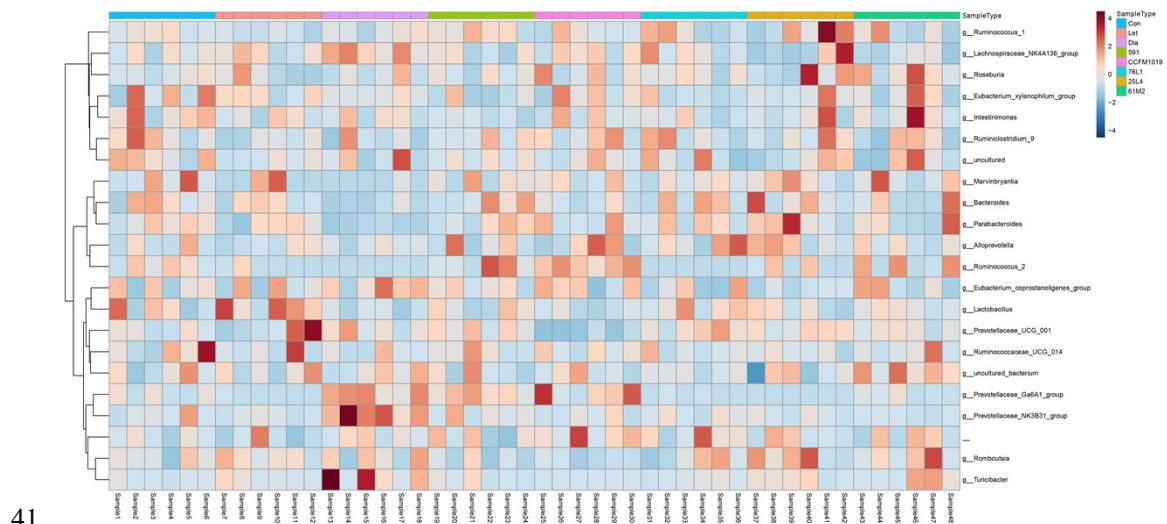
26 1.4 Morphology and immunohistochemistry

27 After euthanasia, ovaries and colon samples were immediately removed from the animals and
28 fixed with 4% paraformaldehyde and embedded in paraffin. The ovaries were sectioned at a
29 thickness of 4–5 μm and stained with haematoxylin and eosin for microscopic examination. The
30 thickness of the granulosa cell layers was measured using Image Pro Plus 6.0 software (Media
31 Cybernetics, Rockville).

32 Deparaffinised colon tissue sections were treated with citrate buffer for antigen retrieval and
33 blocked with 3% H_2O_2 . The slides were then blocked using 3% (w/v) bovine serum albumin for
34 30 min. A rabbit-derived primary antibody, anti-GPR41 (Affinity Biosciences Inc, OH), was used
35 at a dilution of 1:200. The slides were then incubated with a secondary antibody for 50 min and
36 stained with diaminobenzidine. They were then counterstained with haematoxylin and cleared
37 with xylene. Image Pro Plus 6.0 software was used to measure the integrated optical density of the
38 target protein.

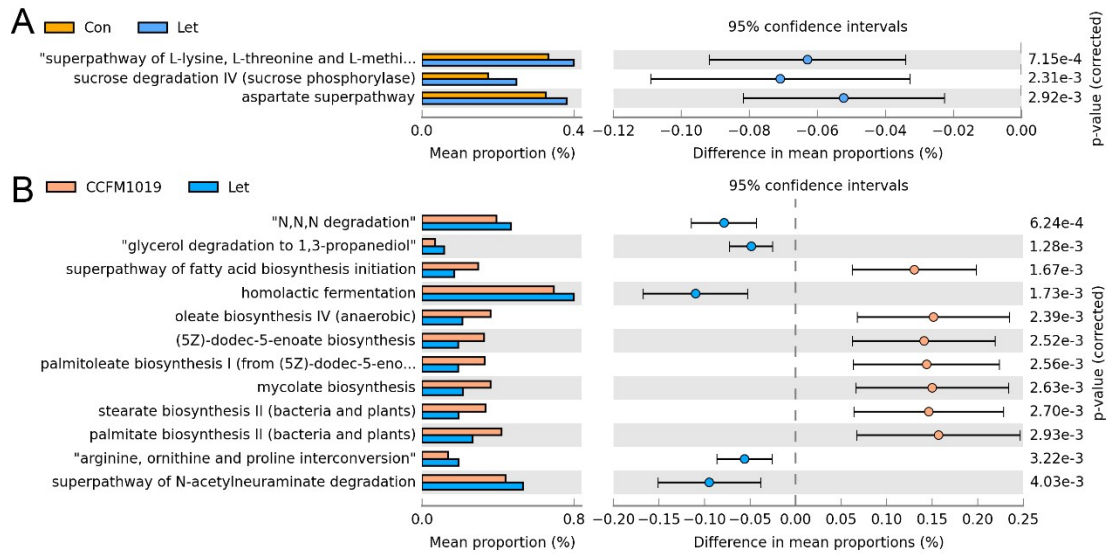
39 2. Results

40 2.1 Overview of top 25 genera



42 Figure S1 Heatmap of the top 25 abundant genera of individual rats. Con: control group; Let: letrozole group; Dia:
43 Diane-35 group.

44 2.2 PICRUST analysis



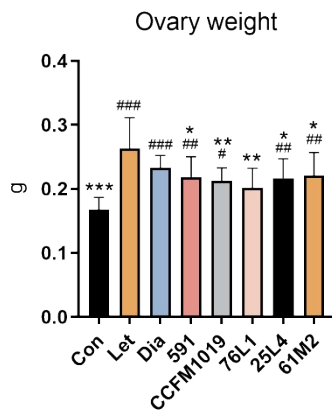
45

46 Figure S2 Differential microbial functions between groups. Phylogenetic Investigation of Communities by

47 Reconstruction of Unobserved States (PICRUSt) was performed based on the Kyoto Encyclopedia of Genes and

48 Genomes (KEGG) database. Con: control group; Let: letrozole group.

49 2.3 Ovary weight



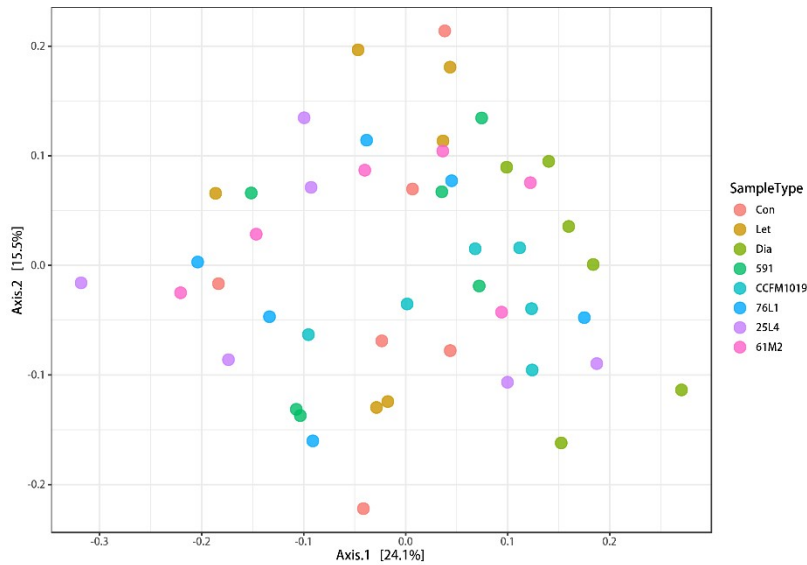
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51 Figure S3 Ovary weight. Data are means with SD. # $p < 0.05$, ## $p < 0.01$, ### $p < 0.001$ versus the control group; * $p <$

52 0.05, ** $p < 0.01$, *** $p < 0.001$ versus the letrozole group using a one-way ANOVA (or Kruskal-Wallis test). Con:

53 control group; Let: letrozole group; Dia: Diane-35 group.

54 2.4 PCoA analysis



55

56 Figure S4 Principal coordinates analysis (PCoA) using the Bray–Curtis distance. Con: control group; Let: letrozole
57 group; Dia: Diane-35 group.

58 2.5 One-way ANOSIM test of microbiota between experimental groups

59 Table S2 Detailed results of one-way ANOSIM test between experimental groups in PCoA analysis.

Group	Con	Let	Dia	591	CCFM1019	76L1	25L4	61M2
Con		R=0.11 <i>p</i> =0.15	R=0.64 <i>p</i> =0.01	R=0.02 <i>p</i> =0.38	R=0.52 <i>p</i> =0.01	R=0.26 <i>p</i> =0.04	R=0.27 <i>p</i> =0.06	R=0.29 <i>p</i> =0.02
	Let	R=0.11 <i>p</i> =0.15		R=0.76 <i>p</i> =0.01	R=0.49 <i>p</i> =0.01	R=0.82 <i>p</i> =0.01	R=0.48 <i>p</i> =0.01	R=0.51 <i>p</i> =0.01
Dia		R=0.64 <i>p</i> =0.01	R=0.76 <i>p</i> =0.01		R=0.45 <i>p</i> =0.01	R=0.42 <i>p</i> =0.01	R=0.46 <i>p</i> =0.01	R=0.43 <i>p</i> =0.01
	591	R=0.02 <i>p</i> =0.38	R=0.49 <i>p</i> =0.01	R=0.45 <i>p</i> =0.01		R=0.29 <i>p</i> =0.02	R=0.08 <i>p</i> =0.24	R=0.14 <i>p</i> =0.13
CCFM1019		R=0.52 <i>p</i> =0.01	R=0.82 <i>p</i> =0.01	R=0.42 <i>p</i> =0.01	R=0.29 <i>p</i> =0.02		R=0.39 <i>p</i> =0.02	R=0.28 <i>p</i> =0.04
	76L1	R=0.26 <i>p</i> =0.04	R=0.48 <i>p</i> =0.01	R=0.46 <i>p</i> =0.01	R=0.08 <i>p</i> =0.24	R=0.39 <i>p</i> =0.02		R=-0.05 <i>p</i> =0.57
25L4		R=0.27 <i>p</i> =0.06	R=0.51 <i>p</i> =0.01	R=0.43 <i>p</i> =0.01	R=0.14 <i>p</i> =0.13	R=0.28 <i>p</i> =0.04	R=-0.05 <i>p</i> =0.57	
	61M2	R=0.29 <i>p</i> =0.02	R=0.57 <i>p</i> =0.01	R=0.39 <i>p</i> =0.01	R=0.11 <i>p</i> =0.16	R=0.20 <i>p</i> =0.06	R=0.05 <i>p</i> =0.34	R=-0.05 <i>p</i> =0.61

60 Red number indicate significant difference between experimental groups ($p < 0.05$). Con: control group; Let:
61 letrozole group; Dia: Diane-35 group.

62 2.6 16S rDNA sequences of five *Lp. plantarum* strains

63 *Lp. plantarum* 591 (Preservation number: CCFM591)

64 CTATAATGCAGTCGACGAACTCTGGTATTGATTGGTCTTGCATCATGATTTACATTT

65 GAGTGAGTGGCGAACTGGTGAGTAACACGTGGGAAACCTGCCAGAAGCGGGGGAT

66 AACACCTGGAAACAGATGCTAATACCGCATAACAACCTTGGACCGCATGGTCCGAGCT
67 TGAAAGATGGCTTCGGCTATCACTTTTGGATGGTCCCGCGGCGTATTAGCTAGATGGT
68 GGGGTAACGGCTCACCATGGCAATGATACGTAGCCGACCTGAGAGGGTAATCGGCCA
69 CATTGGGACTGAGACACGGCCCAAACCTCCTACGGGAGGCAGCAGTAGGGAATCTTCC
70 ACAATGGACGAAAGTCTGATGGAGCAACGCCGCGTGAGTGAAGAAGGGTTTCGGCTC
71 GTAAAACCTCTGTTGTTAAAGAAGAACATATCTGAGAGTAACTGTTTCAGGTATTGACG
72 GTATTTAACCAGAAAGCCACGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGG
73 TGGCAAGCGTTGTCCGGATTTATTGGGCGTAAAGCGAGCGCAGGCGGTTTTTTAAGTC
74 TGATGTGAAAGCCTTCGGCTCAACCGAAGAAGTGCATCGGAAACTGGGAAACTTGAG
75 TGCAGAAGAGGACAGTGGAACCTCCATGTGTAGCGGTGAAATGCGTAGATATATGGAA
76 GAACACCAGTGGCGAAGGCGGCTGTCTGGTCTGTAACCTGACGCTGAGGCTCGAAAGT
77 ATGGGTAGCAAACAGGATTAGATACCCTGGTAGTCCATACCGTAAACGATGAATGCT
78 AAGTGTGGAGGGTTTCCGCCCTTCAGTGCTGCAGCTAACGCATTAAGCATTCCGCCT
79 GGGGAGTACGGCCGCAAGGCTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGC
80 GGTGGAGCATGTGGTTTAATTCGAAGCTACGCGAAGAACCTTACCAGGTCTTGACAT
81 ACTATGCAAATCTAAGAGATTAGACGTTCCCTTCGGGGACATGGATACAGGTGGTGC
82 ATGGTTGTCGTCAGCTCGTGTGCGTGAGATGTTGGGTAAAGTCCCGCAACGAGCGCAAC
83 CCTTATTATCAGTTGCCAGCATTAAAGTTGGGCACTCTGGTGAGACTGCCGGTGACAAA
84 CCGGAGGAAGGTGGGGATGACGTCAAATCATCATGCCCCTTATGACCTGGGCTACAC
85 ACGTGCTACAATGGATGGTACAACGAGTTGCGAACTCGCGAGAGTAAGCTAATCTCT
86 TAAAGCCATTCTCAGTTCGGATTGTAGGCTGCAACTCGCCTACATGAAGTCGGAATCG
87 CTAGTAATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTGTACACACC
88 GCCCGTCACACCATGAGAGTTTGTAACACCCAAAGTCGGTGGGGTAACCTTTAGAAC
89 CAGCCGCTA

90 *Lp. plantarum* CCFM1019 (Preservation number: CCFM1019)

91 CTTAGCGGCTGGTTCTAAAGGTTACCCACCGACTTTGGGTGTTACAACTCTCATGG
92 TGTGACGGGCGGTGTGTACAAGGCCCGGGAACGTATTCACCGCGGCATGCTGATCCG
93 CGATTACTAGCGATTCCGACTTCATGTAGGCGAGTTGCAGCCTACAATCCGAACTGAG
94 AATGGCTTTAAGAGATTAGCTTACTCTCGCGAGTTCGCAACTCGTTGTACCATCCATT
95 GTAGCACGTGTGTAGCCCAGGTCATAAGGGGCATGATGATTTGACGTCATCCCCACCT

96 TCCTCCGGTTTGTACCCGGCAGTCTCACCAGAGTGCCCAACTTAATGCTGGCAACTGA
97 TAATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGAC
98 GACAACCATGCACCACCTGTATCCATGTCCCCGAAGGGAACGTCTAATCTCTTAGATT
99 TGCATAGTATGTCAAGACCTGGTAAGGTTCTTCGCGTAGCTTCGAATTAACCACATG
100 CTCCACCGCTTGTGCGGGCCCCGTC AATTCCTTTGAGTTTCAGCCTTGCGGCCGTA
101 CCCCAGGCGGAATGCTTAATGCGTTAGCTGCAGCACTGAAGGGCGGAAACCCTCCAA
102 CACTTAGCATTTCATCGTTTACGGTATGGACTACCAGGGTATCTAATCCTGTTTGCTAC
103 CCATACTTTCGAGCCTCAGCGTCAGTTACAGACCAGACAGCCGCCTTCGCCACTGGTG
104 TTCTTCCATATATCTACGCATTCACCGCTACACATGGAGTTCCTACTGTCCTCTTCTGC
105 ACTCAAGTTTCCCAGTTTCCGATGCACTTCTTCGGTTGAGCCGAAGGCTTTCACATCA
106 GACTTAAAAAACC GCCTGCGCTCGCTTACGCCAATAAATCCGGACAACGCTTGCC
107 ACCTACGTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGGCTTCTGGTTAAATAC
108 CGTCAATACCTGAACAGTTACTCTCAGATATGTTCTTCTTTAACAACAGAGTTTTACG
109 AGCCGAAACCCTTCTTCACTCACGCGGCGTTGCTCCATCAGACTTTCGTCCATTGTGG
110 AAGATTCCCTACTGCTGCCTCCCGTAGGAGTTTGGGCCGTGTCTCAGTCCCAATGTGG
111 CCGATTACCCTCTCAGGTCGGCTACGTATCATTGCCATGGTGAGCCATTACCCACCA
112 TCTAGCTAATACGCCGCGGGACCATCCAAAAGTGATAGCCGAAGCCATCTTCAAAC
113 TCGGACCATGCGGTCCAAGTTGTTATGCGGTATTAGCATCTGTTTCCAGGTGTTATCC
114 CCCGCTTCTGGGCAGGTTTCCCACGTGTTACTCACCAGTTCGCCACTCACTCAAATGT
115 AAATCATGATGCAAGCACCAATCAATACCAGAGTTCGTGCGACTGCATGATAGA
116 *Lp. plantarum* 76L1(Preservation number: FSCDJY76L1)
117 CGGCTGGTTCCTAAAAGGTTACCCACCGACTTTGGGTGTTACAACTCTCATGGTGT
118 GACGGGCGGTGTGTACAAGGCCCGGGAACGTATTCACCGCGGCATGCTGATCCGCGA
119 TTAGTAGCGATTCCGACTTCATGTAGGCGAGTTGCAGCCTACAATCCGAACTGAGAAT
120 GGCTTTAAGAGATTAGCTTACTCTCGCGAGTTCGCAACTCGTTGTACCATCCATTGTA
121 GCACGTGTGTAGCCCAGGTCATAAGGGGCATGATGATTTGACGTCATCCCCACCTTCC
122 TCCGTTTGTACCCGGCAGTCTCACCAGAGTGCCCAACTTAATGCTGGCAACTGATAA
123 TAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGAC
124 AACCATGCACCACCTGTATCCATGTCCCCGAAGGGAACGTCTAATCTCTTAGATTTAC
125 ATAGTATGTCAAGACCTGGTAAGGTTCTTCGCGTAGCTTCGAATTAACCACATGCTC

126 CACCGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTCAGCCTTGCGGCCGTACTCC
127 CCAGGCGGAATGCTTAATGCGTTAGCTGCAGCACTGAAGGGCGGAAACCCTCCAACA
128 CTTAGCATTATCGTTTACGGTATGGACTACCAGGGTATCTAATCCTGTTTGCTACCC
129 AACTTTTCGAGCCTCAGCGTCAGTTACAGACCAGACAGCCGCCTTCGCCACTGGTGTT
130 CTTCATATATCTACGCATTTACCGCTACACATGGAGTTCCACTGTCCTCTTCTGCAC
131 TCAAGTTTCCCAGTTTCCGATGCACTTCTTCGGTTGAGCCGAAGGCTTTCACATCAGA
132 CTAAAAAACCGCCTGCGCTCGCTTTACGCCAATAAATCCGGACAACGCTTGCCACC
133 TACGTATTACCGCGGCTGCTGGCAGTAGTTAGCCGTGGCTTTCTGGTTAAATACCGT
134 CAATACCTGAACAGTTACTCTCAGATATGTTCTTCTTTAACAACAGAGTTTACGAGC
135 CGAAACCCTTCTTCACTCACGCGGCGTTGCTCCATCAGACTTTCGTCCATTGTGGAAG
136 ATTCCCTACTGCTGCCTCCCGTAGGAGTTTGGGCCGTGTCTCAGTCCCAATGTGGCCG
137 ATTACCCTCTCAGGTCGGCTACGTATCATTGCCATGGTGAGCCGTTACCTCACCATCT
138 AGCTAATACGCCGCGGGACCATCCAGAAGTGATAGCCGAAGCCATCTTCAAACCTCG
139 GACCATGCGGTCCAAGTTGTTATGCGGTATTAGCATCTGTTTCCAGGTGTTATCCCC
140 GCTTCTGGGCAGGTTTCCCACGTGTTACTCACCAGTTCGCCACTCACTCAAATGTAAA
141 TCATGATGCAAGCACC AATCAATACCAGAGTTCGTTTCGACTGC
142 *Lp. plantarum* 25L4 (Preservation number: FCQHC25L4)
143 GGCTGGTTCCTAAAAGGTTACCCACCGACTTTGGGTGTTACAACTCTCATGGTGTG
144 ACGGGCGGTGTGTACAAGGCCCGGGAACGTATTCACCGCGGCATGCTGATCCGCGAT
145 TACTAGCGATTCCGACTTCATGTAGGCGAGTTGCAGCCTACAATCCGAACTGAGAAT
146 GGCTTTAAGAGATTAGCTTACTCTCGCGAGTTCGCAACTCGTTGTACCATCCATTGTA
147 GCACGTGTGTAGCCCAGGTCATAAGGGGCATGATGATTTGACGTCATCCCCACCTTCC
148 TCCGTTTGTACCGGCAGTCTCACCAGAGTGCCCAACTTAATGCTGGCAACTGATAA
149 TAAG
150 GGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAACC
151 ATGCACCACCTGTATCCATGTCCCCGAAGGGAACGTCTAATCTCTTAGATTTGCATAG
152 TATGTCAAGACCTGGTAAGGTTCTTCGCGTAGCTTCGAATTAACCACATGCTCCACC
153 GCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTCAGCCTTGCGGCCGTACTCCCCAG
154 GCGGAATGCTTAATGCGTTAGCTGCAGCACTGAAGGGCGGAAACCCTCCAACACTTA
155 GCATTCATCGTTTACGGTATGGACTACCAGGGTATCTAATCCTGTTTGCTACCCATAC

156 TTTCGAGCCTCAGCGTCAGTTACAGACCAGACAGCCGCCTTCGCCACTGGTGTCTTC
157 CATATATCTACGCATTTACCGCTACACATGGAGTTCCACTGTCTCTTCTGCACTCAA
158 GTTCCCAGTTTCCGATGCACTTCTTCGGTTGAGCCGAAGGCTTTCACATCAGACTTA
159 AAAAACCGCCTGCGCTCGCTTTACGCCAATAAATCCGGACAACGCTTGCCACCTAC
160 GTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGGCTTTCTGGTTAAATACCGTCAA
161 TACCTGAACAGTTACTCTCAGATATGTTCTTCTTAAACAACAGAGTTTTACGAGCCGA
162 AACCTTCTTCACTCACGCGGCGTTGCTCCATCAGACTTTCGTCCATTGTGGAAGATT
163 CCCTACTGCTGCCTCCCGTAGGAGTTTGGGCCGTGTCTCAGTCCCAATGTGGCCGATT
164 ACCCTCTCAGGTGCGCTACGTATCATTGCCATGGTGAGCCGTTACCCACCATCTAGC
165 TAATACGCCGCGGGACCATCCAAAAGTGATAGCCGAAGCCATCTTCAAGCTCGGAC
166 CATGCGGTCCAAGTTGTTATGCGGTATTAGCATCTGTTTCCAGGTGTTATCCCCGCTT
167 CTGGGCAGGTTTCCACGTGTTACTCACCAGTTCGCCACTCACTCAAATGTAAATCAT
168 GATGCAAGCACCAATCAATACCAGAGTTCGTTCGACTTG

169 *Lp. plantarum* 61M2 (Preservation number: FZJTZ76L161M2)

170 GCTGGTTCCTAAAAGGTTACCCACCGACTTTGGGTGTTACAACTCTCATGGTGTGA
171 CGGGCGGTGTGTACAAGGCCCGGGAACGTATTCACCGCGGCATGCTGATCCGCGATT
172 ACTAGCGATTCCGACTTCATGTAGGCGAGTTGCAGCCTACAATCCGAACTGAGAATG
173 GCTTTAAGAGATTAGCTTACTCTCGCGAGTTCGCAACTCGTTGTACCATCCATTGTAG
174 CACGTGTGTAGCCAGGTCATAAGGGGCATGATGATTTGACGTCATCCCCACCTTCT
175 CCGGTTTGTACCGGCAGTCTCACCAGAGTGCCCAACTTAATGCTGGCAACTGATAAT
176 AAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACA
177 ACCATGCACCACCTGTATCCATGTCCCCGAAGGGAACGTCTAATCTCTTAGATTGCA
178 TAGTATGTCAAGACCTGGTAAGGTTCTTCGCGTAGCTTCGAATTAACCACATGCTCC
179 ACCGCTTGTGCGGGCCCCGTCAATTCCTTTGAGTTTCAGCCTTGCGGCCGTACTCCC
180 CAGGCGGAATGCTTAATGCGTTAGCTGCAGCACTGAAGGGCGGAAACCCTCCAACAC
181 TTAGCATTCATCGTTTACGGTATGGACTACCAGGGTATCTAATCCTGTTTGCTACCCAT
182 ACTTTCGAGCCTCAGCGTCAGTTACAGACCAGACAGCCGCCTTCGCCACTGGTGTCT
183 TCCATATATCTACGCATTTACCGCTACACATGGAGTTCCACTGTCTCTTCTGCACTC
184 AAGTTTCCCAGTTTCCGATGCACTTCTTCGGTTGAGCCGAAGGCTTTCACATCAGACT
185 TAAAAACCGCCTGCGCTCGCTTTACGCCAATAAATCCGGACAACGCTTGCCACCTA

186 CGTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGGCTTTCTGGTTAAATACCGTCA
187 ATACCTGAACAGTTACTCTCAGATATGTTCTTCTTTAACAACAGAGTTTTACGAGCCG
188 AAACCCTTCTTCACTCACGCGGCGTTGCTCCATCAGACTTTCGTCCATTGTGGAAGAT
189 TCCCTACTGCTGCCTCCCGTAGGAGTTTGGGCCGTGTCTCAGTCCCAATGTGGCCGAT
190 TACCCTCTCAGGTCGGCTACGTATCATTGCCATGGTGAGCCGTTACCCCACCATCTAG
191 CTAATACGCCGCGGGACCATCCAAAAGTGATAGCCGAAGCCATCTTTCAAGCTCGGA
192 CCATGCGGTCCAAGTTGTTATGCGGTATTAGCATCTGTTTCCAGGTGTTATCCCCCGCT
193 TCTGGGCAGGTTTCCCACGTGTTACTCACCAGTTCTCCACTCACTCAAATGTAAATCA
194 TGATGCAAGCACCAATCAATACCAGAGTTCGTTTCGACTT