

1 Supporting Information

2 **Iron oxide nanozyme suppresses intracellular *Salmonella***
3 **enteritidis growth and alleviates infection *in vivo***

4 Shourong Shi^{1,5,6}✉, Shu Wu^{1,2}, Yiru Shen¹, Shan Zhang¹, Yunqi Xiao¹, Xi He², Jiansen Gong¹,
5 Yuhua Farnell⁴, Yan Tang³, Yixin Huang³ and Lizeng Gao³✉

6 ¹Department of Feed and Nutrition, Poultry Institute, Chinese Academy of Agricultural
7 Sciences,

8 Yangzhou, Jiangsu 225125, China

9 ²College of Animal Science and Technology, Hunan Agricultural University, Changsha,
10 Hunan 410128, China

11 ³Jiangsu Key Laboratory of Experimental & Translational Non-coding RNA Research,
12 Institute of Translational Medicine , School of Medicine, Yangzhou University, Yangzhou,
13 Jiangsu 225000, China

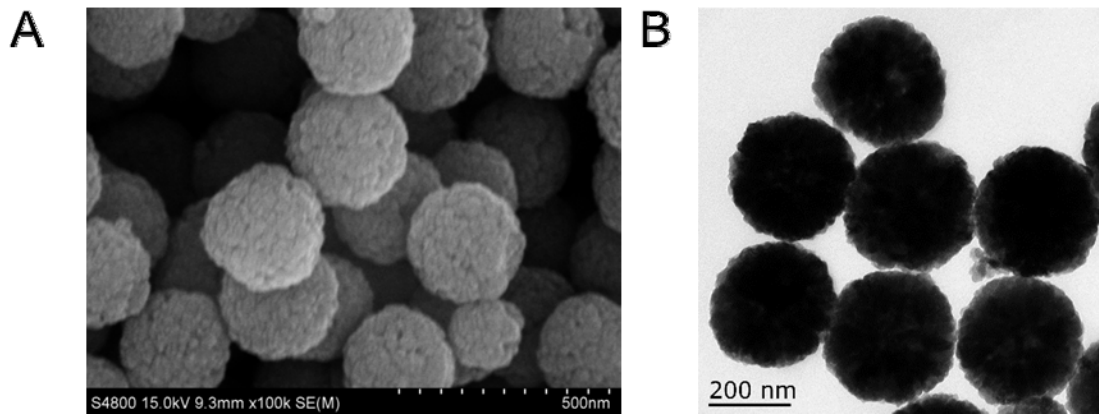
14 ⁴Department of Poultry Science, Texas A&M AgriLife Research, Texas A&M University,
15 College Station, TX 77843, USA

16 ⁵Institute of Effective Evaluation of Feed and Feed Additive (Poultry institute), Ministry of
17 Agriculture, Yangzhou, Jiangsu 225125, China

18 ⁶Jiangsu Co-Innovation Center for Prevention and Control of Important Animal Infectious
19 Diseases and Zoonoses, Yangzhou University, Yangzhou, Jiangsu 225000, China

20 **Corresponding Authors**

21 ✉ Email: ssr236@163.com (Shourong Shi), Email: lzgao@yzu.edu.cn (Lizeng Gao)



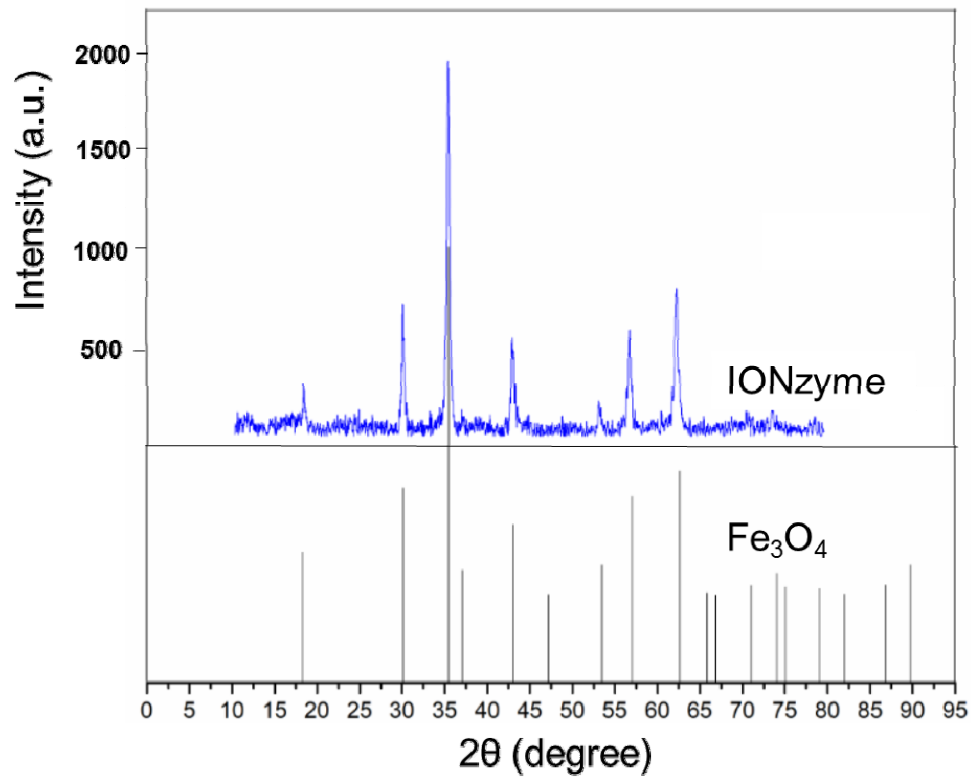
22

23 **Figure S1.** Characterization of prepared IONzymes. (A) The SEM image of the

24 prepared IONzymes. Scale bar: 500 nm. (B) The TEM micrograph of the prepared

25 IONzymes, Scale bar: 200 nm.

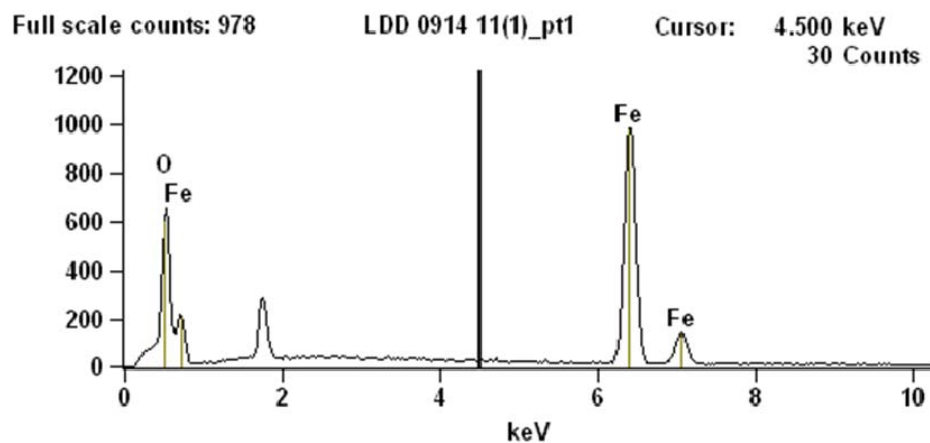
26



27

28 *Figure S2.* XRD characterization of prepared IONzymes. IONzymes were identified as

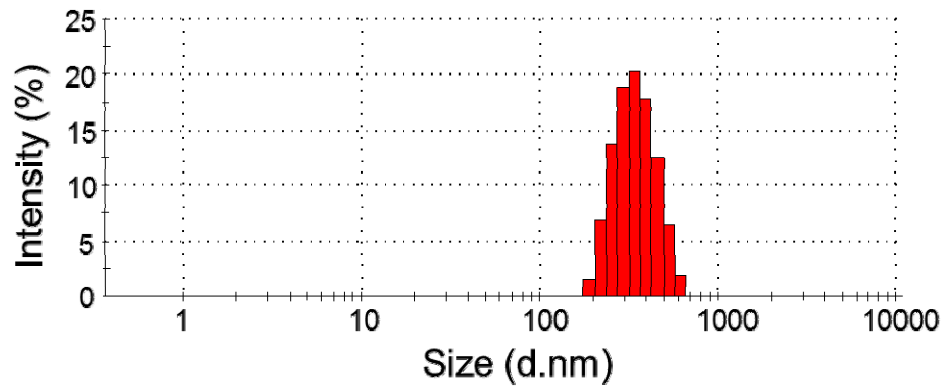
29 Fe₃O₄ nanoparticles.



Component	Weight %	Atom %
Fe	76.61	48.42
O	23.39	51.58

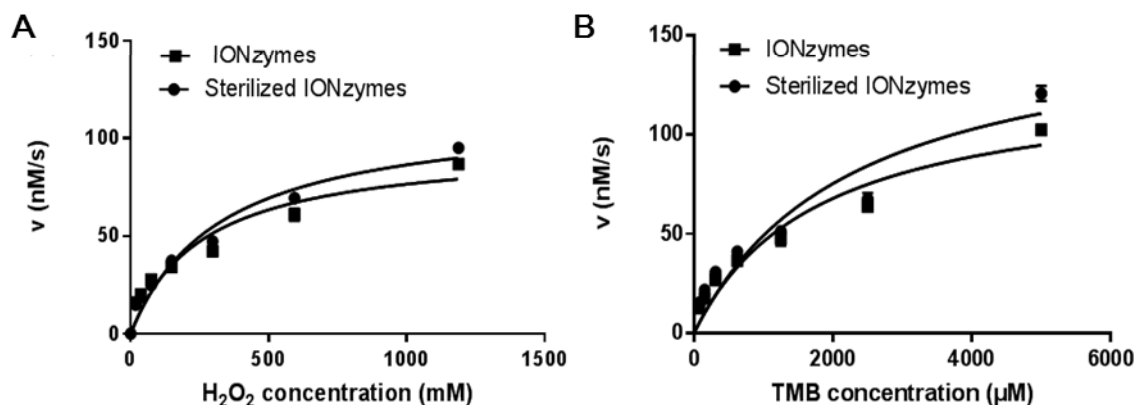
30

31 *Figure S3.* EDS analysis of the components in the product of IONzymes.



32

33 **Figure S4.** Size analysis with dynamic light scattering. The hydrodynamic diameter
34 was around 350 nm. Reaction conditions: 50 $\mu\text{g/mL}$ of IONzymes in ddH₂O at room
35 temperature.



36
 37 **Figure S5.** Peroxidase-like property followed the Michaelis-Menten kinetic analysis. **(A)**
 38 The kinetics when H₂O₂ concentration was variable. The reactions were conducted
 39 with variable H₂O₂ amounts in NaAc buffer (0.1M, pH 4.5) containing 10 μg/mL of
 40 IONzymes (or sterilized IONzymes) and 833.33 μM chromogenic substrate (TMB). **(B)**
 41 The kinetics when TMB concentration was variable. The reactions were conducted
 42 with variable TMB amounts in NaAc buffer (0.1M, pH 4.5) containing 10 μg/mL of
 43 IONzymes (or sterilized IONzymes) and 148.46 mM H₂O₂.

44 **Table S1.** Kinetic parameters of IONzymes when H₂O₂ concentration was variable.

H ₂ O ₂	IONzyme	Sterilized IONzyme
Vmax (nM/s)	96.4	114.5
Kcat (s ⁻¹)	1.26×10 ⁵	1.5×10 ⁵
Km (mM)	259.7	325.9
Kcat/Km (mM ⁻¹ ·s ⁻¹)	485.2	460.2

45

46 **Table S2.** Kinetic parameters of IONzymes when TMB concentration was variable.

TMB	IONzyme	Sterilized IONzyme
Vmax (nM/s)	128.5	160.8
Kcat (s ⁻¹)	1.68×10 ⁵	2.1×10 ⁵
Km (μM)	1789	2275
Kcat/Km (μM ⁻¹ ·s ⁻¹)	93.9	92.3

47

48

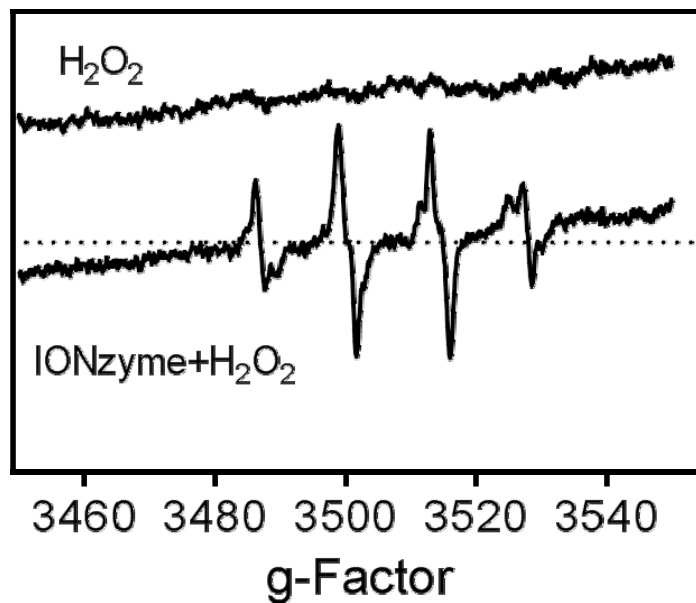
49

50

51

52

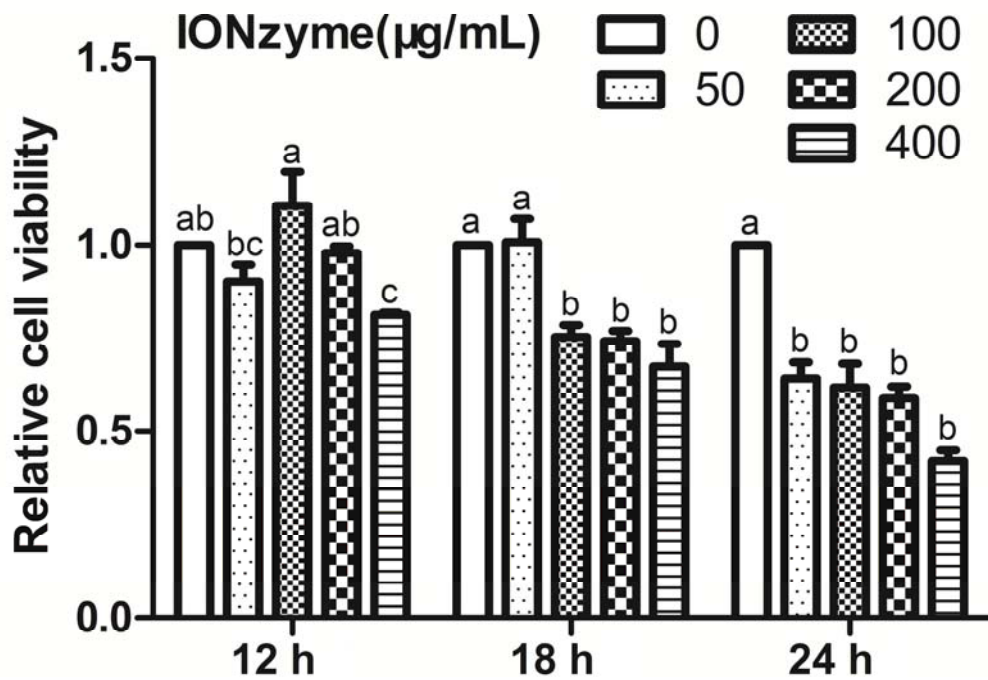
53



54

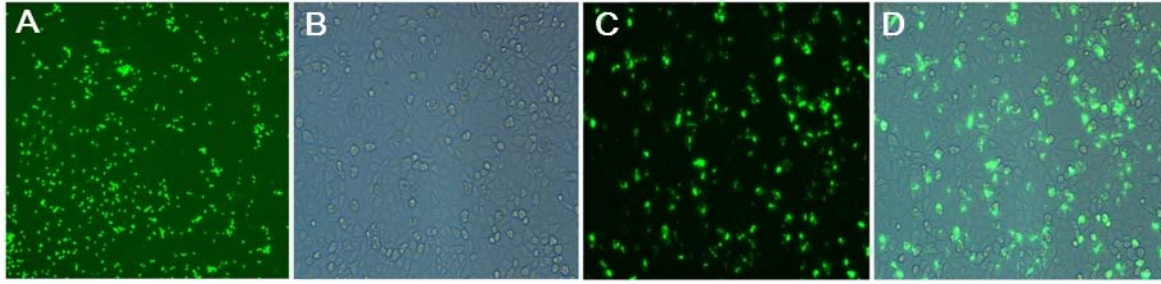
55 **Figure S6.** ESR signals of hydroxyl radicals generated by IONzymes in the presence
56 of H₂O₂ under acidic condition. The assay was conducted in NaAc buffer (0.1M, pH
57 4.5) containing 100 µg/mL IONzymes, 200 mM H₂O₂ and 10 mM BMPO at room
58 temperature.

59



60

61 **Figure S7.** Cell viability assay of *S. Enteritidis* infected-LMH cells treated with different
 62 concentration of IONzyme at 12, 18 and 24 h. Data shown as average percentage of
 63 live cells, normalized to *S. Enteritidis* infected-LMH cells without IONzyme (0 µg/mL)
 64 at different time points. Results presented as Mean ± SEM (n=3). Experiment was
 65 repeated three times. Different letters indicate statistically significant difference ($P <$
 66 0.05).



67

68 **Figure S8.** Fluorescence micrograph of GFP-expressing *S. Enteritidis* and LMH cells

69 infected with GFP-expressing *S. Enteritidis*. (A) Fluorescence micrograph of *S.*

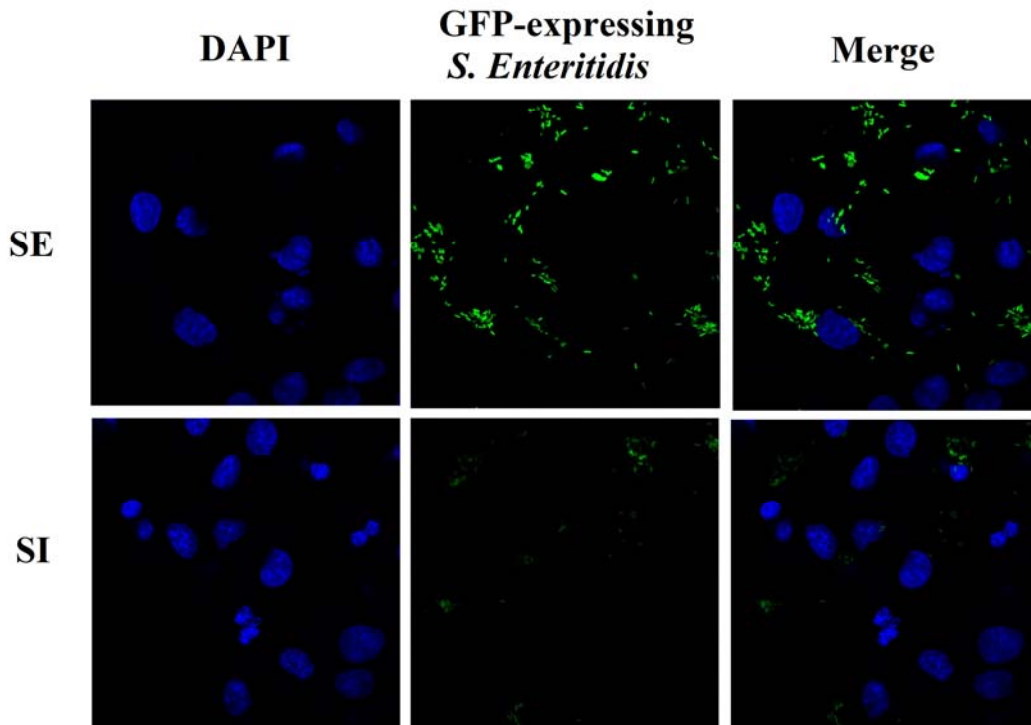
70 *Enteritidis* in liquid medium which were transfected with green fluorescent plasmid

71 (pGFPmut3-1). (B) Bright field micrograph of LMH cells which were infected with

72 GFP-expressing *S. Enteritidis*. (C) Fluorescence micrograph of GFP-expressing *S.*

73 *Enteritidis* (5×10^7 CFU/mL) in LMH cells. (D) The merged image of b) and c).

74



75

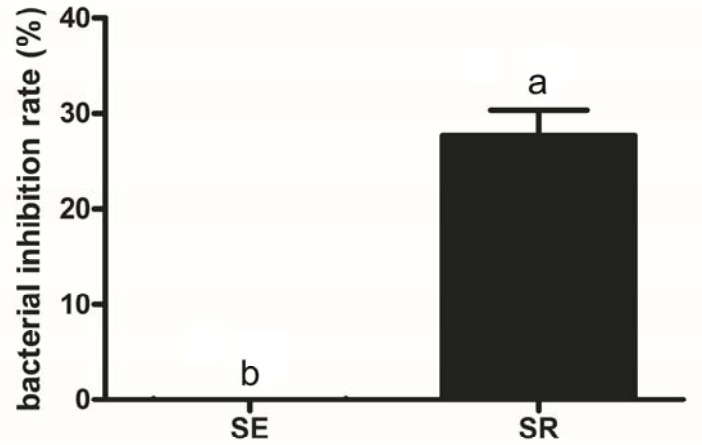
76 *Figure S9.* Micrographs of GFP-expressing *S. Enteritidis* (Green dots)-infected LMH

77 cells in the absence (SE) and presence of IONzyme (SI). The blue DAPI fluorescence

78 indicates nucleus of LMH cells, and the green dots indicate GFP-expressing *S.*

79 *Enteritidis*.

80



81

82 **Figure S10.** Inhibition of intracellular survival *S. Enteritidis* in infected LMH cells in the

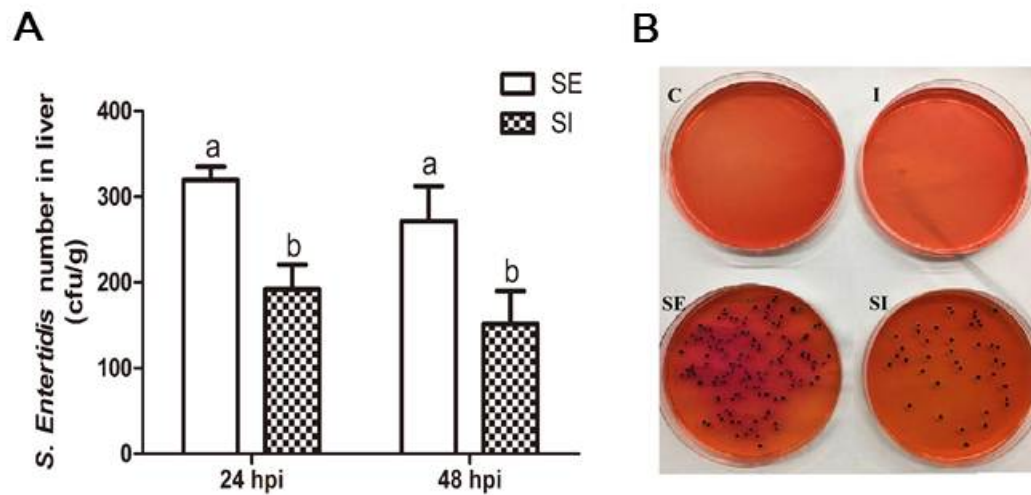
83 absence (SE group) or presence of rapamycin (RAPA, SR group). Data are

84 expressed as percentages of the mean numbers of intracellular CFU relative to levels

85 from SE group at 24 h. Results presented as Mean \pm SEM (n=3). Experiment was

86 repeated three times. Different letters indicate statistically significant difference ($P <$

87 0.05).



88

89 **Figure S11.** Effects of IONzyme in chicken infected with *S. Enteritidis*. Chicken were
 90 treated with vehicle control (C), IONzyme alone (I), infected with *S. Enteritidis* in the
 91 absence (SE) or presence (SI) of IONzyme. **(A)** Bacterial inhibition rates of IONzyme
 92 at 24 and 48 hpi in liver of *S. Enteritidis* infected chickens. Values represent the Mean
 93 \pm SEM (n=9). Different small letters indicate statistically significant difference ($P <$
 94 0.05). **(B)** Photos of *S. Enteritidis* CFU number of chicken liver.

95

Table S3. Up-regulated differentially expressed genes in group SI compared with group SE

Gene_id	readcount_SI	readcount_SE	log2FoldChange	P value
100857889	35.75811495	9.622193267	1.8938	0.011215
100857899	36.52365614	16.66974239	1.1316	0.031354
100857902	26.91755387	12.02051257	1.163	0.043054
100857984	442.3678059	288.5052396	0.61665	0.038465
100858205	2017.482806	1287.92547	0.64751	0.022591
100858343	25.05738149	6.55551337	1.9345	0.008804
101748003	52.11634545	17.69078549	1.5587	0.001038
101748342	233.8932735	65.1423018	1.8442	0.000516
101748649	36.89332672	15.82080764	1.2215	0.018314
101748973	45.34441717	17.68409456	1.3585	0.006337
101749127	195.4546735	96.56811257	1.0172	0.032277
101749229	87.55061224	46.99286707	0.89768	0.021245
101749586	1397.449236	729.3568901	0.9381	0.00109
101750578	12.72492571	2.940896818	2.1133	0.019913
101751160	16.12244877	5.474796802	1.5582	0.041392
101751655	36.45933264	9.197376122	1.987	0.011753
101752332	5.661534708	0	Inf	0.030721
107049124	6.937259004	0	Inf	0.049287
107049445	5.920434285	0	Inf	0.047523
107050343	8.446167113	1.317158807	2.6809	0.024262

107050532	44.06878767	21.06563116	1.0649	0.039586
107050552	151.7009019	70.81660207	1.0991	0.029266
107050871	35777.83826	19892.34771	0.84685	0.021493
107051301	261.4828576	148.3726203	0.81749	0.009569
107051726	51.82215592	23.71374091	1.1278	0.013468
107051772	220.8388802	88.02514859	1.327	0.025278
107051936	32.41475022	7.546497768	2.1028	0.013434
107052542	16.72006133	5.952596493	1.49	0.039757
107052582	77.0704891	40.11764826	0.94194	0.023328
107052590	16.74066416	4.248258022	1.9784	0.01396
107053315	220.3710463	89.30733348	1.3031	0.001107
107053383	465.2401154	299.4376468	0.63572	0.03187
107053568	20.10602547	6.596035564	1.608	0.017637
107054014	18.68074474	5.801637103	1.687	0.018657
107054179	164.5820803	69.57113316	1.2422	0.028673
107054419	15.02521967	5.208517828	1.5284	0.048966
107054433	18.53611165	6.956929098	1.4138	0.048963
107054646	25.32000024	6.822902165	1.8918	0.003307
107057116	28.43689964	6.670832955	2.0918	0.025162
112530424	14.64972819	4.564856792	1.6822	0.035009
112530896	54.26838194	28.07687459	0.95073	0.033603
112531545	11.1021525	0.336859868	5.0425	0.019221

112531586	11.40889332	1.573418214	2.8582	0.037647
112532141	28.43519929	13.0615948	1.1223	0.045289
112532487	18.8910003	6.108438272	1.6288	0.023288
112532491	36.26767297	9.570985615	1.9219	0.014229
112532524	13.12845838	1.010579603	3.6994	0.000657
112532901	17.5600912	3.277978649	2.4214	0.002693
112532951	7.086414051	0.950018276	2.899	0.034109
112532968	60.53406999	30.73300705	0.97796	0.021616
112533350	10.62655138	2.307699276	2.2031	0.035359
373902	2113.558971	1345.974717	0.65102	0.021235
374010	82.96368497	44.80318377	0.88888	0.040633
374116	728.0631736	458.5981478	0.66683	0.0221
374131	192.3139483	121.8517876	0.65834	0.046455
378924	4025.002613	2600.026444	0.63046	0.023676
395357	244.3857481	120.6156395	1.0187	0.041909
395480	1898.575829	792.0898105	1.2612	0.001369
395562	42.4601713	16.25852906	1.3849	0.037353
395650	674.3463621	339.9509069	0.98816	0.019909
395686	48.56604296	21.67276454	1.1641	0.021421
395694	227.3962547	137.5930726	0.7248	0.049249
396025	22974.06219	12010.68298	0.93569	0.036037
396048	81.70614328	30.99839817	1.3983	0.01065

396057	896.6049377	547.5931983	0.71137	0.048748
396091	28574.60346	17087.11929	0.74182	0.008221
396099	101.5825264	59.01382357	0.78353	0.035607
396256	169.5964728	73.59762893	1.2044	0.001998
396273	39.38989709	8.054356158	2.29	0.007774
396485	2731.053225	1205.410932	1.1799	0.003688
396489	7407.128158	2313.198411	1.679	0.001612
396494	3867.181534	2397.447115	0.68978	0.0135
396532	151.7360038	89.54621733	0.76086	0.036479
408024	2833.347782	1520.637706	0.89783	0.004569
414341	11170.07102	6801.905269	0.71563	0.046993
415489	152.6170986	78.91832603	0.95148	0.017215
415560	37.47396083	17.46480674	1.1014	0.029723
415724	32.98763938	10.55217241	1.6444	0.005556
415895	532.7195936	288.3095079	0.88576	0.00693
416148	209.0165247	87.93427378	1.2491	0.014205
416163	92.59612809	43.70642261	1.0831	0.013468
416303	440.7547743	287.1844317	0.618	0.041124
416328	2180.986799	1132.599391	0.94534	0.041173
416575	272.4100592	117.3534843	1.2149	0.021923
416651	1201.427523	577.3073827	1.0573	0.037165
416652	2396.42671	1213.730404	0.98144	0.033101

416716	69.02806645	36.26658947	0.92854	0.025661
416768	274.3601273	127.5329679	1.1052	0.000598
416782	421.5297	263.8747676	0.67578	0.027199
416783	1765.135916	929.5909374	0.92511	0.016633
416868	225.4130444	119.7945446	0.91201	0.017849
416875	444.6153472	270.1101981	0.71901	0.01665
416910	181.8216871	112.1590134	0.69698	0.035513
416933	3983.56016	2302.915787	0.7906	0.036191
416967	456.790149	222.7712714	1.036	0.012752
417013	1463.38473	501.6378636	1.5446	0.028676
417227	1587.442334	779.5145477	1.0261	0.013841
417245	158.7709404	88.3009712	0.84645	0.013208
417387	792.0402495	503.9027554	0.65243	0.02626
417439	1191.604154	710.2487477	0.74651	0.031514
417440	2232.888401	630.6562715	1.824	0.015561
417628	351.6466219	213.830855	0.71766	0.045038
417647	530.9375711	173.637519	1.6125	0.009347
417963	399.0831673	237.8211148	0.74681	0.028389
418201	2162.446994	1139.643622	0.92408	0.028196
418237	216.2090811	131.2377606	0.72024	0.026564
418298	771.9992794	435.1342621	0.82714	0.006742
418311	548.2864933	300.4972119	0.86758	0.021619

418495	694.4562463	417.4844436	0.73416	0.012499
418528	370.6588292	216.9246744	0.7729	0.012331
418715	357.3471998	208.9081785	0.77446	0.011247
418924	160.4301736	100.0467382	0.68127	0.048631
419051	917.1271761	344.3900134	1.4131	6.36E-05
419091	678.5692755	357.461151	0.92471	0.032355
419142	3031.300464	1976.161247	0.61724	0.027468
419407	402.7006002	212.7703322	0.92041	0.008731
419480	3542.791549	1799.475917	0.97731	0.022645
419784	8.547174327	1.30713924	2.709	0.040268
419824	34.06497363	15.95172789	1.0946	0.03499
419832	1999.088019	1303.198489	0.61729	0.032972
420133	1815.362702	1108.364362	0.71183	0.037317
420534	412.831781	39.34110293	3.3914	0.031696
420689	1225.714437	505.4701511	1.2779	0.032897
420695	40.79247326	16.86188987	1.2745	0.011115
420819	1368.651476	910.0212836	0.58878	0.039414
421106	191.9455886	113.9045063	0.75287	0.044237
421114	1162.201635	713.4589748	0.70396	0.026289
421152	2651.604315	847.0571431	1.6463	0.004236
421278	581.0653106	344.8908933	0.75256	0.038209
421282	2884.146982	1757.380905	0.71472	0.010895

421405	97.95294081	57.24803592	0.77486	0.039272
421809	170.882457	79.73346398	1.0997	0.017044
421887	34.9420886	16.03632289	1.1236	0.033777
422053	139.2249121	77.99573735	0.83595	0.016904
422077	384.5369244	232.9607097	0.72304	0.043742
422384	139.5658676	51.1295789	1.4487	5.93E-05
422403	219.0519924	109.2158969	1.0041	0.026014
422493	449.5744629	194.0521348	1.2121	0.013805
422611	91.20009271	52.55628705	0.79517	0.037793
422765	1219.110058	806.9633845	0.59525	0.037819
422802	1031.292726	398.7225533	1.371	0.015944
422860	2268.802583	1149.901751	0.98042	0.000522
422889	67.35844437	34.51237513	0.96475	0.039269
423016	12.53948834	1.276858577	3.2958	0.031977
423064	443.0987771	232.6450661	0.9295	0.002373
423144	363.7645932	197.8132731	0.87887	0.026584
423154	1565.556703	866.5927863	0.85325	0.03598
423158	33.03296561	8.873676141	1.8963	0.001008
423216	54.47411554	20.41927373	1.4156	0.046354
423225	3309.596541	1946.241522	0.76596	0.006404
423339	2312.679015	1524.534123	0.6012	0.032373
423390	549.6565785	339.9021384	0.69341	0.037089

423435	191.7595023	35.75895304	2.4229	0.045772
423456	3277.492265	2131.479767	0.62074	0.033369
423457	1743.182352	612.8635598	1.5081	0.000222
423506	63.34432336	22.98947942	1.4622	0.000957
423587	380.9932678	216.2890697	0.8168	0.006847
423588	1461.522575	829.7858287	0.81666	0.012335
423664	767.8853109	351.3297577	1.1281	0.030391
423767	1603.400425	959.7647184	0.74038	0.009305
423792	6195.725259	1016.667278	2.6074	0.010689
423809	192.1026782	110.4960513	0.79788	0.048608
423857	1300.296148	829.4726242	0.64857	0.023881
423882	17.23284235	5.962616059	1.5311	0.038718
423888	296.1059044	189.7294905	0.64217	0.0406
423961	8.10323877	1.664260205	2.2836	0.046503
424028	4378.210183	2058.866906	1.0885	0.024583
424033	429.7961365	131.1432133	1.7125	0.049165
424112	5448.829065	3408.264569	0.67691	0.015223
424130	113.655776	67.15455044	0.75911	0.035657
424168	25.05003792	10.46691152	1.259	0.035764
424253	871.6527169	545.8032448	0.67537	0.021403
424354	367.7093282	222.9990258	0.72153	0.0451
424374	922.0622231	600.3256563	0.61912	0.031095

424434	532.0551647	344.2723429	0.62803	0.037641
424440	22370.08988	10016.00008	1.1593	0.013963
424471	409.4945278	259.5514895	0.65782	0.033013
424484	163.9585862	91.07153457	0.84826	0.013361
424535	926.686295	596.6610974	0.63517	0.027159
424666	4169.396765	2195.072485	0.92557	0.001073
424877	3257.507885	1611.885927	1.015	0.043916
425113	224.2289162	134.1710786	0.7409	0.021535
426146	30.82413877	13.87980496	1.1511	0.037077
426250	753.9997166	471.3953964	0.67763	0.026419
426534	1948.048457	1056.095837	0.88329	0.016878
426754	17.31817007	4.564856792	1.9236	0.030505
426871	1828.33992	666.3717167	1.4561	0.018636
426872	14.81093834	2.277418613	2.7012	0.004574
427000	113.2104126	58.0415137	0.96385	0.047853
427008	483.9825517	308.3282226	0.65049	0.02877
427091	412.519947	212.605104	0.95629	0.009445
427207	103.0964408	43.29054885	1.2519	0.036991
427391	14140.3699	4976.686145	1.5066	0.012211
427592	340.2761007	220.7481498	0.6243	0.043658
427605	14.10116103	4.585117889	1.6208	0.045742
428333	3207.786346	905.3430864	1.825	0.029776

428743	8144.920375	3771.535572	1.1107	7.63E-05
428953	41.53893428	12.63300509	1.7173	0.011769
429536	687.9168871	438.4434446	0.64984	0.025666
768548	48.17899255	18.56578441	1.3758	0.005367
769044	35.83690189	14.42862948	1.3125	0.011535
769191	12.93056452	3.56451872	1.859	0.032489
769579	298.8297429	182.3092526	0.71294	0.021984
770203	967.7281812	273.0343533	1.8255	1.22E-05
770334	914.7011844	585.2160426	0.64433	0.025903
770846	63.12430402	30.91668789	1.0298	0.047328
771001	120.7139252	68.22569137	0.82321	0.023188
771137	99.83873416	55.26850873	0.85314	0.024828
771738	174.6325536	72.88738236	1.2606	0.000391
771871	10.3030217	2.358019073	2.1274	0.032448
772289	1607.879029	893.2059996	0.84809	0.011112
772378	4.802602353	0.336859868	3.8336	0.049119
776552	230.0427948	139.125745	0.72551	0.026975
777252	12.83417405	3.534016093	1.8606	0.045214
777408	7.764430993	1.34743947	2.5267	0.036536
Novel00009	108.8276356	39.80929416	1.4509	0.000138
Novel00084	39.16485961	5.851734936	2.7426	0.008788
Novel00314	19.75727622	1.684299338	3.5522	0.012331

Table S4. Down-regulated differentially expressed genes in group SI compared with group SE

Gene_id	readcount_SI	readcount_SE	log2FoldChange	P value
100315749	2.425623185	16.24895342	-2.7439	0.001717
100857281	188.2252557	328.7227623	-0.80441	0.00922
100857521	3786.976082	11013.47058	-1.5402	0.033812
100857604	14.85254539	37.3454975	-1.3302	0.031596
100857637	193.7894417	351.461021	-0.85887	0.007042
100857679	57.51436383	144.5368409	-1.3294	0.002456
100857896	1.658559341	10.32663759	-2.6384	0.022878
100858049	10.88003143	32.93496238	-1.5979	0.005085
100858236	623.0261425	1222.261293	-0.97219	0.009261
100859636	148.0215748	775.9283536	-2.3901	2.31E-06
100859828	200.7962541	591.8027917	-1.5594	0.001549
101747681	0.351169475	5.147734537	-3.8737	0.040895
101747982	64.18887519	204.9999543	-1.6752	0.000105
101748153	72.53945461	123.3706703	-0.76616	0.031591
101748650	887.706917	4460.444002	-2.329	2.90E-05
101749238	7.861719028	58.46078338	-2.8946	3.15E-06
101749898	4.3339434	21.70770563	-2.3245	0.017348
101751423	541.9583019	850.2170171	-0.64965	0.023683
107049075	536.1383298	1028.18207	-0.93942	0.001315
107049500	14.69425164	76.4759011	-2.3798	0.007281

107049692	2.376979168	9.898713772	-2.0581	0.044787
107051046	60.54141355	125.8935964	-1.0562	0.00776
107051757	31.75231797	70.16850258	-1.144	0.014023
107051858	235.1069657	557.0800143	-1.2446	0.045861
107053430	96.34524421	176.6518174	-0.87462	0.017695
107053863	9.447312342	25.37888897	-1.4257	0.022608
107054594	9.132826574	23.48284695	-1.3625	0.031197
107054809	283.8821742	545.6891594	-0.94279	0.00245
107054965	1.025065851	9.77714719	-3.2537	0.021064
107054990	51.77864704	115.4151452	-1.1564	0.020198
107055302	5.210656977	23.44945961	-2.17	0.033186
107055491	20.19045563	47.02536738	-1.2198	0.011468
107056280	237.1609085	402.6069001	-0.76351	0.01319
107056410	4.144786854	20.35871241	-2.2963	0.008972
107057229	0.980542399	7.037751522	-2.8435	0.040773
107057318	289.3892291	556.7092682	-0.94391	0.0324
112530177	1.400557334	9.550946482	-2.7696	0.014348
112530755	0	4.086835138	#NAME?	0.037332
112530970	14.43083011	35.50713209	-1.299	0.025069
112531294	8.551294893	30.22758944	-1.8217	0.010324
112531571	4.455553444	17.03732685	-1.935	0.012173
112531627	7.151138946	21.84886741	-1.6113	0.015577

112531894	33.61642133	74.69635496	-1.1519	0.019039
112532442	349.7826339	964.8105722	-1.4638	2.22E-05
112532483	0.70233895	6.610049664	-3.2344	0.049784
112532519	48.33993021	103.0172506	-1.0916	0.031765
112532872	37.22410515	80.75691422	-1.1173	0.04669
112532904	20.42051124	67.62543724	-1.7275	0.000107
373903	1068.143086	12628.39529	-3.5635	0.000275
373904	384.7675916	600.7822959	-0.64286	0.030901
373960	161.2009907	296.1054412	-0.87725	0.005166
374174	72.18608861	123.3899763	-0.77343	0.02837
374182	517.8758759	785.2441088	-0.60053	0.041856
395144	7.376979198	22.98079163	-1.6393	0.013911
395148	321.4679694	541.0480187	-0.75108	0.012432
395215	74.58779117	200.9224072	-1.4296	0.012914
395254	74.83835482	128.37144	-0.77847	0.029796
395450	116.4666426	188.3806528	-0.69373	0.034892
395488	3326.285432	5224.94388	-0.6515	0.022026
395594	16.66769813	49.37713945	-1.5668	0.001186
395604	41.69050954	103.0927138	-1.3062	0.021321
395685	5658.278763	8600.51648	-0.60406	0.033562
395826	6.453321948	20.98277824	-1.7011	0.030458
395853	16033.60476	26063.17377	-0.70091	0.012086

395856	8.397924483	29.96866729	-1.8354	0.006699
396069	1167.383536	2401.288662	-1.0405	0.024563
396182	1655.864265	2511.413593	-0.60092	0.036426
396257	810.9696358	1720.670037	-1.0853	0.000629
396267	8.483252207	23.50266412	-1.4701	0.021281
396269	31.52638292	238.2590791	-2.9179	0.021105
396336	10.12532928	32.77442735	-1.6946	0.003367
396361	503.8683757	997.3396353	-0.98504	0.04712
396404	21.63061307	48.46342688	-1.1638	0.014221
396423	16.67141731	40.92805849	-1.2957	0.010125
396487	11587.24744	24742.6696	-1.0945	0.013162
396512	133.8241062	348.5399516	-1.381	0.005868
404752	180.8496096	357.2014301	-0.98195	0.001528
404756	5566.576696	14601.32154	-1.3912	4.26E-06
408039	19.75807899	92.37531152	-2.2251	0.001907
408043	12.26078871	54.34474294	-2.1481	0.019788
414849	104.3323873	171.6212447	-0.71804	0.034226
415473	500.8886857	927.3027841	-0.88855	0.002358
415580	925.9160584	1526.902182	-0.72165	0.025416
415661	351.4235691	1263.271617	-1.8459	0.000448
415706	1081.527623	2017.134015	-0.89924	0.001415
415708	480.9814648	835.3201451	-0.79635	0.012857

416049	128.1850035	225.899846	-0.81746	0.012177
416070	4.418869737	15.7609122	-1.8346	0.021072
416147	1531.407177	2457.757106	-0.68248	0.015286
416306	379.8444664	720.2314435	-0.92305	0.035519
416367	1157.382019	2404.702777	-1.055	0.018107
416421	655.0648222	1057.605138	-0.69109	0.017326
416555	342.3487815	531.5697173	-0.63479	0.034388
416647	2356.533744	4235.522349	-0.84587	0.02803
416743	261.3772797	594.8778373	-1.1865	0.005329
416745	822.0179434	1328.000683	-0.69201	0.028046
416778	377.9514243	788.4269522	-1.0608	0.020527
416800	642.6792877	1213.740798	-0.91729	0.006667
416811	650.8131596	1184.64334	-0.86414	0.002832
416836	760.8549942	1237.210249	-0.7014	0.032116
417415	293.8720091	479.8414573	-0.70737	0.04644
417708	248.6542082	432.7134325	-0.79927	0.009013
417757	678.7382888	1289.891171	-0.92632	0.049414
417957	29.82791688	57.09799803	-0.93678	0.03326
418141	41.70447679	75.52236586	-0.8567	0.049525
418174	135.3370401	242.4743408	-0.84128	0.009369
418233	1482.672665	2610.927274	-0.81636	0.047117
418380	475.9264002	972.1831929	-1.0305	0.001687

418487	88.31746429	598.914303	-2.7616	0.039038
418488	2345.082592	5073.300932	-1.1133	8.82E-05
418582	203.6393431	322.0243106	-0.66115	0.032162
418610	2031.461001	4057.275983	-0.99799	0.000384
418611	120.9982903	367.9878612	-1.6047	0.004396
418885	77.78791656	133.7364647	-0.78177	0.02611
419045	65.49456471	108.279416	-0.72531	0.044734
419176	534.1865733	901.2268835	-0.75455	0.010326
419181	41.93363484	81.40904107	-0.95708	0.015872
419197	124.3699806	198.4802026	-0.67436	0.040519
419198	574.2292396	983.5993543	-0.77644	0.038115
419297	4.075941394	13.82637849	-1.7622	0.042917
419435	566.9387598	919.8053687	-0.69814	0.016583
419618	1363.981597	2349.320804	-0.78442	0.030536
419690	271.1462806	436.5230468	-0.68699	0.024187
420089	286.3353083	538.4175939	-0.91102	0.002219
420090	6042.05891	27737.89824	-2.1987	0.002832
420212	863.7716245	3332.309822	-1.9478	4.00E-09
420249	129.4146936	200.2697675	-0.62994	0.04868
420292	321.114014	593.9798777	-0.88733	0.003107
420293	297.2825189	490.4549578	-0.72229	0.01707
420340	49.13261502	161.9077327	-1.7204	2.14E-06

420599	121.6518682	266.353024	-1.1306	0.007669
420827	149.1881677	275.7144841	-0.88604	0.005774
420854	152.1511886	369.3956064	-1.2797	0.018774
420883	56.60406065	108.1498284	-0.93405	0.046085
420965	38.42323904	92.77638425	-1.2718	0.035117
420999	229.168417	350.027432	-0.61106	0.046662
421013	1208.36682	2553.45296	-1.0794	0.011029
421127	744.9564379	1128.229246	-0.59883	0.03909
421226	291.107544	965.5312388	-1.7298	0.000107
421368	284.8035889	567.0806228	-0.99359	0.003456
421369	69.19177972	219.7698501	-1.6673	0.023341
421681	36.79603868	92.95197591	-1.3369	0.000659
421688	443.420297	795.6820899	-0.84352	0.004075
421841	315.4728465	479.504732	-0.60403	0.04325
421867	4.790240655	36.09739948	-2.9137	0.009634
421922	143.2524212	308.3460749	-1.106	0.000531
421979	528.4154793	871.6746582	-0.72212	0.031097
422049	772.0663594	1179.932416	-0.61191	0.03556
422257	33.43470314	78.22967151	-1.2264	0.047581
422417	436.2605865	859.4744512	-0.97826	0.00209
422418	368.1157404	637.375514	-0.79198	0.015555
422428	449.0174237	1000.036016	-1.1552	0.034358

422665	134.1729843	214.7126667	-0.67831	0.036567
422673	4.774159778	14.74966671	-1.6274	0.040934
422692	113.7945763	181.2318318	-0.6714	0.04401
422931	1260.479874	1935.571194	-0.61879	0.027196
422932	1311.258047	3112.721766	-1.2472	0.000273
423001	4.892050643	41.35243089	-3.0795	0.010208
423112	606.860484	1168.709318	-0.94548	0.034567
423113	794.021976	1335.186957	-0.74979	0.015331
423316	2709.510647	5950.277604	-1.1349	0.002178
423401	86.05236548	182.480695	-1.0845	0.001519
423409	96.34002618	184.1767888	-0.93488	0.022743
423414	699.952388	1434.841124	-1.0356	0.00038
423463	18540.39453	34595.31802	-0.8999	0.001375
423494	432.2885807	681.9331345	-0.65764	0.048438
423504	1045.919503	2869.888919	-1.4562	5.45E-06
423595	685.4591243	1070.504061	-0.64315	0.027884
423705	1257.230394	1910.239336	-0.6035	0.037145
423771	128.1281184	337.6314763	-1.3979	0.042137
423802	22.81769185	56.32360506	-1.3036	0.003725
423816	464.1946363	741.4891019	-0.6757	0.020548
423921	11.59061151	29.20210788	-1.3331	0.019439
424046	658.6762696	1448.186792	-1.1366	0.000643

424117	5.851588825	30.53664308	-2.3836	0.000171
424118	461.4259396	883.8552258	-0.93771	0.001549
424250	526.2151661	947.1161024	-0.84789	0.013064
424282	50.3566841	114.543918	-1.1856	0.001497
424293	1476.304706	2304.333174	-0.64236	0.032881
424546	81.94166442	142.9064457	-0.8024	0.021937
424552	33.56375154	61.67106585	-0.87769	0.040582
424572	376.045468	564.3427447	-0.58566	0.045065
424675	261.9587535	897.9941396	-1.7774	3.71E-09
424751	81.64478218	163.0233559	-0.99765	0.039107
424882	692.0794286	1150.535094	-0.7333	0.021251
425353	163.0965256	252.0266198	-0.62785	0.047452
425791	61.62940915	143.2239323	-1.2166	0.014495
426054	270.7697598	966.8912322	-1.8363	0.04494
426071	427.5792049	811.6545979	-0.92467	0.002113
426846	32.7135565	88.88118619	-1.442	0.0054
426878	755.8499626	1137.67565	-0.58992	0.042249
426943	11.48920291	28.51925644	-1.3117	0.023417
427107	776.9223586	1298.681827	-0.74121	0.043596
427303	206.4784642	351.2173758	-0.76637	0.033803
427401	90.28087451	151.020287	-0.74225	0.031531
427450	202.4919711	310.3302288	-0.61594	0.048582

427528	114.3135915	183.1267648	-0.67985	0.041901
427538	16.55352645	43.47889011	-1.3932	0.045518
427546	125.870329	212.3641896	-0.7546	0.027501
427650	46.54296008	96.28367029	-1.0487	0.012853
427768	58.20161427	106.2992566	-0.869	0.019941
428140	74.81035963	432.2442156	-2.5305	0.00687
428268	13.44666333	39.2128126	-1.5441	0.002868
428310	154.6140984	424.866303	-1.4583	0.033444
428321	280.9127902	427.7985576	-0.60681	0.046888
428417	15.46955662	32.45738465	-1.0691	0.045323
428435	42.52108222	107.09299	-1.3326	0.002863
428505	3.712811608	23.67074429	-2.6725	0.031561
428857	1.755847376	10.21531254	-2.5405	0.016368
431302	5.060604359	16.83560374	-1.7341	0.037251
768427	298.1821874	449.3834859	-0.59175	0.044901
768861	64.83253384	135.6255601	-1.0648	0.003135
769087	279.4026795	2184.005473	-2.9666	0.01739
769097	1776.115501	3369.753967	-0.92392	0.005563
769132	190.4220615	576.8111427	-1.5989	0.009871
769528	303.6794638	847.3084187	-1.4803	0.001226
771284	42.87728173	100.6251446	-1.2307	0.034387
771419	78.88617212	140.1786561	-0.82942	0.020565

771494	20.81168221	42.1085268	-1.0167	0.036837
771806	13704.58266	20908.90409	-0.60946	0.029982
771985	14.21323099	71.19642574	-2.3246	0.000768
772114	1195.509864	1864.342747	-0.64104	0.022982
Novel00022	5.420014966	17.90363799	-1.7239	0.033114
Novel00030	0.351169475	15.9951348	-5.5093	0.00955
Novel00138	225.7748146	374.546066	-0.73026	0.033026
Novel00150	1.020945285	8.570869507	-3.0695	0.014769
Novel00151	757.7286995	1599.403765	-1.0778	0.001061
Novel00167	1.025065851	12.45243093	-3.6026	0.001172
Novel00201	688.741005	1634.238554	-1.2466	0.007723
Novel00216	2.376979168	10.82824899	-2.1876	0.027667
Novel00260	3.850502528	59.61559781	-3.9526	2.92E-07
Novel00291	28.74587108	57.00889811	-0.98783	0.046966
Novel00292	55.06329738	104.2034891	-0.92024	0.024615
Novel00318	14.93577138	279.6014038	-4.2265	2.10E-23
Novel00322	3.099519561	15.17803446	-2.2919	0.00722

Table S5. Gene ontology enrichment terms of biological_process category

	GO_accession	Description	p Value	DEG number
up-55	GO:0006790	sulfur compound metabolic process	0.0013	5
	GO:0000045	autophagosome assembly	0.0027	2
	GO:0016236	macroautophagy	0.0027	2
	GO:0044699	single-organism process	0.0062	98
	GO:0007033	vacuole organization	0.0076	2
	GO:0044272	sulfur compound biosynthetic process	0.0084	3
	GO:0032011	ARF protein signal transduction	0.0100	2
	GO:0032012	regulation of ARF protein signal transduction	0.0100	2
	GO:0009084	glutamine family amino acid biosynthetic process	0.0101	2
	GO:0010876	lipid localization	0.0116	5
	GO:0008152	metabolic process	0.0133	100
	GO:0016055	Wnt signaling pathway	0.0160	4
	GO:0072528	pyrimidine-containing compound biosynthetic process	0.0160	3
	GO:0009267	cellular response to starvation	0.0188	2
	GO:0031667	response to nutrient levels	0.0188	2
	GO:0031669	cellular response to nutrient levels	0.0188	2

GO:0042594	response to starvation	0.0188	2
GO:0006820	anion transport	0.0200	6
GO:0009991	response to extracellular stimulus	0.0220	3
GO:0031668	cellular response to extracellular stimulus	0.0220	3
GO:0071496	cellular response to external stimulus	0.0220	3
GO:0000077	DNA damage checkpoint	0.0220	2
GO:0031570	DNA integrity checkpoint	0.0220	2
GO:0032990	cell part morphogenesis	0.0266	3
GO:0048858	cell projection morphogenesis	0.0266	3
GO:0033993	response to lipid	0.0270	3
GO:0043401	steroid hormone mediated signaling pathway	0.0270	3
GO:0048545	response to steroid hormone	0.0270	3
GO:0071383	cellular response to steroid hormone stimulus	0.0270	3
GO:0071396	cellular response to lipid	0.0270	3
GO:0071407	cellular response to organic cyclic compound	0.0270	3
GO:0055114	oxidation-reduction process	0.0300	20
GO:0006869	lipid transport	0.0301	4
GO:0030203	glycosaminoglycan metabolic process	0.0313	2
GO:0009165	nucleotide biosynthetic process	0.0321	6
GO:1901293	nucleoside phosphate biosynthetic process	0.0321	6

GO:0072527	pyrimidine-containing compound metabolic process	0.0336	3
GO:0031532	actin cytoskeleton reorganization	0.0337	1
GO:0090630	activation of GTPase activity	0.0337	1
GO:0006817	phosphate ion transport	0.0362	2
GO:0009755	hormone-mediated signaling pathway	0.0378	3
GO:0032870	cellular response to hormone stimulus	0.0378	3
GO:0014070	response to organic cyclic compound	0.0389	3
GO:0031122	cytoplasmic microtubule organization	0.0390	1
GO:0035058	nonmotile primary cilium assembly	0.0390	1
GO:0006164	purine nucleotide biosynthetic process	0.0400	5
GO:0090407	organophosphate biosynthetic process	0.0405	8
GO:0044711	single-organism biosynthetic process	0.0419	15
GO:0007166	cell surface receptor signaling pathway	0.0428	6
GO:0006027	glycosaminoglycan catabolic process	0.0438	1
GO:0009253	peptidoglycan catabolic process	0.0438	1
GO:0071495	cellular response to endogenous stimulus	0.0451	3
GO:0018144	RNA-protein covalent cross-linking	0.0451	1
GO:0072522	purine-containing compound biosynthetic process	0.0477	5
GO:0043087	regulation of GTPase activity	0.0489	2

down-	GO:0009056	catabolic process	0.0009	18
120				
	GO:0006914	autophagy	0.0012	9
	GO:0048869	cellular developmental process	0.0012	10
	GO:0044248	cellular catabolic process	0.0014	15
	GO:0009653	anatomical structure morphogenesis	0.0018	9
	GO:0009065	glutamine family amino acid catabolic process	0.0029	2
	GO:0007127	meiosis I	0.0033	3
	GO:0007049	cell cycle	0.0040	13
	GO:0032446	protein modification by small protein conjugation	0.0061	5
	GO:0007126	meiotic nuclear division	0.0062	3
	GO:1903046	meiotic cell cycle process	0.0062	3
	GO:0071822	protein complex subunit organization	0.0070	13
	GO:0048856	anatomical structure development	0.0079	10
	GO:0051321	meiotic cell cycle	0.0086	3
	GO:0006461	protein complex assembly	0.0095	12
	GO:0070271	protein complex biogenesis	0.0100	12

GO:0044767	single-organism developmental process	0.0103	14
GO:0009052	pentose-phosphate shunt, non-oxidative branch	0.0104	1
GO:0044085	cellular component biogenesis	0.0112	17
GO:0006771	riboflavin metabolic process	0.0118	2
GO:0009231	riboflavin biosynthetic process	0.0118	2
GO:0042726	flavin-containing compound metabolic process	0.0118	2
GO:0042727	flavin-containing compound biosynthetic process	0.0118	2
GO:0000280	nuclear division	0.0129	5
GO:0008277	regulation of G-protein coupled receptor protein signaling pathway	0.0132	2
GO:0022607	cellular component assembly	0.0137	15
GO:0065003	macromolecular complex assembly	0.0149	12
GO:0022402	cell cycle process	0.0152	9
GO:0032502	developmental process	0.0156	14
GO:0007131	reciprocal meiotic recombination	0.0160	2
GO:0035825	reciprocal DNA recombination	0.0160	2
GO:0030154	cell differentiation	0.0169	7
GO:0009628	response to abiotic stimulus	0.0176	2

GO:0048285	organelle fission	0.0194	5
GO:0006098	pentose-phosphate shunt	0.0201	1
GO:0000075	cell cycle checkpoint	0.0217	3
GO:0043623	cellular protein complex assembly	0.0224	8
GO:1901606	alpha-amino acid catabolic process	0.0226	2
GO:0006113	fermentation	0.0230	1
GO:0019665	anaerobic amino acid catabolic process	0.0230	1
GO:0019670	anaerobic glutamate catabolic process	0.0230	1
GO:0006457	protein folding	0.0232	4
GO:0051156	glucose 6-phosphate metabolic process	0.0234	1
GO:0010639	negative regulation of organelle organization	0.0238	3
GO:0009411	response to UV	0.0241	1
GO:0000902	cell morphogenesis	0.0242	4
GO:0032989	cellular component morphogenesis	0.0242	4
GO:0000003	reproduction	0.0244	8
GO:0009110	vitamin biosynthetic process	0.0248	3
GO:0042364	water-soluble vitamin biosynthetic process	0.0248	3
GO:0045116	protein neddylation	0.0249	1
GO:0016567	protein ubiquitination	0.0268	4
GO:0006766	vitamin metabolic process	0.0272	3
GO:0006767	water-soluble vitamin metabolic process	0.0272	3

GO:0006538	glutamate catabolic process	0.0294	1
GO:0043649	dicarboxylic acid catabolic process	0.0294	1
GO:0070925	organelle assembly	0.0300	4
GO:0098813	nuclear chromosome segregation	0.0313	4
GO:0051129	negative regulation of cellular component organization	0.0329	3
GO:0007128	meiotic prophase I	0.0330	1
GO:0051324	prophase	0.0330	1
GO:0098762	meiotic cell cycle phase	0.0330	1
GO:0098764	meiosis I cell cycle phase	0.0330	1
GO:0043933	macromolecular complex subunit organization	0.0335	13
GO:0070647	protein modification by small protein conjugation or removal	0.0376	5
GO:0043093	FtsZ-dependent cytokinesis	0.0388	3
GO:0006824	cobalt ion transport	0.0389	1
GO:0009832	plant-type cell wall biogenesis	0.0394	1
GO:0010215	cellulose microfibril organization	0.0394	1
GO:0070726	cell wall assembly	0.0394	1
GO:0071668	plant-type cell wall assembly	0.0394	1
GO:0032505	reproduction of a single-celled organism	0.0402	3
GO:0000917	barrier septum assembly	0.0407	3

GO:0032506	cytokinetic process	0.0407	3
GO:0090529	cell septum assembly	0.0407	3
GO:1902410	mitotic cytokinetic process	0.0407	3
GO:0007094	mitotic spindle assembly checkpoint	0.0419	2
GO:0009895	negative regulation of catabolic process	0.0419	2
GO:0031330	negative regulation of cellular catabolic process	0.0419	2
GO:0031396	regulation of protein ubiquitination	0.0419	2
GO:0031397	negative regulation of protein ubiquitination	0.0419	2
GO:0031577	spindle checkpoint	0.0419	2
GO:0032435	negative regulation of proteasomal ubiquitin-dependent protein catabolic process	0.0419	2
GO:0033046	negative regulation of sister chromatid segregation	0.0419	2
GO:0033048	negative regulation of mitotic sister chromatid segregation	0.0419	2
GO:0042177	negative regulation of protein catabolic process	0.0419	2
GO:0045839	negative regulation of mitotic nuclear division	0.0419	2
GO:0045841	negative regulation of mitotic metaphase/anaphase transition	0.0419	2

GO:0051340	regulation of ligase activity	0.0419	2
GO:0051352	negative regulation of ligase activity	0.0419	2
GO:0051436	negative regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	0.0419	2
GO:0051438	regulation of ubiquitin-protein transferase activity	0.0419	2
GO:0051439	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	0.0419	2
GO:0051444	negative regulation of ubiquitin-protein transferase activity	0.0419	2
GO:0051985	negative regulation of chromosome segregation	0.0419	2
GO:0071173	spindle assembly checkpoint	0.0419	2
GO:0071174	mitotic spindle checkpoint	0.0419	2
GO:1901799	negative regulation of proteasomal protein catabolic process	0.0419	2
GO:1902100	negative regulation of metaphase/anaphase transition of cell cycle	0.0419	2
GO:1903051	negative regulation of proteolysis involved in cellular protein catabolic process	0.0419	2

GO:1903320	regulation of protein modification by small protein conjugation or removal	0.0419	2
GO:1903321	negative regulation of protein modification by small protein conjugation or removal	0.0419	2
GO:1903363	negative regulation of cellular protein catabolic process	0.0419	2
GO:1904666	regulation of ubiquitin protein ligase activity	0.0419	2
GO:1904667	negative regulation of ubiquitin protein ligase activity	0.0419	2
GO:2000816	negative regulation of mitotic sister chromatid separation	0.0419	2
GO:2001251	negative regulation of chromosome organization	0.0419	2
GO:0030474	spindle pole body duplication	0.0423	2
GO:0051300	spindle pole body organization	0.0423	2
GO:0044712	single-organism catabolic process	0.0436	6
GO:0006836	neurotransmitter transport	0.0441	2
GO:0007093	mitotic cell cycle checkpoint	0.0448	2
GO:1901575	organic substance catabolic process	0.0448	10
GO:0051784	negative regulation of nuclear division	0.0453	2
GO:0009063	cellular amino acid catabolic process	0.0458	2
GO:0000278	mitotic cell cycle	0.0474	5

GO:1903047	mitotic cell cycle process	0.0474	5
GO:1901988	negative regulation of cell cycle phase transition	0.0480	2
GO:1901991	negative regulation of mitotic cell cycle phase transition	0.0480	2
GO:0051301	cell division	0.0484	5

Table S6. Gene ontology enrichment terms of molecular_function category

	GO_accession	Description	p Value	DEG number
up-46	GO:0019825	oxygen binding	0.0001	3
	GO:0046983	protein dimerization activity	0.0050	9
	GO:0000702	oxidized base lesion DNA N-glycosylase activity	0.0076	1
	GO:0008534	oxidized purine nucleobase lesion DNA N-glycosylase activity	0.0076	1
	GO:0005086	ARF guanyl-nucleotide exchange factor activity	0.0100	2
	GO:0008762	UDP-N-acetylmuramate dehydrogenase activity	0.0111	1
	GO:0020037	heme binding	0.0121	5
	GO:0003995	acyl-CoA dehydrogenase activity	0.0146	2
	GO:0005315	inorganic phosphate transmembrane transporter activity	0.0153	2
	GO:0046906	tetrapyrrole binding	0.0172	5
	GO:0004714	transmembrane receptor protein tyrosine kinase activity	0.0188	2
	GO:0016627	oxidoreductase activity, acting on the CH-CH group of donors	0.0189	4

GO:0050797	thymidylate synthase (FAD) activity	0.0199	1
GO:0004643	phosphoribosylaminoimidazolecarboxamide formyltransferase activity	0.0214	1
GO:0000977	RNA polymerase II regulatory region sequence-specific DNA binding	0.0220	1
GO:0000978	RNA polymerase II core promoter proximal region sequence-specific DNA binding	0.0220	1
GO:0000982	transcription factor activity, RNA polymerase II core promoter proximal region sequence-specific binding	0.0220	1
GO:0000987	core promoter proximal region sequence-specific DNA binding	0.0220	1
GO:0001012	RNA polymerase II regulatory region DNA binding	0.0220	1
GO:0001159	core promoter proximal region DNA binding	0.0220	1
GO:0030284	estrogen receptor activity	0.0239	1
GO:0004719	protein-L-isoaspartate (D-aspartate) O-methyltransferase activity	0.0254	2
GO:0008173	RNA methyltransferase activity	0.0272	3
GO:0009020	tRNA	0.0299	1

	(guanosine-2'-O-)-methyltransferase activity		
GO:0008855	exodeoxyribonuclease VII activity	0.0316	4
GO:0004019	adenylosuccinate synthase activity	0.0324	1
GO:0004529	exodeoxyribonuclease activity	0.0338	4
GO:0016895	exodeoxyribonuclease activity, producing 5'-phosphomonoesters	0.0338	4
GO:1901677	phosphate transmembrane transporter activity	0.0349	2
GO:0004308	exo-alpha-sialidase activity	0.0349	1
GO:0016997	alpha-sialidase activity	0.0349	1
GO:0016798	hydrolase activity, acting on glycosyl bonds	0.0377	6
GO:0004806	triglyceride lipase activity	0.0390	1
GO:0016616	oxidoreductase activity, acting on the CH-OH group of donors, NAD or NADP as acceptor	0.0413	4
GO:0017046	peptide hormone binding	0.0413	1
GO:0042562	hormone binding	0.0413	1
GO:0051424	corticotropin-releasing hormone binding	0.0413	1
GO:0010340	carboxyl-O-methyltransferase activity	0.0420	2

	GO:0051998	protein carboxyl O-methyltransferase activity	0.0420	2
	GO:0004373	glycogen (starch) synthase activity	0.0429	1
	GO:0005085	guanyl-nucleotide exchange factor activity	0.0432	4
	GO:0004013	adenosylhomocysteinase activity	0.0435	1
	GO:0016801	hydrolase activity, acting on ether bonds	0.0435	1
	GO:0016802	trialkylsulfonium hydrolase activity	0.0435	1
	GO:0008198	ferrous iron binding	0.0456	1
	GO:0003937	IMP cyclohydrolase activity	0.0498	1
down-30	GO:0000149	SNARE binding	0.0006	3
	GO:0019905	syntaxin binding	0.0006	3
	GO:0043565	sequence-specific DNA binding	0.0009	14
	GO:0003919	FMN adenylyltransferase activity	0.0014	2
	GO:0016866	intramolecular transferase activity	0.0044	3
	GO:0008565	protein transporter activity	0.0045	5
	GO:0004659	prenyltransferase activity	0.0061	3
	GO:0004751	ribose-5-phosphate isomerase activity	0.0104	1
	GO:0008791	arginine N-succinyltransferase	0.0145	1

	activity		
GO:0034069	aminoglycoside N-acetyltransferase activity	0.0216	1
GO:0046353	aminoglycoside 3-N-acetyltransferase activity	0.0216	1
GO:0050097	methylaspartate mutase activity	0.0230	1
GO:0004519	endonuclease activity	0.0260	6
GO:0030145	manganese ion binding	0.0309	2
GO:0015035	protein disulfide oxidoreductase activity	0.0312	2
GO:0015036	disulfide oxidoreductase activity	0.0312	2
GO:0004864	protein phosphatase inhibitor activity	0.0352	1
GO:0019212	phosphatase inhibitor activity	0.0352	1
GO:0004161	dimethylallyltranstransferase activity	0.0352	1
	tRNA		
GO:0009020	(guanosine-2'-O-)-methyltransferase activity	0.0355	1
GO:0015087	cobalt ion transmembrane transporter activity	0.0389	1
GO:0005138	interleukin-6 receptor binding	0.0403	1
GO:0016765	transferase activity, transferring alkyl or aryl (other than methyl) groups	0.0404	3

GO:0000014	single-stranded DNA endodeoxyribonuclease activity	0.0406	1
GO:0001071	nucleic acid binding transcription factor activity	0.0410	14
GO:0003700	transcription factor activity, sequence-specific DNA binding	0.0410	14
GO:0070566	adenylyltransferase activity	0.0448	2
GO:0004800	thyroxine 5'-deiodinase activity	0.0452	1
GO:0004683	calmodulin-dependent protein kinase activity	0.0468	1
GO:0016853	isomerase activity	0.0487	5

Table S7. Gene ontology enrichment terms of cellular_component category

	GO_accession	Description	p Value	DEG number
up-8	GO:0030896	checkpoint clamp complex	0.0051	2
	GO:0005890	sodium:potassium-exchanging ATPase complex	0.0066	2
	GO:0090533	cation-transporting ATPase complex	0.0066	2
	GO:0098533	ATPase dependent transmembrane transport complex	0.0104	2
	GO:1904564	Nbp35-Cfd1 ATPase complex	0.0104	2
	GO:0031012	extracellular matrix	0.0183	6
	GO:0009539	photosystem II reaction center	0.0217	3
	GO:0097546	ciliary base	0.0390	1
down-14	GO:0044430	cytoskeletal part	0.0065	13
	GO:0015629	actin cytoskeleton	0.0071	5
	GO:0005856	cytoskeleton	0.0127	13
	GO:0070876	SOSS complex	0.0195	1
	GO:0031225	anchored component of membrane	0.0224	2
	GO:0005634	nucleus	0.0295	31
	GO:0005730	nucleolus	0.0316	2
	GO:0005815	microtubule organizing center	0.0330	3
	GO:0043232	intracellular non-membrane-bounded organelle	0.0337	21
	GO:0043190	ATP-binding cassette (ABC) transporter complex	0.0365	1

GO:0019028	viral capsid	0.0373	9
GO:0043228	non-membrane-bounded organelle	0.0418	21
GO:0016459	myosin complex	0.0424	3
GO:0019012	virion	0.0495	13
