

Supplementary Information

Identification of G protein-coupled receptors required for vitellogenin uptake into the oocytes of the red flour beetle, *Tribolium castaneum*

Hua Bai ^{1,2} and Subba Reddy Palli ²

¹ Department of Genetics, Development, and Cell Biology, Iowa State University, Ames, IA 50011, USA

² Department of Entomology, University of Kentucky, Lexington, KY 40546-0091, USA

Corresponding Authors:

Dr. Hua Bai

Department of Genetics, Development, and Cell Biology, Iowa State University,
Ames, IA 50011, USA, hbai@iastate.edu

Dr. Subba Reddy Palli

Department of Entomology, University of Kentucky S-225 Agricultural

Science Centre North

Lexington, KY 40546-0091

Phone: 859-257-1134, Fax: 859-323-1120, Email: rpalli@uky.edu

Table S1. Effects of GPCR RNAi on female fecundity in *T. castaneum*. The mean number and standard error of eggs laid per female per week are shown (4–10 cohorts, 12–20 pairs of beetles). To compare the mean value of GPCR RNAi versus that of malE control, one-way ANOVA analysis was performed, and followed by Dunnett's multiple comparisons (** p<0.001, * p<0.01, * p<0.05, ns-not significant).

Class	Family	Tribolium Official ID	Drosophila homolog	Drosophila symbol	Drosophila full name	Mean	SEM	Significance	Adjusted P Value
Class A: Rhodopsin-like	Biogenic amine	TC007490	CG33517	D2R	Dopamine 2-like receptor	0	0	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC011655	CG1147	NPFR1	neuropeptide F receptor	0	0	***	< 0.0001
Class B: Secretin receptor-like	Latrophilin-like receptor	TC001872	CG8639	Cir1	-	0	0	***	< 0.0001
Class A: Rhodopsin-like	(Rhod)opsin	TC000118	CG10888	Rh3	Rhodopsin 3	5.99	1.97	***	< 0.0001
Class A: Rhodopsin-like	Biogenic amine	TC012297	CG16720	5-HT1A	Serotonin receptor 1A	7.74	4.51	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC007170	CG14575	capaR	capa receptor	7.84	2.76	***	< 0.0001
Class D: Atypical	-	TC010568	-	-	-	10.33	2.05	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC010505	CG8985	DmsR-1	Dromyosuppressin receptor 1	10.41	3.00	***	< 0.0001
Class A: Rhodopsin-like	Biogenic amine	TC011960	CG15113	5-HT1B	Serotonin receptor 1B	10.48	1.83	***	0.0082
Class A: Rhodopsin-like	Biogenic amine	TC011667	CG12073	5-HT7	Serotonin receptor 7	11.00	6.33	***	0.0001
Class A: Rhodopsin-like	Biogenic amine	TC003331	CG12796	CG12796	-	11.06	4.87	*	0.0124
Class A: Rhodopsin-like	Peptide	TC009749	-	-	-	11.16	1.95	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC001056	CG5811	CG5811	-	11.75	1.82	***	0.0003
Class A: Rhodopsin-like	Protein hormone receptor	TC008163	CG8930	rk	rickets, bursicon receptor	12.35	1.98	*	0.029
Class A: Rhodopsin-like	Peptide	TC015904	CG13229	CG13229	-	12.49	9.21	*	0.0316
Class A: Rhodopsin-like	Peptide	TC011156	CG10823	SIFR	SIFamide receptor	13.07	1.43	**	0.0011
Class C: Metabotropic glutamate receptor-like	GABA-B receptors	TC014995	CG6706	GABA-B-R2	metabotropic GABA-B receptor subtype 2	13.17	1.22	**	0.0013
Class A: Rhodopsin-like	Peptide	TC007986	CG33696	CG33696	-	13.65	4.47	*	0.0104
Class A: Rhodopsin-like	Biogenic amine	TC012597	CG33976	Octbeta2R	Octopamine receptor	13.73	3.95	***	0.0006
Class A: Rhodopsin-like	Peptide	TC011318	CG9918	CG9918	pyrokinin-1 receptor	13.84	4.24	***	0.0002
Class B: Secretin receptor-like	Methuselah-like	TC010567	CG17061	mth10	methuselah-like 10	13.89	0.84	***	0.0002
Class A: Rhodopsin-like	Peptide	TC014211	-	-	-	14.24	2.13	***	0.0038
Class A: Rhodopsin-like	Peptide	TC004716	CG3171	Tre1	-	14.90	5.05	**	0.0073
Class A: Rhodopsin-like	Protein hormone receptor	TC009127	CG7665	CG7665	GPA2/GPB5 receptor	15.00	2.48	**	0.0081
Class A: Rhodopsin-like	(Rhod)opsin	TC013765	CG4550	Rh1, ninaE	Rhodopsin 1	15.19	1.03	ns	0.1412
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC013642	CG11144	mGluRA	metabotropic glutamate receptor	15.37	1.37	**	0.0014
Class A: Rhodopsin-like	Peptide	TC005641	-	-	-	15.39	1.21	*	0.0115
Class B: Secretin receptor-like	-	TC012521	CG11895	stan	starry night	15.43	1.55	**	0.004
Class A: Rhodopsin-like	Peptide	TC016363	-	-	-	15.44	1.78	*	0.012
Class A: Rhodopsin-like	Biogenic amine	TC011639	CG3856	Oamb	Octopamine receptor in mushroom bodies	15.48	4.92	*	0.0125
Class A: Rhodopsin-like	Biogenic amine	TC012447	CG9652	DopR	Dopamine receptor	15.56	0.08	ns	0.168
Class A: Rhodopsin-like	Peptide	TC008438	CG32540	CCKLR-17D3	sulfakinin receptor	15.82	1.20	*	0.0169
Class D: Atypical	Frizzled-Smoothened	TC014055	CG17697	fz	frizzled	15.83	2.99	*	0.0171
Class A: Rhodopsin-like	-	TC013650	CG7497	CG7497	-	15.87	2.24	**	0.0064
Class A: Rhodopsin-like	Biogenic amine	TC012598	CG42244	Octbeta3R	Octopamine receptor	15.93	1.40	*	0.0187
Class A: Rhodopsin-like	Peptide	TC003150	CG7395	sNPF-R	short neuropeptide F receptor	15.95	1.84	*	0.0189
Class A: Rhodopsin-like	Biogenic amine	TC011641	CG18208	CG18208	-	15.95	4.20	ns	0.0584
Class B: Secretin receptor-like	Calcitonin receptor-like	TC013321	CG4395	CG4395	-	15.97	2.07	*	0.0192
Class A: Rhodopsin-like	Peptide	TC006805	CG14593	CCHa2r	CCHamide-2 receptor	16.21	1.46	*	0.0237
Class B: Secretin receptor-like	Diuretic hormone receptor	TC012799	CG8422	Dh44-R1	Diuretic hormone 44 receptor 1	16.63	1.91	*	0.0335
Class A: Rhodopsin-like	-	TC016387	-	-	-	16.74	2.11	*	0.0367
Class B: Secretin receptor-like	Calcitonin receptor-like	TC001222	-	-	-	16.74	1.69	*	0.0367
Class A: Rhodopsin-like	-	TC007259	-	-	-	16.87	2.98	*	0.0173
Class A: Rhodopsin-like	-	TC006608	-	-	-	16.89	2.29	ns	0.2994
Class A: Rhodopsin-like	Protein hormone receptor	TC015777	CG34411	CG34411	-	16.96	5.16	ns	0.3084
Class A: Rhodopsin-like	Biogenic amine	TC013982	CG8007	CG42796	-	17.30	4.73	ns	0.1351
Class A: Rhodopsin-like	-	TC015120	-	-	-	17.40	4.42	ns	0.1439
Class A: Rhodopsin-like	Biogenic amine	TC001180	CG13579	CG13579	-	17.41	4.13	ns	0.3655
Class C: Metabotropic glutamate receptor-like	-	TC010857	-	-	-	17.52	1.94	ns	0.0662
Class C: Metabotropic glutamate receptor-like	GABA-B receptors	TC016191	CG15274	GABA-B-R1	metabotropic GABA-B receptor subtype 1	17.67	2.17	ns	0.0743
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC004727	CG11144	mGluRA	metabotropic glutamate receptor	17.78	3.03	ns	0.08
Class B: Secretin receptor-like	Calcitonin receptor-like	TC008110	-	-	-	17.80	4.83	ns	0.4221
Class A: Rhodopsin-like	Peptide	TC004977	CG6515	Takr86C	Tachykinin-like receptor at 86C	18.04	2.05	ns	0.096
Class A: Rhodopsin-like	Purine	TC012510	CG9753	AdoR	Adenosine receptor	18.16	2.25	*	0.0295
Class A: Rhodopsin-like	Peptide	TC014731	CG34381	CG34381	-	18.50	1.29	ns	0.1302
Class A: Rhodopsin-like	Peptide	TC002068	-	-	-	18.52	2.83	ns	0.1324
Class C: Metabotropic glutamate receptor-like	GABA-B receptors	TC007169	CG3022	GABA-B-R3	metabotropic GABA-B receptor subtype 3	18.69	1.48	ns	0.1478
Class D: Atypical	-	TC012209	-	-	-	18.69	5.36	ns	0.1478
Class A: Rhodopsin-like	Biogenic amine	TC012600	CG6919	oa2	Octopamine receptor 2	18.75	9.00	ns	0.2908
Class A: Rhodopsin-like	Biogenic amine	TC000574	CG18741	DopR2	Dopamine receptor 2	18.80	0.17	ns	0.5827
Class A: Rhodopsin-like	Peptide	TC004565	CG32547	CG32547	-	19.01	3.94	ns	0.18
Class A: Rhodopsin-like	Peptide	TC011171	CG8784	CG8784	pyrokinin-2 receptor	19.09	1.10	ns	0.1878
Class B: Secretin receptor-like	-	TC009527	CG11318	CG11318	-	19.28	3.06	ns	0.2108
Class A: Rhodopsin-like	Biogenic amine	TC013979	CG1056	5-HT2	Serotonin receptor 2	19.38	1.91	ns	0.2237
Class A: Rhodopsin-like	Peptide	TC007687	CG4322	moody	-	19.41	3.93	ns	0.2276
Class A: Rhodopsin-like	Peptide	TC003492	CG6986	Proc-R	Proctolin receptor	19.61	2.31	ns	0.2537
Class A: Rhodopsin-like	Peptide	TC011478	CG13229	CG13229	-	19.62	2.50	ns	0.2552
Class B: Secretin receptor-like	Diuretic hormone receptor	TC002694	CG32843	Dh31-R1	Diuretic hormone 31 receptor 1	19.87	2.39	ns	0.292
Class D: Atypical	Frizzled-Smoothened	TC006527	CG4626	fz4	frizzled 4	19.96	2.49	ns	0.1983
Class A: Rhodopsin-like	Biogenic amine	TC004470	CG4356	mAcR-60C	muscarinic Acetylcholine Receptor 60C	19.97	4.03	ns	0.3077
Class A: Rhodopsin-like	Peptide	TC002497	CG30340	CG30340	-	20.26	1.32	ns	0.3567
Class D: Atypical	Frizzled-Smoothened	TC003407	CG9739	fz2	frizzled 2	20.26	2.95	ns	0.3567
Class A: Rhodopsin-like	Peptide	TC001381	CG2114	FR	FMRFamides receptor	20.65	1.18	ns	0.4297
Class A: Rhodopsin-like	Peptide	TC009772	CG11325	AKHR	Adipokinetic hormone receptor	21.11	2.92	ns	0.385
Class A: Rhodopsin-like	Biogenic amine	TC000298	CG7918	CG7918	-	21.13	2.76	ns	0.7226
Class A: Rhodopsin-like	Peptide	TC002917	CG16752	SPR	Sex peptide receptor, MIP/allatostatin B receptor	21.26	6.65	ns	0.7499
Class A: Rhodopsin-like	Peptide	TC002216	CG33344	CcapR	Crustacean cardioactive peptide receptor	21.57	1.50	ns	0.6257
Class B: Secretin receptor-like	-	TC001376	CG11318	CG11318	-	21.57	3.50	ns	0.6257
Class C: Metabotropic glutamate receptor-like	-	TC013504	CG31660	pog	poor gastrulation	21.57	5.19	ns	0.9638
Class C: Metabotropic glutamate receptor-like	-	TC005523	CG31760	CG31760	-	21.58	1.73	ns	0.3809
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC004301	CG30361	mtt, DmXR	mangetout, DmX receptor	21.83	2.04	ns	0.6853
Class A: Rhodopsin-like	Biogenic amine	TC004545	CG7485	TyrR, OcR	Octopamine/Tyramine receptor	21.96	4.99	ns	0.9788
Class A: Rhodopsin-like	Peptide	TC009184	-	-	-	22.09	2.18	ns	0.7441
Class A: Rhodopsin-like	Biogenic amine	TC006457	CG18314	DopEcR	Dopamine-Ecdysteroid receptor	22.17	2.25	ns	0.625
Class A: Rhodopsin-like	-	TC003432	-	-	-	22.35	2.25	ns	0.8
Class B: Secretin receptor-like	-	TC013682	-	-	-	22.39	2.73	ns	0.9816
Class B: Secretin receptor-like	Diuretic hormone receptor	TC007104	CG8422	Dh44-R1	Diuretic hormone 44 receptor 1	22.44	3.47	ns	0.5845
Class A: Rhodopsin-like	Biogenic amine	TC012122	CG7431	CG7431	Tyramine receptor	22.57	3.99	ns	0.9503
Class D: Atypical	-	TC002308	CG8285	boss	bride of sevenless	22.62	2.69	ns	0.8515
Class A: Rhodopsin-like	Peptide	TC011320	CG9918	CG9918	pyrokinin-1 receptor	22.75	3.20	ns	0.8747
Class B: Secretin receptor-like	Methuselah-like	TC009370	CG6965	mth5	methuselah-like 5	23.17	2.66	ns	0.9362
Class A: Rhodopsin-like	Peptide	TC011198	CG7887	Takr99D	Tachykinin-like receptor at 99D	23.27	1.69	ns	0.9474
Class A: Rhodopsin-like	Peptide	TC003151	CG7395	sNPF-R	short neuropeptide F receptor	23.62	3.00	ns	0.8725
Class A: Rhodopsin-like	Peptide	TC012493	CG5911	ETHR	Ecdysis-triggering hormone receptor	23.90	3.56	ns	0.9213
Class A: Rhodopsin-like	Peptide	TC007536	CG42301	CCKLR-17D1	sulfakinin receptor	23.92	3.08	ns	0.98
Class C: Metabotropic glutamate receptor-like	-	TC010500	CG32447	CG32447	-	24.02	3.57	ns	0.9678
Class B: Secretin receptor-like	-	TC016199	-	-	-	24.90	2.38	ns	0.9911
Class A: Rhodopsin-like	Peptide	TC005327	CG30106	CCHa1r	CCHamide-1 receptor	24.97	1.34	ns	0.998

Class D: Atypical	Frizzled-Smoothened	TC005545	CG11561	smo	smoothened	25.54	2.95	ns	0.9983
Class A: Rhodopsin-like	Peptide	TC013945	CG33344	CcapR	Crustacean cardioactive peptide receptor	25.56	5.93	ns	0.9983
Class A: Rhodopsin-like	Peptide	TC010818	CG13995	CG13995	-	25.60	3.89	ns	0.9989
Class A: Rhodopsin-like	-	TC003453	-	-	-	26.67	3.09	ns	0.9989
Class A: Rhodopsin-like	Protein hormone receptor	TC009575	CG7665	CG7665	GPA2/GPB5 receptor	26.83	4.30	ns	0.9993
Class B: Secretin receptor-like	-	TC010267	CG12370	CG12370	-	28.12	2.46	ns	0.9996
Class A: Rhodopsin-like	Peptide	TC012842	CG13702	AIQR2	allatostatin C receptor 2	28.12	0.82	ns	0.9996
Class B: Secretin receptor-like	-	TC013091	-	-	-	28.23	4.62	ns	0.9996
Class B: Secretin receptor-like	Methuselah-like	TC010656	CG4521	mith1	methuselah-like 1	28.37	4.29	ns	0.9996
Class A: Rhodopsin-like	Peptide	TC002524	CG33639	CG33639	-	28.63	2.38	ns	0.9997
Class A: Rhodopsin-like	Peptide	TC006482	-	-	-	29.28	2.45	ns	0.9999
Class B: Secretin receptor-like	-	TC000764	-	-	-	29.28	2.05	ns	0.9999
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC001106	CG11144	mGluRA	metabotropic glutamate receptor	30.85	2.93	ns	0.9996
Class A: Rhodopsin-like	Peptide	TC001245	CG11325	AKHR	Adipokinetic hormone receptor	33.60	3.75	ns	0.9985
malE (control)	/	/	/	/	/	29.71	3.58	/	/

Table S2. Effects of GPCR RNAi on larva hatch rate in *T. castaneum*. The mean percentage of hatch rate is showed (4–10 cohorts, 12–20 pairs of beetles). To compare the mean value of GPCR RNAi versus that of maE control, one-way ANOVA analysis was performed, and followed by Dunnett's multiple comparisons (***) $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, ns-not significant).

Class	Family	Tribolium Official ID	Drosophila homolog	Drosophila symbol	Drosophila full name	Mean	SEM	Significance	Adjusted P Value
Class A: Rhodopsin-like	Peptide	TC004716	CG3172	Tre1	-	0	0	***	< 0.0001
Class C: Metabotropic glutamate receptor-like	GABA-B receptors	TC007169	CG3022	GABA-B-R3	metabotropic GABA-B receptor subtype 3	0	0	***	< 0.0001
Class C: Metabotropic glutamate receptor-like	-	TC010857	-	-	-	0	0	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC013945	CG33344	CcapR	Crustacean cardioactive peptide receptor	0.36	0.36	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC014211	-	-	-	0.81	0.81	***	< 0.0001
Class D: Atypical	Frizzled-Smoothened	TC005545	CG11561	smo	smoothened	0.91	0.58	***	< 0.0001
Class A: Rhodopsin-like	Biogenic amine	TC012297	CG16720	5-HT1A	Serotonin receptor 1A	1.40	0.92	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC003150	CG7395	sNPF-R	short neuropeptide F receptor	1.49	1.49	***	< 0.0001
Class D: Atypical	Frizzled-Smoothened	TC003407	CG9739	lz2	frizzled 2	2.12	0.82	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC009184	-	-	-	3.04	1.14	***	< 0.0001
Class A: Rhodopsin-like	Biogenic amine	TC012600	CG6919	oa2	Octopamine receptor 2	3.59	2.12	***	< 0.0001
Class A: Rhodopsin-like	Biogenic amine	TC011639	CG3856	Oamb	Octopamine receptor in mushroom bodies	3.62	2.21	***	< 0.0001
Class A: Rhodopsin-like	-	TC013650	CG7497	CG7497	-	3.68	1.97	***	< 0.0001
Class D: Atypical	Frizzled-Smoothened	TC014055	CG17697	lz	frizzled	3.83	2.21	***	< 0.0001
Class A: Rhodopsin-like	Purine	TC012510	CG9753	AdoR	Adenosine receptor	3.99	1.62	***	< 0.0001
Class C: Metabotropic glutamate receptor-like	-	TC005523	CG31760	CG31760	-	4.43	1.40	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC004565	CG32547	CG32547	-	4.39	3.39	***	< 0.0001
Class D: Atypical	-	TC010568	-	-	-	5.18	2.20	***	< 0.0001
Class A: Rhodopsin-like	Protein hormone receptor	TC009127	CG7665	CG7665	GPA2/GPB5 receptor	6.05	3.66	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC011318	CG9918	CG9918	pyrokinin-1 receptor	6.08	2.57	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC007536	CG42301	CKCLR-17D1	sulfakinin receptor	8.40	5.04	***	< 0.0001
Class B: Secretin receptor-like	Diuretic hormone receptor	TC007104	CG8422	Dh44-R1	Diuretic hormone 44 receptor 1	10.05	4.88	***	< 0.0001
Class B: Secretin receptor-like	Methuselah-like	TC010656	CG4521	mth1	methuselah-like 1	10.23	4.73	***	< 0.0001
Class B: Secretin receptor-like	Methuselah-like	TC009370	CG6965	mth5	methuselah-like 5	10.67	6.77	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC007687	CG4322	moody	-	13.72	6.83	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC003151	CG7395	sNPF-R	short neuropeptide F receptor	12.13	4.58	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC012493	CG5911	ETHR	Ecdysis-triggering hormone receptor	12.45	8.83	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC001245	CG11325	AKHR	Adipokinetic hormone receptor	15.52	7.67	***	< 0.0001
Class A: Rhodopsin-like	(Rhodopsin)	TC000118	CG10888	Rh3	Rhodopsin 3	17.58	9.41	***	< 0.0001
Class A: Rhodopsin-like	Peptide	TC011320	CG9918	CG9918	pyrokinin-1 receptor	23.91	8.56	***	0.0003
Class A: Rhodopsin-like	Peptide	TC007986	CG33696	CG33696	-	25.78	15.55	***	0.0042
Class A: Rhodopsin-like	Peptide	TC009749	-	-	-	37.14	12.57	***	0.0057
Class A: Rhodopsin-like	Biogenic amine	TC011960	CG15113	5-HT1B	Serotonin receptor 1B	36.21	7.98	ns	0.2261
Class A: Rhodopsin-like	-	TC006608	-	-	-	39.34	10.48	ns	0.3516
Class A: Rhodopsin-like	Peptide	TC001056	CG5811	CG5811	-	40.45	15.83	ns	0.0755
Class A: Rhodopsin-like	-	TC016387	-	-	-	41.88	9.05	ns	0.1069
Class B: Secretin receptor-like	-	TC001376	-	-	-	42.63	14.48	ns	0.127
Class A: Rhodopsin-like	(Rhodopsin)	TC013765	CG4550	Rh1_ninaE	Rhodopsin 1	43.47	0.18	ns	0.5718
Class A: Rhodopsin-like	Biogenic amine	TC001180	CG13579	CG13579	-	43.99	1.67	ns	0.603
Class B: Secretin receptor-like	Methuselah-like	TC010567	CG17061	mth10	methuselah-like 10	51.12	14.26	ns	0.3465
Class A: Rhodopsin-like	Peptide	TC010505	CG8985	DmsR-1	Dromyosuppressin receptor 1	49.18	14.17	ns	0.2293
Class A: Rhodopsin-like	-	TC003453	-	-	-	47.21	2.84	ns	0.3203
Class A: Rhodopsin-like	Peptide	TC005327	CG30106	CCHa1r	CCHamide-1 receptor	48.76	2.62	ns	0.4165
Class A: Rhodopsin-like	Peptide	TC011156	CG10823	SIFR	SIFamide receptor	49.71	16.55	ns	0.4827
Class A: Rhodopsin-like	Biogenic amine	TC004545	CG7485	TyrR_OcR	Octopamine/Tyramine receptor	50.18	50.18	ns	0.9285
Class A: Rhodopsin-like	Biogenic amine	TC000574	CG18741	DopR2	Dopamine receptor 2	50.46	43.00	ns	0.9374
Class A: Rhodopsin-like	Biogenic amine	TC012447	CG9652	DopR	Dopamine receptor	51.80	28.21	ns	0.9662
Class B: Secretin receptor-like	-	TC000764	-	-	-	53.11	1.87	ns	0.7453
Class B: Secretin receptor-like	Diuretic hormone receptor	TC012799	CG8422	Dh44-R1	Diuretic hormone 44 receptor 1	53.48	16.34	ns	0.7727
Class B: Secretin receptor-like	-	TC012521	CG11895	stan	starry night	53.57	9.27	ns	0.6472
Class B: Secretin receptor-like	-	TC013091	-	-	-	53.80	20.75	ns	0.7966
Class A: Rhodopsin-like	Peptide	TC015904	CG13229	CG13229	-	54.29	26.76	ns	0.9824
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC013642	CG11444	mGluRA	metabotropic glutamate receptor	59.23	15.21	ns	0.9608
Class D: Atypical	Frizzled-Smoothened	TC006527	CG4626	fz4	frizzled 4	55.18	13.80	ns	0.7819
Class A: Rhodopsin-like	Biogenic amine	TC011667	CG12073	5-HT7	Serotonin receptor 7	56.07	19.18	ns	0.9301
Class A: Rhodopsin-like	Peptide	TC002068	-	-	-	57.12	7.43	ns	0.9638
Class A: Rhodopsin-like	Peptide	TC006482	-	-	-	58.46	7.60	ns	0.9803
Class A: Rhodopsin-like	-	TC003432	-	-	-	58.95	5.67	ns	0.9818
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC004301	CG30361	mtt_DmXR	mangout, DmX receptor	60.77	7.48	ns	0.9919
Class A: Rhodopsin-like	Peptide	TC011478	CG13229	CG13229	-	64.19	9.28	ns	0.9986
Class B: Secretin receptor-like	Calcitonin receptor-like	TC001222	-	-	-	64.22	19.78	ns	0.9986
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC001106	CG11444	mGluRA	metabotropic glutamate receptor	64.40	6.39	ns	0.9986
Class A: Rhodopsin-like	Biogenic amine	TC013979	CG1056	5-HT2	Serotonin receptor 2	64.50	7.16	ns	0.9986
Class A: Rhodopsin-like	Biogenic amine	TC012122	CG7431	CG7431	Tyramine receptor	65.52	5.31	ns	0.999
Class A: Rhodopsin-like	Peptide	TC008438	CG32540	CKCLR-17D3	sulfakinin receptor	65.62	7.53	ns	0.9988
Class A: Rhodopsin-like	Biogenic amine	TC003331	CG12796	CG12796	-	67.02	3.53	ns	0.9993
Class D: Atypical	-	TC012209	-	-	-	67.04	5.21	ns	0.999
Class C: Metabotropic glutamate receptor-like	Glutamate-like receptors	TC004727	CG11444	mGluRA	metabotropic glutamate receptor	67.48	8.99	ns	0.9991
Class A: Rhodopsin-like	Peptide	TC006805	CG14593	CCHa2r	CCHamide-2 receptor	67.98	8.97	ns	0.9992
Class A: Rhodopsin-like	Peptide	TC003492	CG6986	Proc-R	Proctolin receptor	68.95	8.12	ns	0.9993
Class A: Rhodopsin-like	Biogenic amine	TC011641	CG18208	CG18208	-	70.21	8.15	ns	0.9996
Class B: Secretin receptor-like	Diuretic hormone receptor	TC002694	CG32843	Dh31-R1	Diuretic hormone 31 receptor 1	70.91	10.65	ns	0.9996
Class C: Metabotropic glutamate receptor-like	-	TC010500	CG32447	CG32447	-	71.75	7.24	ns	0.9996
Class A: Rhodopsin-like	Peptide	TC002524	CG33639	CG33639	-	72.03	7.98	ns	0.9997
Class B: Secretin receptor-like	-	TC016199	-	-	-	72.51	6.22	ns	0.9997
Class A: Rhodopsin-like	Peptide	TC014731	CG34381	CG34381	-	72.70	1.91	ns	0.9997
Class A: Rhodopsin-like	Peptide	TC004977	CG6515	Takr86C	Tachykinin-like receptor at 86C	73.32	7.81	ns	0.9998
Class D: Atypical	-	TC002308	CG8285	boss	bride of sevenless	73.45	7.65	ns	0.9999
Class A: Rhodopsin-like	Biogenic amine	TC006457	CG18314	DopEcR	Dopamine-Ecdysteroid receptor	73.62	5.70	ns	0.9999
Class A: Rhodopsin-like	Biogenic amine	TC004470	CG4356	mAcR-60C	muscarinic Acetylcholine Receptor 60C	74.28	13.09	ns	> 0.9999
Class A: Rhodopsin-like	Biogenic amine	TC013982	CG8007	CG42796	-	74.43	12.42	ns	> 0.9999
Class A: Rhodopsin-like	Peptide	TC011198	CG7887	Takr99D	Tachykinin-like receptor at 99D	75.17	7.27	ns	> 0.9999
Class A: Rhodopsin-like	Peptide	TC001381	CG2114	FR	FMRFamides receptor	76.03	6.81	ns	0.9999
Class A: Rhodopsin-like	Peptide	TC007170	CG14575	capaR	capa receptor	76.19	4.53	ns	0.9999
Class B: Secretin receptor-like	Calcitonin receptor-like	TC008110	-	-	-	76.30	6.66	ns	0.9999
Class B: Secretin receptor-like	Calcitonin receptor-like	TC013321	CG4395	CG4395	-	77.00	6.75	ns	0.9998
Class B: Secretin receptor-like	-	TC009527	CG11318	CG11318	-	77.49	5.70	ns	0.9997
Class A: Rhodopsin-like	Biogenic amine	TC012597	CG33976	Octbeta2R	Octopamine receptor	77.99	6.77	ns	0.9996
Class A: Rhodopsin-like	Peptide	TC002917	CG16752	SPR	Sex peptide receptor, MIP/allatostatin B receptor	80.06	5.98	ns	0.9995
Class A: Rhodopsin-like	Peptide	TC002497	CG30340	CG30340	-	80.26	3.91	ns	0.9994
Class A: Rhodopsin-like	Peptide	TC011171	CG8784	CG8784	pyrokinin-2 receptor	80.64	3.59	ns	0.9994
Class C: Metabotropic glutamate receptor-like	GABA-B receptors	TC016191	CG15274	GABA-B-R1	metabotropic GABA-B receptor subtype 1	80.82	9.38	ns	0.9993
Class A: Rhodopsin-like	Biogenic amine	TC000298	CG7918	CG7918	-	81.37	12.24	ns	0.9993
Class A: Rhodopsin-like	Peptide	TC016363	-	-	-	81.95	3.88	ns	0.9992
Class A: Rhodopsin-like	Biogenic amine	TC012598	CG42244	Octbeta3R	Octopamine receptor	82.21	3.84	ns	0.9991
Class A: Rhodopsin-like	-	TC015120	-	-	-	82.38	5.81	ns	0.9992
Class A: Rhodopsin-like	Peptide	TC005641	-	-	-	85.16	6.45	ns	0.9986
Class A: Rhodopsin-like	Peptide	TC009772	CG11325	AKHR	Adipokinetic hormone receptor	85.92	3.54	ns	0.9983
Class A: Rhodopsin-like	Protein hormone receptor	TC015777	CG34411	CG34411	-	85.95	2.14	ns	0.999
Class C: Metabotropic glutamate receptor-like	GABA-B receptors	TC014995	CG6706	GABA-B-R2	metabotropic GABA-B receptor subtype 2	86.85	5.18	ns	0.9983
Class A: Rhodopsin-like	-	TC007259	-	-	-	87.39	1.89	ns	0.998
Class A: Rhodopsin-like	Peptide	TC002216	CG33344	CcapR	Crustacean cardioactive peptide receptor	88.19	3.12	ns	0.998
Class C: Metabotropic glutamate receptor-like	-	TC013504	CG31660	pog	poor gastrulation	90.64	2.98	ns	0.9983
Class B: Secretin receptor-like	-	TC013682	-	-	-	95.03	5.54	ns	0.9836

Class B: Secretin receptor-like	-	TC010267	CG12370	CG12370	-	96.04	2.30	ns	0.9813
Class A: Rhodopsin-like	Peptide	TC012842	CG13702	AICR2	allatostatin C receptor 2	94.06	5.94	ns	0.9914
Class A: Rhodopsin-like	Peptide	TC010818	CG13995	CG13995	-	96.76	3.24	ns	0.9797
Class A: Rhodopsin-like	Protein hormone receptor	TC009575	CG7665	CG7665	GPA2/GPB5 receptor	100.00	0.00	ns	0.9174
Class A: Rhodopsin-like	Protein hormone receptor	TC008163	CG8930	rk	rickets, bursicon receptor	100.00	0.00	ns	0.9174
malE (control)	/	/	/	/	/	74.93	4.03	/	/