

Identification and expression of candidate chemosensory receptors in the white-spotted flower chafer, *Protaetia brevitarsis*

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Supplementary Table S1. An overview of the sequencing and assembly process

Length Range	Transcript	Unigene
200-300	27,168(25.72%)	24,461(34.81%)
300-500	25,814(24.44%)	20,170(28.70%)
500-1000	20,763(19.66%)	12,569(17.89%)
1000-2000	16,081(15.22%)	7,064(10.05%)
2000+	15,798(14.96%)	6,003(8.54%)
Total Number	105,624	70,267
Total length	110,479,623	53,572,904
N50 Length	2,050	1,416
Mean Length	1045.97	762.43

**Supplementary Table S2. The Blastx matches of *Protaetia brevitarsis* candidate OR genes
and their expressions in antennae**

Gene ID	Gene name	Accession number	Full length	ORF (aa)	¹ TMD	Blastx annotation (Reference/Name/Species)	Score	E-value	Identity (%)	FPKM values		² Exp in male Ant
										Female	Male	
c68694.graph_c1	ORco	MH324899	N	288	4	AKC58535.1 odorant co-receptor [<i>Anomala corpulenta</i>]	556	0.0	92	59.47	58.33	0.94
c62761.graph_c0	OR1	MH324834	N	454	7	AKC58537.1 odorant receptor 2 [<i>Anomala corpulenta</i>]	450	6e-153	56	2.56	4.04	1.16
c68689.graph_c0	OR2	MH324835	Y	437	6	EFA05710.2 odorant receptor 73 [<i>Tribolium castaneum</i>]	280	3e-84	38	20.14	19.7	0.53
c64214.graph_c0	OR3	MH324836	Y	431	5	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	455	1e-155	54	2.75	1.82	0.58
c64457.graph_c0	OR4	MH324837	Y	423	3	AKC58561.1 odorant receptor 26 [<i>Anomala corpulenta</i>]	278	2e-86	37	4.82	2.79	0.83
c59458.graph_c0	OR5	MH324838	N	422	7	AKC58561.1 odorant receptor 26 [<i>Anomala corpulenta</i>]	257	4e-78	35	1.74	2.43	0.56
c64985.graph_c0	OR6	MH324839	Y	422	2	AKC58561.1 odorant receptor 26 [<i>Anomala corpulenta</i>]	251	9e-76	34	5.98	8.15	1.13
c61220.graph_c0	OR7	MH324840	Y	421	6	AKC58536.1 odorant receptor 1 [<i>Anomala corpulenta</i>]	308	4e-98	38	1.89	2.3	0.60
c67157.graph_c0	OR8	MH324841	Y	420	6	AKC58536.1 odorant receptor 1 [<i>Anomala corpulenta</i>]	244	4e-73	34	2.56	1.97	0.71
c61288.graph_c0	OR9	MH324842	Y	417	5	AKC58552.1 odorant receptor 17 [<i>Anomala corpulenta</i>]	361	3e-119	45	3.04	1.93	0.32
c26789.graph_c0	OR10	MH324843	Y	416	5	AKC58561.1 odorant receptor 26 [<i>Anomala corpulenta</i>]	270	3e-83	35	0.72	0.59	0.82
c57916.graph_c0	OR11	MH324844	N	416	6	AKC58545.1 odorant receptor 10 [<i>Anomala corpulenta</i>]	496	3e-172	59	11.76	6.25	0.31
c66644.graph_c0	OR12	MH324845	Y	415	6	AKC58542.1 odorant receptor 7 [<i>Anomala corpulenta</i>]	194	2e-54	30	8.96	40.22	3.34
c56664.graph_c0	OR13	MH324846	N	414	6	AKC58536.1 odorant receptor 1 [<i>Anomala corpulenta</i>]	351	6e-115	39	1.3	3.28	2.65
c61018.graph_c0	OR14	MH324847	Y	414	7	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	454	1e-155	58	3.35	1.79	0.19
c67790.graph_c0	OR15	MH324848	N	413	4	AKC58536.1 odorant receptor 1 [<i>Anomala corpulenta</i>]	275	2e-85	34	5.13	3.22	0.20
c64128.graph_c0	OR16	MH324849	Y	411	7	AKC58540.1 odorant receptor 5 [<i>Anomala corpulenta</i>]	507	1e-176	60	4.59	3.47	0.34
c68297.graph_c0	OR17	MH324850	Y	411	4	AKC58560.1 odorant receptor 25 [<i>Anomala corpulenta</i>]	398	1e-133	50	9.71	5.75	0.40
c59340.graph_c0	OR18	MH324851	Y	410	5	AKC58565.1 odorant receptor 30 [<i>Anomala corpulenta</i>]	396	7e-133	48	1.09	3.22	0.38
c67207.graph_c0	OR19	MH324852	Y	410	4	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	625	0.0	72	5.9	5.4	1.99
c56159.graph_c0	OR20	MH324853	Y	409	4	AKC58545.1 odorant receptor 10 [<i>Anomala corpulenta</i>]	330	8e-107	44	11.56	43.56	2.83
c61293.graph_c0	OR21	MH324854	Y	409	4	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	589	0.0	69	3.35	3.92	0.88
c37091.graph_c0	OR22	MH324855	Y	407	7	AKC58550.1 odorant receptor 15 [<i>Anomala corpulenta</i>]	259	3e-79	33	0.34	.096	0.39
c58248.graph_c0	OR23	MH324856	Y	405	7	AKC58550.1 odorant receptor 15 [<i>Anomala corpulenta</i>]	272	1e-84	35	3.29	2.85	0.89
c64529.graph_c0	OR24	MH324857	Y	405	6	AKC58542.1 odorant receptor 7 [<i>Anomala corpulenta</i>]	326	1e-105	43	1.96	2.41	1.16
c57199.graph_c0	OR25	MH324858	Y	403	4	AJO62225.1 olfactory receptor OR6 [<i>Tenebrio molitor</i>]	152	7e-39	29	0.47	1.41	2.73
c61940.graph_c0	OR26	MH324859	Y	403	7	AOG12953.1 odorant receptor [<i>Eogystia hippophaecolus</i>]	108	2e-22	28	25.66	13.8	0.20
c60401.graph_c0	OR27	MH324860	Y	402	5	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	193	3e-54	39	2.75	3.03	1.14
c53451.graph_c0	OR28	MH324861	Y	401	7	AKC58542.1 odorant receptor	348	4e-114	46	0.89	1.05	1.01

						7 [<i>Anomala corpulenta</i>]						
c61757.graph_c0	OR29	MH324862	Y	401	7	AKC58569.1 odorant receptor 34 [<i>Anomala corpulenta</i>]	359	2e-119	49	3.67	4.38	1.01
c58428.graph_c0	OR30	MH324863	Y	399	6	APC94235.1 odorant receptor 8 [<i>Pyrrhalta maculicollis</i>]	219	4e-64	34	0.75	3.53	8.64
c58360.graph_c0	OR31	MH324864	N	397	6	AKC58538.1 odorant receptor 3 [<i>Anomala corpulenta</i>]	145	5e-36	30	3.24	2.83	0.88
c62170.graph_c0	OR32	MH324865	N	396	7	APC94315.1 odorant receptor 8 [<i>Pyrrhalta aenescens</i>]	261	2e-80	37	7.61	4.52	0.45
c61817.graph_c0	OR33	MH324866	N	395	4	AKC58559.1 odorant receptor 24 [<i>Anomala corpulenta</i>]	287	7e-91	39	6.47	6.48	0.91
c62818.graph_c0	OR34	MH324867	Y	394	5	AKC58573.1 odorant receptor 38 [<i>Anomala corpulenta</i>]	119	1e-27	30	3.97	0.77	0.08
c58563.graph_c0	OR35	MH324868	N	392	4	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	503	4e-175	61	3.59	2.19	0.82
c59782.graph_c0	OR36	MH324869	N	392	7	AKC58571.1 odorant receptor 36 [<i>Anomala corpulenta</i>]	123	6e-30	35	19.41	6.25	0.42
c65136.graph_c0	OR37	MH324870	Y	391	4	ALR72552.1 odorant receptor OR7 [<i>Colaphellus bowringi</i>]	153	1e-36	28	2.74	2.29	0.97
c60035.graph_c0	OR38	MH324871	Y	383	6	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	239	3e-72	35	2.21	2.34	1.00
c52338.graph_c0	OR39	MH324872	Y	382	6	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	323	3e-105	43	1.13	0.76	0.91
c56969.graph_c0	OR40	MH324873	N	382	6	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	188	2e-52	30	2.35	2.91	1.10
c63529.graph_c0	OR41	MH324874	Y	381	6	AKC58543.1 odorant receptor 8 [<i>Anomala corpulenta</i>]	376	1e-125	49	14.81	15.6	1.14
c58778.graph_c0	OR42	MH324875	Y	380	6	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	184	8e-51	32	2.75	5.55	1.41
c50321.graph_c0	OR43	MH324876	N	379	7	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	394	3e-132	51	0.42	1.64	1.32
c66216.graph_c0	OR44	MH324877	Y	377	6	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	207	1e-61	42	3.85	3.19	1.01
c61415.graph_c0	OR45	MH324878	N	376	5	AKC58556.1 odorant receptor 21 [<i>Anomala corpulenta</i>]	219	1e-64	39	6.48	5.88	0.93
c63064.graph_c0	OR46	MH324879	N	376	7	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	183	8e-51	30	5.23	6.65	0.98
c62470.graph_c0	OR47	MH324880	Y	374	5	AKC58557.1 odorant receptor 22 [<i>Anomala corpulenta</i>]	355	2e-117	48	5.32	13.77	2.56
c64270.graph_c0	OR48	MH324881	Y	373	7	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	173	2e-48	35	14.3	1.95	0.40
c66718.graph_c0	OR49	MH324882	N	373	3	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	158	9e-43	35	13.13	2.84	0.20
c66626.graph_c0	OR50	MH324883	Y	371	6	AKC58573.1 odorant receptor 38 [<i>Anomala corpulenta</i>]	224	3e-68	45	16.38	4.24	0.20
c58159.graph_c0	OR51	MH324884	N	370	4	AKC58574.1 odorant receptor 39 [<i>Anomala corpulenta</i>]	246	5e-77	49	1.2	1.3	1.21
c53105.graph_c0	OR52	MH324885	N	366	6	AKC58573 odorant receptor 38 [<i>Anomala corpulenta</i>]	182	4e-52	40	1.79	1.31	1.04
c63434.graph_c0	OR53	MH324886	N	364	6	EFA05710.2 odorant receptor 73 [<i>Tribolium castaneum</i>]	229	7e-66	37	6.11	6.53	0.97
c61280.graph_c0	OR54	MH324887	N	356	6	AKC58542.1 odorant receptor 7 [<i>Anomala corpulenta</i>]	142	2e-35	27	2.69	5.11	1.20
c66300.graph_c0	OR55	MH324888	N	353	4	AKC58543.1 odorant receptor 8 [<i>Anomala corpulenta</i>]	377	2e-126	53	7.09	7.2	0.99
c64771.graph_c0	OR56	MH324889	N	349	5	AKC58547.1 odorant receptor 12 [<i>Anomala corpulenta</i>]	166	6e-44	31	7.37	7.34	1.03
c67873.graph_c1	OR57	MH324890	N	349	6	AKC58550.1 odorant receptor 15 [<i>Anomala corpulenta</i>]	211	2e-61	33	8.97	37.7	3.92
c60655.graph_c0	OR58	MH324891	N	344	6	ARO76449.1 odorant receptor 44 [<i>Conogethes punctiferalis</i>]	84.7	1e-14	22	1.62	3.5	1.81
c55069.graph_c0	OR59	MH324892	N	341	5	AIR07412.1 odorant receptor 21a [<i>Aedes albopictus</i>]	228	7e-70	62	1.34	3.69	1.22
c61932.graph_c0	OR60	MH324893	N	341	6	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	113	7e-25	33	3.07	3.32	1.96
c64992.graph_c0	OR61	MH324894	N	333	4	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	177	2e-50	34	7.94	1.37	0.11

c63184.graph_c0	OR62	MH324895	N	329	5	XP_017777946.1 odorant receptor 30a-like [<i>Nicrophorus vespilloides</i>]	151	4e-39	33	4.56	3.19	1.09
c60530.graph_c0	OR63	MH324896	N	316	6	AKC58549.1 odorant receptor 14 [<i>Anomala corpulenta</i>]	456	4e-158	69	8.85	7.11	1.18
c63350.graph_c1	OR64	MH324897	N	316	6	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	176	2e-50	41	3.47	3.95	1.01
c65645.graph_c0	OR65	MH324898	N	290	4	AKC58546.1 odorant receptor 11 [<i>Anomala corpulenta</i>]	199	3e-58	38	7.28	8.03	1.17
c58483.graph_c0	OR67	MH324900	N	262	3	AKC58537.1 odorant receptor 2 [<i>Anomala corpulenta</i>]	114	1e-25	33	1.17	1.81	1.00
c64264.graph_c0	OR68	MH324901	N	245	4	AKC58564.1 odorant receptor 29 [<i>Anomala corpulenta</i>]	130	4e-32	31	7.73	1.86	0.61
c54545.graph_c0	OR69	MH324902	N	238	4	AKC58573.1 odorant receptor 38 [<i>Anomala corpulenta</i>]	169	1e-48	39	4.02	1.98	0.45
c63892.graph_c0	OR70	MH324903	N	211	3	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	144	3e-39	38	6.68	0.73	0.39
c56257.graph_c0	OR71	MH324904	N	203	4	AKC58572.1 odorant receptor 37 [<i>Anomala corpulenta</i>]	90.1	2e-18	30	0.66	0.31	0.98
c93841.graph_c0	OR72	MH324905	N	182	1	AKC58574.1 odorant receptor 39 [<i>Anomala corpulenta</i>]	168	4e-49	47	0.15	0.29	1.59

¹TMD-transmembrane domains

² Exp in male Ant- relatively expression levels in male antennae compared with that in female antennae, tested in qRT-PCR using the comparative 2^{-ΔΔCt} method.

Supplementary Table S3. The Blastx matches of *Protaetia brevitarsis* candidate GR genes.

Gene ID	Gene name	Accession number	Full length	ORF (aa)	TMD *	Blastx annotation (Reference/Name/Species)	Score	E-value	Identity (%)	FPKM values	
										Female	Male
c65699.graph_c0	GR1	MH324906	Y	440	4	AKC58579.1 gustatory receptor 2 [<i>Anomala corpulenta</i>]	566	0.0	68	18.72	13.08
c58251.graph_c0	GR2	MH324907	N	439	6	AKC58580.2 gustatory receptor 3 [<i>Anomala corpulenta</i>]	783	0.0	83	1.29	1.35
c62976.graph_c1	GR3	MH324908	Y	403	7	XP_017776024.1 putative gustatory receptor 28b [<i>Nicrophorus vespilloides</i>]	142	1e-34	29	8.06	9.94
c60730.graph_c0	GR4	MH324909	N	396	7	AKC58578.1 gustatory receptor 1 [<i>Anomala corpulenta</i>]	510	2e-179	77	2.22	0.78
c59477.graph_c0	GR5	MH324910	Y	249	4	XP_021926063.1 gustatory receptor for sugar taste 64f-like isoform X2 [<i>Zootermopsis nevadensis</i>]	112	3e-25	32	4.24	4.61
c44608.graph_c1	GR6	MH324911	N	216	3	AKC58585.1 gustatory receptor 8 [<i>Anomala corpulenta</i>]	72.8	5e-12	31	0.58	0.33
c65250.graph_c0	GR7	MH324912	N	190	3	ALG36126.1 gustatory receptor 2 [<i>Sclerodermus</i> sp. MQW-2015]	91.3	3e-19	38	2.83	2.61
c2730.graph_c0	GR8	MH324913	N	148	3	AKC58579.1 gustatory receptor 2 [<i>Anomala corpulenta</i>]	82.8	1e-15	32	0.37	0.24
c79372.graph_c0	GR9	MH324914	N	131	2	CAL23187.2 gustatory receptor candidate 54 [<i>Tribolium castaneum</i>]	49.7	2e-04	37	0	0.48
c36602.graph_c0	GR10	MH324915	N	124	1	AKC58583.1 gustatory receptor 6 [<i>Anomala corpulenta</i>]	168	2e-50	73	0.22	0.42
c115661.graph_c0	GR11	MH324916	N	111	2	NP_001137601.1 gustatory receptor [<i>Tribolium castaneum</i>]	68.6	3e-11	44	0	0.32

*TMD-transmembrane domains

Supplementary Table S4. The Blastx matches of *Protaetia brevitarsis* candidate IR genes.

Gene ID	Gene name	Accession number	Full length	ORF (aa)	TMD *	Blastx annotation (Reference/Name/Species)	Score	E-value	Identity (%)	FPKM values	
										Female	Male
c66084.graph_c0	IR25a	MH324917	Y	912	3	AVH87315.1 ionotropic receptor 27 [<i>Holotrichia parallela</i>]	1670	0.0	87	48.04	47.37
c66301.graph_c0	IRx	MH324918	Y	897	3	AUF73087.1 ionotropic receptor [<i>Anoplophora chinensis</i>]	846	0.0	50	1.53	3.55
c55215.graph_c0	IR93a	MH324919	Y	852	4	AVH87302.1 ionotropic receptor 14 [<i>Holotrichia parallela</i>]	1153	0.0	67	108.55	106.02
c64765.graph_c0	IR8a	MH324920	Y	756	2	AVH87289.1 ionotropic receptor 1 [<i>Holotrichia parallela</i>]	1116	0.0	72	33.21	31.98
c57624.graph_c0	IR21a	MH324921	N	722	4	AKC58586.1 chemosensory ionotropic receptor 21a [<i>Anomala corpulenta</i>]	793	0.0	58	223.06	196.78
c61541.graph_c0	IR40a	MH324922	Y	706	3	XP_023310509.1 ionotropic receptor 40a [<i>Anoplophora glabripennis</i>]	764	0.0	57	4.81	3.91
c56110.graph_c0	IR76b	MH324923	Y	540	4	AVH87308.1 ionotropic receptor 20 [<i>Holotrichia parallela</i>]	827	0.0	72	63.78	57.08
c64795.graph_c0	IR75a	MH324925	Y	433	5	AVH87296.1 ionotropic receptor 8 [<i>Holotrichia parallela</i>]	155	8e-42	43	12.97	11.87

*TMD-transmembrane domains

Supplementary Table S5. The number of chemoreceptors in coleopteran species identified from transcriptome analysis.

Species	Family	ORs	GRs	IRs	References
<i>Anomala corpulenta</i>	Scarabaeidae	43	8	5	24
<i>Holotrichia oblita</i>	Scarabaeidae	44	-	9	50
<i>Saperda populnea</i>	Cerambycidae	56	-	24	51
<i>Anoplophora glabripennis</i>	Cerambycidae	37	11	-	52
<i>Anoplophora chinensis</i>	Cerambycidae	53	17	4	43
<i>Megacyllene caryae</i>	Cerambycidae	57	-	-	28
<i>Monochamus alternatus</i>	Cerambycidae	10	2	8	30
<i>Brontispa longissima</i>	Chrysomelidae	48	-	19	19
<i>Phyllotreta striolata</i>	Chrysomelidae	73	36	49	40
<i>Colaphellus bowringi</i>	Chrysomelidae	43	10	9	23
<i>Ambrostoma quadriimpressum</i>	Chrysomelidae	34	-	20	31
<i>Tomicus yunnanensis</i>	Scolytidae	9	8	3	27
<i>Ips typographus</i>	Scolytidae	43	7	6	17
<i>Dendroctonus ponderosae</i>	Scolytidae	49	2	15	17
<i>Dendroctonus valens</i>	Scolytinae	22	4	3	22
<i>Rhynchophorus ferrugineus</i>	Curculionidae	76	15	10	41
<i>Tenebrio molitor</i>	Tenebrionidae	20	-	6	25
<i>Cylas formicarius</i>	Brentidae	54	15	11	18
<i>Rhyzopertha dominica</i>	Bostrichidae	6	-	8	21
<i>Protaetia. brevitarsis</i>	Scarabaeidae	72	11	8	This study

Supplementary Table S6. Primers used for fluorescence quantitative real-time PCR.

Name	Forward primer (5'-3')	Reverse primer (3'-5')
PbreOrco	ATCTTCGGCAATCGGCTCATCG	CGGATATCGACATGGCCTTCTGAC
PbreOR1	TGTCCCAGACCGCAGGAATA	AGTAATACCGCCCCTGTCTGT
PbreOR2	TGGAGCACGCTATATCGCAACTG	AGCAAGCTGATCACCCTGAAGTC
PbreOR3	AAGCATCTGCTGTTGGCCTGAC	GCAAGAGCCTCTATGGTTGTGGTG
PbreOR4	GCGAGGATGCTGTTTCTGCT	GCCGGAAGCACATCAGTCAA
PbreOR5	AAGTATTCGTTGGTCCTCGCTCAG	CTGGAACACCTCCGCCAATGTATC
PbreOR6	GCCATCAGAGTTGTCGGTAGCG	GCCTTATCACTGCGTCCTCTTGAC
PbreOR7	TCAACTGGTCAAAGACGCCG	ATTGTGCAGTGCAATTGGCG
PbreOR8	CCTACGTATCAGATGCTGCCTTCG	TCATGATGACTGGCCGTTGACTAC
PbreOR9	CACCTCTACCGCCTTCTTGTTCC	ATCGGTTCTGTTAGGCGTTCTTCC
PbreOR10	CTATCTCAGCGATTGGAGCACCTG	CGCATCACCATCAAGAATGACACG
PbreOR11	ACGTGCGTTGACCGAAGATGG	TGGTACACAGAGCTTGAACGAAGG
PbreOR12	AGGTGAACAGAGGCGGTGATATTG	AAGTTACGGCAGCGGTGAATAGG
PbreOR13	GAGTACCTGCGTGTCCGAAGC	TCTGCGACCTGGTCATTATCATGC
PbreOR14	CGTTGGTGACGATTGCTGC	ACCGGCTGGTCCGAAGATAA
PbreOR15	CTTCTGCATCAATTGCGCTGGTC	TCTGATGGTGTTCGCGACATATCC
PbreOR16	TTTGGTTTCCTCGTTGCCGA	ACTGGTCGATGACCACTTGC
PbreOR17	GAGATGTTACCTTCGCCGTAGC	AATCGTCAGAATCCTGCCAGTTGC
PbreOR18	TAGCCGATGCGATCTATGAATGCG	ACCGCAGTCAAGCATATCTTCCTC
PbreOR19	ACGTTCGGAATAGAGGCATGGTG	GCATGATGACGAAGTGCACAGC
PbreOR20	ATATGCCCATCGGCAACGTC	CAACGCTGTATCGCACTGGA
PbreOR21	ATGCTGATGTATGCTGCTGCTCAC	GGCTAGGCTTAGGTGACCACTCTC
PbreOR22	ATACGACACGCCAAGAAGTGGTTG	TCATCGCCTACCGGATACCAACC
PbreOR23	TGTTCCGGTATTGGCAACCA	AGGTGCGTTACTGGCGAATG
PbreOR24	TGTGCGGTCAGCCACATATT	ACGGTAGTCATCCTGCCCAA
PbreOR25	GTTATTCGCCGGTGCCTGCTAG	TCGCCAATGCTTCATCCAACCTCG
PbreOR26	TGGGCATTTGCTTGCGACAT	CCAGACTCCTGCATCCCACT
PbreOR27	CAGTCGGAGAGTGTTGGTGATGC	ACAGAACGTCGGCAGATTAAGCAC

PbreOR28	TGGGCCTTACCTACGGCATAA	CAGCAGTAAGCACCACTGGC
PbreOR29	ACATGGCGACTTATCGGCTT	TAGGCACTGACGTAGCCACA
PbreOR30	GACCTCTTGCGATAACCGCC	TTAGCCAGGCGTTGCAGAAG
PbreOR31	TCGCTACGCTGATGACACAACCTAC	ACCAGGCCAGTCCATTGAATAAGC
PbreOR32	AGAGTGGCGGTATCGGTCAA	ACCGCCAGGTAGGAATACGA
PbreOR33	GTTACAGATCCGGCAGGCAC	GATTGCCGGCAGTTGTTTCG
PbreOR34	TCGCTTCTGCTTGCAGTGAGTTAC	GACTGCTTGTGAGAATTGCGACAC
PbreOR35	ATGGAGGGCTTGGTGAGGAT	AGAGAGGTCAGTGCGATGGA
PbreOR36	GTACGCTACGGGAATGTGCT	GCCTGGTTCCCTCAGCAAAG
PbreOR37	TTGCAGTCGTTCTGTACCATTGG	CTCGACGCCGTCATCACTATCAAC
PbreOR38	TTGCCAATGACTTGCCTGCT	CTGAGTGGCCAGCGCAATTA
PbreOR39	AGCTTGCTACCTTGGTAGTTACGC	TCATCGTGAACGTGAACCTCTGC
PbreOR40	TGCCGAGTGCCTGGTACGAC	TGCCGAGTGCCTGGTACGAC
PbreOR41	GAGACCGCTGCTCCGTCATTC	GCCTGAAGTACCACGTAGAAGCC
PbreOR42	AGGCCTGTTTAGTCCTGCGA	CCCTGAGAAACAGCAGCACC
PbreOR43	AGCGTGGCTGCAACCTTCAAC	CTGGTCTCAGTATCGCTTGTGCTG
PbreOR44	GGCAACGTTCTTCAGCGAGT	CGACTCACCAGTGACCACGA
PbreOR45	AGGCTGAAGATGAGGCGTCGATAG	GCCGCATCTGCTACACTTGAAGTC
PbreOR46	TGTGGAGGATACAGATTCGATGCG	CGTATATCGCACGGCGTGTACC
PbreOR47	TGACTTGGAGACAGCGTTGC	TGGCAGCTTGGCTGTAATCG
PbreOR48	TGGTGATGCTTGCAGACGTAGTTC	GCACGAACGCATCCATAACAACAG
PbreOR49	TGTGGTTCTGGTCTTCTTGCTGAG	GTCATCACGACCGCTGGTACAAG
PbreOR50	AATCATGGGCGAACGGATGC	CTTCGCGTAATCAGCGCCTA
PbreOR51	CGATGCGTTATTCTTGGCGATCTG	TCACCAACAGCAGCTTCGTAGATC
PbreOR52	ACTGCATGCACTGGCATCTT	TGCTATCATTTCAGCCGGGA
PbreOR53	GATTCCGTGCGGAGTCATAGTGC	CGACCACCAACACCGCCATG
PbreOR54	GAAGGAGACGATAAGGACGAAGGC	CTGTTCTGCCAGCTCCAATACTCG
PbreOR55	AGCAAGAATATGTCCTCGCATCCG	GCTCTTATTCGTTGCTGCCATGTG
PbreOR56	CGAAGTCACTTTGCAAGCCG	TGCGAGCTGTGACGAGAATG
PbreOR57	GCGTCGATCTTCACCTGGACATTG	GCACCGGCTATTGGCAGTGATC

PbreOR58	TGGCTGCAGCGATAAACACA	TATTACTCCGTGCGCTCCCA
PbreOR59	GTGCTTGTTCGTCTTGGTAGG	CCTCCCTAGCTACACCCAG
PbreOR60	CTTCGTGCGTGAAGCATCACAATC	AAGATGGCGTGGAACCAGTTGC
PbreOR61	AGGCTAAGCATTTCTGGCGT	ATCAACCCTACCGCCATTGT
PbreOR62	TTGGAGCGTTTCGCTTCAGG	CTCCATGCAGCCGTGGAATA
PbreOR63	AGTGGCTGGCATTGTTGGGTTTC	AGTCATGCCCATGTTGACGTT
PbreOR64	CGCATGGAAGTGCTGAGAGG	CCCATGACTGCCATGTAGGC
PbreOR65	TCGTCGCGTCCTTATGCACATTG	TGCGCCGATGCCAAGTAATACG
PbreOR67	TTACTGAAGCGTCACTTGAACCG	AGCGTACAGTCCTCTCCAGCAG
PbreOR68	TGAGCCGCAGATGGAAGAGT	CCCACGCGCTTCTATCCAAC
PbreOR69	TTCCCGGCTGAAATGGTTGC	ATGATTGGTGCTGCGACCTG
PbreOR70	TTTGTATCAGTCGCCGGCAT	GGGCCTCTGACATTTGACCAT
PbreOR71	CGTAAAGCTGTCTGGAGCCG	GTGACAGCAGTACCAGAGCAC
PbreOR72	ACCTTGCTGGTGGTATTCACGATC	AGGCATCATGCGTCATTACAGTCG
PbreIR25a	ATCCCAAAGCGATGGTGTGC	TGGGTTGCGATGGAGTCTCT
PbreIRx	AACGAGAGCTTAGCGAGGGT	CCCATCGCATCCAGTTGCTT
PbreIR93a	TAATACGTGGCTGTGCCTGC	ACAAACCACCTCTCGCACTG
PbreIR8a	ACAGCGAGGTGAGACAGACT	CGCTCCAACGATACTGAGCC
PbreIR21a	ATTCTATGATTGCGCCGCC	AGGTCAACCAGACCGTCCAA
PbreIR40a	ACATTAGCGGACAGTGGTGC	CCGGCCAAACCTTCCAATGA
PbreIR76b	GCCTATCGCCAGTGTGTCAG	TTCCAACGCGGCTTCTATGG
PbreIR75a	TTTAGCGGACTTACGGAAAGCA	TCTTGTCGCTGGTTCAGTGT
PbreGR1	AACCAAACAGCGTCCTCTGC	ATTCGACGGCACCAAGGTC
PbreGR2	ACAACGCTTTGGAATCGGCT	CCGCTGTACGCTTTGCCTAA
PbreGR3	GGTCACTGATGGCGTTGTGT	CTTCACGCAGTTCCTGTCA
PbreGR4	AGTTTCGGCGTCATGTTGCT	CCGCACAGTTCCTTCACGTT
PbreGR5	TGGTACATGGGCACATTCGTT	CTGACCTGTCTAGCTGCACG
PbreGR6	CGTTTGAAGCCCGTAGGACC	AGAGGCATCGCTTCTGGTCT
PbreGR7	TGCCGTCGGTTGAAAGACTA	TCCTGACGGATCCCTGATTGT
PbreGR8	AAGCGTTTTTCGCTTCAAGTGTT	GCAAGTGTGACAGTTTCCTTGA

PbreGR9	GTGCACTGGACTGGAAAGCA	TCTTCCGTGGTATCATCGGCT
PbreGR10	CACGACAAATTGGAATTCACAGCA	CGCCTTCATGACAGCGTATCT
PbreGR11	CGCGCTAGTGCTAGTGGAAT	GCTGCACTTTCATCAAACCGT
GAPDH	GGCTTTTCGAGACGAACCGT	GCGGCTAAAGCTGTCGGAAA

Sequences of ORs from coleopteran species used to reconstruct phylogenetic tree

>PbreOrco

AMSGVPYYISLVYQIYYVGFSMLHSNLLDSLFCSWLIFACEQLQHLKEIMKPLMELSATLDTYVPKSADLF
RAPSAASRDNLIDNDYNQRNEEATMKGFYTTSQEMGVTYRSGNIQDFSGGIGPNGLTKKQELMVRSIAIK
YWVERHKHVRLVTAIGDAYGIALLLHMLTSTITLTLLAYQATKIDGVNKYALTVLGYLIYALAQVFHFC
IFGNRLIESSSVMEAAYSCHWYDGSSEAKTFVQIVCQCQKAMSISGAKFFTISLDFASVLGATVTYFM
VLVQLK

>PbreOR1

SSQRVLKDYFKVQILFFKMIGVNLNSDNSFKSRVYFVYSQVILILTVYLFFITECVDLIGKWGDIDNMTFN
LCYLLSQTAGICKIVAIMLRREKVKKMLKILESDYFLPNYDRGGITEYRIKEAVRQINVQTYFLNTIVCLIV
ANRGFFAGFDKGYFEPTDDFSGNGTVKHYYQLLPYTTWFPFDTNITPFYEIAFIYQIAGALMGGLVIGTSDSF
ICGLMVHVKAQRLRLKNNLKNHVKKAIKEKEINTDINKQVPNITLYDTKKLLPEVQALIKHYLGECIIHHQ
KIIHLAERVESDFSIMLIQFLTSLGLLCLSMFQISNNNVKSTGFLSMACFSFMMFYQLFMFCWNGNGVLE
LSLDIVFAAYDSEWFLCDLEIQKAISIIQRAQRPLQISAGKFAFLTLETYMNVINFIIFLLDETIYRFYELRDR
IIFWFKTLINNF TKYTNVF

>PbreOR2

MYVRWL VITHPDVFIPYACIMKLERIKRVVVSQSNVPVSSVSGGRKMSEKIVHQFMRVNVKILEITELWL
EDGNLTAKKMILKLCIMFILVCPCTIPLREFIIVLIDPAPDIVHRIQIILAESCVLGAMYMVICFWKNRSQI
KDLVDSIADFANYSEL DLLIIDEKAGFFSKIVLGYSLSGMVIYTLSPLLSTESCEKVKSQYKIDHGIPCGIIVP
IRIPIDPENSHIFRFYVFDQVNVGLAVLVVVNITMMVCGLVEHAISQLKQVRCLMSKLSSESGNIEEKLGF
VVKYHYAVIRFINNINKYFGSQLVLHFTLTSVVISLLGFQILMVNDRKESLMYALHLIGWLIMLYNICYYG
QLLIDESIGVAFDAYSVPWYNCSVRVQKDIKIVMRSQKPLTLKAMNLGIMSHPTFLGVISSYSYFTLLLK
VKNA

>PbreOR3

MKMPVEIRMRLKSFGKTFLVKIILSKYYLISLSDFSKDLYKDGVKRTILPAKIIQSICCWPDSDTAFALFV
GWLLFANLFLILIFHAAYVFKHFNDIGDTIAGVTVTTTIEALARLYLIITRRRIINSTLMVMWKQFWPVNA
LETKATQRIERSAQTVVILATMLLILASSCNCFLSGVPLVRYHDIIFKSAPFDWEMMYVVEFIYVWQYFIS
WFEVLLVCGFDFFTTSLVSICALQFTIMQEIFKSILTRKSKKQRMALFGERGRKMTDREMLFECLEQHKLLI
GICNDLEKSFNTQILLQFFVSTCAICAPSLVLKIDSSQFFKTMTYAVGHLCQLYNYCHVGATLSHESVLLSQ
AIYESNWLHTHDIQFQKALLIMLQRSQNAQCLTAVGVTEMNFESFIKILRLSFSFYTLNLLMKNMNV

>PbreOR4

MMVFRKNVQRMLNRFQLFQDKVHFLNDEAKYAMVLGRLLVSIALNSPMDYNLARMFLFLFTVAVSIIH
EITIAVCFASYVRDVTLDVLPALSLGIQIVSKGTVLLIKTKQLATLTEVVWNDFWPANIMGHAVEYKIS
KLSKRILIAFYTELIVTIVYSISTVILPLRRTPKVLFFQASYPLDLKPLGYIAFCIQSYMITYAETATICGYD
LMYQAICINCAAQFRLLCVALEYIGTGKEKEILEEQNAVSDKTKRKSIDQDANKELLGICVKHHQTLIN
VGHELNKIFGTGHFLQLCATLTGICTISYRISQTNDYNTIFVGLNYYFGHLCQLFMFCSASHELFWSTCPS
MSVYNSKWYNKGCDKIKKSLQILMIRSQRQMTMNSFGLFELNYVSFLAVMRFSFTLYTFLKTVAD

>PbreOR5

PFLRRLHPFLKRFRFLQESAHLADASKYSLVLAQIYLYAANMWPINFTSVRKTLFFTIGIAILHLVSILVY
CYSYVKNVDTLAEVFQQVDLGIQVLYKSSVVRKSNRLSNLIHIVWYEFWPSNLFGELEEKIADDTKTVI
VPILLEIIVAGIYSAICLFLPLFAKSTLLLHEAWYPPGWDNRNPMFKYAHIFKSFVAVYTDLGIIICAYDILYVI
LCTNCSAQFRLLCSAMELIGSGMEKDTVDDIQGDDNDIRNPSSHGTREEYEMELLSICVKHHQKLIQFGDE
LNMIFGSGHFLQLHTTLMGICLTSYLIASADNLIYIIFNIIYYVAHFWQLYVFCAASNQVSDSSVCVFDAAY

GSKWYTKICKDITKCLIIIMIRSKSPITMNAFGLIVVNYVLFLLTVMRFSFTLYTFLRTLAA

>PbreOR6

MKSLRHRLLSFLARFEFFNSRMDMLKDKGKCVIFAGELPLKLAKLHPADRGASSIMYFLIIMVLVTIHVGL
MYACLENSRVDAIANILGLSNGGMQTIFKATAIFYQRKEFTKILKTMRYSFWPADAVDSATEEQIWTNS
KKLLLLLSTQYVVPALYLIYIMIGPILKGSRYLPCAYCLLPNQTDSPIFEMVYAFQVITTVFLPLHHIGGND
NLYVTSCSICSAQFRLRAAIRVVGSGHEGELIERLLRLPGVETPPSRGRSDKAKILLVICKHHQNLLRFID
TLNRVFEINGIFGQFVFSLAGIWANCYTLTIQTTIKGSVTTLAIYGSCLLQLLLFCAFSDDLHLSADLANGA
YESMWYQNGDPDVGRCLALVILRSQKAVCMNAYGLFELNHVSFMAVIRFSFSLYTFMSQVAT

>PbreOR7

MILKNTRNPVLKLGGLLKAEDILEDVVKYTMASKIVLSTVHLWPENNNVYTKLSFYMIFFVYASIELS
LLVHIFVAVKDVALTDTMLMLSVGVQTLIKTAILYKSEDLNKMISIRKEFWPSNSFGADV KIRIKSET
RKLLYLCLTSYLGGLCFLQFILRPVVEATRVLPYNSWYPFNWSKTPIYEILYILQGYMAIIVNLNIVCGTD
FLYYFICANCTAQFRLCKAMEEIGRENVYSHILLKTVGVTVSVISNEKSENERLLVLCIQHHQKLLDISF
RLNQLFYSYNLCQLAASVAGICAACYLVTSDSKASASSAPYFIGHIAQLLLYCAVSNELGHWSQQLSIEA
FKSGWYLQKCTDIRQCLSILMMRSQEGISMTALGLFELSYASFLTVVRFSFSLYTFLDKFKET

>PbreOR8

MFFLKKLRYFLNRFDLVQDNVHFLEDASKYVMVLSRLLHFNVLWPMNFTKVRKVFFYATMGIAMGHH
FTISYTCRNVRSIDNLTEILPAMSLMIELLSKTFVLYGKRDQLKDIKIVWNDFWPSNTFGKELEEKISTNT
KDILIPILQMAVGSIYSTICIFLPFVATPSFVYHAWYPPGWDRSLFQILNLRSYLMTYVINSMVCAYDLL
YTALCINCISQYLQLSYALKFIGTRKELEVILKIQKDKNKNPSIIQNDEGRVMKLLIICAKHHQMLIRFGNEL
NTIFGSGHFLQLVATLIGICTTSYNISQKTGHMVVMLSCGYLAYFWQLYVYCASSNSLSVWSTYVSDAA
FDSEWHASNTRDIRKCLSIIMIRSQRPVIMNAFGLFQLNYESLLTVMRFSFSLYTFLRKIAA

>PbreOR9

MSKRINQYDSLDFERKVLYLTGVYCGRKFPNNAAFKIYRIVNTSTAFLFLFLMAAKMIVERDNLELVFDV
LHTFISQITLIIKAIYLCKVLPKYNALERLTEPIFNQQTDPQDALISENILGYKYAAFTLHGLAWVALVLYT
ICPIIEGPILAIPIFWLPSGLDNYKMFVKIYEVLCWTLSGGDPALDLLPVCLLSIGTAQLDILNQNLTCADR
DPDDSYEVQEKKIRVRLKNCVQHHLAIKYLLDDVQDIFSFGMFIQIFTSVVAICMTGLQFISITPDSTVFFQV
VTYFGCMLSQIYNVCWIGQKVITKSDEIRDACYMSAWETCMLSQIYNVCWIGQKVITKSDEIRDACYMS
AWETCCSSNKKTIFIFMERSKRVMFRAGNFFTLSLATFVLIIRNAYSYFAVLVRVYK

>PbreOR10

MSFWMKLHSLLVRCQILKDCAHFLGDSSKYVIVLSKLSLIVGNLWLKSFTKTRRIVFYIMITLSIVHHISILL
YCGSYVRDVSLSSEVLPTLSLGLQVMNKISIIAGKSNQLDDL VKLILHDFWPSNVLGPKTDRIIAKATRRI
LTPIVLQSTFGVCYSICCVFLPIFKTQNLLLHQAWYPKGLDEHLIQKALQIMKSYTMNYLDCLTVTSFDLL
YVAMCVNCSAQFRLLCGAJETLTGKDRAMIWRTNKPTGGNEKEVARELLVICLEHHQKLIKVADEMNA
AIFGRGHFVQFCATLIAICSSFYNIVVQRSYTTIAFSLGYLAHFQFFVYCSASNYSWSTCVSDSAYNS
NWYSKDSNNIRKCLTIMMLRSQKRLSMNAFGLFELNYVSFLMVMRFSFSLYTFLRTVAT

>PbreOR11

ESYTPNFFRVNAEFLTYSGLWSPPYKNGIKYYLYKLYKTVVLFVLFYNPCVVILGVIEHIDFVIVIEALN
VGLTILLTGVKSAFWLSNGERIKEIMHRLETNVLHYEETDGFDSVRMIREAQKSGLWYALLWRAALLTL
AFAYIPVAMLSLWYCFNDLPITGVKAFENLPYYMYVPFKRDTAFKYFLACVLQCSPFCICATVFGIDSF
MSMMNLIGTHMLIVQGAFTSRKRCLKKLKGRALTEDGLYNSEELESYMMDEMKSIEHLQMLFRSCSD
IEDAFQYMSFVQALCTMYILCSTLLLISTVNVLTNEFGKDLIYFLGVTLQLGLYCWFGNQLTLKSEGVPLA
MWESDWLETRKPYKFCMLVTMMRFKKPVYINAGKFVPLILDQTQIAVIKGSYSYYSVLKGMSK

>PbreOR12

MAGGIRSWIRAYKQKELPKNYFRAQVKILRFLGVELMRDETIKYRIYSCIMLFIVAIQGTSEAVEFYAQW
GDLNAIVNVTSYLFTHSIGIHKVMMLFYNRKKFGKMIKTLHNKPFAPENVNRGGDIEEKYLRQIVRTTERQL
MFFFLVLTIVTLFTAATFIKSRVDFPKEEWQYPYPITIKTTDSPLFEMVGVYEVIVWSLYAGLLITTDILL
VTILAHLTIQFMILNNAFKTIRTRSKRMNQADGTDENEGVILSKLLGEYIEHHLRVLELAEEMEELCNMV
YLLIFTSSVILLCFLLFQMSLYPIGSVEFIHNISYYGIIAYQIGMYCFWGNVTLQAEEVAVAVAEADWVGA
PRSVMKAMVVIIARSQKPLYMTAGKFVNLSIDTFMRVIKGSFSYFMVLQQTQEETT

>PbreOR13

EAFKKVISIVCPGIYKINEDNFEDSAKYILIYSQIPINFVKLWPEDKGILKKILYGILVLISVIHYSSLILALFTI
ADDIDSFTRVISSIECGAQVTIKATLLYYNTKELESLIKIRHDFWPSTAMGPKIDQDILKYTKQVSTISIIQYS
CGLTFLLLNIWLPFTKTTKQLPHYAWFPFDWTKSPMYELIYLMHSYFTGYLTCPPVVGYDILYYGICANCI
AQFRLLCQAIKCFGTDEEEVTVQLAKLVGIDADWKDGRLLVLCVKYHQKLINVCEDINRIYGNHVL
QLLSSAVGICMSCYRISNENNLNNITFLFLFYLAHTSQLFIYCTISHELWSTCVSEAAYESLWYLKLNSE
VKKSLCMIMTRSQKIIAMHAYGIFVLNHTSFVAVMRFTFTLYTFLTTIAK

>PbreOR14

MICKKKKGKMDCIDYLLILPKICIKIKQKNCILPAKVLLESVCCWPDNTSSRTITAWILFLNLMVAEIFHAA
YVVVHASDISDAVSAGATVTTTFEALVRVHIMLSKKRVINEILSVIWKQFWPLRVILKEEARKELKMKAM
ISVLLPCTFLVSSVLSNLLITGLPFIKEHQLVLKSIFPDWNQSYIYEALYVWQYVMDWYVLFMVNAFDFF
FVSLVTICCIQFLIMQEVLTHILSSQSKEHRKIIFGPAGENMSDHQMLWECLKQHKLLIGICDDIEQIFNKAA
LIQFAVSACANCAAFIMKVDYQGFFKMLFYAMAHLVQLFYCYVGQQLSYESEALADAIYKCDWHLQ
YDRSFRKSLIMMIQRSQRRVCLTAVGFVELDFGSFIRILRMTFSFYTLNLLMKNEQE

>PbreOR15

EILKKFGLLLDDVDFLSDDAKYSLVLSRLIVDFVCVWPTNFSGFKRIFFFAIITLEVVHQVTMFAYFFIFVR
DVEALTVVLPVSLVGMQVIGKTAILYCKTKKLEELIKTVWNDFWPSNLMGEKIENQLAQDTKRLLTPIFV
EITIGLTY SAYCIIVSLNNREPVPAWYSFDLSKSPAYVTVAIQIFLTMYVDTCLICGYDFLYNAFCINCAG
QFRLLCHTTEYIGSEEEYRIIERIQNYANVESARTLSVGDQEGVLLRICAEEHQKLIRFCNELNQIFGHGH
FLQLASNLMGICTSCYRISLESNYNNILISVTHYITYLCQLFCYCCASDHLSNWSTRLSDAVYHSSWYIKKC
LIKGKCLSIMMIRSQKALVMNAFGFLQLNYVSFVMVMRFSFSLYTFLKTLSSN

>PbreOR16

MEMGFFDLNVKILKLSGLWVPDKEDSNMILVIYNSICVCYSMIYFTIAELVALKESASDLNDLIANLNM
MSFILTLAKVFGWFYRKNIVRIKLEAKENTFSENNVDNENIIEKKRKFKNIWTKSFFIVASLVPISAGILS
LTDTVISGNKYINYQNDSTTIYLQKLPYHSWIPFNYASSKYSFSAVITQCLALLNCGYITVGLDMMFVAL
VSLVTAHFTVCSMAFEKSTNVRREISKQLKDSFVYQKVLNRECDKRIKKCVKHLQVLIGVCQELETIYSP
LVLLQVLISLVVLTCTCLYLVSSLPIGMRLLGNELAYLLAIEIQVATYSYVGNELTYSALPTAIYQSKWSS
TSLDFKKIMLITMMRMQKPVHISVGKFSALTNTFVMIAKTSYSIFAVLKGN

>PbreOR17

MEYKRLLQESGIPVHKLPAFTSDLSKDAARKCIIPGKWILQITLAWPDTDNPYVVAANWFLFINMIVVEI
FHATYTVVYRADLGNALLALATVTTTLEGLVRFQMIFFKKHLFNDILHKKFWPLSVLSSTKEVEILK
RRCYTTLGLTIGCYGPAVICNVVLTGPLYLTGDGLILKSVYPFEWNTTYAYEAVYTWQYFTQWYILILVN
TFDSFAIPMMMICAVQFVWQDIFRNIFTVGSKKQRLALFGKEVNDEEMISICLEQQNMLFEICQKLEEIFS
FAILFQFGNSILALCSCSVILKVDQSKFFEMFTFAVAHMFQLFNICYVGSSELAVQSENMAVAIYDCNWQD
SDDLKFKKVLFPMLQRSQKVRNLTAAGITPLDFISYVKVLRISFSFYTLDDTLFDE

>PbreOR18

MFFNKDNHSQNPSQEFSDDIHKDEIKKCLLPKAFMLESLSIWPAGSDSILQTIWILFWNLVVLQIFHAGYV
LVNIRDIGKAASAWITVTTFQALLKLHIILTRKKVLNQILTKVWKNFWPLCAVTKDNVKLRLRRYTMVPI

MLLASSLICAHLCNIIVTGQPFIIQHGLILKSSFPFDWNKMYIYEVLYVWQYSLEWYAILAIEAFDILFVVLV
AICSVQFVILQEASRSILSRDSKMQRKIIFDDRAWKMTDNEMLWECFKLHQLLIDICDAMEATLNRILQF
AVCTSANCCAFLMKVDYQQFIKMLFAAVAYLFQLFYYCYVGQQLSDESEKLADAIYECDWYLEYNRDF
RKGMLMIQRGQRKICLTAVGLFELDFSSFVKILRLSFSFYTLTLLDSLUMEKE

>PbreOR19

MSGKKTTLRKLSLEFTKDVYKDGVKKCILPGKILLQSVCCWPDDESLFMKVVGWFLFWNLFVIEIFHAAY
VFKNFKDIGDAVGAGATVTTTMEGLVRLHIMLTKRDVINTTLVKIWKQFWSLDVIEPIKRKQIQRKAQLS
VMLTSIFLASSIISNSQITGPYPYVRNRGMVLRSVFPFDWQKSYYYEVVYVWQYYSDWFLVFMINAFDFFF
VAMVTICAVQFVIMQEVFKSILGKDSRRQRVIMFGEKGQKMTDRQMLFEALEQHKLLIGICNELEESFNR
AILIQFFVSTSAICAASLVKVDYSQFFKMLMYAAAHLSQLFYCYFAGAELSYESGHLADAIYECNWHLS
YDREFREAILMMIQRSQRVQCLTAVGITELNFESFLKIMRLSFSFYTLNLLMKHMDG

>PbreOR20

MGAYNTDLFYINDFFLKCAAVWPINHKTGIKHVSYKIYQFFVITVTLVLFPTSLFVNVAQNVDNLLTFMEI
LYPAVIGLLSAAKVYFSFMNCDRIKRVMYSLECNDFHYEKIENFDPCIMKRAKLRGIITMTMWCLCQL
TLFLTYGSPIVKSFWYYIKDMPIGNVTTFQTLPTRLHPLFQCDTALKYLIACLLQFILFSLYILVIVGFDGLF
MNLLNIIEGHMVILQGAFTIRNRCLLTISGIDLGVDELEERMMIEMKKCIRHLQMIFQCCADTEEIFKYICL
IQSTATLLQFCDCLMLLSLTDFRSTEFMYASYIAIVTELSLYCWSGNNLTSRAIDIPLGLWESDWLETRK
PFKVCMLITMIRLQKPTIFTAGNIVPLLLTTQVSILKAGYSYFTVLSGR

>PbreOR21

MSPKIVIRKLSTEFSDVFKDGAKKVILPGKILLQSVCCWPDNESAFMSIVGWCLFWNLFIVEIFHTFYVFK
NFRDIGDAVSAGATVTTTMEGLVRLHIMLSKREVLNGILVKLWKQFWSVEVIEPIKCKKAQRKAQLSIVL
TSIVLVSSVISNTQISGAPYVRNRGLVLKSVFPFDWEETYIYELVYIWQYYSDWFLVFMINAFDFFFIALVTI
CSVQFVIMQEVFRSILAVDSRRQVLIFGARGAKMTDKEMLFECLQQHKLLIGICNELEESFNIVILFQFFV
STSAICAASLVLNVDYSQFFKMLMYAAAHLSQLFYCYFAGDVISYESGHLSLAIYECNWHLQYDRDRK
ALLLMIQRSQRPQYLTAAGVVQLDFASFLRIMRLSFSFYTLNLLMKNMMDG

>PbreOR22

MEFVKGKTFQQSILYFNLNVIKLFQYVWQPKNPSKSLQVLYGFYSFLIIVSAIFNVITESIDVISLLIAGDIDT
FASNAYLYFLNFAYVIRAVHFHAFKKQIVSLIDAMDQIFQPRTEGDMFLSIRHAKKWLLFCKAYIFCGIA
TVCFHIFPFTDSNEIKLPFCGWYPVGDDWFVVLVLYQELQEFSLGMCNISFASIIMCILSYLSMQMDLLQN
CVNHLKERCEEKLSARSWDSSHTFNYQQELGKLINENLVDCICLHQITILRMKHDLEKIFSITIFSIFLFDCL
ILCMTMFQFVTVPLFSTQWFSVITYFTCIVLELFGYCWLGNELIISNNTALTLFHSDWNGTLKNYQTNVL
IFLTLLMRPITVTAGYFTLTVDFTAIMRTTWSYFVFLWQVYNRH

>PbreOR23

MEFQQVNFQQRSVLNFNLNVIKMFQYVWQPENLPKILRCFYRIYSFVIVIFAIFHVVTESIDIIGLVTAMDIDA
FASNAPLYFLNFSYVIRAIHFHAFKKEIISLIDAMDEHIFQPRTEDDMTFSIRHAKKYVMFCKIYIFCGAATS
LLFVIFPFTDAEELKLPFCGWYPVGDDWFAVLVYVYQGVQEFSVGMCNISFTCITVCFLSYLSMQMDLLDT
CVKHLKERCEENLKKKNTDLLNVTYEEKLQKAMNESLIDCISLHQITILGMKRNFEKIFSISVFSFLFDCLV
LCMTMFQFVTVPLISMQCQSVITYFTCIVMELIGYCWFGNELIISNNTALSFLHSDWMGMSKYYQVNVL
LFLSLLMRPIDVSVGYLTLSDVDTFTAIMRTAWSYFAFLCQVYNRDS

>PbreOR24

MHSNSQSSRLGDYFRPQKLILKICGISLRENESISYRLYSGFVMCMIVSLLFVEIHGIVVHIKDVENLAGFIAI
VFQHVLTFLKLIILKRNRAISETLQMLHEGCFAPNFERGGAIEEKLIKECNHDIFVRSATYYIAGAITIGNA
VIALRTRLKGDDYRLWETFWLPFELFEIKSTTCYIYIYCSLAITYFSTFVMVTDLLITSVIKHATTHFVIL
GNFIRNITKYKVEKNDELINDYPKLRNDRLMRMRRAAIVYHQEIHKVTERFENLNFILCEFVGSIFVLC

GTMYKSTLYSLGDQRTIRECVFLFTMTTQLFIYCYCGNELTSSSVSFACYEADFIDEDLWFQKNLLMIM
MRSQKPVALTAGKFTVLSLPAFVGILRVSYSSAMVLRKAN

>PbreOR25

MIREKSKERL VISEFFKPFLRILQIFSCYSPVPASSTAYKMYSVVEVTLLIFVPCFLKTVDVDLQSFTTELDEAL
ATLLIYVTFFIYTLKSISLITQKDDVRKLVRCCLDLIFQPRNTRQRNFIKGILTSGILTLFTAGGCFTCTLL
DLQPLLINRQERNGPINFWYPVVNTTKSPAYEIAAYESIVSITHAFTHCVLDAINIICMAFIIGQLHSIEDTL
INLRSYAEKEVNIKGEPNTTEKIHVQMNILLIECVSKHRALRRFANDLNKIYTNNFFLILANCMMLALAFML
YKMSKAATLDFTFIFMIFYFGTMMTLVFMCNWYGNEIHYKSGNLHTAAYSMDWPGTPISFQKNLLFTIIHL
QVPIKLYALNFFLLCLESYISVVKTSWSYFVMLTTVSNN

>PbreOR26

MVVPMSKIGYKEALAIPISVLTGMGLWPAKKVNLVVISKLFMNIVIAITETVMVSNIIQAARSVNMKLLN
WSICVFFPLTNLHIKALSLWINRSYFLSLLNDLDSTSFNNHPVKLNRHIQTIAKISDVIVKYFALVMVIFLSIF
SLLPSFTNLPLMMPPPFDMGKFDVAYRIGHLLATSYLATMSATIDSLYMSLIALSNAQLDILRERLIKVSED
ANELCDSMDKMKWDAGVWILKECVLLHDTITKYISKLSAVLSLPLLFQYASGCFIICNTIIQITILNERDSR
TIIGMCGYSGIVFAQMSFYHWLGNEIIFKSDKIEASYTSNWWYELDIRSRKCILLMERAKRTTAKLYDLVF
VSLES LGVYYSYFQDGFSTFHRCFLGGSMGIFSFCLS

>PbreOR27

MFQWNINTRVYSSSTLSIKFSAEANMTIIGRRLHVPRALLAVFAIDPFRQEKMSLR CIVLDVFQFYVTLTG
ILLMKDFQNVNADLWITCISCSQAAMKVFSMLTQRRDFFEIGKTLNLYQLHRKYSNSTDGKYEKIGIQCH
KAYLFTIVVTVINFMKPMILQQRILPSVAYSPCDIQYSLTCYLVNYICQCCAGIYAALMISAIDL VFFSLLF
YGYFELEYVKINLLNLKVDKKYSGDDPKVLKDIAFIVEHHDQTFRYLELINKAYAGILYQCCSTLFIVGM
SQFCLTINGFPPSMNTLLTYLPYYLASLGQVFIYCIAGGVIADQSESVGDAAYASEWWIRNQLKMRRALSL
IIMRSQRRNLNITVGGIWVLNLPTFC SIVKTSMSLLAFMKTAYDN

>PbreOR28

MQNCDKKFGDYFRVHKLILRICGVSLQTND SRLYRTYSTFILCLFLSIMMEEVYTLTRFTNDINKVMALLS
VLLSHIVGVFKIYVVLKNRPLICEILES LHGGMFAPNRKRGGVKEEILIKKCIADTHKQIIVYCTPFGISLLN
ASHALMTKFTEDDCEFWELPWEAFGLFKICSSRLYYLIYLYQNGTLFVVSYIIIGTDLVIIAVFAHLTTQFAI
LANFISITVKGDEEFSPHLEIKDKSKRHYRKCMEIVVYHQALIH LAERFEDLFTFVILAVFIGNILVLCST
MYLATLNSPRNPKSLLGLTYGITIVVQVFLYCYYGNELALTSESISSACYDDGIIGTDISFQKDLILIMRRSQ
RPVVLTAGKFANLLLPAFVSILRASYSYFMVIRTSN

>PbreOR29

MIDLNVWFLKLSGLWCILKSTKIARKYVISA AFIIIPCQGIYLPMECYKLITGYENFQRTLELLGFALTHILA
TTKIINLYVNRKEICQIIEDLNSYIIMSDHTAAEECKRLKQRFYKKTYRLGILLFVLGNCAGLIRFGISAFHL
VFCTDDTKYEELCRTMQPFLIPLPEFLDMIFLRWVLCVFQGICLNLYAWQIVACDMLFVSLLVHIDCVTHI
LCYLFETVTERSMSHRNTISDKDSGQQLNSRMNKEINMATYRLQRLITTCEKTSNVYQYVVLMLQLVFALF
TLMSSLYVATSVPIFGASFIYQLEFYVTIVTQLSLYCW FANEITISFGQIPKAIYNNNNWMSGDQSFKKSMIIN
TIRMNKPIYLVIGMVAPLNLNVCIIYILRASYSYFAIINKN

>PbreOR30

MNRNIMSRAFAIQEHMMSIMGYWHKENSSAFYKIRGTVTMLIFLVAYVLMMLMQFFHDIVDFRKFSEILC
MLMSYTSYFCKLCGYLYSRKTFLEMLSHLKNPIFTRCSPEMERHLIKTLNLSLFITKLYRFSCGMVVILFSI
YPLFDDKPLPTSVPFETGRYTFLLYIIESLAMLIAAWDNFCLDTLCTSLMGTAIGQFDILKEKILTFKERAIG
EEEIVLGVNFKTTNIFEANVNKRAKSLLNDCIVHHNALIKFVQQIEDTFSFGLLSQLMGSIIVICNTGFFLML
VSPASLQFGLFSSYFITMMAQLTLYCWYGN EIMLSVQIGEACYFSQWYTCTADV KRSIFIIMEKSRRPLAI
TALKFTTSL ETFAAIIRSSYSYFALLQRLANKFESETK

>PbreOR31

GTMAPDPNQRIHVSGLFLKLYLWILRAICYYYYQEPGEPLWYIVYSAVTMFLYVVPAILNLIKIIKCLIAERDP
EILARGFTNVITYTSEVYCFLVQKNNITQVFNDMDSIDIFQPRNEFQRAIIRQMLKAKRFIDISMWVTCALC
FLYGIKPRIRNDTSLPMNVWYPVDTSPAYWVVYVYEIFMMLHACSHVSLASIPILSMAFLIGQLNMIA
DTLRKLKEYAEEDAKTDNKKDNTVKTHVEMKKLLIQCVYKHRALRRLVIALNKVYTYHFLMILSNAIIG
FALLLYQLSTEGLQSIITATFHIAATLMTQLLLYNWYGNEVTFKSDTLYIAAYSMDWPGTPVWFQKDLLFA
LIHFQIPMKIYACNFFLLCLESYVGVLRTSWSYFLLLTMNEE

>PbreOR32

KTHHISKNLIASMTTATRPNPFDAFRTEKGILTWFGFPVGNWKGFKILKGVASIIISVSLMVS MIGRIALEL
DNIPLILEALYFGLTQTTFLCKIFNILVCNYKMRRLLVDYLKNPLFNQHTKEQDIFIERAIRICHIFANTYRVC
VGLTITFYAIFPFIEHTLPLPGWFPMDSKKYHYVLYIYHLACLIINGYPHTSLDCINASMISMASAQFEVLK
DNLNHLIKPNDMKLTIKKQDEIHKRISKCIHHNMIIKFVSHIENMYSNVIFIQFLCSIIICVTGFQVFMSPS
RIQYITLVLYFLCNLTQIAIYSWFGHDILAKSGGIGQACYMSEWNNVSPNTRKLLFIIMERSKIPILTAKGF
NLSLNTLMMILRTSYSYLAVLQMYKT

>PbreOR33

DDVIKGIISPTAVLNRYKEMLEVLYRCKRFCGIWPDENKPIYCLKLLINITSIMYLLTGFSLHVLKVVTDP
GTVSNIADALFTLQCTFNYSFNIGCAILSETSLNFFTSITNFEEFGMPKQLPAIDRELKNVKIMVGICTAS
AISHLYSLLTYDYCLEKHNGINDIAYCGYCCGLYYPNYDKGFSFVLHVLLNTYTFSMLCFSGVIFICAG
YCGIEFICVRIDHLIQLMLDEVLNGRKDSKETRDGMRNCIRYHIYIISLANSLNDCYSIINTPAVFFYSVTLGL
CLFSLIKDYSYKAALVVVGYICGTFVMSVSGQKLLDKSQSIGQAVYDTKWYQHDVTRKCVLLMMLRS
QKALTYKAGPFGTFSPLPVFMLVIRGAYTYMTMQSNIK

>PbreOR34

MPENSYINTAPNSSKDRRIRFDKSKMAFVKWDAFELGFIVLKTVRLTNNNLATKILIFHLVNTVIYAEVFL
LTMVNLFRVEKEDFLDAMEGAISTLHAWMKYIWIVYYQEDLLRFQEDACEFWDYRVFSEKAKMYAIFL
KTALEKLQTLGMAIVCLITLYMSFPLFSAGRFYVLNLNVHIQSHLLRYSILLSQCYAVMVSACAVYLYEII
FVMLCCQAAIQLQLLSEKIKFEEGNDPKAVLREIVKHHQLISSVLARMKKQYSLVFLQFVIMVASACSEL
LFISIGNTDNWVRLMKSFYICTYLFVEYAIYCVPSEEICSKVSQFSQAVYFSKWYDMLKIDAKDVAFLMM
NSQKDVFYFTIGDLMDVNMEAYVTVVRATFTFYAFVNTMLLE

>PbreOR35

DGQPIKTYLFYLSIQKTAMRKLSEFEFSRDIYKDGVARCILPGKIMLEGIVCWPNKDTLFMRMLGWFLFY
NLLLVEIFHAAAYVFNFTNIGEAVSAGTTVTSTMEGLVRIYTM LTKREVINRILVKVWKQFWPIDVMDPTK
QKEAKRQSYISIALTSLVLLVSGTCTVFITSVPYLTNRGLVVKSVFPDWSKSYVYELIYWQHFNEWLVIV
AINGDFFFIALVTICYIQFIVMQQIFRSILTEDSRRQRVIIFGKRGETMTDREMLFECLEHHNLLTGICSELE
ESFNIAILIQFFVSTTAICAACLVLKLDYSQFTKMMSYVVGHLSQLFYCYCLVGQELSYQSGHLGVAIYECN
WHLSDYDRNFRKALVLMIQRSQRVQCLTAVGITELN

>PbreOR36

CRLCKIEAMARISCTRTIEKPKRILSMGVSVPWPTAKITKYTVLNLIFNLSFDIIVLTVIILNILNALKFKKINLL
NKMICIVISMVNYIAKSSLTINKECFMSIIQDLESTTFNGHAMELNYHIESIYNNCNLVFKYFAFMLVIYSL
IGSILPMIVDIGITIPAPFYTGRIEFLYKVLHFFATGLLSCNTIGLDILCLTLISLGIAQMKILQESLENIVEDRE
ETNGNKYFLNLKVDSTLRECAILHQKIIVFVGKLNLTLSFPLFIQYTCGCFILCNTVVQLTLLREPGETSNTVS
MIGYGAITFGQMAMYHWFNGEMIFTSEKIIESAYLSKWYEIDVSSQKTILLMERAKITQSIQVYKYIFISL
DSLGVIVRWAYSVFALVKARYG

>PbreOR37

MDQQEIRCIDVLAPLEKMLRISGIWPLKHMFTKYKLRTAISWLF SYVFLASMI AEVIHVKG DVEKINEVLC

VLTPICGCGSKQVSLIYYKKNFFNILKILKSDTFNKGANMIQKIMTLTKRGKKIFHGLTFGTLVLYSVIPLF
DQKDYPPIPSFNVGRYKCAVYLFQVASLAIVAWNLTIDLLFVDLLALGTGLANNLGKKLSNIVGGKKEC
NDYCKISAKLNVVEIMNKVSLKSLRECICKLHISILRYINDIEAVFSFSVIVHYMTATLLCSSLQITTMVDIH
STQFIRCSWLAVNALLQSFLYHWFGNEIIVRTDKISEACYSSSWYKCNVELRKMLLIVMTASRKPVGVTIY
KFTELSLVSFVTMLRWAYSFTALVRARYVPD

>PbreOR38

MFQKILTEEVFFLLNIRGQSLDASTLSSKLKAIVCLSLEGLLGILLTVGILDSTDDLYSVLENITGLITLLQIIF
RSVILFVYKDNFLNSIIFLKIFWKADRFGATSFKKISNFRLQFVKILRIYRLIIGISGTYLTKPLFEKHRMLP
MTCLLLCDIHNDVCYVFYYIFQIIALATQLIMLVGFDSLFFVLLMCAYVELEQIKQALSNSMKENAKGD
QDEVLKEMITIEHHNLVLGYIGIFNHLFKTALLFQFGFSIFSLCSSLFVMTNGFPPTTGNFLKSGPYCFSGI
CQIFIYSAVGELIAQQTERISDAAYETKWILNYQPSFRKMLLLLIQRAQLRSQITVGGVWKLDMTTFASILK
GSMSLMAFIQTVYYNKK

>PbreOR39

MADKKDISYKRLLSKTLSYLGIVGLNPLAHTKASDIKAVVILTLEVLLTFSIAASFSINLSEPYAIIENFTGFA
PAVQIVYRKIMLLMHRSDFRDIINYLDYFWSINAFGKHTANQVIRIQKMQSKFLKFYLWTVILSGIAYVAK
PAFTDERELPVLINICPIKTSSACYLGSYAFQSSCIAVLLCHIVLLDSLFLNLLLYGYCELEQIKYAFHEVK
AEVHVHDEEPPKVLQLTILIKHHIKVLEYFDKLNKLFSLMLLFQFSSSLCSLCTGLFMLTSNRSPSSSFALKF
VSYVISALIQIFAYCLAGQMILEQNESITASAYFNCKWWEAYQPKLRKGICLIQRSQRPVNIVAGGLWKL
EMDMFVKIVKGSFSLTFM

>PbreOR40

AIYGLNGLTNMHMIGRLLKSPYFLLKTVGLNPFDPKRFGFRSILMVAQIVMAVLILMGLKDFRSVTADV
WVSCIMALQGVIKGSSAILQKDAFYNIGEALNCFLSRKFTSSEQKIEEFVHRMQYTYTITLILALVAFIHKPA
VVKQHILPSAWYDVCIEATITCYLLCYGYQCYASVYCVIITAFDCMFSGLLAYGYIEMEYIKRSLLKLN
DNENCTGDNQEVLLNIGILVERHNQVLRVFRDIDKAYSGILMCQYAATLMIICSAIFCLTTSGNQPPVDVIV
TSVSYFLAGITEIFFLCLSGDIISLQSESIVHAAAYGCNWNHKKPLTKALCLMIIRSQRACRITVGGLWILNLE
TFTSVMKATMTLLTFMKKMYGR

>PbreOR41

MEDEYVMKCGLYYLHLIGTNPFKRSIRGNIICFIQTFTAIYSLGMAIDGVISKYENIKSLAGSIDTVPSAIQT
VIKLLSAIFLRQKMKNLYLMVEEKWPDDIFGREFQNKLNKWSKMFKTSYKVYLYFYVFTLVFFISRPLL
HSRILVTEWNLPCNVASNQCYGFYVVLQASYFSIIVSVVFGFDIIFYAFLFYGFCELEKIKYAFEHLSISENV
EGDEEKVYVEFCKILKHHDYILRFLDMVSKVYSLQLLSNFSAYVSTIVFGVFFMNVDGFPPSKENLAKYIP
YLITHHFQLIMYCVLGEMIRTQLSSVSDTIYLSKWYVKKQPKLTKAMIIVMQMSRIPNKKILIGGIWAMDLD
LFMKVVKTSISVHAFMQTIYQVD

>PbreOR42

MTLNRRRLDLPCAILAIFGIGLFSPAKISLWCLFLLLIQFLVFITALVAFKDLRNMDADIWVTGAAVSQGI
VKVIVLLIQPKFSKIADALNNFQLRRGRSMTINAKREQKFVQFGMRCQRIYTFIVTWALFAFITKPVVKKR
ERITPSPAHYFCNIETLYCYVLQYTAQCWAATYTIYILVSDCLFWSLLSYAYLEMEHIKDILLHLQVNKQ
RVGDDWEVLEQISFVVEHHAQILSFVQLINDAYSGLMIYQCACTFFIVGMSQFCLTINGFPKLTVMVTYV
PYYVAGLCQMFTYCIAGDIITNQAKSIGDAAFNSHWWIKHQPKLTKALCLVIQRSQRTLTVTVGGLWVL
NLETYSIIKTMTMLAFVKTIYEN

>PbreOR43

KKDLRYSMFCWPDNDALYVKIIGWFIFMNICVTVCHGACLFKATTEISVIISVAATFNALIELTVRFHILL
TKKKILNEILVKVWKKFWPAQAILRPEIRNKLKRVIITFVLSIIFLITGTISAAEITVPYLKERELELRNVP
FDWTRKFLYEIIYVYQYFIVWYSFSMINTFDIFFVALVNCIAQFVILQEALKFILSEESKRQRRIIFGGKAE

NMTDSEMLSECLKQHVLISICNDMEKSLNRAILMQFIVSATASCAGFLIMKIDYNQFSKMLFYAVAHLIQ
LFHYCYVGEHLSNESERISDVAYECNWHLEYRMEFRKALILIMQRGQRKICLTAVGLVELSFASFVQILRT
TFSFYTLNLTLLVKRN

>PbreOR44

MGTIQQIPMTEVAIFLLELIGEVGQRSSASIMIFRVFNCSVFVIIWYAFANLFVVTGESFVNSLLSVLYASH
GILKYFLLIHYKPIIESMLKDIGSKFWDHRDFSINIAETAEEIFRKVNFVQKAIVGGVLIVMYSYHLAPLFD
NRLFLFETKAPESPFMNAVLLMSQYYCVSMEVPIVLGYDCIYFTICHLVLQLRLLKQKITNLTETKENV
ESEIYKCIRYHQFLISMFTRMKDTYSAMLLFHYFDTMITTCSVLVEVDGGYTTILNFIGKLITMIFFYAQF
ACYTFPADQVAEEFSGLSHSIYNSLWYQNTIAVQKTLLFMMMRAQRTHYFSGGLIDVNVDAFGSVVRK
SFSFCTMLRNFVNKEVEV

>PbreOR45

HSIQQKMLEPQHTIEQLSRLISKSMLETFKESATLLFECIFPLLVTLWCWIFEDLSSYVLMESITGGIPAYQGV
IKLVLSYKKNKIREIMESLKKFWPKNKFGKAQLVKVNACEAEIIMMLKIYSMVLWIGYVAFVSMPLVQTK
NLPVTWVTFCDIENNIYCYIFNYVLQSLCIAKLMHLLSLDTLLFVLLWHGYCELEKIKYGLAHLGENDFT
ETVAVQDMASLVKQHSVLIIYIQKIFDLFSNLLFQLLTSSTGLCACLFVLKAEDEASIVAALTYVPYLCG
CLLQAFLYCGIGQTIYRQTSSVADAAYASNWVQKNAPTQRKALCFIIQRAQKPEQMTAGGVFALNMEFTI
SMVKGALSVAFLQAVYHSK

>PbreOR46

MAIIGRPVLKPLFIMSLYGLNLFNPSKNYRKFLIIWLAQTVIASTTLVVLKDFQELDADVWITFMAASQG
TIKSVVLLIKKETFVEVKELLNNLRLQRGNVEDTDSMRNFECFAIRCQNTYSFLQLLSLLAFMGKPFVMD
GRILPSEGYPDCDIRGDACYIFSILQCYAGIYSILVIVSADDLFWGLSCGYIDMEYVKHILLHLKVEERVE
GDDSKVLQQIAFVVEQHNQILMYLKKNRAYAGLLVYQCFFITFFIVGMSQFCLTASGFPPPLHIVSTYAPYF
LASLFQIFLYCMAGDIVARQSETIGEAAYGSKWWLKHQPKLRRALCLIMRSQRTLKFTMVVWVLNLET
CAILKTTMSFLAVMKTFYE

>PbreOR47

MLKDDIKRCFIPIKIYLEALCCWPYNRSAFIKCAWFIFSNMLIAEIFHAAYVVTNIDDVGGAVGASATVIT
SFEALVRMYILLTKQDFIKEILLKVSQKQFWPFQAINVDTRNQLRSGVILSISLPFIYLTCAITSTGGYVFMSL
RSYQLVYISVFPDWSKRFVYEIIYFWQYIINWYNIFMINVDFCFFVSIVAICTAQFVILQEALRVIFDEKSR
RQRRIFGMKGGYMTNREVLLKCLEQHKMLLSICTDLETALQRATLIQLAVSVNASCSACLMMTIDYSQA
AKMLSFGIAHLIQLFYCDVCQKLSTESEQLGDAIYESSWHLEYDRDIRRTLILMMQRSQRKVQMTAVGV
MALNLSTFVRFCFSC

>PbreOR48

MSWSELDFIFGLTLLLFIGEYMEYTPKEIKVFRVINCVVIIITVLVFI LGNLADAKSGEFVSTMEDFTTVFH
TLFKYLIFMYNKNLKLMDARTERFWKIPHGNEKLARKIRNIYKGVNIVQVVMLADVVPVIEIYFLTPY
FNPSNIFIPSNVFNVSVMDFVLCQYYFASFVAFIVVGYDFIYLSLCTELRVQVKLLKYKLREVFTKTS
EDPVSGISICVEYHHFLLSIYERMQKMYSSSTLLFHYFVSLVTVCFDMYQSFVGESHLHELLKFLMLAAIIA
QLAFYCVPAELLSSEFTDIAQALYMSKWYKHKPDVQKLMPLIMVKCQRPHFFSAAGLMEINLDAFGSVIR
RAFSFCAVIRNVLDK

>PbreOR49

ESARVGKMLPANYMSQVPLSILRFIGEHMYYSKLLNLYRLFNFFVILTTAFFVICAPFNKEKLTRYAEYL
ESSAVTVQVGIKYLFFVYNKSIRNLLAELAKIPWDSKDFTRNFLTSDQKFQKLIRLAALSFTIHTIVVLV
LLRPAYQKYAYILETLDVDSIILSTMVLALQYYILMLVPAVVMTCDCLYLALCAEIMIHLRRLRHRMERLF
ENIDDTSGVRNEFCELIKWHELLRVFSRLQEIYSFMLLFHYTTLTQTNCAELYTFLGSAKFEIKYLSIVIAI
VSEFALYTFPAEAITVEFEKVSTSLYMSDWYKSSLDCQKLLFTIMRAQVRECLGGGIVEVNLRAFTSVL

KLFSFLYTLLRNI

>PbreOR50

MKQIPRDDIMQMGLALLKIMGERMHFKSTLLNCFRTFNITMMVVNLFFVLAYYPQIGADYAKYIKSTEC
ALTIHVIKYSFLFIYHKRNIEDLLDHLLEFDWYNSYGDNIRLTTSTLFRNVKVGQFYYSIVTLACIALVFLK
PYVNPDRNFLVCWTFSGSTELETTVLACQYYFWSILYPIVLGYDSVYFSYSMHIVQVRLLKQRLQNIPS
NVHIEEIVTCINHHKLLISIFARMGIYFWMLLLHYFITLVTGCSLLYVILLGAADNADLFATIFYLIGLFIQF
AYYSFPVEEIVFELTDISRAIYMSNWYEQNVKIKKILLFMMMKSQRQNYLSAGGIIDINVDAGFSVCRKAF
SFYALLKTVIDR

>PbreOR51

LIMSRLPEGDILEFALQVYATFGENLSNTPKKIYVFRAINVVMLSLTVIFILEACIEEEGIVLVKTLESAITVL
HVLIKYLSFMYSGEGLKAIVEARLKFWNPQAINEHVAQFAKKLYSIKTLNTILLVVFITSSEFYWLKPYF
NSGEKFMLNARVPYNFLPLEAVALLMQYHSLGLITPIVMTHDALFLAICGHLVQLRLLKCKIYEAAVGE
WEDLKTCEIYHQFLSRIFIQMQEIYSWFLLTQYFISLGILCVQLYILNSRALNIADTIELLLYLGTMYCEVAF
YSIPIEDISFKFLDIGNAIYMSPWYEKGLVRRKKLVIIIMYSQAVRYLKGGGIIPVNVMDLGSIFRKSFSLY
LLLKNVIQK

>PbreOR52

SNEIDLFKISRILLQLMGETYNKNTLKRIIFFRIFNSVIMVYTSLFITANFFYASGGNHVETMQGLILVTHTL
KYLLEYFKPGIRELLQNKHEESWAYQDIDNHIMAAIKMSKTTELIQVFVLLAMSITAILYLFRLTRNNP
FPFEAWVSGVIIMDVITLACLYYFFCIVIPVLSYDSIYLCLCIQTVGQVKLLKNRLRYFQGSVKADISYYIK
YHQFLLSTFSGLRRLYSSMLLFHYFVTLITACTGIFEVLGRNSATDIAAKAITICAAFFQFAYYTFPAEMI
AFELSDLSNSIYLSKWYINTVNVQKQLLFMMTKSQHQLYFTGGGLIDINVKTFGSAVRTSFSFYTLRLNIL
TK

>PbreOR53

MSEKIAHQFMGVNVKILKFTELWLEDGGLVISKVKIILKFVIFLMVCPTCVALLSECVIVFIDSEPDIHRIQ
IILAESCVLGAMYMVICFWKNRSQIRDLVDSIGDFVNYSELDIVPVDKKVGFFTAIVVGYSLLGMIIYTLSP
LLLIESCEKTKSQYRVDHGPCGVIVPIRHVHPENPHMFRLYLAGQVGNNGIMAVLVVNITMMVCGLVE
HALFQLKQVRSLSMSKLSSEANIEERLGFVVKYHCVVIKFINNINKYFGSQLVLHFTLTSVVISLLGFQILMV
NDRKESLMYALHLIGWFIMLYNICYYGQLLIDESIGVASDAYSVPWYNCSIRVQKDIKFIMMRSQKPLSLK
AMNLGI

>PbreOR54

MGGGIRSWIRAYNQRLPENYFRVEVYILRSLGIELMREETIKQKIYTFFALFLIMFQGTFTAELELYVQLG
NWNAAALNVTTFLFTHFIGMMKVAMLFYNRKKFGNMIRTFHSPFLPDNRRGENEEKYLRKTVKTTESL
YIFFFFLIYVTLISGAVAFVQSRIFNKDWDWRHPYVPITVPTADTPIFEIAGVFQVIWVSVYATLLISIDTLL
VAILAHLTIQFRMLNNAFRSIRTRSKKIYQTTEGDDKDEGVILNKLGGYIEHHLRVLELAEQLEELCNMV
YLLIFLSSVLLSFLLYRMSLHPIGSIEFIHCASYCIVVYQIGMYCYWGNEVTSQSAEVAKAVAEADWV

>PbreOR55

QMMEQEYVLASGLRYLDLIGLNPYKSTWQQRIRALMFVSSAIFGYFLNLIGLFYNCLDLKSIADSMDSIPA
AQQVTVKLLGAVIMKKQLYNLYKTVMKWPNVDVYGPELEKRLNELSLSKRIYMVYRGTIWFAVLLYF
SRPLMLFSKVSITEIYLPCLDSSNYCYASGLFVQIVYVVVLASVIYSLDAVFYAFLFHAYVELEKIKHGFIN
LPITEDMLNDKVITYQEFSLVEHHNSVIKFLDDVNNVYHLQLLNHFITMSAIVFGVFSINMDGFPPNLSK
LIRCVPLISYHFQLYIYCVSGEEVYNQLCSVSDVIYNSKWYIKRQSNFTKVNLCITYFEHATLASLGAFL

>PbreOR56

MGRFRCNCKYIVLFLYTYFGVLVGLIKVTLLFYNRKKFGNMIKILHNKPFVDPINRGGEVEKIYLRKIVKT
TETQMIAYSTLLVTALWSGAVSFLNSRIFNEKSEWRYFPVPIIIDTTNSPYFELAGIYQTFWISFYGLLIVT

ADIVLTHLAHLSTQFKILNNAFKSIRMRSRKMNELAGGDSRNEGILSKILGEYIEHHLRVFELAAQMEELC
HLMILAELSGSVLTLCFILYQVSSIPPNSFSFLLYFFYYWIVVFQISLYCYWGNVTLQAANVAKAVAEAD
WLEAPKSVRKAILVTARSQKPLYMTAGKFVNLSIDTLVRIIKGSFSYFMVLRQRGISEG

>PbreOR57

MENHLGDFQKQSVLEFNLRILQIFGLWGIENKLNRAHKVYRFVMVIFFSLHVFSQVTGVVQLARDNLLDA
LELIYIPALSTGLFIKVWYMVKEYEKGLEDLINSMDGIFKPRTTEQAEFVEKYTHSMGVLFRTFIIASIFTWT
LFYATTLKNIQQRSLPIAGAYPYKQELFFVYYLFQGLEELLVAFCNVSVHCITGFLCHMRMQLHLLNENL
KNIEALSVQKLDKRQGISPKNSSVREKLQDMMDETLEVCVEHYGSIKMKTDFEDTFGATIFFVMIVDCF
VICMTLWQFIVLSFRSFKFFDVLVYLTVCVITELLLFCWPGNELILKSSEVPYSAYESEWIHRPLY

>PbreOR58

MVETKSSEIFRASSFFEPFLHLMRAFCWYSSELASSICYNVYSAIIAIFFIMLPSCLGTTITVIETFSQLDEILDV
LMLYTTTTLSYAIKGYFYIKQKEDIRKLLGDVDLKIFHPKNAHQKYIISSTMLKIKRYVKIMIVAAAINTNIW
SICSILNNDLPMSLWYPVNKYRYPTYQIICVYESLYLGAHGVIHPTLDAIPLVLMAFIIGQLDIITDILSNLKK
YSEVEMNVDESNDSTKDV LHQKMNNMLIECVHKKHRALIRLVQILNRVYTYHFFSILANCIITLAVLLYNIA
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>PbreOR59

TKVKGIACRSPAAYIYRHYRPTFWYIGTTMGPDLYYGDELAIKGVIKEFKNSARAKNIAKRSLNSADG
NVLDQHDQFYRDHKLKLLKLFQVLGVMPIQRGEIGKITFSWLSVPTIYAYCFYAVTTVLVVLVGYERLIILT
QKSKKFDEYIYSVIFVVFLIPHFWIPYVGWGVAREVCNYKNSWTRFQLGYKITGKSLVFPHLNALIVIIST
GCLILAVAFLLTSLALLEGFTLYHTTAYLHIITMINMNCALWYINCRAIGNASKSVADSFEVDVKQYCGSY
IVKHRYRLWNLSEILQKLGNAAYARTYSTYSLFMITNITIAVKYHYGNIMVLIYT

>PbreOR60

MGLVRSHLLDLPSLLLSKIGIKLFTLEKVSCLKCIVLLLIQLIVVIMSMVILKDFRTVNPDIWTTVAGSQSSIK
MFVILTQKQKFFEIGEIVNNLDLRRNCEQAFTKEQKDFKRFFANLQLIYIFIITGLTALAVKPIVLKERSLPS
PWYPVCDIQTSITCYVTCYMILCITGILVILLSDLLFWSMLAYAYLEMECIKYKLLHLRIDKNASGDDA
NSLSQIASCVKHHNQVLTLIEKINHSYGMLIYQCLVTLFVVGMSQFCLTATGSTPSLPIMLAYIPPYLAGFI
QMFGYCFFGNIIIEQWSIYSSQKVSVIQLIMQIGGPKVNLSSQKLLC

>PbreOR61

MLTAHFILSNLAKAEGEVYVETLENFISVFHVLFKYLLTMYKKDFAELMQKKAKHFWRNSRNGDKHLT
ASIDNLYKGINILQITMAVGLIVIAEYFLIPYFNPNTIYFFHSYVFVDSVVVEVFLLACQYYTILLVPPIMG
YDYMYLCLCTELAVQIKLLKQKLKETFTSTNGDILKSIAICVEQHELLLWIHNRMQRIYSITLLFHYFVTLI
TICFDMYQAFVRQNDLSNEILKMVSLTAIVAQFAFYCVPAELVSSEFADIANAVYMSKWYNHKAQIKLI
LPTMIRSQRSHYLSGLGFVDINIEAFGVSIRKAFSFAVIKQVLNE

>PbreOR62

MDTNDIHLKINMKSLFVLGAFRFRFKCWLTDIAYRTYSYFIRTYFVTFIICEYIELITMPDKRLLSIVEILAVS
LIYSTAAWRLKVYNSKSFNKLIRQLREVEHDIFSNNNTDLLKIYNEHVRTNSRICTGFMWIGVLTVPYYIH
PILQEASANEATYMNVTNNITKLLKIRPLPLSSWFPYNRYEYYSYAYHIVAAAIGASMVVLTDLLFVS
IMIFLIGQLKTLQYHFKNACKIAMVLKLNIGTTYNNSLNYTIKYGIRMHQFIIRYVEDLDKSMSRLMLVDF
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>PbreOR63

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MACFYQTLKLLQEDERVQLSLPYFSYIPFDYEYSKVKFLIAIYQFFPLFNYAYLIIGFDTLYIAILSISA
QLDIIYGAFETIRPRCMIRLKLDPKNILKDPPMLMKEMHKEINKITYHLQVILDICRRLEDIYSTIILAQVLI

SLIVLCTCIFLVSLMNQNKYCSYR

>PbreOR64

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AEREIRMCiQYHQLLISIFKRMKRIYAIMLLfHYfVtLLTGCLDLyELLIRKSNLAYMAVMGMSVvFIYAQ
FGCYTIPAEAVATEfSDLSNSiYMTNWYD

>PbreOR65

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AQILTYLQKVNDTFAAMLvYQfVASLCTLGMAfCLTMEGfPPSLRITVMYSPYYLASAQqIFVYCLAGG
IISNQsASVADAAYNSEWWSKHQPnTRKALSliILRSQREVKITvGGLWILNLNTfCAIVKAAMTMLTFM
KNLYGRE

>PbreOR67

LIMALPLLRYSNNEAPKNYfALQKGVlKILGISfSGDESrWYRIYSfVWLTSviISfSVIELyELyIYKDDM
DVTINNLSYLGTDLLGIAKMSVLLYHRLNIGKILDRMEQGVfSPNKLrGGDFEEELIKRCILfSNRQTCLY
YLSVGmVvFIGVVASLLKRHLEPEaENWEMPYTtFSWFDiHRSPNfEIVCFYQFCWRGLYALIVSSIDSLI
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>PbreOR68

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IIMGKQDLIMPIWtPFEPQMEELATYvFETfYLSYViMFYPSLDAIYIGATQTLVSQfQLLKDNlKRALDRS
AWDSTIKENIETKRQLKICVAHHNAILE

>PbreOR69

GIAAYYLYIFRPILtNSNPfPFDaVWSGVMILDILELAGQCYYlCLTVpVVVAFDAIYLCLCARTAGQVKL
LKNRITYfQELVVLDMGHYISCHQfLLSTfAHLRRLYSSMLLfQYIMTLITACTSiYELLMNTTNTNETVN
NTIWIWILLQfAYYTfPAEMVAFELSDLSNAIYLsKWYlNNIDVRKRLLFMMVRSQHQSylTGGLIDIN
VRTFGSVIRTSfSFYTVLKNILAK

>PbreOR70

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LLMHDKMQKMNSNVLLfHYfISLVtLCFDIYQSSVEDAElsYEiARfVSVAGIGQfAFYCiPAELLSSEfM
DIARALYSSKWYENKPNVQKLMIPIMVKcQRPHYfSASGLLDINMDAFGSVIRKAfSFCAVIRNVLDK

>PbreOR71

MNIlQKYRISNEIVRKAVWSRNKLmRViQITMITLSAFLWMIYISKALITIDYvFVYETAfPDSYALCALVL
LSQYYfSSIQVMAVLVTNFMYLLLCAYLILLMQALRGnTRIINSKRDFLKEEIfDCISDHQTLlSAYSLMN
NVfSiILMfEYYSLViFNCSViLEfVLNPnKTVLLQESLTLVFILfHFgFFtFFAEQMA

>PbreOR72

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THDALFLAICAHLsvQLRLLRCKIYEAAAGEWEDLKKCiEYHQfLSRIFIQMqEIYSVfLLTQYfISLGILCV
QLYILNSRALNIADTIELLLYLATTYCEVAFYRIPIED

>AcorOrco

MMQFKPQGLVADLIPNIKLmQfSGHFMLNYyAETTGAHVHTLRLGfCFGHLfLLLLQfGFTFGNLVQQSD
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MLHSNLLDSLFCSWLIFACEQLQHLKEIMKPLMELSATLDTYVPKSADLFRAPSASSQDNLVDSQDYNQSN
EDANLRNLYTTHQEMGVTYRSGNLQEFSSGGIGPNGLSKKQELMVRSAIKYWVERHKHVRLVTAIGDA
YGIALLHMLTSTIMLTLLAYQATKIDGVNKYALTVIGYLLYALAQVFHFCIFGNRLIESSSVMEAAAYSC
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>AcorOR1

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LSLVFVVQYASAILFLWFSVLLPLAKPGRKLPHTSWFPDSTVSPLYEIIYVWEVYLTAYINANIVCSYDTL
FCSICGNCISQFRLLSAAVKCIGISGKENQISNRLLRLQGVDYNPVRTNQGKEDRESRRLLVICVNHQKLI
KITQELNEVFGPGHLAQFFASALGTCTACYKPIEKNPGDLFVLIIFYIAHVSQLECYCALSHELSYWGIKL
GDAIFESFWYIKKHSQIRKCLPIIILRCQRAISMNALGIFELNYPFLIIMRFTFSLYTFNNMSKSTI

>AcorOR2

MVSKSYFKVQIFCFKMMGILMEDIDWNRFTSRAYAIYSFLLSCFIYLFIIITEAIDLILKWGDLNMTFNL
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NRGFYAGFDKGYFIQFTSVNGSETTNKHVKVMPYTTWIPFDTNVSPYYEIAFAYQIVSALIYGLLIGTCDSF
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RDCIIHHQQTIKLVEIVESEFNYLMLIQFLGSLLLCLSLFQLSINDIRSTRFFSMICFAGLMLFQLLIFCWNG
NEVLVESLEIAFAAYGSDWFLCDLATQKALVLVIQKAQRALQLSAGKFAYLTLETYMNILRASGSYYMV
LRKVNE

>AcorOR3

MDDENSNGNPDVGADFFKPPFSILKVILYWPLYTSKSQLLQHVMMLLSAVKVTFTVVLVIFLECFTVYKR
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TNCCFTVTWLWAIPLQNGSIVLPYNYHYFPDVTSSPAREFAYIYEAGILYLIVVSHVSLDALMVGIMAFISA
QLDVLNLYNLRGLNNLDEVNSYSKHQFLKEEQIRCMIFHKKVMRLVKMLNQILAVPLVTQSCFGAIIILCLS
LYKLSTLNPLSGEGLSFINYFGMLIQLSVYFWYGNELIWKSNELSRSAQCKWVNTSKPFRRHLLFFMLS
TREPLKIYGGRVLELSLQPLISILKFSYSCYTLLKSV

>AcorOR4

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YYIIVVIIGQIKTFSLYRSLSQFNSLEDMLQDVIFNAEISTGCTSISKAVDTYKIFKRIFWGTASFCAVYSLM
PLLSGDLSPWIWYPSEFSLYCYQLFEIVCIWTIAASLLSIDVIIMGLIYFMSAQINTLNLYNLRNATDRNPDYDA
GTQEKQVQDNLRICIRHHLAISEFVSKLEEIFKGLLLQIFSSIIAISAGGVYMFVVTLPSSFIILVSSMTMIL
AQIAMYCWVGQGLLTESDQIGESCYMSEWYTCNIATRKMFIIIMERSKRVISFKAGNFFELSFATLVMIK
NAYSYFTVIITAFK

>AcorOR5

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ILSITETLTGKEYVVFVRNDSSLIYIQKLPYYSWIPFDHTSSKCAFRIAVVSQCIALLNCGYITVGLDMLFVA
LASSITAHFMLTKEAFRSIGNFGSNEFDNAQNDNYIKFKNCMMHLQTLIKICRLEVIYSFLILMQVLVSLV
VLCTCLYLVSSIPVGVRLLGNELAYLLAIEIQVAVYCFVGNKLTDAALQIPLAIYECNWLNTTSNFKKAVII
TTIRMQKPIYITIGKFSPLTLNTFVMIGKTSYSIFTVLKSRN

>AcorOR6

MKRDITQYNALNFERKILWFYGFYSGKDYLRKHNRNIPLIISCSFSFTFITGMVLKVLEYQDDLETIFETAH
ACITSITGAIKLFCLYRALPHFNILEESLIDPIFNLEIFEGSNFISKAVKEYVSFSKFYWTMVFITFVLYGVFPV
ISGEIPIWIYPADCPKFYVQIFEVISILILSCSYPGIELVLGFLFYLSAQLDTLNLYNLNSTQWNGEDNREV

QEEKIQDRLKCCIEHHLAIIRFINGLKDIFSFGIFAQIVLNVLIICTSALQFLRNSVTIVTLLSSIMYTLTILTQIG
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AIVITMYK

>AcorOR7

MSLRDEKDPEILSDYFWFHKLVLKICGVSFKEQENLIYKIYSRFVQCLIGFLIFGEIYTIILSRNDLQLMAEIIIS
VSTSHFLGLFKLSVLWKNRASIADALNALHTGVFLPNSRRSGLSEKILIKNCITKVYMLIAFHSATLVATVF
NIIGSSLVTKFKFDDYELWKMPWIPFRLFPITTTIVYYTIYVYQTVTLILFACIIITDLMVAVLVHITTQFH
ILASVMRTLVENNSVNYISEQYDLYLRKKLKYAAYYHQELIKLTDRFEELFNMLVLAIFMGNCIVLCFGM
YLMSSGELELNQLISEFTYLITVVMQIFLYCYYGNMITEASDAISFACYETDFVGTDLRFQKGLLLIMMRS
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>AcorOR8

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QVMVKLLSVFLRNEMKHLNTVEKKWDNKIYGEELNTIKKLSLKFKKIYNTYRMTIWWTAILYVSKP
LILFSRTLLEMYIPCNLSQLNYCYISFIAIQTIIYFDLAFVVYTFDGIFYAFLFYVYCELEKIKYGFANLNVSIT
TDLNNNEEDCYTKFCEIVKHHYSMIKFLQDVNKVYYLQLLNHFTTITATIVFGIFFMNMDGFPPALGKVS
RYIPLYMSYHFQLYIYCMWGQQVFDQVCSVCDVIYQSQWYVRYQPKLAKGMLLVMKVSQIQNKLTIGD
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>AcorOR9

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HYFFLHFVWVVKIMFLYGFRRRLRNLEAWLQTEIFNSYTRRQDHFLNKAAMRKQMSFFKLLWSSTLCFTSM
FALFLPKDKVSLNPIWMPFKMDRIFWHIYEVLCYVITASTYPAIDCIITGLVANMTAQLQILGDNLERIHL
DHEGGLLKCEDKIQERFKRFIQHHAILQFINETEAVFSYSLFCQILFSVLGICLSGFQFLLVPPGNTKFMLA
CGYLTVMFFQIYFTCFWVEDLIIQGSDDVVTSCYASEWYNYGSTTKKLLFILMERAKKPISFRAGYFFTLSL
ATFVMILRNSYSYFAILRHVYKE

>AcorOR10

MDSYIPNFFKVNVTFLKHGAVWSPKDKTQRSYKVYKMYQVIVLFTLGCSSYSVVMGIIHILKNFAILIEV
LSVSFTILLAAVKTSFWLIKGEKIKIIMNRLETDLFHCEKIDDFDEGMLNQAKLSGIKYACLLFFSHLVL
GLGYIPVMSLACWYYFKDLQITDVPTFKTLPPYTHIPFDHDTPLKYIFACLLQCVPMYLYVNAFVGVDL
FMNLMNFIATRMLILQGAFTMRKRCLQKIIGYDLAPDSLHNSNEMEEYMMSDMKKCIQHLQLLLRSCK
DIEDNFQYVSLVQALGTIYILCSTLLLLSTSPPFTEKFGNIFYLLGVIVQLGLYCWFGNQLTLKAANVPIA
VWESQWLETRKPFKICMLLTMMRMKRPLINAGKFVPLILDTQIAVLKGSYSYTVLKGMSK

>AcorOR11

MAFYKISIKTSLTMLNLKGLNPLISTRSSNTRAITFLLTEVLATITVASSLFTKTLEADS
VVDNISGIVFSIQTICKEVTMLLCRDEFVALLNYVEEFWPVNEFGIESGTNIRNIQKSTSKALKIFRCLLLMC
TVIIISEPFFAEGRQFPVSWIDISCIQTSLICYGVIYGFLCGCTIGLVIFLSLIDGLFFNLLSYGYCELEQVKYAL
FNLSIDGDVRGDQVETLREIAVLVRHHVTSLEYVQRVKKLMSKVMLYQFSSSLFTLCTGLYVLTYQGFP
SVEAAVKFVPFVACAAQIFAYCVAGQKISEQTESIANAAYECRWFKHQPRLQRSICLIQSRSHRRIVLSA
GGLWNLDMDTFIRILKASFSLTFMQTMYIPE

>AcorOR12

MNSTSIYKNYFKVHFFVLTCLGIELKPMKGSIANFIYKIYAVMIFTVVYLYFPYSEILSLVYEENFESAIYNL
AFLTQILGLIKISLILYKKKIRMFCKFIETPPFLPDQNRSGEAEFLYVKEAIRACNTQGYIFYGLTAGIISQM
MYDALSNPGYTKCFVDSATNITITKHIRALPFNSKLPFETIDSPYIEIACIYGSLSGAIFGYSVGAMDIAICGI
MCHIRAQLLILQECLKTFIPRGIYQMRENVKLTNNDQKLLQSITNNLNETIEIPNTLQKYVHIAVCNIITHHQ
KIIKLAQDAEELFSPLMLVQFLFSLGILCFQLFQLSITDIESVHFFGMSSYLILMLFQIYLCYRGNEIMLHSH

NITDAVFESLWFLTDLKTQKLLIMMIRACRPIKMTAGKFVFLSLEAFVSIVRSGSGSYFMVLKNTNAPATE
L

>AcorOR13

MASNKTRTLCKNYFRIHYFVLMMLGVSIQPMKNIYSYLYKFYSIVMFTIVYIYFPLAEILYLVYNTDLENI
TSGTTYICTHTLGTLLKILIFRKRITAFCELIETKPFLPDPHRSGDIEFDYVQEAINACNYQGYTFHIFVVAI
VLPKIFYSLRDSEYETVFNDQNVTFVLVQRQRAGPFNCVMPFNTINSYPFEITAIYQASCAAILGCVIGSIDA
IICGIMCHVKAQILILKSLGTYIQQGLFLMEEDNIDGKNVIGVDEFEMIRNSKTSIQLENVPISLQKYVDIS
VTQIIHHQKVIKLSQDAEETFSLLMLVQFLFSLSIICCQLFQLSILKMGSAQFYSMCFYAMLMLFQIFLCY
RGNEVIVHSYDLIDAIFQSNWTELNLKTQKSLLLMMTRACRPIRMTAGKFVFLSLEAFMSIVRSGSGSYFM
VLRSINMPEE

>AcorOR14

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GMTHFLANIKVCLWFYHRKEIMAIETLGIYGRRYESYGDFTDKIVQNAKRFDIFSVLFLNFAMFTSISS
CLICFLNVITAEIPPGEEDMKLPYFSYVPFNYKASKVAFSIAIWYQFFPVFNAYIIVGFDTLYTAILGYVS
AQLDIIQGAfetirPRCMVRLGLKLSQNILRDPPTLMDEMhKEMNKVVNHLQVLLDICRRLEEIFTNVILA
QVMISLIVFCTCIFLVSNLPMMSLNFAAEMIYMAIECQLLIYCVFGNKVTVSSGNISSIYNGDWYSTSTSF
KRSMLITMSRMQKPIYFTIGKFTPLTLSTFLTISRASYFFAVLKNSDFSN

>AcorOR15

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LFAIFPLIDKNEELEINTDGWYPFKSSNTVTLVAYVYLSLEELLAGLCNVSMDCIVIGCLSYICMQVRFLK
HNLKHKMDICTNTLAKIPDQSLNKNKYRRQLQEHMDDTLINCILQYQTIVRIKRDIEEIFGMGIFIMFMFD
CLALCMTMFQLLIISFKSIQFFCVIIYMMCITMELMAYCWFGNELLVISSQVPVAAAYESDWIDTPVYFQKN
LLMFITIAMKPMKVTVIHFSLSVETFTVIMRTAWSYFAVLRQKYNEEH

>AcorOR16

MTRREMNYPKNYFHKPLRNALCGLWLYEPKKMNYKILHYLWFILATCACFYLLTEYTHIIKHLHEMQ
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VMMTTGVLPLYKNGRTFNEISPNITQVIVKFPYPSTLPFEVDYTASPCYELMFTFQVFSMNLYGWYFSNID
ALIIGLMMHIIAQFKILVSAIENVTKRAENMAAHDKSSALSQVIKKITFIKYNIDCDNFIIHervetySETIMA
NLKKCINEYAYYHQEVINLVDDMEKSLNFLFLIQFIGCLLTIVVGLYQISLVPFGSSSFTNMAFSFAITFEV
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SYFTFLQKMNEELNM

>AcorOR17

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QLTYTICPILDGDIWAPIWVPLTDGSPKLIYQAYEALCFMSLASVEPALDLIPVGFISTMAAQDLILNDNLK
HSADKNEDELEEGKIRKRLAKCVKHHLAISFLKKLEEISFGIFIQIFTSVGAICMSGQLFLVVPVRSATFV
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LATFVMIIRNSYSYFAVLMQMYK

>AcorOR18

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MKQLSLLIYQGEYADILNTVDKFWAYDKFGAAPNKKLTSIQNLIEKLVQCHMVVIIACGFFYYFKAALQR
EKVLIMGWVTVCGIENNM CYAVNYAGQVMWIAWLMPIFLGYDTMSLLLLGRVYCELEQIKYGFINLEV
QGESEVLKQVSALVRQHNLVLD FLEKIGGLFSSILLCLFLTVLMALCTSFLLTATGFPPSFVLSRLGPYL

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FAVTKASASALAFLNTMYN

>AcorOR19

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CNFFVKSQYTNCRNRIRGVLEDISLDIFEPKDKQSEDTVTKAMAYSKRIFYIYVITCCSFGFLGAGAIISE
EHNALPFNFSPFDKTHGFGYKVALAYEALSISSNAMTHATMDCVVYSILAFVRVQSLLNEDLCNLGSI
QYNTYQASLEQQILCIEKHQAIKRIVKELNEITFPMFVQSTLSAITLCMSVYKLTGVELLSEEGISYIMYCA
VMHAQLGIPFWYGNEIISKSNELTISAYQCNWIEENKHFKSNLLIFLMSTIKPIEVSGGYFIVMSLEPLITILK
CSWSYTTILRSI

>AcorOR20

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DLKKYRLIVYLYEACNFFITACNNTAFDGTVIALITIMAAQIDVLKDNLIRATLRDQTVDAKDQERCIHKR
LKHCVIHHDAILDFTKTTQKIFSNGVFVQILVSVLGICMTGIVFLTVPLKSMKFISMVFLITQVVQIGMFC
WFGENIRAKSSEIAQSCYMAHEWYSNNMSNKKILFIIMERAKVPIIFKANGVFVLTNTFVMVLRSGYSYF
TVLRHISQNMCLS

>AcorOR21

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TKEIGLLTHQEFRTVITCLKEFWPKDKFGKQVKAKLDNIESFSKRFLQIYICSVACAVSLYMLKPILEGNK
ILPIMWVTFCSLEESLYCYIFNYILQVVWAACGLHMLVGFDCFLIFLLLCGYCELEQIKHALISLDPDETDD
EDDAPLLDLIASLIEQHNRVLNLLKRIQDLLGSLLLQFVATLLSLCASLFLTSVDFPPSLPVVSKSLPYIFS
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AIMKTTGSALAFMNTVYGEET

>AcorOR22

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VKNYKDIEDAVTAGATVTTTMEGIVRLHTILTKRNIINSILVKVWKRFWPLDVVDPIKRIQLRKRAQLALV
LTSIFLASSIISNSQMVAVPYIKNRTMLLKSTFPDWDQLYYYEIVYVWHYFSDWFVLFMINSFDDFFVAL
VTICSIQFAIMQEVFKLILSKQSLRHRVIFGQGRKTMDDKEMLLKCLEQHQLLIGICNDLEKSFNITILIQF
FVSTSAICAASLLLKVDYSQFLKMLMYAAHLSQLFYFCFVGHELSEYSGQLSDAIYECNWHLSYDRDFFR
KALILIIQRSHRVQWLTAAGMVKLDFAFLKIMRLSFSFYTLHDMMLMKNLDLN

>AcorOR23

MEKETLQYNAFHLERRILWFCGIYSGKDFQSQRHFLRAMGVFLVLLIFDLSMLMKIIVDHNKLEIVFQTA
YHIIVIIIQIKTVSLYRALSFRNNLEDMLRDPINFNTETSTRCTFIKAVNNLINLKRNVWRMTIFATLYSLM
ALINGNLPIPLWCPSIVLDMFNPPYQLYEVLCIWVTTATISTDLILIGLLYLMSAQIKTLNFNLRNVTDTNP
DYDAERQEKQVQDNLRISIRHHLAISDFVSKLEEIFSGLFLQIFSSIIAISAGGVYMFVVTLPSSFIILVSSM
TMILAQIAMYCWWGQGLLTESDQIGESCYMSEWYTCNIATRKMFIIIMERSKRVISFKAGKFFELSFTTLV
MIIKNAYSFTVIIITAFK

>AcorOR24

MLEVLYTLGEYTGVPQKNKTDDYKNVLNLLVVFYAAIGVFWFGVNVLMNSKATLLDMVDAIYTMES
CSLLYYYMISIHTRKPAKLKYNDVTDFTTFGPKTLEREETRICKIYKIIVGYGIVAPTVTNGFYLATYDWC
MRSHRNDDDIQYCGYTFGIYPYNFEKGVSFIIHTAINWYSFVFLSLVALTLVGYTICVARYLVLKIDHLN
TMLSEVLKNDVNRRELLKKCIRYHKHISLVDGLNELHSMNNAPAFLYSTIIGVCLFYLTNEYNTKAIAL
ACGYIGGIFCLNFAGQMIKSETVGVAAYNMEWYNADSSTAKDIMFIIIRSQVPLKYKAGPFGTMSLIFF
GSILRGAYTYMTMQTDIKEK

>AcorOR25

MEEELPHKIRRLSKDFNRDISNDGAKRIMIPGKIFLECLLVWPDREMKYITVFNWFMFINVIFEITHACFVV
PNIADYTTVIAVLVTVTATFQFLVKFYVIVFKKSIINQILLNIWREYWPLSVLSPKKVKRHSSTCKVKLRILIL
GCYTALAVIFAAIITFAPFLTNTTELIVKSIFPFQWNKTYTYELVYTWQFVTAWYITFLINSFDMLMISVVIISA
VQFAVLQNVVKNILTEKGERQRRYLYNKDISNQDMFKRWLEQQRMLIDTCNKLEEAFRIPILHQLFCSITG
LCASSVILKVDQSKFLEMSTIALANMFQLFYCYCFASNELTLQSEKTSDAVYFCNWQISQDMKFKKALVLV
LQRCQKPLSLTAAGFIDLNFLSYIAVLRLCFSFYTLTLDLIVSKLEAAELQ

>AcorOR26

MASQQELSFLNRKFQINREIIMDGAKYLLIPGLVSAKIIMAWPEDVRSKSFEILVFVMSFIQCVTIITSIVL
NIVDVNTTIMMISAFEAVLQVVVGKFSALIIKSKDLCLKIKTVRYEFWPSDITNKDTAEKIRKDSRILFKIMMI
ESSICIMVVLTIAGPLLKTGRVLPYPTWYPFDTSASPVYEIVYILQSYFGLHLSVPPIIAYDMLYSLCANC
TAQFRLLCDALRCIGNGTEDEMITKLVEFDESQKELRGTSQKLLILCIKHHQRLINTANEISQAFGNHGLV
QLMGSAAGICTACYILTSNPDLSSVANALVQYIAHVQGIFIYCAVSNELSYWSTLVPTAAYESLWYKKKY
PNIRQCLAILITRSQIAISMQAFGLFELNYTSFSLSIMRFTFSLYTFLSSFA

>AcorOR27

PEDTSFNIYHGLILAACFLNIVSTTISVIVNTEDTDALVLKLFSGALAGISVKYAALLYKSKDFTKLITIIRVE
FWSSDILDLDLDCRSIYKDTKLLLVIIVTEYLAGCTCSSLMAIPYIKSSKELPYSLWLPFDWTRSPYYEILYL
LQGYIAVFLMNAVFGYDSLYYTMCANCTAQFKLLCCAICKIGTGTEHEIIRKLLNIPGLIHEWNPRISDEER
ILFICIKHHQKLIKMCNDINVVFNGHILQLIGSTIGICAACYRITTEPNFNDLLTCIAYYMAYVGQIFIYCAV
SNELTYWSSCVSIAAYHSLWYKKKYANVKQCLSIMMLRSQKPVSMQAFGLFELNYAFFVTVMRSTFSLY
TFLTKMATK

>AcorOR28

MTLNQNELQYTIINTERRILWANGVYTGGKYPRISITNKTVTIINTILTFTFLTSMLIKMILTKDDLGVVFEII
HMFITEVVWALKACYFVLTTKQFNALEESLKDVPVNEFTRDQKNLVSQQINKTKRIGNIFRNMSLTTCAC
YILCPILDGDVWAIPLWIPFTDGDPTIYYQLYESICFLSLASAHPSFDMLVIGFLNIMAAQLDILNDNLMNST
DRNEDEDFEVQEAKIKSRLRKCVIHHLAIVRFLSKLERLFSFGIVMQIILSTIAICVVGLQFLRVSLYSGTFL
GIMFYFWTMVIEIGLYCWAGQNIITKSTHITTACYTSNWYNCSTSTKKMFFIIMERSKHEIIFRGANFFDISL
TTFVMILRKSYSYFAVLVQVYK

>AcorOR29

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LELGMFFLGSSWISIEETTAQIYSLRQVAEIEEMLESYDYFKPKTELQCQFILAKRRRLVLITQIVWFCVYSF
MIIFVLCPLVTNASLVIPMWIPFGNKEFSAYLYQSFYLLILCGIYTLLHNTFLGPILMATAQFQILKDNLIHA
TDRSEDEDGFAQEKRIRKRCVKQHNAIKLVSTVQGM LAPVFLGNISFTILGICFTVLQIILATDSGNFI
LLTSYLILILQMFLTCWVGNDLISETSITQACYLSEWYNCTPSTKKMFLIIMSNTQQPISLQSIIFPVSGT
FVMILRSSYSYTVFSQVYD

>AcorOR30

MSTKTGKLEKLSLKFTQDIYQDGVKKCLLPVKVLLQSVCCWPDDDELPGKAIGWIFFSFLFINGVFNATYI
LMHGKDISEAVGASVTVTINFEALVRIYCILNRNRVFNELVKIWKQFWPVKAVDDKTQAHLENKAVFAI
TVISIVLITSIFSNTFITTMPFLKYNQLISKSTFPFDWNKHFFVYELIYIWQYFLNWYILFAVLAFFDFFFVALVS
MCAIQFSIWQHVMRNILNEESKEQRRVIFGKMENEMTDKEMLRHCWQGHKLLNNICDDMESAFSITILLQ
FVVSTCANCAAFITMKVDSSQFSKMLSFSMGHTTQLFYCYSGQELMYQSEQLSHAIYECNWHLSDYDRD
FRKALVLMHLKSQRIQCLTAANFTTLDFTSFIRILRLTFSFYTLTLDNLVEDTAENGI

>AcorOR31

IIGIMQTAYVICLIITCSLIAFVAGCTEFIIIRIEHLNLLKRVVKPNDLDSKESLIKCIKYHIHISLVKKFNMC

FDKFTMLFLLQTGPTIALTSFSVIVEPKPSVIIHLAGWTMTLFI FCLSGQRLMDASTSIGDTIYDTQWYKMN
NSLGKYVILILIQAQRPLAMRMWLYSEASYMTLAQVMKLAYSITTLLNSTLQKD

>AcorOR32

RMLPMTMIHVCNFEDNSCFVFYYVLQICGLFTQLITLVGFDGLFFTLFCGYIELEQIKNALVNLDNRNGKA
GISDEKLLQQTIEIVEHHNFVLEYINKFDRLFQIALLVQFGITIFSLCSVLFMMTADGFPPSTSNLIRGGPYAL
SALCQILIYSAVGEKIVEQTEDIAQVAYEVDWYTCYRPK

>AcorOR33

LPPAAILSNTKISLKPLL VHKLLFKSSFPFNSQALYIFEIITYTWQYFVDWVFMFMACGFDFFFISLMSVCITQ
YIILQDVIRAVFSKESKKHRKIIFGERGINMTDKEMLFECLKQHKLIRICSDLEEAITTTILLQFAVSVGAN
CIAFLILNIESSLFVEVFPYCGAHLQLFYFCYVGQNLTHESGNLSVAIYESGWHLCYDLQLRKSLVLMIQR
SQEQRITAVGLIELNLESFIKLLRLSFSIYTLLDSFLVVDDE

>AcorOR34

FLPMEFVKLITSYQNVKSTMEQLGVVTMHMISTLKIVNLYFKRNEISRIIDELHYNDLTETSGSLERKNLQ
NKFHRKIRRLCMFFFFHMGNCTSTILCATSLIHLIICKHETVYQEF CSTVQPIVISTPIHIRSLIYSRWIICAFQW
MCMFLYGWQIVAHDTLFAAILIKIACNIRILQMDFKNITAESDQNTKMNYKMNQ LTFQLQKLIRTCQCA
ANVFQYIILLQVLSSLFILITCLYVAASVPVFGIEFVFLQYYLTVVTQLSMYCWFADEV TILFSQMPVSIY
QNYWICGDQSFKRSM LINMIRMNKPIYFIIGTVAPLNINVLVYILRASYSYFAIKNK

>AcorOR35

SDNYCYTFFLVIQIVYVSAMVFTTFVFDVVFHAFLFHAYCELEKIKYGLQH LGISEDVDNDTIVYKKFCNI
VKYHNFTLKF LDKINDVYYLQLLNHFATFVA AIVFGIFFMNIDGFPPSPDKLSKYIPYLITHQFQLYMYCVL
GEIVYNQVNSISDVVYHSKWYIKRQSKLTRGMLMVMIVSRLKNKPTIGNIWKLNLATFMQVLKTSMSFH
AFMQTVYKTDN

>AcorOR36

MIKYHSIAAAQINILREKLRTLHTTLDKFDENVRQGLHDCIRLHISIIRFLENINRVFSEVVLIQYISAMILV
CNFVMQLLFLVDPLSTQFAWSCSFLLVILTELLLYHWFGNEVVVM SHRIGESCYLSEWYMFNSANKRMII
ILMERAKRPLNVTVYKFTDVS LASFGTVMRWSYSLFAVMRNM YTKEI

>AcorOR37

DEFNRNISKTLAVRYKIVKFIQLGVVGISIVGVLAFFLRPVFISDVTFMLETWIFIDSNLLAGIVLMLQYYYF
SVIISVLLGYDFIYMSLCIDMISQMELLKHKISQILSDNIANVTLEL VTCIRHHQILLSVYRRMREVYSLMLL
FHYFVTLIGTCTTFYEF LGKSDVPDFVINLTVSVLFLQFGCYAFPAEQVALEFFDLSNFTYMSKWYEC SIR
VQKLVL FIMTISHKELCFSGGGIMDINANAFGSVMRK

>AcorOR38

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DIYICYSAHVIIQIRMLKYKFEHITKNVEIETINSYIRHHQFMLNIFDRMKGVYFWMLFFVYSLTLITGCSQ
LYILILGNTQLSDLLASAVFITALFFEFGLYTFPVEEIVSQFTDISSSVYKSLWYERALED RKVLLYVMMKG
QRQSYFSAGGLIEINVNTFGSVIRKIFSFYAILKNVLNK

>AcorOR39

KIASNTKLIYNYTKMVQTFLLCVFITSVHFYFLKPFNSDDVFPFNVWINFNSLLLNMV LASQYYCLCIV
TPVVLTVDVIYFISICLHVIIQLRLLKYKISRSSNNTQNELKI WVCHHQLLSSIFTRIQEIYSGTLLQYLM TLG
MTCIQLYILNTGQLDVADTTTELILYLATMYTEFGYYSIPVEEMSFEFLDVGNAVYESLWYETDARTKRSM
LFVMMYAQDLKYLNGGGLIRVNIDTF

>AcorOR40

SWTTFCDIDHSVCYAFNYIAQLLYVLWGLMGLLCYDIMIMLLLAAGYREFEQIKSGFLELSIDETVGEENI

KALEQIRALVKQHNLVLD FIDGIGSFLSKILMFQFIAIVFTNCSSFLLSVVGFPFPASTTCRIIPYLACLFQG
NFVYCIAGQLISDQSVSVADAA YGSKWWAKTQPSLRRACLVIQRSQRRSQISAGGLINLDLNTFMAVTK
TTSSVLAFANAVFQ

>AcorOR41

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SIFLVSSIICSIKITSDAFLQNRGMVLKSVFPFDSTKPFSEYELIYIIHYCTVWCGLFVINAFDFFFVALVTNC
QFAILQDAFKNILTGTSGKQ RVAIFGQKHSNISDKDMLLKCLEQHQILIGICNEEESFNISILIQFVVSISAIC
AASLILKVDSNQFLKMVMYAAAHLAQLFYCYFAGHGLSYESDKLSDAIYGCNWHLFYDRDRKALVLII
QRSQRVQYLTAAGIAKLDFASFIKVMRLSFSFYTLLNSLLAKNI

>AcorOR42

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QIKTFSLYRSLSQFNSLEDMLQDVIFNAEISTGCTSISKAVDTYKIFKRIFWGTASFCAVSYSLMPLLSGDLS
IPIWYPSESKLYCQLFEIVCIWTIAASLLSIDVIIMGLIYFMSAQINTLNYNLRNATDRNPDYDAEKQEKQV
QDNLRICIRHHLAISEFVSKLEEIFKFGLLLQIFSSIIAISSGGIYVVVVPLTPSSYLLLTGTSMSVLLQIAMYC
WAGQGLITESDQIGESCYMSEWYTCNTATRKMFIIIMERSKR

>HoblOrco

MMKFKPQGLVADLMPNIKLMKFAGHFMLNYAENSGAVHTLRLGFCFGLFLMLLQGFTFGNLVQES
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MVGITIGSWIAWTTITFFGDSVHNRKDPNNENETITEIPRLIRSWYPWDAMSGIPYYVSLIYQIYYVGFMS
LHSNLLDSLFCSWLIFACEQLQHLKEIMKPLMELSATLDTYVPKSADLFRAHSASSQDKLTESDYNARNE
DAHMRAMYSTHQEMGVTYRSGQLQEFSSGGIGPNALTKKQELMVRSIAKYWVERHKHVRLVTAIGDA
YGIALLHMLTSTITLTLLAYQATKIDGVNKYALTVLGYLFYALAQVFHFCIFGNRLIESSSVMEAAAYSC
HWYDGSSEAKTFVQIVCQCQKAMSISGAKFFTISLDLFASVLGATVTYFMVLVQLK

>HoblOR1

MRRLSFEFTKAIYNDSVKKYMWFGKLLLEMLCAWPSKEGLFKRAIGWLFFCNLAVVEIFHAAYCAQNY
NIGDAVMVGATVTTTLEAMVRFYIMLSKREINKILTKVWKKFWPVEVLDPVKRKKIQNKAKFRFWNL
FFSSSLISSTNVNLAPYLSDELIFKSSFPFDWNKPYVVEFLYVWQYFSNELVVFMINAFDFFMSLVCICTI
QYIIMQEVFANILSKDSRRHRQVIFGDRGKHMTDKEMLKCCLEQHEMLIEICNELDNSFNRAILIQFVVNT
AANCAAFVTLKFD RSQFTKMLTYAVAHLSQLFYCYCLAGQDLQYESQRLSDFIYDSDWQSSYNRDRKSI
VLMIQRSQKPQCLTALGLVNLDLFLSFVQIMRLSFSFYTLLDGFLADE

>HoblOR2

MSAGNTTKPVIRKLSLEFSRDVYKDGVKMCILPGKVLLQGVCCWPDDGLRMKIVGWFLFWNLVIEIF
HASVYFLNFNDIGDAVDAGATVTTTMEGLVRLHIMLTKKGVINSTLVKIWKQFWSLDVIEPVKRKKIKRQ
AQTAVMLTSIFLGSSISNSQITGTPFIRNRGLVLKSVFPFDWRQYYFYEIYIWQYYSDFVLFMINAFDFF
FIALVIICSVQYVIMQEIFYILTDESKRHRKIIFGERGETMTDREMLFECLEQHKLLIGICNELESSFNIPILIQ
FFTSTCGICAATLIMKVDYSQFSKMFTLVGAHISQLFCYCYVGQHLAFESDYLAAYDCGWHIDYDRSF
RKALLMMQRSQRTQRLTAAGITELDYASFLGILRLSFSFYTLLNNLFMKNVGQ

>HoblOR3

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RYFYTSRAPGYEYESTFDQTSNITIVKYVRMTPFYTILPFEQINSPGHEITVLYQVISA AVIGFMIGAVDAIIGG
ILCHIKAQLFILKDCLASYEQRAVYLMNKDGIYIDNREFAKHEMNKFNYSGNVRKLPSVLQKYVDVCVIQ
LIKHHQKIIELADGAEDTFSLLMLVQFLSLLLICFLQFLQSICEIRSTKFVSMICYFFLMVLQLALYCWYGN

EIMYHSSSLSDAIFESNWIVANAKTQKSLIMMRVYRPIKMTAGKFSVLSLESFMAIIRGSGSYFMVLKN
TQSAV

>HoblOR4

MNNEYVMSFCLYHLHLGLNPFKQSIFSCLRAGFVALITCVLYGFNLAALFHDNNGIKSLQNTIDALPCGQ
QTSVRLLYLLICGNKMKQLYEMTNETWPNDICGSKLKERLQFDSERFKSFFKSYSTYLVTVIYILITPSFYT
YRRLTTEWYLPCKLESDMCYLSARLAQVVYFMLIYQIIIFDGMCAWFLFCLFLETEKVKYSFKYLNIEEL
NSKNEVNRKFCISIVKHHCYLLEFLKRFINAVYSLQMLNHFLTIAAALCFGMFLVSKDGFPTTFENARFIPY
VIGYNTQLYICCYSGEVIYSQLISIADAIYESMWYLNHNSNVNGIRLGIQVSQIGNKVTIGGLWPLSLSTFV
SVFKTSVSLNAILQTVYINAERSI

>HoblOR5

MSDNFFNVNFTMLKMSGIWIPDSKSSLIVKIMYWAYNFVWIGYSCLFFCPSELVYFATTLSNLEDLVKNV
NMGMTFLANIKVCLWFYRKEIMGIIETLGAYGRRYESYGDFFNEKILKKAKKFKDIFSVLFLNFAMFT
SISSCLICFYNTMELDLPKGGRIELKLPYFSYVPWDYRRSKILFSAIWIYQFFPVFNAYAIIVGFDLTLYTAILG
YVSAQLDIIQGAFTIRPRCIVRLGLEVPEDVLRDPPELMNEMNKEMNKIVDHLQVLLDICTRLEEIYSYVI
LAQVMISLIVFCTCIFLVSLPMFSLNFAAEMIYMAIECQLLIYCVFGNKVTLSSSNIPNSIYIGDWYSSNIS
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>HoblOR6

MVPCCEEILSSPRWILELLGCWPMKSPTKTYTIKMFVASVFTIAFPTMLCFEILFVYKNYNVLMQILNFLIP
YVYVLCKYTIFTFQQQLFILLNCTKSKLFNQSPSNDKILRPIADVIMVTKVFRFTLVFALLMIALPLSET
KLYPVPISHDLGRYSILMYVFQITCLSIGGWLCMGFDCGFIALAAIGIGQIDILKRLSSVIQDLVVNKNTFS
KSVEQLKTQTKINKALRACILHFAIEEYCKRLSNLSTTIFIQYLSILALAITMSRILTITELSVKILELVFI
LMFIFTQLITYSWSGHQIMIKSSEIGEACYMVKWYYYDASNRRILFLIMERAKRPLYIKASMFAKTTLTTCI
NILRCTYSIFTILSMSYREN

>HoblOR7

MKGHSENFDDINLIFLKYSGLLPKKNKSISYTYKILRFFAVIITVILGTTGAIIGVIENIYNFNVLIELLNVA
LTMFLSAIKSVFWLINSKSIEEIMQTLATNEFDYEQTEVFKPNILKEKARRIGRNYTLILWILTQLTLGFAYI
PAISLSFWYYVNDLPITNITTFQTLPPYIHIPFAYNTAMKYCLACIVQAVPCYMYANILVGVDTLFMNILNL
IGTHMLILQGAFKTMKRCLKKIAGPSLAPDGLHNSNEMEYMMLEMKKSINHLQMLFQCCYKLEEIFK
YVSLFQALGSVIILCSSLLMLSTTSCVSKEFGNEIFYFIGINVQMGLYCSFGNQVTLKALDLPQAIWESEWL
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>HoblOR8

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MISIASAQLEILKDNLHNLRRNEDDDLTDQEDVVVRKRVKKCVLHHNVIVKFVADIEDMFSNVLLVQFL
CSIIIMCVTGFQVFVIPPARMHYITLVLYFCCNLTQIAIYSWFGHDILAKSSDIGLACYMTEWNVLSPKSRK
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>HoblOR9

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ITNIRPIVPASFKTGKFTRLYNVAHLFAVIFVGYNSTAFDVLFMSLMALCGAQLDILKERLSNVFVDASEIY
EDASSNMKFTDINVVVGCILKDCVALHEAINRFVMKLDILLSFPLLTQYGIGCFIICNTILELTIMGHLD
SANIIGLCGYSGVVFAQIAVYHWLGNEILYKSDEIIQSCYLSQWYKLDLKSQKCIMLLMERAKRSLVITLYKFV
FISLES LGVIVRWSYSIFALIKARYK

>HoblOR10

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QRLYYAIDAGYYKNFWDSTNTTIVKHVKSTPFYTVLPFEPIDFPYYEITVMYQAYCSATYGFVIGATDA
IICGIMCHIKAQLLILKNCLKTYIQRGIYIMKEDKVHINIQELEKHQELNKDSVYAVPLVLQYQYVEISITELIK
HHQKILELAEGAEDTFSFLMLVQFVFLALICFQLFQLSIYSIPSVKFFSMFSYLLMLYQLFVYCYHGNEV
MLYSLSIIDAIFESNWVMNVKQCQKSLLSMLRASRPKMTAGKFVYLSLDSFMSIVRGSGSYFMVLTNM
NARKH

>HoblOR11

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>HoblOR12

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VLPVSWLSVCSIHESMICYTINYISQCFYIGDLIFSLLIFDELFFKLLTYGYCELEQVKYALSFLKTKNTTSEK
ESKIMLEMVIIIKHHSRALEYIDKVDKLFMSVLLCQFSTSVCGGCMGLFVLTYEGLPPKLNLTALKNVPYVL
GVLSQIFIYCVAGQKIAEQSESVADMAYNMRWWIKHQPVGRAICLIMQRAYKRKQMTAGGVWNLDMI
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>HoblOR13

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LLTSILFFCSASSNSLITSTPYIRNHGMLLKSVPFEWNQLYVYELIYIWQYYSDWVFLFMINAFDFFVAL
VTVCFLQYVIMQDVIKFIKSEKRSQRRIIFGKRGQSISDKEMLYKCLEQHKLINGICNEEESFNAILIQFFV
STTTLCAAALIMKVDYSQFSKMLTFAGAHLAQLFCYCYVGHQLSYESTSLAYAIYTCDWHINYDRNFRK
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>HoblOR14

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CIAIYLLGMLFLLQIAAAPLMKGIRILPYNWYPFDSQSPTYEVLYILQSFMIYVTENIVVGCDFLFFSICF
NCTVQFNLLCEVFKEIGNGREMELLNYLFRLPGTFRPTMNEVDVNERKLMVLCIQHHQKLLNICLQLNK
LFNYGHLYQFVASVTGLCASCYLITNENSANGRSLVASYFVAHASQLFQYCAVSNEVTHASLELSTAAFQ
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>HoblOR15

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TILAIPWTPFDEDKYKIYAQFFEIICFIVLSTIDVAIDCISTSMINLMAIQLDILNDNLRRIGQNRSTGSYLEQE
KQIQNDLVRYVQHYIAIRFVSDTQDIFSVGIFIQFTSVVAICTTGIIQIALRTSGTFISTLLYFQTMIEIGMFC
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MRVYKN

>HoblOR16

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LRLKLQHFTADAKQEFLKRRKRENCYHTISNEILVDCVDLHIAVIRFLKKVEDMVTIILLVQYSAGVVIV
CNNILQLTKSDSIFSPDFIQPFSFLCGVILDLVIYHWLGNEIIAKSDKIGEACYTSEWYICNAKTHKTLFMIM
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>HoblOR17

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ICVIFVYVMLPFVEDKPLLLPLSFDLGRFEKATCIFQVISFSYCCMSVVCVDLFCALLLSLATAQLEVLELRL
RNIVSEAKFSNGSSILNYKRDLQDRVYKILRKCIKHLSIISLVRQIEKTYTVPLFLQYTLGIGIICFLLQLS
YTVQPGTLQFLLLCNCLVAILNELLYHYFGNELIFQSLRIRDACYMSEWYECSPFIRKMLVIIMERTKIPL
AITVYGYCLVSLESLSALFRWSYSIFALLSTVYWKVNQ

>HoblOR18

MLGIFGLYSRRDENGVEFFKIRRALIAVFSTVMLICLFIKMYENRNLLDIFETCYFVMVQAAAFVIKLYIYF
YHLPDLHALEEMLSGKIFNSLSKEQEMYISDAMKSHKIFAGCYQFCCVCCAIYSIFPAMDGQALAVPIYSP
FNVEKYRMFLYCFEVCCFFMTACNNSSFDGMTVGLTTIMSAQLDVLKDNLKAADRDMMGGKFLEQEKK
IKDRLRNCVRHHNAILEFTAKTQDIFSTGVFFQILASMLGICLTGLQSLMVPWGSVQFASVGLFLVTEIIQIG
MFCWFGENIIKSSEIELSCYMSEWRSCSTSNKRIFLIIMENAKTPIKFTAKGLFILSLGTFVMVLRSGYSYFA
VLRQVSQK

>HoblOR19

RISRASCKKRNELRICIKHHQLLSIFGRMQLIYSWVLLQYLMTLGMACVQLYILNTGELDIADTIELVIY
LGTMYTEFGYYSIPVEEISSEFSGIVNAIYMSSWYEKDMATKRILLNVMTTAQVPKYLYAGGMIQVNMDT
FGSVFRKSFSLYLVKLNLVK

>HoblOR20

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VKLLTTWILRNKMKYLYEMVNQKWPDDIYGNEFEIKLNNNAKNFKRIFALCKAQFMFSSLIYTSKPLFVQ
ARVLATQLYVPCDLLNSCYITFLGIQNIYIVIVATGEVVFDFIFHAFLFFAYIELEKIKYGFRNLDIMGKKE
NNEKIVYSEFCIIKHNFHLEFLHNLNNIYSLQLNHFITLSANIVLAILFMNKDGFPPSYDEMARYIPYLIT
ILSQLFLYCLAGEGIYSQLASVGDAIYESKWYNMKQSSSLTKGMILVIQISHINRINRKLITIGNIWPLNLATF
MSVVKSSFSLQACLQTAYNTDDTM

>HoblOR21

NCTALIRFLITTIHLTYCKEDTIEKELCVTVKPLLIPTPGPLNTISGRWILGGFQCICLILYAWQIIAYDTL FAC
FLIYVDCNVHILRYFFETITERSINKLQLRCCSTPNLELTQQMNIQMRTGTINLQNLIITCEEIMDVFKYVILL
QVLFALFILMTSLYVAASVPVFGASFTYQLEY YMTIVTQLSLYCWFGNEITLSFTKIPDAIYNNNWVSNK
SFKRSMILINTIRMNKPIYIKIGMVAPLNLNVLIIYILRASYSYFAVIKNKY

>HoblOR22

MANIKCIKTITTPIWMLRKTSFWPEQTYTKTIFILTSIFNNIFHTIYTLLILDIIINALKSNDIKLFNWVIGILIPIT
NYYAKAVTHIYNKKCLFSILDDFKSNIFNSHTEKHNHILQLIRKVSHLIMRYLIITMGIFVLIFSVPSTFNGL
LFIPPPFEIENFDVLYKFVNLIACIYIGYNGGGLDVLFLTLFALCVAQLQILKERLKNILEDAKKINVESKYK
MDLDIILADILRECVLLHKKINRFVEKLGVLSSLPLFVQYVSGCVMICFSIIQLTLGSKRSALDIIGLCGYSS
ATFGQMSAYHYLGNEIHYQSNEIVESCYLSRWYELNPKFQKRILLMERATRPLILSAYKFVFISLASLGI
VQWSYSLYAVTKAKYG

>HoblOR23

SKMSSDEFNGGSEVCDSILPYYIVIPFDISTKISCCFALIFQILPFVVFAWQITAHDLLFAVFLIALKCHFIIVR
GAFETLSRCLKMLNLQPHYNILHNRDNIKLDNAMKTEMRKCTQYYQIIKLAQEVENSFTHIILVQVLIVI
FIMVSCLYMMSSLVITSGKFFAEVNFVIAILIQITFYCWFGNEMTLASADICSGIYDNNWLSASESFKRSMIL
QMIRSSRITYITVGKFSAVTLLTLASILRGSYSYFALLSNLKE

>HoblOR24

LRNAATTEIYACVKHHELLLSVFSCMKKMYFWMLLFHYAVTLITGCSQLYVILVSSTDADLIGTLIYVN
GMLVQFAYYSFPAEEMVFELRSVSVAVYMSMWYEKDASVRKTLLMIMMKSQQQEYLSAGGIIDMNVN
AFGSVIRKVSFYTVLHNVLSN

>HoblOR25

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LPGKLWFPFNTSNHPVYDILYIYETIAVILHPLTHICMDTIPLALMAFICGQFDVLHDTLTNLKIFATERLES
NTKRTKDDLHEEMNKLLIECIIRHQETKRLANEVNDVYTSHFFAQLVNCVSVLSLIMYKLTMIPIASVGFF
TLALYLTCLLGLLLLYCWYGNIEIVSKSSAVYLAAYSSDWTGCPISFQKNLLFMMLHLQRPVTMYAGRFF
PLSLDVYTAILRFTWSYFTLLLNIIDE

>HoblOR26

AVLTVLFFGILDSILSRFKSNDYNDWSMPLAPFSLFKVTTNTQFILVCLYQSTCLLICASIISIDLLMGSVLA
HMKTQFTILKNTIRSMQSNDDLAEEVTERHSQKTSVDLLQNKLYVVVYHQSLIDLAHQFEDVFSFLLLT
LFIGNFVVLCTMYHASLYPLSNTKALMDFAVIAICVQLLLTCYWGNELTLESESVAFACYDVKFVGTGS
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>HoblOR27

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MFVAIMSLTNAHFILLKNAFRRIGAVRIERLNITSTICIEQSTMLRRACENELNKCICKHLQMLIRICQSLENIY
SPVVLMMQVLISLVVLCTCLYQVSSIPFGAKLLGNDLAYLLAIEIQVVVYCYVGSKLTHSALDIPSAIYESSW
LTASLTYKKTMMTMMRMQKPIHITIGKFSPLTLNTFLSIGKMSYSIFTMLKSRN

>HoblOR28

VKTLQSLMHFTHIFLKYFLMYKVDIEKILVDILKYFWKTWMFKKQIAEEVEKIYKTVESIQKCTIFLAAI
VLLVHTLRPLFDKSHIYLLETYPSSYAIGALLISQCYTYLFGFCVAIGFDLIYFSLCVHLILQTRLLKEKLR
EVFENSNDNSSFKLGYCIQHHQFLFSLFLRKKAIYSLMLLFHYFVSLITGCSVLFEILSSNTDLGNAIHIELTVI
VFFMGQFGFYTFLAEQIAFEFSDISDAIYLTQWYNSNIFLQKCMLHIMMKSQRIHYFSGGGLIDINVDAFGS
VLRKTFSFCAIMQNLINK

>HoblOR29

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SLENIKPLLKRTLRECIILHDAIAFVKKSIVLSFPLFVQYTCGCFMLCNTVLQMTIVSDKVTESCYLSMW
YATDTLSQKTLMLIMERAKRSLILQLYGFVNISLDSLGVIR

>HoblOR31

YCFMGGLIVQLGGIFTYETCMKNSVKTNKDMTCGYGYKVHYPYEQSGISQIAHIAVGVYSLSFVAASAS
LFLCLFICCV EYITVRIDHLNDMLLKVF EVEDYEDQSFTMKLCLEYHILITGLAEQANSCLLILSTAALFNY
SSTIGLSLFAMLKGNITKPLVSAIGFTCSIFILSAYGQIQINKYEAIGTAVYNSKWYHSSPLL RKHVLLIVMR
AQKPLLLQVGLGFYFHLPLFT

>HoblOR32

LLILHFYFYFCIGFPVVFGFDLIYFALCVHVHIIQTRLLKRKLKNVSRNCGKNSVSELNSCIQHHQFLFSMFLR
MKDVYSMMFLFHHFLTISTCSTLFEVLNGHNTDLTNYFIKFVLILLFISQFAYYALPAAQVASEFSEVSDA
IYISEWYNKEVVLQKCMLFIMMKAQRIHYFSGGGLMDINTDTLGSVIRKTF SFYAIIRNLINK

>HoblOR35

PFEIDFSIKLLIQIMDFFYVLWVGITCVLIGFVVGCAELIIRVRHLNIMFKDALSFASCVNSKKLLVTCVKY
HAHIISLTD RYNKCFDKFVMLFLMQTGPTIAVASFSIIIEPKISVMLHLSGWVVTFLILCISGQRLTDESLVIS
QSVYDTEWYQIDISLRKYVILILMQSQRPLRAKMWMFSEASYMTFAKVIKMSYSIITLLNGTLARKN

>HoblOR38

KKLKKLVEKMNEILAVPLFIQSVLGAVILCLAMYKLTKVAPMSGEALTYINYIAMIQLSVYFWYSNEIL
WKSDELSNSAYQCQWVDKTTSFKRNLFFILSAHSPLKIYGGYFVVL SMDLLIAIVKFSWTCFTLLKSM

>TcasOR1

MMKFKVTGLVADLMPNIRLIQASGHFMLNYHADNSGALHTLRLGYCCMHLVFVLVQTFSCNFVNLVLE
RGDVNDLAANTITVLFTHCVTKFVYFAVRSKLFYRTLGIWNQPNSHPLFVESNNRYHGIALKKMRRLLY
IIIIWTSFSAIAWTGITFVGDSVHNKDPENENLTITEPIRLLVKAWYPWDAMSGMPYYITLVFQVYYVFFS
LAHANLLDSLFCSWLIFACEQLQHLKEIMKPLMELSATLDTYVPKSADLFRAPSATSQDQLIENGTPAKK
NEDLKG VYSTRQELGGHFRGGALQNFSGGGVGNGLTKKQELMVRS AIKYWVERHKHVRLVTAIGDA
YGVALLLHMLTSTIMLTLLAYQATKITGVDKYAATVLGYLLFALAQVFHFCIFGNRLIEESSVMEAAYS
CHWYDGSSEEAKTFVQIVCQQCQKAMSISGAKFFTISLDL FASVLGAVVTYFMVLVQLK

>TcasOR4

MYSENKDFVLTIKPNILFLKIVGLWPVDNNDVYRIYTLIVTVFFMGVDFDTRIMNIFVYTDLKVL TATIY
LTVTDITVLVKTCFLMSNIKTLKRLIVTINCDFVQPKTDHQQLVQSGLKAWKVSYMVFWSLVFCCLVM
WTVSPIIQATPAGRKPLPLPAWYPYNTDITPFYEITYVCQVISMWFLATANMNMDSLIAALMIYVGAQCDI
LSDNLKKMKTF SKIKEEQAKFNQTLIDRIEHHKKILQFAYDCNASYNFIILAQFFTSSLAIALSMFQLTLVDP
LSMESFPLLSYAFGMALQIFLYCWFGNEVEAK

>TcasOR7

MNKLQKFDWKATIRPNIAFLHYLGIWPEGEEYYKLNFYTLKILYIIILVISTIVFQVINIFFTLDDLTSLTAN
IYVLLTEILYFIKLCFLVKNMPALKLLMKTL DHKLFQPKANQIVIIQPLLNFWKLI FLAFVITCSFTVLFWAI
FPILDSSEEEKRLPLLAWYPYDTKISPNYELTYLHQVASIYICYSHLNIDTFITALNTYIQCQFDILCDNLK
NIKSDTKNVDTKLAKCIKHLLILMFANTSNEFFSWIIFQFTSSAAITGMTL FQLTVVKPFTTEFYNF MAY
VTAEVVQIFMYCWFGNEVQVKSSNIPYAAF GSDWTEFSPNKQKSLFLITRSQKSVKMSAFNVFDLT TDS
FILKSAWSYFALLNQVNSZ

>TcasOR10

MEDFSWEATLSQNINFLKVCGLWPPGDEAYKFNL YGIYAGFCVLGFLCVHTGTQTFNVYFILDDLEAFTS
SIFVTFSCVACVFKYTYLLKNMKLLKVLFININKEIFQPKNKEQQLLIQPSILFWKRFYLVFRILCYNTCFFW
CAYPILDKRIKQHKLPFLAWYPFDSSVSPLYEITYFYQAVAIWYIVIIISFNIDMLIGALNMFVGAQCDILCD
NLRNLGKSDINELNPDLIKIQHHKAILS FVSKLNIFFNWIVLLQFFSSAVSVGFTMFELTLVAPFSGQFY SFI
CYGSAITTEMFIYCWFGNEIEIKSSKIPYAAFECNWVGTPLGVQKSLIIFTIRTQRPMQVSALNFLYLSLDTF
KTVLRTSWSYFTVLNQVHSZ

>TcasOR11

MEKYDWMQAIKTNILILKIVGLWPDESDYKDFYALHASVWLSTLLVASTFFQGINIIFILDDVKALTGTA
YVLLTEILAVIKTYFVVKNMKMLKHLMQSLNNNKL FQPRSHEQIKLIQPSLKFWKLLYNLFHSLVGGATL
FWILFPIVDKKEKRLPFLGWYIVDTKVSPYYEIVYGFQFCSCCYMSALIINIDTLIAALNVYIGNQIDILCNN
LRNLKAGCSIERDLITCIKHHQEILNFVQYANKFYRWIILLQFFVSAVSIGITMFQLTIVVPLSSEFY SFLFYA
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LRTSWSYFALLNQVTZ

>TcasOR12

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TIYILLIEILLVKVYYLVKNMTVLKQLLKMLETEMFQPRNSTQINEIQADMKFWQMLIRFLWVSVMCSN
LFWAIYPLVDNAGKEKRFPLAWYPYDAQSPYYEITYVYQTISVNYMSSIHVSVDALAGALNVYNGNQ
FDILCDNLRNLHRLTKNGTIDAGRNFYCLKHHKHILDFAKKCN NYLWNWILFMQFFVSTISIGITMFQLTV
VRPFSNEFYSLFTYISAIIGQIFMYCWYGNEVEVKSSKIFYATFESDWIEFSEEVKKELIFFVMRTQKPVKLS
ALNFLYLNLD SFMRLKTSWSYFALLHQISNRNSZ

>TcasOR14

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IEFMTAWKALNFALNRKKFMQLLDAIDKTTFQPRNGKQVTLVLRNIDGWKVMFKMFGISLGLSFIFTGLL

PIFSKTYKDRKLPMEAWYPFDSTKSPFYQLCYVYQMAAVAVAVMVILNVDTLVAAMNICIGLQCDLLCD
NLRNLHTNTSKSMNQKLIIECIKHHQNIISFAEKFRQAFNWSIFLQFFVSTTSLGIVMFKITRFSLYVSEYYRF
ISYACSVLVQVFIYCWFGNEVIVKSSKIPYALFESDWTQDSLEMKKNMIVFILRTQKTLKITVCHVFDLSLP
TFLTILKTGWSYFAFMNRVTSPHZ

>TcasOR15

MLVKWSSVIKINIFLLKWVGLWPGEKYQLNVYSFYAFTVILILCGQTLSTGLTLILGSGDVTFTETLFFV
NIEFMTAWKALNFALNRKKFIQLLNAIDKPMFQPRNDKQVTLVLRNIDGWRVMFKMFAISLALSIFTGL
LPIFTKTYKQRKFPYEAWYPFDSSKFPIYQLCYMYQMASASTLVVVILNVDTLVAAMNICIGLQCDLLCD
NLRNLHFDTSKSMNQKLIIECIKHHKSIIRFAEKFRQAFNWSIFLQFFISSTSLAIVMFKISRTTNYGSEYYRFI
SFACSVLVQVFIYCWFGNEVIVKSEKIPYALFECDWTPEPLEVKRSMIIFIIRTQRILKITVSYMFDLSLPTFL
SILKTGWSYFAFMNQVTEVNTSKZ

>TcasOR17

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LIQSMALVKAIFYILKNMRILKNILKNLETNKMLQPRNLKQIKMVQPSLTQWRLLSQMFWISAVFAMCLFG
AFPIVESTYKEFRLPYLAWYPFDTKSSPFYEIMYLHQFVSSYTIAIVDIGADTLIAALNVFVATQCEILCDNI
RNINGSVEEMDSKWKECFTHHKEILKVARHCQKFFNWIVLMQFCASVICIGLTMFQLTLVVFSSEFFSSL
FYFGAITVQIFMYCWFGNEVELKSSKILYATFEANWVEAPHQVKKNILIFAIRCQNPIKMSSSLNVFYLTLET
FMAIFRTSWSYFAVLRQIQNRISEEZ

>TcasOR23

MANFNWTKIETNFVVLKVIGLWPEKTFACKLYNIYTHFMVTCLLVIHLLLQTIQLALIIDEFQLFLTALPL
LLQQYHLLIKLFYFMVKFPILRYILHSLNNHQVFQPNQDQKIQMEDRLSFMKKIYFSFYSMAGVAISFLV
AFPILDILNGGERQILFVCWFPYDYMTSPFYEFTYFYQSASIIYAGVIVLQIDTLVTLLMTYLGFCDLLCE
NLTQVGYNNSKENNTLEFVKCIKHHQELIKLNHCVDFFSSGLIFVQVATSSIAIGLTLFQMTLNVSTFNVI
FLVLYGLSVTFQMFQYCWFGSEVIHKSDKIAYSAFEMNFVDAPLSVKENLVIFMACTQKPIKMPVLKVTH
LSLQTFTKVLRATAWSYFALLVQVSKZ

>TcasOR27

MLETKQIVFHSFKLNVTVLSLIGLYPPKNYSILYKIYAVILFLAVHTPQLVLGLLHYFLMGDFTSIDYSDFV
TVGMMFYAFKLLPFVTSVTKIQKCINYFDTLGYKILKSEEKIIDCVGSCRRNTNVFFVGCCLSWMGFVA
QVFLRDEPQQPLPKVWFPYSRDESPVLFYCIYILLIFGPGYSVLACGTIDPMIGGLAYHAAAQLQRLKRNL
QYLDEYIKEKNVGKSKENKRGVIYEEIISCVQRYQEIATFVDLFKDSFSQVVSQFMGSVFLIGLCCFQIITA
TEVDINFVITANYIWWILFQIFFYCYYGTMLEENYTLTNAIYLSNWYEYSIPEQKALFMLMERSKKPMIVT
AGKILDLSLDTFTMILRRSYSLCCLKZ

>TcasOR32

MCLSTSEQSFSINLKIMKLCRLFPPTGKGFYKIYAYLLQFLLLLPIPIGLNLHLLLDENLDMEKVNYNAVF
LAQVTCFVIKLMIAIANSEKIKKCITELDSPKFAAVRENHKKILQHCIVCKRNTLIFVVFICGASSWATKP
LFWSRRNLPLDVWFPLDTTSTPVYCSLYIYLLIGVYFTSFANMVIDPLIAGLAYHATSQIKILKDNLQHLNN
VYANEEITSSKNKIYMKIKRCVQHYDDILSFVKEFEECFSLAIFSQISASVVICFSCQLSKIKTFGYFYIQL
VFYFGVILAQIYFYCFYGSTLFESSSIINAVYSSKWYDFDVPCKALLILMERAQTPITVAAGKIMDSLVS
TFATILRRSYSLVAVLNNYQZ

>TcasOR36

MKGLVEKSFRVNLLVMQVMGFYPPQKYKSLYKIYTYVVYCAFTTLIPVLATLELFLAENINLEQISDNAFI
VCEAGCFIIKYLPFVRNADKIKKSLFLIERPMPFHIYTKRQEHIEECVAICRRNCRLFLTFCTITVINWSITPFF
LPGNNLPVEIWSPEFHKASRKFYFLSFVYIVAGVGNAAVSSGVIDPLLAGLISHATSQKVLKNNLQFLDE
HAEERIASRNISFIERKRKFADFIYQKIKLCVNHHIAITEFIDVYEDTYSSSVFIQFAASVVVICISCLRLSMVE

PFTFTFFVMALFLWTMLCEIFLYCYYGITILYEENHSLTNAIYMGKWYNNDIKSMKALVILMERSKRPMIV
TAGKILDLSLETFTTILRRAYSLLLVLKNYESTPTEZ

>TcasOR39

MSNQHEIDLTEFVKLNKMHFFGYFFPRFGHNKTRKTLTYMYSTLFGSTFVLTAALSQIANMINSFGDM
ERMTEASFILFTNVVQCCKIYSFLTYGPRVWNLDGLNRNIFKPINTDQHRILVNDIYMSKKISKIFLLACTL
TCMSWAISPFFDKRGDVLRLPLSGWYPFNTDKSPAFELVYIYQILTTWIGGMGNISMDTFISGIIMAISSQLS
ILNNALKNITKNNELVRCVFHYRIIKFSDEVIYLFNTCLTTQFIVGVIIVCISMFQMSLVPVLSFQFVAMLLY
QMCILLEIFLWCFYGNEVMKSDQLTQAAYMSDWTSPNHFKQNLLFFMTRTQFPLKLYASGYFTLSLE
TFKAIVKSSWSYFAVLNQVHSRQTQZ

>TcasOR40

MSSLIQESLHINLRVLEFFLLYTPGEPTNFQKLRSILFFALMFHVPVLSGINLIVGKHNDNPMKLVDNSFGFV
GLSCYIAKLWPLIGNRSKIKVCINYLDKPIVELRENQKGILQACSKICRRNSNIFLYYMIISVTGFVTKPFLFE
ERGFVPDVWLPTSLKDRLDVYWGFIYVSIGVAYPVIASGVLDPLPSLLCLATGHLKVLNDNLEHLDEYS
SEENGSKDSNLYKNIQKCIKHIEILNFVYNHQCFSLMVFSQFLGSPMILCFTCWNVSMREPFSLWFQS
LAYFLGLLLQLFFYCYYGTRLSEEFHVTTAVYMGKWYKYDVKSRLIILMERSKKPTIVTAGKILDLS
LETFTIILKRSYSLLAFLKNQNZ

>TcasOR41

MDNTLDIDLTEFVRFNVNSIHFFGYFLPEFGKHPKKKIYVIYAVIFVGTTFGLSLVSEIANMINAFGDIEKM
TDASFLLLTLNVQCFKMYSLTHGPRVWKLHSMNNSDFKPNLEQRNILVEEIKMSKRISKTFFMACTIV
CSLWGISPFDIRGNSEKRLRLPLSGWYPYSTDTSPGYEITYAHQTLTTWIDGLADVGMDFLSGVIMVIAAQ
LSLLNNSLKNLTKNCKNDGKKANTNLIIECVIHYRTIISFADEVTYLFTSCITAQFIIGVIVCVSLFQMTLVSL
RSFQFFSMFLYQGCVLMEIFLWCYYGNEIILKSDDELTRSAYMCEWIEESREFKKNLIFFMTRTQFPLKLYAS
RYFTLSLETFTAVVKSSWSYFAVLNQVHTKZ

>TcasOR46

MSKSEKIHTLATYFDSNIAFLKLTAFWIYDDETRRKKYLQHAYNIFWIFYLFVAYQPAELLYVYYSFNDL
SVFLRALRDIGNHVSLAYKAFNYFIMRRDILKMETLQHGNYHYEDCGDFQPKLIVDEEKKEALKWTKY
FLNFCNAICLSMFANGVFTFIFLSDKQYVERNGQRVYHQEQPVNTVSPFGSGTKLRFVFTFIYTMIALTFY
AWTIVALDSLFTITMSCISSHLKILQGAFKTVRARFIKLCASLSKLLISVSGKLESIYSTQTFTVQTFISLGEMCF
SLYLLSETADQNIGNEITYLIATGFELLMYCWFGNRITEASLKISYALYESDWFPTLSLFFKKQIIFTMTRMQ
KPINVTIGKITPLAFSTFLTIARGAYSFFTFLKQRHGINHZ

>TcasOR48

MPHATLSKMVVQKIDLLEPFDNVTRLLKILGLWYSPNETIVYKIYKNFVMATCFLYTLTCTVYGFKFMSF
ETLEIAFGAVEGVKLKSLMFRLKFQKIAESWQQIRQQEFQPRNEHQRTVLKWEIVTKSLFLVYFFGVYIGC
ISALTVSSWLRHKDFPTDHWFPFNRRPFLYQYIYVHITVGFYLTAFLNCASDSCFYLSLLHITAQCEILAD
TLKNVHDLHKLNAAKKNSGQKGEDEVNMNQLIECMKHYNLIKKYTSLVADCFKEIITLQFVPTIVMICIA
MYKISTLEPSNTQFWFFAFTELGAIQIFIYCFVGNLVTSTSQKLFYATFESQWYNASQKFKKNLITVMMMA
VQRPVIFYGWNIFAINYATFKSIVQTSWSMCAFRSTQDLZ

>TcasOR49

MVVEKINLREPFENVTRLLKILGCWYFPNESLVYKMYKNFALITCCMYTVTSIIYSFKYMSIDYDKAYESL
EIGVGTAEGVLKGIIFRMKFQKITESWQQIQQPEFQPRNEKQKMLLRRYIYVTKFLFKVYFFVVYIVCVTG
LIVSSLLRHKDLPTDHWLPFDYRKPLHQYIYHLTAGLYLNSLTNCAVDSCFYLSLLHITAQCDVLADTL
KNIHDLDKLNAKNAPERENKDQVMNKILVECMKHFNLIKFTNQITDCFKEILTLQFVPTVAMICMGMY
KISTLQASSSQFWFFVCTDLGATTQIFIYCFVGNLVTTTSEKLFYATFKSQWYNASQKFKKNLITFMMAV
QHPIIFYGWDVFAINYETFKSIMRTSWSICVALKSTQDLZ

>TcasOR50

MVVEKINLLEPFENVTRLLKILGCWYSPNETAVYKIYKNFIIATCFIYTVTCNIYVFQKMFTDSDKAYETLE
IAVGSAEGVLKGIIFRTRKFQKITESWQQIQPEFQPRNEKQKSVLRRYIEVTKTFFKVYFSLVYVGCVTGIV
VSSWLRHKDLPTDHWLPFDFFRPFLYPYVYVHVTVGLYLSFTNCVLDSCFYLSLLHITAQCDVLADTLK
NIHDLDKLNGKNVPERENVDEVMNKILTECMKHFKLIQKFTNVITDSFKEILTLQFVPTIAMICISMYKIST
LHPSNTQFWFFIFTDIGATTQIFIYCFVGNLVTTTSEKLFYAAFESQWYNASQKFKKNVITVMMAVQQPIIF
YGWNVFAINYETFKSIMRTSWSICVALKSTQDLZ

>TcasOR52

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LEVVLQAILFRKNFHLIRKSLNNLKQKEFQPKNDTQEKILKDSIALSRRVFYSFFWLVFVMIGMWMVLPLT
KKGKYLPTKYWIPFDYRLPVVYELLYVFECSCIIHAFSNVALDTFFSIAMIQIGAQCVDLCTIRNMDEQE
KTNTMDRILIECVHHYRLIEDFAKSIATSFEILMVQFVCSSLMLCVSMYELSLSEPMSGHFFQVLLFQISA
TNEIFLYCWFGNEVIKSERLFYAMFESKWDYSAATHRKNLMIFAHQVQKPISSLVWNIFPVDLKTFFGGLL
QKCWSFFVAMKNIQEIQEZ

>TcasOR54

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ALSTAPFKLVIFQKSFKKIQNLLFLLQSQYTKIRSEKQAKMVEDSVVLSKRVVKVFAVLVVPCTCVGLFGM
PLLKDEIKLPLIIWIPFDYHEPVVFGLVYFVISFSGSFTAYINIGTDTFFYNCLIQIETQCNILSDTLRNLHEFG
RFEAEIHILIECIEQYKTIKFTKILSKTYQGILSVQFICSLLSLCLTMYRMSLADPGSEEFRLRYFVFQWGV
PEIFLYCYFGHRVLDSTKNLYYSTYELQWYNTSAKFTNLLIFMGQIQNPVIYVAGIFSLDLETFFKIMQK
AWSFFTALRNIHEQZ

>TcasOR55

MKAFSFNILKFQIFGQWCYENESFYKIYKYTATVLLFLDWLFTMIFVLVNFQSEVVDLSYISPSMTTSM
KYVIFRVNFSQVERMLKIVEEQYLKIDSRRVGFLVERGTKSSVFIKACFYLVMATVVSLLITQPLLQEDIDI
PLVIWLPFDYHRSGIFELIYVYVSYSYLYFAYVNVATDCFFYISAIQIGVQCEIVGFMLENLNEIAKQEEEN
VRRLFLSCVTTYNNILECVKIISDCYREILIVQFFCSFVALCMTMYQLSIVEPFSDFVFFKMCVFQSAVICEIF
LYCFFGDLVLEKSGKLFYASFSFGWYNGSAKFQKELLIFMNQLQKPIIFHVGNVIPVTCTETFKSIMQKSWS
FFIALKNTQNRZ

>TcasOR57

MSHSNPLEAFKLNTFFLKALTVWHVENPTYRLYKIFVVFSFAVTFFSAWICALVNYNVSEISENFYYPAM
STGPLKYAIFQKNFTNIVNLTHLLETQYAKIRTENQKKIFDESVIFERKVMKNFAILIPTCVAMFIVPYFQD
RREMP LIVWFPFDYKQPVVFDLVYFILAFACISIAYTNVSTDAFFYTCLIQIETQCEIVSDTLRNLDKIVTNG
FRNVAESRKIFIECIEQYNVILRYTKIVSDTYQGILVVQFFCSLVALCLTMYKLSLADPGSQDFIKYFVFKLG
VISEIFMYCYFGHRVLEKTEDLYFAIYEMHWYDASKQIQNEVFIFMGQLEKPIVYVANIFSLDLDTFKKI
MQKAWSFFTALKNMHDIRNNZ

>TcasOR65

MTATKSLKEIPPIYLRVHLTVLQILGIDILPVESVPQNLFYTYTALIISTMCLFTIAEFLDMVLNYEDIYRLTF
GLCYCVTHVLGTVMFLMLYLRKKLWGNLTLEEGIFKPNPTRGGPEELQIVNDAITMCNRQG YV FYTL
VFLIIGARLLYASLANWPYDKHNYFDGNVTVIVNTKEMPYTTWMPFDYNDSPLYETIFAFQIFSTTVYGF
YIGAADAVICGFMMLIKAQFLIVKRELETLIERAQKAAIAENPDNEDNFGREIERIELLDKRTQDYVAKYA
NECVYHHQELIALCDHAEEDFCYLMLLQFISSLLIVCFQLFQVSTLSPDSVEFFSMVCYLLMLFQLLCYC
WHGNEVQIVSGELSRYAFGINWIIMRESPKKTLLLLMMRAQRPCYFTAGKFSLLSLQTFMTIVRGAGSYF
MFLRQMNIZ

>TcasOR70

MPSIIDISFKININVLCLAGLYLPDKFKSLYRVYTYLVYVFIVIPVPTLGCVYLLAQEKITFRQIADNLFLLIAE
LGCFIPKYWPLVRHAERIKRCIHYSAPIFKTDRKEHQEILDDCIKVCHQWSAFYFASVTAGFVSWWSIRPIS
WENHILPTDIWLPDPHTASSAKVASVYFYLVLGKGFGFLGIKILKNNLQHLGEYVDEELASLEPCRKAQLT
YQKIRQCVIHHEHILAFVEEYEECFQSVALSQFVGAVVIFCVSCLQLTIVEVVSLEDFLAMMMYFIAMLCQV
YLYCHFGTILYDESDTISDAIYLSKWYEFDKRSKKALCILMERLKRPMPTVTCGKIFTMSLVTFTMILRRAY
SLLAVLENYNIELNZ

>TcasOR76

MMESTVTRLKRMYLWPTASVTSRKPAPFLITFSCFLLYGSMHLIVNDISMEEVHVVIETTAGQFGVLYYL
TLFTIYRKGILEIYADLSNFTKFGKPYNFDKRNKQLNQWSRWFSVVLVYFFVISVFAWPGIFTQSCEDLNVA
LNKTEVCGVSPVWLPFRFDYKPMKQFVYFWQSFCCLYSNGGAGTISFAMSETIEHLILRVEDLKILFPKI
VAERSPEVRRKMLAKWVDYHLWLLSIGKLMNDTYRYSFSVIVLCAGTLFGCIGYTMKNASTNFNSSFIF
FGWMESVFVICVCGQRLMDAFHSVGTTVYNSEWCDTDVDFQKGVILITIRAQKPVRIYAGPFSYVSHLLI
LTVFQTSYSYINLLNASSZ

>TcasOR77

MKYILMKKTIAFLSVTGFWPKTKESTKTRAFCLFSSSFLLFGSLGYLIVYRKFGSDDIDSJETATSHFGVLY
FMFFWILKRDGLVHIVNLLSDFSKEGEPFFNDNRQLDYLLQYCIFVLSVATGGVFLCPIIFVKNCEMVK
QEKNLTKVCGLVSNVWAPFDYSEYPMKRVSLSWESYCCFINFGCGGIMSFTMIKTMEHLHIRVEQLKDM
FPDVVNEKNLAVRKQKLEKWVKYHLHLYDIGELMNNTYRYCLSVIVLCVGILFGCIGISTMQPGSSHNSL
FLFMGWFQSICILCMVGQRLLDVFLSVGVMAYDSAWYEKDVDFQKAVLMIMIRARRPVLIYAGPFTNLS
HLLILGVLQTSYSYINLLNAKZ

>TcasOR78

MGHAIMTEILTYLTLMGFWPRSPKSSKASAFLLILSTSFLFFGILFYLVNRQFGSSEIDSJETITSQFGVLYYL
ILFTWKRNDIVEIVELLSDFSKFGKPPFFDQRSTRNLNRYLSCIVLILIVANIVVAALPVIYIDSCHKANEQLNL
TKTCGLIAPVWLPFDYNEYPRKHLVFAWEVYCCVMNYVGSIGALTMVGTMEHVIRIEQLKYIFPKILD
QPNPRIREQMLKNWVRYHLALFEIGRLMNDAYKWSLSVIVLCVGALFACIGISMLQSTASQINSICLFFGW
FPSIAFLCMWGQRLLDSSLSVGTAVYSSRWYDMDVAFQKSVLMILIRSQKPIRISVGPFTHLSMLLLLGVF
QSAYSYINLLNATSZ

>TcasOR79

MGHVIMNEILTYVTLLGLWPRSRKSTKTISYLIILSSSFLFFGSLLYLVVHRKFGSNEIDSJETVTSQFAVLY
YMTFFTLKREGTVRIIDQMSDFSKEGKPPFLDQHNKRLNYLLSYFVICLFVAIVGVVALPAIYTGSKHAN
EQLNLTKTCGLVAPVWLPFDYNGYPLKFLVFAWEGYCCITYACSGISSLVLTGTMEHLIRIEQLKLMFPE
ILNEANRHIREQKLKNWVQYHLALFGIGKLMATYTYCLSVIVLCVGILFGCIGVSTMQSASSNNSVFLFL
GWFQSLIVLSVCGQRLIDTCLSVGIADVNSRWYDMDVSFQKSVHMILIRSQKPIIYTGPFYSLSHLLLSV
LQTAYSYINLLSARGZ

>TcasOR84

MTEEKELRLCLWSCYYLKLSLMWPLKREEFKSSKGLYLRLLVFVIISGSTFTAMIFMHLKYSLKVGSYDV
SEDLAILASNIGYVLMMTMYVSRQKDLELLLLDLSDFKTYGKPPNFDKVRKRDLYAHLIFFYSMFGSFV
YNMDKIILIDKCKEARRINEVCGSAIPFWTPFETEDLFTLTLVITYVLINIFVVVKVAMTVSVQVLEISSHN
LRIEQLKIFIAGCFDRDFKASRERLDFCIRYHNVIIDFSERFSRCFSYVMFIHLAITGIIIGCLENQIVQEHQPE
AMLHMGGWSTATFIACYGGQLLMDASTSIADDEFYNCPWYEADV KMRKDLILILRAQKALFVSTGPFNV
LSFALFVSIMKLSYSIFTVLSZ

>TcasOR87

MKHVIMDELLIFLTFLGLWPRTPTSPKIISYLMYSTSFLFFGSSYILILHRKFGSDEIDTIEIITSQFGVLYYL
LLVVKRDGITKIVNLLSDFSKEGKPPFLDQRSRRLNLLRLFVTVLLAATVAIVSVPVVFVNSCNKQNLQLN

ATKICGLAAPVWLPFDYTQNPRKYFVSAMEIYCATMNYAGSGSGAFLVIGTMEHLVIRIEHLKNMFPEIL
NEPDKQIREKRLKKWIEYHLSIFEIGELMNETYKWPLSVIVLCVGILFGCIGVSTMQSVSFQNSSVFLFFGW
FQSIFVLCFWGQRLLDSCLSIRKAVYNSKWHEMDVSFQKSVLMILIRSERPVLHAGPFSYLSNLLVLGVL
QTAYSINLLNARSZ

>TcasOR89

MKEAVLQQSKKEMHLLNLWPKGHVKHFRFRYVITLIIVSPFTLGTLTHTFINVLKENLDVDLSGDISVIAVV
TGLHFMLITFVWGHKKIAYLWENLGPHEYFGKPDNFEKRCKQLNFYSRLYAYYCYLGLTVYIIMKNRGG
IECRLNVERNLTEICGLVTTFWAPFDIDFFPFRQILFVDQVFATYFIVKGGAAISFTTLEVGEYIILKIKHLK
RLVKEVFDDPREEVQRKKLVFCIKYHQYIISIQLYDGRYKHCNGCYILMVGIIASLSNEIMKNHNIEALL
HLVGWVFSFYICCFSGQSLLSESLTIPDAAFESKWYEAPVYMQKDLLLLMMLRSQKPLMLHATPIGVMSLS
LFITLVKTSYSYFTLLNQSTZ

>TcasOR90

MAKDTSPVLRESIEVMKYQLWLPQNERTNLRRRYFIVIFLCSPLHLGLATHLVVCLKDNLDVDLSANIAV
LSAVTGLTYMLIVFVWSQDKLVHLLAKLDTHEIFGTPDNLTKRSRRLNFYAKLYSYCYFGIVIYSLVQII
EMPQCRKMNEEKGLSEICGMIVPFWAPFDIDWFPLKQIFWLNQLLGIYIIKGGAAVSITTEVAQYICLKIK
HLNRLREAFDDPCDVVVEQKLLHCIRYQQHIIRTNELFNVCFKHCNGCYVVMVGIIASLLNQILKEKSV
GALVHFAGWICSFFICCHAGQAVISESLTIPEAALDSHWYEAPVKYKKVLLLLLVRSQKAFNLQATPIGIM
SFDLFIALLKTSYSYFTLLHKSTZ

>TcasOR92

MKNQEIKICRATLTVLKYSLIWPSEADEMNPGKWYYIRVVTFILFTCPWVLSVFMHLIVSIRNNADIHLSE
DVALMVAFTGVYMYMTIYVKKQPKVAFLLRDLSEYFQFGKPPGFDETERILGFLSKLTFCYSVMAVVIYNYI
KYRQKPECERMNKLKGLKENCMLTPTWWPFEINYSAPFQLIFLYIFTSTQVMMKLSLMISFNVLEMAH
HIILRINHLKTMILESLDEQDYEASKRKIKTCILYHLEILGFAERMDDCFNSGMFAHLTITAAICGCLEKQFV
DGDNLQGLSLLHIFGWILALFLACLGQHILINASETISDAIWSSKWYDADLRLRKDLIFMMARSQVGLYLN
VGGFGILSYALFLSVIKMSYSILAMLTZ

>TcasOR94

MAIKICKFTRKNMQISLIWPREFEENPGKWYYIRIVIFLITYGVFPFCTFLHAVVVIHNNLDIRISEDIGAVV
SNIGISYMAIIYVQQNQIAYLLKDLSDFKDFGKPPFFEEENKRLNFWISICTFIYPTCGASLYNLSKILEKSE
CNKINEENGLPATCGFIFPIWVPFNINYFPLFHIMLISTWFCTTMFVRLHLSISYNAFEIAHHILRIKHLNGMI
ITCFDCQDYKISRQKFTTCVLYYKQILDLSNRLNQSFSSIMFVHFTMTSAVCGCLEKQFVDGEYVGGFIHL
VGWIISLFIASVGGQDLVNASQSISEAIWSSKWYLADIRLKKDVLFMLMRSQKDLHMSVGSFGVLSYAFF
VSVLKMSYSILAMLTZ

>TcasOR97

MNNQKIQISNMTRKVLRYSLWPKTNEELNPGIEYQFSVLGFFLVTGVLVLCITIRFFITIKAVHEVDAEVL
AILIASYGSYYMICAHLKNQHKVALLMRDLSVFNNFGKPPNFDKRNNQLNFVAKLLALYSFLATIFYNGE
QLINKTECKRINKEKGLSDHYCGLLAPCWLPFEIDYFPVFHLILYAFITSGYLLIKMAIHISYNAFEIVSNIVL
RIEHLKAMILETFENRNKQVCHKFLQCILYHIEILDFAARLDDSFNSMFGHLALTGGICACLEKQIVSGV
NVVAGTLHFIGWILALFIGCVAGQYLINASEILPSAIWTAKWYDADLELKKKVLFMLARSQKSLFIRAGPF
GILCYPLFVTVLKTSYSILCMLTSZ

>TcasOR98

MVKKESEIKISRVTRKLLQYSLLWPTEGEELNPGKWYFRIFAFLSFTSLWCIAICMHFIFVMKDKPDWDP
TEEIAIIAIYGTYYIVLAYVKNQRKAAGILRDLNFDKFGVPPGFEEEEQRLRVYIICVFIYGFITITTFYNYK
MSQKKSCERFNIENHLHENCGLLSPVWIPFRIDKFPRYELVFLYLLTCCHLLMKLPLIVSYNALEMVHHIIL
RINHLKIMITECFDDPDYEISRRKLTQCILYHTEILEFATRVDDCFSNCFMAHLTLTGTCACLEKQIVAGFS

RFGAILHFFGWILALFIACLGQFINASDTIPEALWASKWYNADLRLRGDLLLLMMMRQRDLHITAGPF
GVVSYALFVSVLKASYSILCVLTSZ

>TcasOR105

MKPALKLANVLGLDPLRNDNYTQLKKMFCAICIVSLFVSAYLEFFSNFTTFETYETAPESLIPHFQTMFKM
YSLIFSRTEIVELIQMAEQFYKFSQCDEKRLTKLYKRVDLFFYVYASLVAAACVLFAIVTLIFKPGKPIFLC
YGGHLGLESPEFEIYLVVDLIGIVISVTPAFDGLFFYFALYIYTEFKLLKIAFKTMSGQELREAVKHHDFL
LKYIKKLSNVYSPIFLYQFFCNLLAICFCLFMLSRSRGIPPEMVFSKYFLCLLAFLVQSYTFCSIGDLITELSE
DVSNAIFYTDWLDDEAYENKTARLIIMSRAQNPVMLTIGKFANMNLRTFILIVRNAYSFLAFVNHANZ

>TcasOR106

MESALKLIDIHGLHPLKSDKYSTMRTISFLSLVVILISAQLEFLSHLSVFEVYNSGPHSTIPPLQSLKMATL
HFYKNELIDLMEKSKSFWKLDKFGDLYKQELSKLHRLVTIIVYIYIALLTATCVQLAVLTLIFRRGKPIFLC
YGGLYGLES PHYE IYSILDAIGIGVISIAVSGYDAMFFFFALDIYTEFKMIKSAFKRHS DQTVSSYNKQFIEA
VKHHDFLLQYINQVNDIFSPMFLFQFFSGLLGICFSLFMISRSLQDINTLSIYSAGLLGFTAQSYTFCLVGE
VISELSEDISNEIFYTDWLDDEVYRNKTAILIVMNRAQESPKLTIGKFADMNLRTFIMIVRNAYSFLAFINN
ALDZ

>TcasOR107

MENPLKLLHHIIGLDPRQSDKYSTIKKVISFLIVLAVLLSALIEFFLHHNESQVYDTAPQSTVPNLQALLKMF
ALIYKKEIDLFTKGNHFWKLDKFGDCHKQKLTKLHKYVDLFFYVYAVIITGAFLQLALLILIFEPGKPIFLC
CYGGLYGLES PQFEFYAVLDFLAIGVIAISVTAYDSIFFYFALYIYTEFKMIKIAFKRENCAQFIEAVKHHDF
LLQYISKVNEVFSVIFLTQFFSGLLGICFNLFMISTQGTRDMKSFSSTYFVGLVGYYTAQSFTFCLIGELISELSE
DISNEIFYTDWLDDEVYRNKTARLIVMNRAQESPKLTIGKFADMNLRTFIILRNAYSFLAFINEVLDZ

>TcasOR109

MGKVKFTEPLEFLNVVGLNPENCSNFSLFRRVISLGFFLVVITLGLLELLHHFEGLETCSRASEAMIVQYQL
FIKIAVLLKHRKNLVVLMQKTRKFWPLDKFGQDAKIERPHKLLKAFFFAFKLIMILMALQYILRKFSKN
GKPLAIAFGESKGLSPKVDHLYFVLHSTSTFVVLHAVTGFDRLFFFLIGHVLTCLKLVKKSRYLTQNRREK
FLETVQHHAFALEFVRKLNRIYSQVLLNQHLSCFLGICFGLFLVSKDGIPDLGHVTKYVPYVISFITQFTFTF
CFIGSLLITWSLQVPDAIFYNDWGKNQAYKYKTDKIIAMIRGQRAAKLTLGGFGDLDLESFNLVVKNAFS
FFTFFVNAMNQKZ

>TcasOR110

MDKVEFSDPLFFLNVIGMHPFKADKFSKFRLAFSIAVYFAVIFSGVLELIVNSQGLEYARASDTLIPQCQL
VCKIFVLAKYKKQIARLLNGSQRFWDLGQFGARYGNSFGKTHKYLKSFFLLYKVMLTFTCLQFLAVKIIF
KIPKPIAISFGETKGLEPLYDHLYLVLHAMITLVNTLVNGFDGLFFYFIGHVLTCLKLMVKVAFGDSPIETN
WSEEKRFKFAVRHHRFVLDIEQFNIVYCTMLLVQHLLTCLFGICFGVFLMTKDGVPDDLDRASKYLPYIVT
FIFQTFTFCFAGNLLLSWSLEIPNEIFYHDWAKKTTYENKLAKIISMKRGQRAARLTLGGFANL DLSFRM
VLKNALSFFTFFVNAMMNKKA VTSVZ

>TcasOR112

MITRLMAQFAIKGRVGTGGYIMDKVKLAQPLAHLNIIIGLDPLKNDRFSKIRTVITVAVFALCNVFSFSELFL
HYNNPHVIVRSSEVFPFFQNDWKIAIMLVYKKNLAQLIQNTSRFWQIDAFGKNYQYSMGIKHKYVRIFY
LVYRLMLMFSCSQYILLTIGSDRPMILSFGETGGLGSGALLFYLIHIVYLLIIFNVINGFDGLFFFLVAHVLS
ELQMVKVAFSSSVITFWNHKRRFKSAIQHHRFVLDYINRLNSIYSILLLNQHISCLFGICFGLYLFISDGFP
PDYEHISKYVPYVIYITQVWVFCFAGQLIIDWSVNISDEIFYHDWTLNRTYENKTDKLIHQRAQHAARLS
LAGYGNL DLQS FNLVLKNGLSFFTFFVNAVIHKZ

>TcasOR113

MLDAWERLTFYPFKWISLGGLHPQNDRLVAKFLFLYNFAGFGTILGLAITQIYLSYENIYYTIDSILTIVLYL

HIASKYVNLHLHKDTLAMLQERSKFWPIDTFEMTVRQKCVRLTKSLTIKSYLGYSLLVVISFLIQPIITGQ
LPVFMYPVPRGTYIYFFVIFMTITPGIMSSIWGVDTLFFSITTPVSIQFKLLAHKFETIDLKMDSKRVRHEFRK
LVVDYHNFLINYCQNINRMSSGIFLTQYLVAIATSCMQLFITSQPEFGLLNKKICLTYFIMQIETGIYCFTAQL
ISESSENVGNAVYKAPWYDFNCGTRRDIALVIVRSQKKVVFNGLGVLWIKMETFTKIFKTALSFYTYLNT
MVYQNZ

>TcasOR116

MPETLSFYPELMLKSAGLHPYTKLKIVKFFYHHYLNLFFFIFLLFLAILEVGVSVKCDIYRAIEALSSVLFMT
LTLFRYVVNYRNKPSLAWLLEKRSNFWLLEHFEGQIRTDCAKIMHTSSNFIRNYKNYAIVLAAVFYVQPI
FHELQMKIYVPEGWFYLYLVYWYMTPLFVSVYGVTSMFCAICIPVTIQFKLLAHRIQNLDKSEKFQR
DLKHLVDYHNFLIDYCTRINRYSNGVLLFEFFITISVCCILIFIAANDYPFVDKIKYAGFIVSQFLDTAIFCYN
CELISDASENVGKAAYDSLWYESESKIRRSLLIIVRAQKKVTFSGYGLVRINMMTFTQVFKATLSFTSYLN
TVTVDEKMLNNZ

>TcasOR117

MDKNLDPDDL SAYPLKFLWYGR LHPGLNPWWTKILVPVNVSVAFLYLVLAIKGIFSSYNHDTFFTAECV
QTCILVVHAIGKFSNFLVHKNSLLRLVAKKSQFWKLESFDGDLYNECVWISTFVKKITRFYYFLNLFVLISF
DLQPFTTGYPGTGCYVPEGWFNFLTGLLWYLSCAVLFGPLPGTDGFFCSLATSLIIQFKLLGYKFKNTKLYK
NEPDITLWNNLKQLVDYHNYLLSYSKELDATFKTIFLLQFMISIGSASVSVFIFMQPGDWSNRIKFLLYFVA
TMVQTAFYCIPLEFVVSSAKQIGDFVYESNWWYQVKDIKFEKCFTLILARTQKNVVFSA YGLIWINLGTFLV
ICKTVFSFYTYLNSVNKITSZ

>TcasOR120

MAKKFLLDISADSLRLLWLGQMHP LSPFRRFVTFLLNLAAACWLMIALAIKGITISYKSDIFFVAECLQTCN
LMFHG V GKFLNLYFQKNNLKS LLENRSKFWQLDDFRSEKLYSQMQGITFVIKKVLRYYYYLLVLCVVFLF
DLQPFATGLLPTGCYLPEGWFKGLTLTLWFLSVSFFLNIQGTNGFFYSQSVSLIVQFKLLSHRFKTTQFDK
KELKELVDYHNFLT SYCKQLNQAFAAIFLLQFFTSITSASLSIFIFMQPGAWTNRIKFI LYSYTLVETSFYCI
PAEILVNAASEIGNSVYDLDWHKIRINRVKKCIVILARTQKTMVFTGYGLVNMNLQTFVVYVKT VFSFYT
YLNSVRKIZ

>TcasOR123

MAKKFRSDDISADPLRLLWLGQMHP LSPFRRSVAF LVMNVSACWLLAALAIKGIITSYKNDIFFVAECLQT
CNLMFHGIGK FVNLF LHRDNLKLLKNRSKFWKIDDFQSEEIYQELSEITSTVKKGLRYYYYCGVVVVMML
FDLQPFATGSLPSGCYVPEGWFKSLTVMTWLLSLSFLNGVQGMDFGFFCSISISIVIQFKMLTHR FKNMRLF
HNESERKMWKELKELVDYHNFLTRYCKLLNTIFASIFLLQFLVSIISASVSIFIFMQPGAWSNRIKFI LYLA
VVAETSFYCVPAEIVNSASEIGYAVSELDWYKIRINQIKKCFVILARTQRTMVFTGYGLVNMNLQTFVV
YVKT VFSFYTYINSVRKIEKZ

>TcasOR126

MYNNKDSLLYDPLRFFGFIGFHPIFNSLILKISFYSTTLGLFIYTM AIIIGIVKPEETNSFFTLECLQTCILLSHT
IGKQVNYYMNSNKIVKFLQMTTEFWEFETFQGTIHPESNFLFHTVRKMIRYYFLVTTFGFIFFLINPPVCYV
PEGWELFLRIVRALTFWSYYTSTMATDAFFVACGTL LLIQFKLLGHKFKNLDTQSQEKWNNLRQN VKHQ
IFLHSCLLNQIFAVVFLIQFLNSIAAL AISIFIFSKPGSWNNRFTLFYLVVVL FENAFYCVPAELVSAEALK
ICDQLFASKWYESNVAQFRKSLVIVLCCTQKVIKFSFGLVEMNLQTFVLISKTALS FYAFLNQLKRZ

>TcasOR127

MSPRTLEMIADLPKDII TDSLKMLRLGRHHPTGSIWWTIFFIPVNTFFCSLLIILSIVGIVRYHEDDVFLAVDC
LGTCTLMLHAISKQIFLHAQKNAINVLLKMKSQFWNLDDFDGEISKECEMILTSGKIAVRIYFSFTCAAAT
FYFLQPFTAHHLP SDCYVPEGWF PFLAISYMYLIPTLVPSVVGLDALFWALGLSLAVQFKLLAQKFKLLGT
CHENETAILWNQLKELINYHRFLIDFCKKLNKLSFIFVQSFITITSASVAVFIVMQPGNLSTRVKCLLTFV

SYILEMAFYCLPAEMSVNAAIDVADSVYNSKWFRIKSTEFKKCLILIIGRAQIPFTFSGFGLIHINIRMFQLV
CKTTTFTFYTYLNTVQNRQZ

>TcasOR133

MEYLKYCQTYIKGTGLASNSSLFRNILAKYFFLPPCFLIIAFSIHELWDTNNNDVSLVTEVLECVASYTQLII
RKYIVFTQSDLMVEIINDCGKLWPFDMFGSELGKKFKQMKTCWTLVKFLVVCGFATFFLMCISARAAE
RDNSLPFLCWVPDFPYATELLFFLQFMLLLELLYYVLATDAFYILICMDIQFEMMGKMLKSIKFGEISEK
ECWDKLVELAKQHDRMLHQKLNQVYSKYVVVQYFMTVGSMTVQAYNLKYRMVNIQTALKSIVYTFSL
MFQCGYYFFPASNIEIEAENFSTEIYFLNWQNIGNIKIRKHILFMLMKSQENLAMMGEGMVHVNRNECLM
MFRLAFTIATLLDGLNQVZ

>TcasOR136

MEYLKYCQSYIIGSGLASNSPVFRQFLARYLFFPLSLILVSLSIYIHKDANNDIYFLTEVMESLASYTQLLIRK
YMIFTQSKLMVEIINDCENLWSLELFGPELGKKFKQMKNCWTFVNVLVTSFGFSTVLLICITTLTDKEKSL
PFVCWIPGPFHATELIFLTQFVLLMNGLYYIKLTDAYLLVCMIDIQIQFKMMGKMLKTIHFGLLSEKESWE
KLVELAKHHNKILHKKLNKVYSKYVVVQYVMSVTAMTAQAYTLKYIEVNIQLALKSIMYTCSTLLQGA
LYFFPASNIEIEAENFSTEIYFLNWQDHGDVKIRKHILFMLLKSQENLEMMGEGMMHINRNEYLMMFRLS
FTIATLLGGLNQLZ

>TcasOR138

MGASIHFYFNYFYGHSQSSKFPTSSKSLKARIFNYVLYPISCTILAFMLYNFRYMNDNIFKIARNCSITSFGQ
IFTRHFIYAQHSFLLNLLKNTAKNWKYDPKNPLFGHKTWTRVILVKSLLKIMSFFVVTFIILPFFCQDIDL
QACWVPGSGHKMQLLIYFLQSVCLLEPMILLDMVDSVLLTGVELEIQFILLRKAIKNVQISEQENQNFCM
GKLKLYASYHQFLLDQHTVLKQAFSSFFLQYLVSVQGLCVEIFVIKQASTIEQIFFSATYIVANAMFLSFA
FLAASYLEIEAEALPHAIYSIDWYNGDEKLGHVLFMLMRAQKPLILTGAGMFAVTRNALLQVYRLAFSI
STLLKQVZ

>TcasOR139

MSDHFYVSTIFKLSGYLPSLTKLTKILKYVFSPIMFTLITFIIYNFRYMHHDI FEIARTCEALSTHGHVFG
KLAVLKHANLIEQVINDRNFFWSYEKFGEKLGQRFRQKLFFRDYVMKSLSAMSVMMLAYFYLTVPFVRS
VNLPAQASWVPQFSHATALVYFCQVVCLESIPVAVIDGTFLLMGALEIQFNLLKKTLLKAVEIGQNSGQK
HEEKCLKQLKICASYHDFLLKEHVMMKTIFSEFFLLQYLLSIEGLCIELFVFNKAQTWGQFALGAIYVVGII
MQSSFTFLSASNLEIEAESLADSIYDWDWYNAKDPRIRKHILFMLMKAQEPLRLTGAGLFDVNRNMLLQI
MRTGFSISTIMRQFZ

>TcasOR144

MAFNESQDNFKLCFIAFNLSGLGPSSKPFLKILSYVLYPWLCLLFVLVCVNIVFKHSNIWDIGEVTSISIAV
MMVVRKTILIKYSSVFAEIIELHSRFDYGLFGKATETKIRKKVDFFKILKCYIVSGITATSTRSIVPIFDKN
LTMPQDCWIPGNNISIVKHIIYAFQVIFYAESISYFTFFDGFLLIVTANLQAQFILLQKATGSINFETDSEETA
WKKLVKCCHEHKKFLISVHKKLNTLYSYFYLVTYFLVITMGCVSLFVIFDKSSTFAQLLESITMVVLNVM
AMICICSSEIEIEAEKLLTQIYEVNWEYETPNLKIRKFIWFWMQAQVSVETKGAGLLVVRSLMLQVQRFS
YSVSTLLKGMNEZ

>TcasOR146

MKYIREVENIKAGIFSSCGIVAEQVRVEMSEKNQDYFKIPDKCYNWSGVRVSSNALTGFVSLYILYPLML
ILYFMIYNIRFKKNISDITEVFISISTFTIITFRKTLIRNGSIYEDILKKQSHYWKYYMFGKPTMKLRKSME
FCVMVIKFLIASTTGSIIHSHIPIEGKIVLPQPCWVPNNDPVANDIIFALENIFYMEGTNYLVVFDGLYLL
MTANLKTQMILLRKAVASINFREDEKTTWAKLKEYCEYHKFLLRIHGKINKIYSAFFLMTYVFTIMGTCTP
LFVIFYEEADMVLLGKSVFIALILNTLLVMTFIPAGELEIEAEKLSFEIYSINWEYETKNLKIRKFLVFWIMQT
QIPVQMSGGMLIVNRPLVLQVQRIAYSLTSFLAGLSZ

>TcasOR153

MAPNKSSKKDFLDMCRKYMHGSGLGPTSPKIKRFISLWLLFPVSLLLDVLVIYDFHFLDNDIFKTAELLES
VSSFGQLPIRKFILTYHSLIQNLLEDNRKKFWSYEMFGETYGKFLRRKMVLATRLIQTMIFFGASVATLMF
VSTLADDRKTVPLECWIPEFKHSTHVVLVMQFCSLCEIHYLVGAVDCLYVLTCDVIKIQFLLQKKLKTIQ
VGVKPMEECLNELTICVKHHNLLLRSHKSLNRIFSEYFFVQYFVSVLAACVQLYILMYITASLEDIMKSIV
YLSAVVFQVAIFFMPASDIEEEAEQFAVEIYNVNWECTSGTKFRKQLLFMLMKAQKPLYMLGGGMIHAN
RNEYIVLFRLAFSISTLLGGMNENGRTDKZ

>TcasOR154

MSNNDETDYFKIPLKFYNWSGVRITSKKIPKIIISVYILYPMIMVLYGLMIINIRFNIDSLAKFIEVGISVSTMTI
IALRKTLLIKNGSVYEDLLETQKLYWAYNRFGQAFESTQRKRMYFCLLVTKFIIGYSCVSLSYHSIAPHIM
HEMILPQPCWNPNTTIGRNIIFVENIFYIEGTSNFVIFDCLYFLLATNLRIQFALLRKELNSIDFKEDSEEK
CFARLVKCSQYHKLLLSVHRKINTIYSAFFLLTYVFTITSTCTLMFVVFYMEADAALLGKSIFIVIIINTLLV
MTFIPAGELEIEGEKLAMDIYFMNWEYETSSLKIRKFIPLFWLMRAQIPLQMTGGGMLVVRPLVLQAERVS
YSLASFLANLZ

>TcasOR160

MSGKTKRITTKTIHLSNPYSSFKKVFSDFAYSIMIFYTIATLAFHMLSLFLQIYYVATNYSVELICRYGPM
MCLAIYVVTAKEVGVFYKFTFMLENQCLFVLWKTCSNSPTTQRLILNKSLKMNQKLHLALMSYFLLAI
VMLPTWGDNLNELFISQVYERYFKFWAPVLYFYISTFLWCSYYSFHLPGCILYLTLLLDVQIKLINDKITEI
IDQNFQNEISETLRLCISHHIALKRWMSTLAKMVNSVMPVFLVLLGALSTVAVSFFVLNTLQNTTMILKIR
LAILTVCNFVIVSTFAELGQIFSDQNNSLFEHLIDCPWYLWNVKNRKILLMFMANCMKPKTFSWGGITLD
YSFAISILKTSFSYALILFKLRGETIRNZ

>TcasOR165

MSDNTKKATTKSLDLTNPYSSLKKVFINFAYSIMIVYTSATLIFHILSLMLEIYYLATNFSVELICRYGCM
MCLITYMVTAKFFGMLFSNQKFLEEQLLDFWKAFNSGPTTQRLILKESKMNRIKHLALTFYVILAIIM
LPIWEDVNDFFMFMSQVYENYFANWAPVLYFYISTFVWCSYYSFHFAGVIMYLTLLLDLQFRLINDKITEI
DQNSTQNEICGTLRLCISHHIALKRWMNKLANSVDAMPVFILLGALSTIAVSFFVLNTLQSTSILKIRLA
TITVCNLIVVATFAELGQIFSDQNNSLLEHLMDSPWYLWDVENRKTLMLFMANCMKPKTFSWGGITLDY
SFALSIFKTSFSYALVLYQLRGNTFZ

>TcasOR173

MSNVTFDEPFMFKKVFFDFGYCTSRIFYHLFCFTFHICQIIENYFFLTEYLSADFVTRYGCPMIVIGYTIV
CEFFLMKWEEPIKELLDERETIFWEIDSNSKPQLKYSSKVNRIYKFFLFWVILAIFFLPFWDLDETFIIR
IQKIYFGKWSTLFYTYLVSTLPMVYSGIRFPIVTLYLIMQSHLQILILSQKIGQISQNNNHMDDVSKFHDV
GYQKKIRTSLHVCMRHVTLKQWISKILQIVQKAIPVYFSLAIIVLVTVMFCILYNVESASTTTIFKIRLVV
GICGAVVLFTFSETGQLLSDDTSQVFDTLAASPWHEWDPKNRKTLMLFLLNSLKPVKIYWGGFALDYQL
GGSVIKTTFSYALVLFNLRKDZ

>TcasOR175

MRNFQDSDDPFIFIRKVFGVFGCSTIIMYYSRLIFIHFTLSLLLESYHVITNFSLDIITQYGSAMSLMLYSITSQ
FLLICEQNLITEVVEECKSFFWTMDFLSFIKQTQILKDMTKIKRMYLSWIWFVVFICIALPVWGDYNEMF
LFPFIYQTYFGNWSPLFYFHHASSFPFLAYIAIRIPAFILYLTALHFQTLLLNQKILQIPQNKSGNQEDIFRN
LCSCISHHVALKKFVTKTQQSIQKMIPVYFVLAILCLVAVMYSCNLAMSTSNHFKVRGFFGGVCGVVV
LYTFAEAGQLQADTTGEVNTLMQCSWYNWNNRNQKILLFMVNSLKPSYIDWGGVIVGYSGSSVIKT
CYSYALVLYKLIKISKEQNVTFZ

>TcasOR198

MPNVTNKRQKRLFSKTRTKSEDPFVMIKDVFDGQYHPVTKMLNYICLVHSCSLLELNYFVHNYHFDL

MMKYCCAMSLMGYIATMLFAIFQEHSIDLTKDILSLFWPIDYCGPRVKEEIVKKATKINRIHYIVLLFAG
ALGITMFPIWGDQKEWFLCVQVYQHYFGKWSKIPYYVFFTYPMLAFSSVRLPFMTMYAIVQIRMQVYL
LHQHISEISGEYVYDMKNLQILCDQNYQNEIYDKMRLIISHHIMLKRWMRKL VHTVQISMPVFVLLGTMT
SISVLFYAIYSFHNINFILKVRLISVSVCTVLVVYMFSEAGQALSTETTGVFDLLMTCPWYVWNIKNRRILL
IFMANSLEPMTFSLAGVTLDYRFALGMLRTSCSYSLILYKLKTGIZ

>TcasOR199

MSMTRSKYFQDSDDPFSFIRKIFIDYGYSKKINYNNRVTFNTCSILLESYYMITNFSLDL FVRYGGALS
MLYHVVTQFLVIAKQKSLEQLLEESKSYFWKADIFNSSVKNQILKSCNHMQRKFCLLWTPFVACGIVLLP
VWGDFTESHIFPQVYKAYFGHWSPIFYF CISSYPFAVYTSIRLPAIALYLFLQAHFQIVLLNQKILQISKNN
DLDETTIFENMEYQKTIYRNLRSQISQHV ALQKYITRILVSIQKAIPVYFCLAVLCLIAVIFVLLNNLMSAS
NHFKARIVSGVCGSLILYTFTEAGQLLADTTGDIFNTLMQCPWYYWNIKNRTVFMIFMLHSLNPLKIDW
GGFTLGYSFGGAVIRTCCSYAVGLYNLRESKYZ

>TcasOR200

MSIQNTKKTNLNGKEKHPDFIKFCFTDSNDSFLILKRVIYIDFCYHKITKTCNFLLVISQLFFYLIQIHFLLSRFS
LELLARYSTIMMITVALFGLILSFYLEEDIHEL YKILTEIAWPLDKASKKDQQLRQKSRRLNSLNLYFLGF
LAFMIVIFLPIFGDEENLFLCIQVFDEYFGDRAFIYNLYFIGFPFLIYFSVQLCFMFLYAILHLHVQINLINHH
ICEMGASFELLSDWKKLHVVYQSAISQLLCQIRQDIALKR FIVKLNETVQLGLPFFLPVSGLCGISVIFFL
LNYMCTMSLVWLVRVSAFFICLVFVALIFSVSGQLLIDETGKIFDTLVKCPWHIWNVRNRKIYLI CLTHCV
RPNCISYAGITLNRIFLITVFYKTVSNAFILYQVRNSZ

>TcasOR202

MVEFKDPVIMLKTIFLVNVKEMTKFSQVFLAIFTFYSLVHCVQMYLYKNFDVNLLIKYAPATTATL FVS
NTKLLSSSLNIMPIFSVVSETKLLRITTFIDKTFWPLDSIRKEARIKLERKCRAINISIY CILLLSVAVFSNFPC
FGRQDDFFLCIKIFKEYFGQWSSIPNYIYFTLFPIFCYPYFRIAFS FVYAILETQLQFSLIEEYLF EYVYQMVDL
NWKYLQDPRYQQEIGKSLQLCIEHHTALKKLIHSIVNITLTGMPIFLLFGIGLFVSCFVFIINFGDTMTMILK
LKTPLLL YVATMLSMTLLMCWNGQQVIDVTSRIFYTLVRAPFYFWNL YNMKVLLMFI TNCTRNENIVLA
GICLDYTL SVSILRISVFYTLGLLELRNHSFDZ

>TcasOR206

MWNNNPFI VIRTIFLDINNYKIVKFCYVSLTVFYSLVHCLQFYI IKNFNLNLIIRYGFITSLLSYVLAAGILS
LVVEKRIRKTQIFFDEIGWSLNIVGKDAEMKLEKKCKLINISIYAIMLLLIITLLVNL PFGVSGQRDLFLSIQVF
EEYFGKWSEILDRLYFALAPFLSYHGARLSFTCIYAIMQVQVQFSLIGEYLFETYQVDDSKSWKYLQDTR
YQHDIGESLRLCVEHHVALKKSIMMVDIALTCLPFLVLLGLCTLISCLAFIMNFWDTMDN ILKLRFMW
AAWIVLITIMFCRSQQQLIDATSDIFFTLGGAPWYYWNLDNIKILLTFMANSTKNDSISLAGICLDYPLFVS
VANTTVSYALVLVNLRESSLDSSNKKZ

>TcasOR207

MVEFNGPFI MLRITL FIDMNTYKILKLFNVLLNVIYSLIHCLLVYHMFKNLNINLIIRYGP AVLFLILVIVGA
VFSVYLEKDILEIVTLFRKTRWSLSMIKKDARIKLEKKCKIINIFILFLVLLIISTITINAPYFGDQRELFICIQV
FEEYFGEWFFIPYNFFFAFPFLYNNFFKLWMTFVYGILEAQLQFFILEEYLCGTFETDFRKNWEYLQDTR
YQQEIGTSLRLCIAHHINLKKLIKMIQNVTLMVMPFFLV LGVLILISSFSFIINFADTMTTI AKIRMVISAISM
VGITILLSWIGQQVIDVTS DIFVTLG GASWYYWNQKKYXKTLLMFLTNSIKNESIVLAGICADYGLCVALL
RLSVSYALVLFNLRKSTLVZ

>TcasOR208

MEKLDDPFITLRKMVFIEAKNCKIARFCDVLLIVLYSLAQCLHLYYMCQNFNLNLIIRYGPILISCLLVIVT
AVISVGLDKEIFEYVTV CWKISWPLNFLRKDAQTKLRRKCQIINRGILCSALLFLT TTVISTFPCFGSVRDFFI
CVEVYEKYFGEWSFIPYYFYFAAAPFLYHFFRV CYVFAY AFLHAQLQYFLIEEYLL ETYQTNDLKGWK

YLQDTRYQQEIGKSLLLCITHHIALKKYVKISQNLVLIGMPFFLVLGVLLLINSFGFITNFGDTMSNILKIRIL
IFVACGVSTITVMCWIGQQLIDVTSEIFVTLGGAPWYFWNRDNNNILLMFLTNCTKNESFILAGICVNYQLF
FSIVRLTVSYTLVLYNLRESGFIZ

>TcasOR209

MMPEFSDPFIMLRKMIFIKNHKIAKFCDFLIHAIYSSAFCLQIYYLCKNFSISLLIQYSPTLLCYIFVIDAAVL
FYVEKNILEAITYYDEIGWSLSMIPKDAQTKLRKKCLIINICVSFILLILSTLTINLPYFGSQRELFIGIQIYEE
YFGNWAFFVPHHFYFGVFPFIYNSVKMWISFVYTILEAQLQFILVEEYLLSNIINDFKGWKHLHDIRYQQ
EIGKSLRLCITQHIALKKLVKMIVNITMAAMPSFLVLGVLLLISSFAFILNFADTMTNILKIRVLMFVACIVC
ITLLCWTGQQVIETTSDFDSL VGAPWYLWNRENIQIFLMFLVNCTKNESVLAGICLDYRLFVSMLRIS
VSYALVLFNLRKSSITZ

>TcasOR214

MAEFIDPFLMLRALVSVKFNDYTSCLKCNILLITYSLIHCLLIHYMFKNLDINLAVRYVPMIMFLTLVIVG
AIFSVAIEKDILEAQVFLFKANWSLEMIRKDAQKLKERKCRINIICILCVLLIFATTINAPLFGSQRELFIGIQ
VFEEYFGKWSFIPYYFYFAAFPLYDFLKLWMSFVYAVLEVQLQLTLVEEYLFETYQINSSKEWKNLQD
THYQQQIKKSLRLCITHHIALKKFVKMTVDLTIKVMPFYLTIGVLILISFFSFIINFADSMSNILKIRIFMFSAS
IVSITVLLSWIGQQLVDVTSGIFWSLVGAPWYFWNLENVKTLLIFLMNCTKNESIVLAGICIDYSLGISILRL
SVSYALGLFNLRKSSLDZ

>TcasOR222

MDKRDDPFILRRKMIFIEAKNCKIAKFCDAFLILFYSLVQLLDIYYMSKNFSISLLIRYSPITIMYLLIIIAAVIS
VGLDKEIIEAYTVCKIRWPMNVVKKQTQIKLKKKCQIINAGLSCTVPLFLVTIISTFPYFGSERDLFIGVEV
FEAYFGEWSFIPYYFCFAASPFYYHFFRITFVLVYAFLHAQLQYLLIEEYLFETYETDEAKGWKYLQDTR
YQQEIGKSLQLCISQHIALKQFVKKTVDLVIGMPFFLVFGVLLLTSLLAFTNFEDITSNILKIRILLAAGCS
LCITIVFCWIGQQLINVTSDIFFSLGGASWYFWNRDNMKTLLMFLINCTENESVVFAGICLNYELFLSVVRL
TVSYTLVLYNLQKQZ

>TcasOR223

MTDFKDPFIMLRRIIDVNSYKITKLCDFTVITFHSLVLCLQLYYMIRHFDVNLSIKYGPITAFFLMTVSAV
LSGALSQDIFRAVAFFEKISWSLDVIRKEARIKLERKCQVINTCISCILLFSSTTMVINLPFCENQRYFFISNQ
VFEEYFGKWSVLLNVFYSGVPYLYGYSVKPCFVFVYAILEIQLQFSLIEEYLLQTYETDYLESGEHLED
QYQREIGEALRRICITHHVQLKKLIDMMVDIVLMYMPFFLVLGVLLITCFAFIINFADTTNTVKVQAFMF
VVTALCNTVLCWNGQQLIDVTNSIFLTLGGAPWYHWNVENIKILLMFITNCTKNDSIVLAGICLDYKMF
VSVFRISVSYALVLFNLRKRSLVZ

>TcasOR224

MTEAGDPFIMLRWILLMDVSNNKITKYNVFLTTIYSVVLCLQIYYIFKNYDTNLLIKYGPITISLLFMITVA
VISLIMQKEIFKTVTFIRETCWPLNIIQKSGQIKAERKCRITNFYITSTFLLFLSAIIHYPCFGSQRDFIICIMF
EEYFGEWSSVLYLYLIGVHFLYRFLQTCYMFVYGMLEAHLQFFFLGEYLLQTYETDCLKRCKYLQDT
RYQQEIGQSLRFCIKHHIALKKLVKMAFNLAFIGMPFFLVFGVLLLISCFTFIINFADTMSTILKIRIFMFASN
TVCIAILLCWIGQQLIDVTSDIFVTLGAPWYNWNLDNIKLLMFIMNCTKNESIVLAGIRADYQLFVSLLR
ISASYALVLLKLRKCSLVZ

>TcasOR229

MSARPLHLRNFPYYFLKVLVDFDEQYSAGKVL SYFCAIVHSISIFLQMHYLVKNFTKETMFQYGCVLTVL
TYCVVALFFAIASGNFVEKLESEISSFWPLDICGEDVKAAILKRAFYTSLVAYITIIAFPIFSVIMFPVLGDQ
SDMFLCVRVFNFTKWSQIPISLYFYSPVIAFSGIRLPGMLLYAILITHIQMFLNRRIEQISELSNQRRVF
ETLCSCELQAKLKRLIRNVFLVYIAMPFIILLGAVSSVFLFFVNSLETASYFLVLRMGCFGANVLVV
FIFSQSQSFSDTGRIFDTLVMCSWYNWDRNKKVLLMFLANSLEPMSITIAGITLDYKFALAMLRSCS

YALVLYQMKNZ

>TcasOR231

MEVTGKKVTSGDPFITLKKLYIDLGYHKVTKLVNVFFIVFYGFVYLLQIYYLIVHFNFEIIAKYSTILLSTY
LFNVMIFSIIEKCILDAYKTFSQIAWPCDNASKPLQIIILQRSKTIKYLNYFFLGFIFFMACINWPWLGDN
DFLLCIQVFKKYFGSWSPFLFFYYLGFPIIGYSAARIFFIILYGVHLHELQIRLITELFCKISR NATLEDVRNA
KYQRDVYWTLREGIRHDTALKKVLFDLNKEVKHGIPVFLIVTLLCSVSIFFFAITYLESMGFGIQRTIAFVG
AVIFVLFYSLLGQHLLINQTSLLFDQLYECPWYTWNVKNRAIYLNFMMLNTVRPIKITYAGICIDSRFFLSITR
IILSNAFMLYQLRNSZ

>TcasOR238

MMSEFNDPFIVWRMIFMINFKKHKITKFCEIVLIVIFSLIHCLLLYYMFTNFSVNLLIRYGPTTLFGIFIIAVTI
FSVALEKELSGGIDILDEICWPFNMIGKEAQLKLERKCRMRNMCTAFVVLIIITTIIVSYPCFGDQRDFICI
KVFEYFGEWWSIPYYFYFITIPFCYNYHKLCFTFVYAVLETELQFFLIEEYLLETFKMGYLKRWKYLEN
TQYQQELGKSLRFTIAHHNALKKMVKAIVNVTVNGMPLFLLLGFLLYISCFTFVINLADSMNTILKIRIFVC
GASCVSVTVLLCWNGQQIIDVTNSIFSTLTGAPWYFWDVDNVKILLIFITNCTKNDSITMAGICLDYKLFAS
LLRISFSYALVLFNLRKSSLSZ

>TcasOR254

MDKLDDPFIVLQRLIFIEAKNcklaRFFDVLLIVLDSLHCLQIYYMCQNFAFSLIRYGPVFIFFLLVIVTAVI
SVGLEKEIITYAVYCKTCWPLNIVKKQTQIKLKKKCKIINRGILCSLVFLAAVISLFTCFGSQREFSICVE
VFDEYFGEWSFFIQHFYFTVAPLLYYHFFRVCYLFVYALLQAHLYFLIEEYLFETYQTNDLKGWRHLKD
TRYQQKIGKSLLLCITHHIALKKFVKMTLDLVLIGMPFFLVLGVLLISSFAFIINFADTMSTILKIRILFFAA
SSVCLTMTFCWIGQQLINATSEIFWSLGGAPFYFWNRENSKILLMFLMNCTNNDSSVVLAGICLNYRLFLSV
VRLTVSYALVLFNLHKSGLVZ

>TcasOR259

MMPEFNDPFLVWRMIFTINFKKFKITKFCEIVLIVIALVHCLLLYYTFTNFSANLLIRYGPVMIFYIFMIAA
TTFSIALEAEELSEVITFLDEICWPLNMIAEDAQVKLQRKCRIINMCIAFLVLIILSAIIVNYPFFGDQRDFICV
RVFEYFGEWSFIPYYFYFAASPPFFYYNYFKLCFTFVYAVLEAGLQFFLIEGYLLQTYKVDYLKRWKCLK
DNRYQQELGKSLRLCIVHHIALKKLVKMIVNLTVNGMPIFLLLGSLLYISCFTFTINLVNSLTNILKTRIILM
GASCVGTVLVCWNGQQIIDVTSSIFTTLVGAPWYFWNLDNIKILLMFITNCTKNDKIVLAGICLDYKLFA
SILRISFSYALVLFNLRKASVSZ

>TcasOR263

MWNNNPFIIVIRTIFLDINNYKIVKFCYVSLTVFYSLVHCLQFYIINKNFNLNLIIRYGFITSLLSYVLAAGILS
LVVEKRIRKTQIFFDEIGWSLNIVGKDAEMKLEKKCKLINISIYAIMLFLVITLLVNLFPVGSQRDLFLSIQV
FEEYFGKWSEILDRLYFTLAPFLSYHGARSFTCIYAILQVQVQFSLIGEYLFETYQVDDSKSWKYLQDTR
YQHDIGESLRLCVEHHVALKKSIMMVDVALTCLPFLVLLGLSTLISCLAFIMNFWDTMDNILKLRIFMW
AAWIVLITIMFCRSGQQLIDATSDIFFTLGGAPWYYWNLDNIKILLTFMANSTKNDSISLAGICLDYPLFVS
VANTTVSYALVLYNLRESSLDSSNKKZ

>TcasOR272

MTRTPTDDTTFDLDNFMKNDSMKLVRVIAYDTLKFKITKLILFITFLVHFSTTLIQVYFVCVDFNVYFFVK
YAPAMFGSLFVMVSIIALFVTAETDMVVRVFRKAQLRKLTVEDGPSFHVQKECKIFTVFFVLNIIALFSG
YLHALPDDDDREIFYAFAFFEDYCEWKDFCSFLYRITFLPVAYVVMYVPINVFVYAAIHLKSQIYYLKEHL
IQINEGYDISNNNDLFYDENYQRIIREKMIYLYKIHVKLFLAALDIRKLIRGFIALFAIVGCLLGISILYFVML
FQGNLFDKFGRLSTLTVVAFNSFAAVIISGQMIESSSSDDVDIIYNCNWYDWNEENKRFFLLIRMATMHP
FKLQFSQNYAVNYQLGVAILKAMYSASFLLKAIKNDFZ

>TcasOR276

MTMQFIVKRATRGIHDLRVLKFISDDIFDIKIMKLCFLITFLIHLTACAITIHAFMFNNFSRREFISCAPVLF
CFYGLLGGLTILFKPSMTRTLMLELKAWDITAADDAVSSRIKFEINVITVFCLVNYLLALVASFFYYMSFY
GDEEIFYLIRFLEDHCPNHKRVLIKLYKISFVLLGYVMVHVACQVLYATQHVRVQLILCAHFMANVTKQA
KNIKDEHLPDDNNYQNMIRERLKFCIIRHQEIRRFYFDKLEEMGNLIGGFALLGCFLGISFAMHMLTSEFLR
YHFARTVSSIIAGVTTFATVIAAGQSVETEVDISTRVVKEVKWYTFNESNKRSYMLMLLSMQTYKIKFSE
NYSINYELGLSIVRGVFSIVSVVVQLDYZ

>TcasOR281

MDYSEKSLIQGDCLKLLKVISSDIFQPKLVKLILLIVFGVHLVVDLLTLRALLVNELDFKEFIFYGPVFFGSF
YGMALLTLVLKDDFISNLKQEFRLWPLDCAGDEIYSQIKFENKIIKIFVVENCIVTFIGSYLYFLPLSDNE
TFYAVRFIEENYPDHRNLLHGLYRSTFLIFGYAMTVHVYQVIYNSQHLRYQIIIFTEYVASIGNPDKRKENE
LFYDKGFQKVVYERLKF CIMRHQEFLVISNKKVGD MRVFIVGYSLCGCLLGISLTFYIFSGKFYREHFPRV
SVACVGAVTTFWAVITAGQAIESEYDSSLSTLLGKIEWYYFNDSNKKNYLIMLINLMQPWKIKFSEEYAV
NYELGLAIVRAIYSIVSVIASMHFEAZ

>TcasOR283

MLKFEPKPTTKDELLWVVRTIYVDLFRNKLIQFALKMLFYGSIIMAIYQGVLFLEYEFIHYFVKYSSMYCF
TCFILLAAYSVPPIAEVATTAFTTIKCWKIDSGGALVENKIKQEAHFTNIITAINCIFGLMVLVLFIVPFEDDN
DFYFLFIAFEKYFPQWQQLKWGFKAFFPCITILLQAPFYIVYACLRIKFELYMWMEFLKLNINIVYEKSDI
CELVDHSEYQTEISKRLRFCIERQEHIYRSLLYGKKYVQQLDIYIFAYAILGSLGGISIIIFVCISFEGNFFQGT
YLRLSALTFTVTLTTFMHVIWAGQSVETTSSDSYDILKQCDWFLWNLKNRKTYLMCLNYTQRPLKAQFTQ
NVSINYVLGFSVVRTVYSTLTALNSLRKASKZ

>TcasOR286

MSVQKVSPDNLWLSAKICLHIFQYKAIIKILSLSIIILTCIQTFLYLKRFD SAYFMKYLPVYAGSLFILASI
FCIEHISHVILSTVEEFWDYADSKPEIRNWIKEALYINTFMVVDAFVAYLSGIFHAIPLEDDEYEIFYPLPI
FQEFPDWTNVLGWLYRSSFLIVPVVMTAPSLMIIYFTSR LRFQMFLMDILENISEGYDISEANDLIENSTY
QKEIKERLKT CIKRHNEFLSAGGQVMKNGQLFILIMSAAGVILGVSIIFFLSFEGSF EKRYPRLVTLVISTG
LTFTHVIIAGQLVENIATRLYEILHFMDWHSWNQENRKILLIFMHNAQQELQIKFLDEVAVNYQLGISIGK
AVYSMISVLSSFKNLEESYNZ

>TcasOR287

MISFEEKHLTNVRES DVLWLGRIMSLEIVQYKPMR FILNIIAVSIIALTLIQTFLQKFDGLYLIKYASVYT
ASLFILFSIIAAPFLTKFSTEALNNLEYWPIESAGA QIEKQIQREAIYINTFFVVMVSVLSISGVAHMIPLDDD
KELFYPLAIFEEFAPKWKNWLEWGYRLSFLVVPVVM LNSSYVGIYTL SNFRFQISLFNHLKKNINFLNDN
EQTIELMDDQKYQNEINKRLKFCIKRQTHLYKV AHYVTGKVKHL SFFVAILTILLIAVIVFLFSFQGT FEN
RYFRIITLVLTAGNTFIHVIIMGNRIEEET EKIFENLKS LNWSSWNLQNRQVYLIFLHNNEEHFKVPISENAS
VNYELGISMAKTICSMVSVMSQLKNIDYSKNZ

>TcasOR289

MLNFEEKLDENIFKNDVLWLSRKLCYDYNTKIVKIILFVLSIRVAILTLLQTLLFLQRF DGRYIIKYAPVY
AGSFLIFLSVKHIPLSLMLINSFKTITLWRIDSCGPEIERKIKKHAMWTNIC LISCTVVGLVSGIFHAMPLEDD
EELFYPLAMFEEFVPQWKNL LSWMYRLSFLTVPFSMPIPVYIAIYVTTKSYFQILLFGHFLENLNTGFD TTL
NHLLIYNKYQNTIKRLVFCIKRHAYFSRAMNELIKKTYVTIATFSIMGVILSISVIAFLFSFQGNFENRYI
RVTTLVFTIVTVSTHILYAGQLIEDAAFQVYTTLKTVDWNSWNLNENRKLYLVCLQNAQIIFSIFTQDVSIN
YRLGFSMAKDIYSMISVMSKLRNVDYSKIZ

>TcasOR292

MQPNLQKNDILWLIRKLTDFDLQKITKMFLIITSVSIILLTHIQTFLFLKKFNGYFIMYSAVYTGSLFILVSS
LSVLPISKLIKTAWVKFSFWEINSATPKIERKIRKEIFYINC VVFFNTIVAIISGIFHAIPLQDDEELFYPLAIFE

TYTPEWKDWFSGIYRASFLPMPIIMVAPAYTVVYLCAHMRQFCLLLHFLENINPDNENISDKKYQAQIKE
RLHFCIKRHIHLFSKSRPVLEDLKKFVFLVTLTCGTIFCISIIHFHFSFQGTYEGRYPRIITIIIAASITFFLSILPGQ
LIENTSSEIFEVLRTNWNVSWNEQNKKLFIILLNTRQIYKIKITENVSLNYELGVTMAKAMYSMISVMKQ
LZ

>TcasOR293

MISFEENIDHDIYKDDVLWIMRKISIDYFHYKVVKILLTLLSIGITILTVIQTFLFLERFEGRYFVKYAPAYIA
TFLMVVAMQYISFSIRLAALIKRITFTWTINSARVETERKIKKHAMYTNIFFLGTVMGVISALFHIMPLDDD
NELFFPLILFEEFVPNWKNNFFSWMYRLNFLAVPFTLPIPIYITTYHLIKSYYQILLYLDFLKNINTGFDTTSSN
NIESAEYQQVTRDRLVFCIKRHSYFYTQMREVNRMKMSKFIAIFALISVLLGGSVLTFLFSFQGTFFENRYPRI
VTILITAGCIFAHVYIAGQLIEEAATQVCENLKVLDWYHWNCHNRKLYLIFLQNTQKPYKTQFSQNVNIN
YELGLSIIKTVYSLISVLRNLQDINZ

>TcasOR294

MIVYEEKIDQDVNGNDILWVMRKVCIDCFQYKIVKILLLLLAIFIAILTLVQGFRFLERFDGPYFIKYAPAFI
RTFVILVAIAFISFGMETAIYVKDITTFWLIDSAGLESEKRIKKHAMYTNIFFVSIVVGVISAIFHIIPLDDDN
DVLVPLALFEEYVPDWNLFSSIRFTFTLTPFTLGIPLYTAIYIITTVYYQILLFVVYVKNINTDLDEVNFK
YQETIEKRLIFCIQRHSSFLKRMKESNRKMSATVLVFSIVGILLGASVLMFLFSFHMSFKIWWYRIITMVLPT
GAIFIHIIFIGQSLNNAISQLEANLKMVEWYHWNIPNRKLYLIFLINTQEKGKVSQNVSVNYKLGVSIAK
AVYSLISLMSNLRSIDZ

>TcasOR295

MKFAEPQIQEEDYLKLIKICFIDVFETNLAKLALIVAFVIATGLTILQSYYSINNFTANQFLKYAPVYFGRFY
VLVCLVFIFYTKVIFKIFDTPVKWKYETVSKKYNQHVRRDALYMNYFCLFSVLAGLCTAVLYVIPSEED
HEIFFIVSWFEDNVLEWADILSLCLRLSFLFVSYLMQAPCFQMCYLLRHIQYQMGILKFYMRNIHHGFENL
DKLIFDDSFHKEIKRRLEFCIKRHVTIVLIGTTMVREGRIFFILLFAISGAMISVSLMMFLFLVERSLPFTYLRL
SALIFTATLTGIQYIAQGQSIQNTSEQWFRTLVRIKWYYWNRENQKSYFIILNAYKPFSIKFSQKLAVNYKL
GITIAKAVYSIMSFMYITDHSVGNZ

>TcasOR299

MNFDGRGEPKKQEEDYLELLKLCFIDSFRTYFAKFFLTIAFVNVIALTILQTYYSLSFSTVQFLKYAPIYFG
RFHVLVCLLFIHLYINVTDFKNFQNIWRYSYTTIGRTYDNEVKKNALYTYILVACIVMAGFGSSVLYAIPTE
KDNEIFFIMTWFEEDNLLEWADILSLCHRMSFLFVSVMQAPCLQICYMIKHTQYQVGILKSILENIHQGFDN
LDELVYDDNFHKEIKRLVFCIKRHINITLVGRKMVRDTGIFVLFLSISGAMLGVSMMFFYVIEDTPTFV
NVRLCALIFAATITGMLYVIQGQNTEDISEECFQTLTEMGWYYWNEENKRIYQLLFINSCEPFSIRFSENMA
VNYKLGIELAKAVYSMMSFMTYVSNYIKNZ

>TcasOR300

MIGLTNGDYSPRPSMEGDCLKILKFFAVDIFNPKIVRFFLWIMLLYHVVFVLVTAYFMLYVLSNSEIIGYTP
AFLGNFYPMCLCVWSVLFISRLIYVKEDMPLWAIDTAGAKVQASIKRKIFLYTAFGIFNLVLSLSAGSFYLK
NVSEDVNVFLALRIFRDYFPNYYQVLDLIYRLIYFCFSYLMVAPSYLLIYYILHVRIQAIIFAAYVAHIDGHS
DYGTDIDLFDNEEFQSEVERRFKFCIKRQIEFLMESKKLSQISNLIAAFSLAGCLFGSIIHFLFTGQLIQEYY
FRIGLTSALAAIATFSAFIYTGQSTEVQIELVDNAIDNLCWYNFNRSNKLLYLIAKADLARVRKIKFSGQWA
VNYDLGFAIVKGIYSIISVVVSMWZ

>TcasOR301

MSFENEHLGIKLTFLCVDLIKKRPVKFLKNLIFQYFVVQIIQTYYFLKIFEIRFFVKYAPVYFGTYFLLFVI
IVSWFSENIDNYTTAQFDKWELENMTQTFDEKLYKKIKTPSMIVSIVITNFALALVSGYFHILPDDDDKEIF
FIFIFVEEHFPKWQSVISWAIIRSTYIFTAYFMIYPINTLSYFMWRLKFHMYFYLENIKKINEGRPQNEKNITT
CIPFQKEVRKRLIRCIKRHTEIAHLYTLTNGIFGTMLVCAVLGGLLMVSTAFFVLAFEGSFFKKIWRVGTLI

LCAAITSAGSTHSGESLETSGNNIFLYLKEQDWYIWDRENQKIYLIFLTNVKPLRIEFSADVGINYKLAVST
LRTVYSIVSVLSQLIKZ

>TcasOR302

MDFSEPAPFHADALWIVRLLAVDILNKPFRFLMFTVLLFHVTVLLIQYFICFVQTFGEFVKYSAIFCAMP
YVNLSMITLLYEKNMVKHILEKCKLWALNSIDDKIYQDIRREALFGTVFVITNLILVFVTTITFIAPLDRD
VFFVYVFESYLDQTWGKILTLVYRATFLLGFIVVTCAHQLFYTIQQFKFQIYLLKEHVENITNIEFFDED
DSLLLKNPSYQREVKRRVRFCIKRHIQILNGADVGMKLVKKWIPLYSIAGILFFVSIVFSCISFDGSLEDVYL
RVGSLGVVSVTTFCSHFVGESIATQSDVLAQVNTFIRWCSLNRENQLFAIMGIMSKEPYVVKFSQNLAIN
YALGIKVVKLVSFLCFLIQCKGVLYZ

>TcasOR304

MRCYNHDVLWLLRFWCCDIFQYKLLKFVIFVMLVANTVLMVLQGYHFLINFNSLYFISYSPYWFGSFFIIL
SLTTCLTISNIGPEGIKSATLWQIKSTDPKLINRIKFQVKLITAYIIVNTVIALIAGLAHTFPSKNAEEICYVYK
IIEIYVPKWKTELCWMYKASYIVMALALPATCNQVVYGATHIRFQFYLVLDWIRNNIIESGCDDLKLPND
KDFQHKITKNIIVIVKRYTEFHRTFQAVNQRIAIYILLYAVIGLLGISILMFYFKFSDTLVISDYHAGTLTV
AAITTFMATVTSGQKLEDIFEELLYTWCSPWYLFNKWNKQIYLMIMVNIKPINFRFTENSSVNYNLGAAI
AKTIYSMLSLLTQMSDKDVSTLZ

>TcasOR314

MEQLPKNDPLLVLRALPEILMQHKIKYVVLFIICYMTVTMILCSYVLATVRGLWDLFWSQYSLLAFGSSI
GFSCYFVAFWKGEFIKLRRRVFANYWPLTSLGEESFQKIKKLSIFANVFMVATILASLATSTAGLPWVG
EYDIMFPVRVYTDYFGERAVPLLVPFYLAMYCTGFVMISTGFIFVHFALHLKFQFFLLNKRLDGLRTEPLV
NDFLYQNHVKEELTCCIEYHQKLLKVAKEMNDIVYPIFIVVSCGIMFSVCLVFYMKNFKNFSVRGTTMA
MTGTLTTFGFGFTGQLMENESGRLFDTSVMLPWHLWCLSNRKLHYHIFLTKCQYHVSFSSSGIINLNHTLFI
SLYTKITSILSFLLNVSCKNHTKZ

>TcasOR315

MTLVRKLQAAATNAFEIRIKDDILAELFNWPFLVLDKSWSTKFAVFLTVYCVFETLACALVYSTLDVNM
MGTYAIVARFATTFCSFFSFFTKRKQYFEIINENFPHFWPLQSLGKSTFNRIKMRASSVKFYSLNVVVMLI
GAVILISFTQDESEVYLSVKIYKDYVNKWTGTFVMFFYVSFIYIGLVVAAISFVLTYTAFHLIFQCFLLNQK
LKQINDSIVENEQKQAKFDEKYQSFIYKELISCVKLHQRLILFGKRINHLVYAPLLVYIFGGIVVGVALIYY
LKSSVQHIFTSLILLIALLINSTTFVINGQMLENEAENIYISLTNLPWYSLNVQNRREVYVVMLMQSQKIIHM
SASGLVSLNYQLTIVFFRCIYTGMTFLVNVGLZ

>TcasOR316

MTLMRKLQTAIRNLFEIQIKDDILAELLDWPTLVLFKSWPKNFAIFSTIYCVFDTLVCTLVYSTLDVEMLG
KYAIFIAKSTIALCSFFSFFAKRKQYHKIINENFPHFWQLQSMGESTFDQMCKIATTVKFYSCLSVVAMLIG
AVILILFTEDESEIYLSVKIYKDYVNKWTGTYIMFFYASFLYIGIVTAAVVFGITYIVFHLIFQCFLLNQK
LINSYIVKNGQKLVKLEERNQNFYKELISCVKLHQRLIYFSNQINDLLYAPIFMYTFSGIVVGVALIYFLKT
SIQYILTSVLVSIVSLIITTTFVINGQLLEDETENIIISLTNLPWYSLNVQNRREVYVVMLMQSQKIIHMSASGI
VSLNYQLTIVLFRCIYTAMTFLVNMGLZ

>TcasOR324

MNIKFLDKSGGFSMAVVYFVAEGVFHIKFIRLYTYSALISNSLGFLFMLYQFIVGAESLYIIKYGPVLTGCT
YVLVSLWGILFLRKTEEFKQEFHFWSEHNASKEIQNRIKQHINSVTYVILNIVLAFTAGTSLILPNKDEIHY
HYFIKKLSELDTIPRGINETCYFYKINFVLMFPIMTVNSNRLLYFSRKFNQVKLLVERIETMAKDYNVN
DPNLFYNVRYQNDVKQKLKIFIRRQAYIAQYVAKMNKFLAPFIIMFAISATLLGISVLLLLVTATIYYNKY
QLILCGAIYISTLFCIAEATETVEMESVEIYNALLAQPWYSWNNANRKTFIIFLKNCEKPIQITKFSDFYFNY
DWGISVFKKVYSLGSVFFNLRQYIDKZ

>TcasOR339

MMLFRNTEIRRFQTKAKDPLHFLYASTFGLFRVKLVRLVSIFTLVFHSVISCAFFCEMLYSFDPNLLIEYGP
MIFIFGSGVMAIAVFFYIEQNGRLLLRQSVGRLWNFDSSSNLYKKMKLESKYILQVVFHNNFLGVCMVFF
HLPAGGQSDKVFYGINLFRRILPQHLNFKQIYYSTFPILTYMVTVNPYLLLYASSHMKFQVCYVNELLVK
MTKDYKDIDYNLLRNEKYQKTVTLGLKNCIHRHAILKFMDKKLNKLIHWPLLILMALSVVAIISLLFIAIV
TRQDVHVPSFGATMIFGIVTNSLAVYSGQEVINESMKSLSCAGTSRWTSWNFFNRKMLVIFMTNAQKPI
LQSPFFVCEFAFVIKALKFVSSVCGLFFEVARRRDLGELZ

>TcasOR340

MPYVQKGRNLNFKPTNPYFNFRFPFLGPEKTVHRHRVSHRNEKTKFRHLLIQFDTSIVIFQALAQTVYEKTV
LELLCEFYSLYWPLDNVNPQKFLKQFRFLYVISFVTGGMFITSVLLVSPVFKNEKDIFLIREMFHNWQILE
VVFWAGLFFQTVWAILIACVLAYAIFGIKFLSLLLYQIKGMKGLRHQSMVKEKLHSVIRRHVCLTGFVR
KVVKTYWGLLQVEVCMFLVVNISMLFFFINFSRSDWQHNLRLPCITVTSFMLTTCLIVLCLQIPDMTGRI
FDTTLELPWHLWNSKNRRTLLIFMTNSVQPIYINILGLGRLNSSSVSEYVKMIYSTTTVLCSLREGKKZ

Sequences of GRs from coleopteran species used to reconstruct phylogenetic tree

>PbreGR1

MKFCWKSQKQDSTESFSYWKTIMQSLEEPANVYDTLIPVHVLKMSVGLSPCILVVENGKLRYSSTLGS
YSVLAILLFVGYIYAVEERETNDETnkVVRSIDMYHLYGSMIVMACCIILNSVHQKTLEAIDRLNDADV
IMAGYTKKIDWKTsrnnMTVYLLVIMAMLAAGEFMNCTMFLRQVATLNTYCLLMCYIPMLINGFVEAQ
FVCHILLKQRFaVLNSELRRlITKQRPLPSFKIHKVGPPIVEEEPKTLVPSKLIHNARQLHCQLCEIGVLLNR
YYSKQILLDIGDVFIGFTTLAYYCFDGCMKLYMKDDENLYNTVTTGVWTLVKLSRLLVLTLSCSIVKNE
AKSSGDIIYKienkyQPELSPEVYAFGKQIIHWNFKFTAfDFFeVDMSLFYSaVSSATTYLMILLQLDIANK
QIEKSMENSENHS

>PbreGR2

DYGYHVRNPHQKITENNIRVERLSNAGLETISHRGDEDEPDPELLERFDSFYATTKSLLVLFQIMGVMP
ASNGNTTFRWFSATAIYSIYLIAETIFVSIVFKERLLLILQKGKRFDEYIYSIIFLSILIPHFLLPAAW
TNGHEVAKFKNMWTKFQLKYYRITGTaiIFHNLTVITYSLCIFSWSVLGIAIMLAQYYLQPDMLWHTFG
YYHILAMLNCLCSLWfVNCTAKGRVAKDLAQNLHNALESADPANKLAEYRDLWVDLSHIMQQLGKAY
SGMYGMYCILLTTIVATYGCLTEILDHGLSFKEAGFLIAFYCLSLLYVICNEAHTSSKMGP
EFRDRLNVLNLMAYDYRTRQEVHMFLLTAIDKNPPIMNLNQYADIDRRLITATVTSMATYLVMLMQ
FRSTLMRNAALAARRSAMNLNRTATNATT

>PbreGR3

MVATFMVKPSRDTNIRYITPLFKLCTLLCIIPPYDFRNYKFTICIKYRIYRALVLVFLGGA
VYCFISKVLYTFDMIQNTVVVVNVLAYISFFLINVTSVTSANFNFKSLDKFMNELVSIDRKL
LAYHITNKTKTSTWLWLEIFLNHVVLFFVMLFDGTLWYLASDNKFHFYMLYENLQKYHTHILSHLM
VNLIICLKHRYRIANNLLAEAVKQRDVVNISTKILFKPYKDVYTVKNVIKIFIGLNRMIEYFN
KIYGTLLCIHINIIASLLVSLDFIIEFSSESNILRDKYGLEFILLMSMWSLMALCLGIFL
ASTANSTINEAQNTSNVSYKLLQYVPPSSTNPHDRELREDLLLLSEQSSLRTPCFTAAGFF
NVDTMLFTLLSSITSYLVVLIQFSN

>PbreGR4

LCSSMKDVKMSKITFKESLKPLLVLGSFLGVISFNLTELTRSNLRIVTNVLLVIFYIILTGH
SLYERSLLDTTLLTTTDDMMQVSTSTLQIVVSWVMSALIQNKMISFLKRVSEIDKA
FRQLGVYIYYDAVHRTVIKRLIVRLTLGFASIIQLFIYDYALAI
SQIGFNVTLYFAILNVVIVEQFYTFAKLLRVFEILNQHIQVQKCDVTKENISYIKLTGPIG
SKLSTLRiICPIHHELTkIAKLLNESFGVMLMSFQASFTIIVSLYDCSVYLRFFKMENVKEL
CGSIIMCCTYVLDCLCICYSCHSTVEAASKSGKLLHQIDTEDMDVKDQIEMFSLQIVNEK
LEFTAAGFFTVNYGLLFSIIGGITYLIILIQFSADPSESQ

>PbreGR5

MLDRRSIRITVQMGLTTRPRDDAYKKEVDAREILYTCRKEGSLYTATIFFYLN
GFSVILLFLKLATKWPDFMQYWQDTEVFIRCKIILPNRYSYVFLIIGAAIVEHTLLITYSMTA
EEYKKYQTNNTRFEHFLARDSHIFKHISYTWYMGTfVKVISLANTFYWNFMDVFIIAM
SIALAAMLKLINyRIRAAARQVRAIIWTDLRRNYDRICELSFREDIMSPILITSFASNLY
FILVQLHGsvk

>PbreGR6

ASILVIYIYYLVKGFLLRRITSINDTLERTFEHVSLLDDIQHGTQTINNLEETAADISLLHAKLS
NVIRSFNEIFGWQMLCVLLNYILLFMVtyEMGLRIASRHLQninWQFTVWFICSMVYAAIAV
SAITSICDETTFEARRTTDLSSYLYNLNLSKQHQEASLVRILTTLVRQTRSDASITfSAAGFF
YIDYSTLFTLIKLLMSYLIVLIQFE

>PbreGR7

PIYCNINEIRSKPFLMGKCKNMPSVERLEGRIVLINSTKIYTKLCEISRLINRIYNIQIFVSIM
SRFVMITTQLINTYNTIRDPSGGDIVLYVVLFLYIGLHFSKIFMVTNVSASTSSKAKDIAIC
IHDMWGLLPEFNSEIQNFSLQIL

HQNLKFTACGFFTL DQTLINSVIA SVTTYFII VIQLEKTF

>PbreGR8

ARLLNKAFSLQVLIVLAFDFVLFVVNLYICYSKFVDERFKNSSSFKETVTLAFFSVQILLHMISIATVCFYTQ
KQANQSLELCFKIKEAYDVQIAYEINIFVLQIQHWN IQFTAMD LFKIDMTLLYSIIRSATMFLLIVIQ LNGTT
I

>PbreGR9

NSFNATFGWSLLFVIFFIASCLLAVGFIVFDYSNSFGSVHWTGKQYIALSIIWTISFLIAAIVLGKLADDTTE
EFSKTS DICFELAYKLQHSNTTKEHLLRDNLISFAQFTFSTKPVFTAAGFFNIDYTM

>PbreGR10

NLDAIFHALKRLVLNLVELLLDLRACMLVCAKVNHTKNVLFKIKIDPQNEEVRNLIMVAVFKLMHDKLE
FTAYDLFNMDFEFIFSMFASITTYLLIFLQFDIDAAKTRYAVMKANLTQFQGEF

>PbreGR11

IYLMGQRIKHRLRKKKFIILGIALVVEFLIIVIPDCVFFVENETVIYLATSYYPIPNGLMKVQLITLLYLLSQR
FGAVNMILESLKSKPKHEGKNKKKS FVRSHNNQPFK

>AcorGR1

RSDLDTTLLSMTT DIMQVTTSTLQIVVSWFMSAVSQEKTMSFLKRISDV DKTFRQLGVYIYYDAVHKSVI
QRLLIRMSLVLASTISQLFLYQYQWNVGMISFYVTTYFPILINVLIVEEFYIYTNNLRTRYEILNQHLIEVQK
YNDSCKEKISYIKLTGVIGSKLSTLRIICPIHHELT KIAKLLNEAFGVILLMSFQSSFVTIIVSLYDCSVLLQYF
NIEHIRELCAAIIMCCTYVLDCLYICYSCHSTVESANKSGRLLHQIDTDDVDVKDQIEMFSLQIVNEKLEFT
AAGFFTINYGLLSIIGGITT YLIILIQFSADPNESKH

>AcorGR2

MLFSRKSKDHLVRCNVLT YWQSTLSGLIQPRNVYDSL IPLHLITKCVGLSPFNYNILNEKPLYQTSLLGSSY
SFAMILFVGYYIYAVEERDESTDSNKVARSIDMYHLYGSIIVMSACIILNSYHQKT LIQAVKSLNEADLNM
AGYSSKISWKKSRNLIFGYFSITLAVLITCEMLNCTMFLRQVGTLT TYCLLMCYIPMVINSFAEAQFVS YIL
LLKQRFAILNDEL RSLITQKKYLPTVKITKVG PVINREENRPKPIAKSLICVRQMHSQ LCEIGALLNKS FSLQ
ILLNTGDVFIGFTT LAYYCFDGC MKLYLNEDGSNL YNTVTTGVWTLVKLSRLLTLTLSCSIVKNEAHLA G
HIIYKIDNRYESEL SSEIYSFGKQIIHWNLKFTA FNFFD VDMSLFYAVVSSATTYLMILLQLDIANKQIEKSM
EINRL

>AcorGR3

MDYGNNTPIHCARNPHQRKIEGNVKAQRLSDAGLENSAKGDSEPDPELLEQFDSFYQT TKSLLVLFQIMG
VMPIERSAKGITTFRWFSGATIYAYSLFVAETIFVTIIFKERLLLVLQKGKRFDEYIYSIIFLSILIPHFLLP IAA
WTNGHEVAHFKNMWTHFQLKYYQVTGTAIVFHNLT LISYSLCIFSWVLGVAIMLAQYYLQPD MQLWHT
FAYYHILAMLNSLCSLWFINCTAKGRVAEDLAQNLHNALES PDPASRLAEYRDLWVDLSHMMQQFGKA
YSGMYGMYCILILLTTIVAFYGCLTEILDHGLSFKEAGLFLIAFYCMCLLYIICNEAHYTTARMGPEFRERL
LSVNLMAVDSRTRQEVHMFLTAIDKNPPTMNLNQYADINRRLISSTVTSMATYLVMLMQFRSTLMRNAA
IAAKRSAMNLRNRTGTNATT

>AcorGR4

MYRPTDVNNLSFLGSNNNYKPKKSVYLEGASVFYQKNKVTQVAPALSNNAQWNNLPYSASEGGVVQEC
LKPIIMLERSMGIFPISVVPGGFSKVTLPWMIYSVFVFL LLSYIGYIKWDKVEIVRSTEGKFEEAVIDYLF TV
YLIPVVIPIAWYESSRMASVFSEWMAFERIYQTITHKKLPLFMGNKPLLVT LGLPILSCGTMVVTHITMVH
FRIVQVVPYCFINAITYIVGGMWY LHCDLIGRVATVIANDFETALHHIGPSVRVAEYRSLWMMLGKLTRN
VGLGSCYVITFLCLYLFLIITLTIYGLLSQIQDGLGVKDVGLTITAFCAIGILYFVCDEAHYASNCVRVYSIR
MRCLTKAIYYL

>AcorGR5

MNRTIMSGEIFIKYPKAATIFAAICAILFCIVGFLGNFVTILALARCPKLISQATTAfVLSLCISDLIFCSVSLPL
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LIMLPPLLGIWGQGLGHPPTFSC TILEKNGKSPKKFIFLVGFALPCVVIISYICILYLVKKSTKKLRKHQVND
STRNKNSRREREDGRLTKLMLLIFVCFVFCFLPLMCVNVFDDEVRYPTLHV FASILAWASSVVPFIYAAS
NRQYRSAYSKLFNVFRSSMTATDSRQLSNSHKSRGTDNKNNHQLAKVVP AE

>AcorGR6

PTIVNTTIKLQFHLYNLILITRTEIINANLNDRIASSTPASKFTAFYQMEKDIESTMKIHKKITDTSRLVNRIY
GFQELFSFALCFVLLSEGYIVLYSLTVGEGEAEENFGYTLFSSLRLVIFYLLQLLVDLRACMLLCAKINHTK
NILFKIKVEPENEESRNVVMVAVFKLMHDKLEMTACDLFNMDFSFVFSMFASITTYLLILLQFDIDAAKNR
RANPLVNSSTA

>AcorGR7

NNRIRTA AQTKLILWAEVRRYYNKL YELSFRVEEKISPIILISFTSNLYFILVQLHGSVKKRNSAMESVYFFF
SFGLLCMRTLAVCLFVGNDDEESKTSIKLL

>AcorGR8

SFQFYCNFILSLLIRYFVLLINERFHQLNLMIEHHPEEVINTEGDQKKNVYVANSKDLVKAYHLLLEQVNIS
NNVFGIPMLFLSFCFIVDILNMLLMWIVYSFQDNAQMKGVVFGIDMLILCCFSVVKDLITYLALVSSCDQT
AREAGYTSFACYKLLYELSKSNNLYDSYTSKEKLSGRYDITLLAIQSSNVSVCFSAAGFFVMDFSTFFT LIS
FIMSYLVVLIQFNDRL

>CforGR1

YYSFLYLLIQSNFTSSILYKYEDINRNLLKLRKANVLQSTTALRRIKKCRKMYHEMGKIIGILNDLFGFPLFS
IYGFCGCQILYLCTDVYVIVAIPTHMAAYS WPLNSALVTVLVVLTLWITSIHYDMVSSQSNTLVTTCYAIQ
KNLNIFCERRQELVDFCDQIEMRKVKFSAARFFTINRSVIFTHVSVAASYFIVIV

>CforGR2

MPYLSRTHLEIMTLARISSFAFIVITLGMQFTVMLCCDFV VRESEKLLVTCIDLQRRFPLDSA EYRELQSFA
DTLTKRKISFSAANFFKINRSAMF SMLGTTLTYFITSIQFIEKPNK

>CforGR3

MQFAVMLSCDLVMKESEKVLVLCVELQEKFPEDSA EYHELRLCDKLT LRKIKFTA AHCFD VDRSTIFSL
VSNTVTYFIAIIQFIEKDSKHGGKN

>CforGR4

ELRRLQQYHNRLCDLIDKFNEVMGSVLLLAILYIVTSLLWDVSAVIEFFVKGCVIEGVRLDDLVLDDFLFW
ILISIGQTMFMARVGNNAVVDENKRTLNYCYEFMNKLPSIPDTLVQRIRDNLREL ANQVEARRPALTAAGI
VKIDFRILGIVTTNTVTYVVVVLQFL

>CforGR5

MKQSHKNVAVMKSILVVGSVLGVC SPLWATFKPKSMAYFYKIYSIGSAVFWILVTIWMIYAKQKYLSDSI
ISPVRFMDCAVHICLAVFSVSVILVSGYVHSDRLKTLFKHLDLLDERLTHDVMKSRRKIYYHFGTFNVFLL
AFMISDATIWISTLGLKWYSKYYLTRVIQLYQCFLT VFFANVLADQLRDRFETLNQLLVNTIKGSDCGFW
VYSQQFNVRLLNNRRGVKEFSQIHTFLCEMVENFNSIFGFLFMFAALVSIVMILNFVVMMLAIFFFEIKIEGIE
YGTNLLVVCTMGIVIIIVQTVILAWIGERLSNEASKTHRISYSILNSISLLPYIETKEGLRDDLLLLSMQSVFR
KPCVRASGFFVVNYRMLGFM TATLTSYVIVAVQFLTQTPPKLKELY

>CforGR6

LLLITLCCCGVSALLNFYFAIFGGFGQTSLIAAVHQESRTWADVFWALYFLLRFLDVCGAAEFLCRETDR TK
SIISELLHECRNNRVKEELWTFHTNNAASKVTFTA GFFSIDFRLVSSAIATGTTYLVILAQFHS

>CforGR7

MLQVLR IAVFFSRYAKHRSVDNYDPMDKKPKIPINRRFPKKT LR TISLLYYKIVKVS NMLNQTF SFQIILML

YKSLITILESIDYCLSNATGITIWTDLFWSCATMLEVLIMFLLTTKLQSQVSPW

>CforGR63a

MFARELTISGHPHVVTNADDERNIYLEGSMPLFQKQSQNLVKVAPAPTDYKTELRGKINAFENESYEF
SIVINYLKPVLRTRLRILGLLPVANSDRGYFVTIHWIVYSVLLLLFIMGYTAFIQLHKVEEAKAGEGRFEEAV
IDYLFYVYLIPIVTNVIGLYEAKKQAEVLNQIISFEKIYNSTTKKKLDLFLANKPLLLSIALPIIGSGIMVVTH
VTMSNFVVFVKIPYCYINVVTYMLGGAWYIYCNIIGKVATIIAEDFQQALKNIESSIKVADYRSMWMMLS
RIIRNVGNSFGYALLFLCLYLFFVVTLTIIYGLLSQIQSGMGTKDIGLTITASSAVMMLYFICDEAHYASACV
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>CforGR43a.1

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SIIFLMVAMAATLLFCYDMFSYAVEASCRTCFLTNFTAYYLLYFMIFFQGVFIWHLLYFINIRIVSLNRCL
DIEKKRLKQGTTKIFVIPYKITNGANDDQKSRADSPDVAARIAELLKVYDRIRESVFIFNTSPSFGVVMLILS
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KTLKHFLAHLSLCEITFEGCGFFVISR

>CforGR43a.2

FYILYYNLVFGIFVWHLALFINIRLDSLHKQLIDERRYLSKLTFTVTSRKHLNSARRMIVWLSMYRKIKDS
VDVFNDSPSFGVLSLTLSCLIHLTVTPYFLLIELAQRGDWLFISVQLVWLAHTSTLLLLIEPCHRCLNVTQ
LINSSVSSLLMLDIDEETRAVEKFMTYMAHCSINFKASGLFTINRNLITSVAGVVSTYLVIIQLF

>CforGR21a

VQWCLMDLKLNTVDQATAKEVQLFLAAIHMNPPKVSLRGYAVVNRQLLSSGIATIAIYLIVLLQFKISLV
NL

>CbowGR1

MFAGMMAFCTIFVLFADFTGAPALVKARQFLSDIPGFIPVYIRAGETPLEDINPDLAEEAFNYAQAQKHGRL
AFGRSIDEKSDNTDFHSGFPEGDKLSDIDTVSLDDESIQEGDNNVTVTNPKESQHIQKIPKA

>CbowGR2

MTSWCRMDDKIMNESYGYPESLDKRLQLFPAIFLVLALTEYFLSVWSRYIRLTLTLGEKYDYEKYYSDFTP
QIFKFIPMNVVTAAYCSIITVHATLMWGLMDVFIIMSIALALRFKQVSRRIAKHVKRATSETFWAEIREDY
HRLSILCKELDDHISYIILLSTLNIFFILKQLYESLEIRSGTVGKVYYLFSFLYLLVKVGSVSLYGAWINDES
KEPADMLNSVSSACFNVEIKRLLAQINFDNVALTGCRMFKLTRGIILSIAGAVVTYELVLIQFNSATIDNY

>CbowGR3

MNILFVVTQLYKGLTTRRTTVDCYFVFSFGMILRLVGVTLCGSTVHTQSKKPLAHLVSLKSEFYNVEV
KRLILQIHCHDDSLSGNQFFTITRPLIFEMATVIITYVLFMLQASITIYS

>CbowGR4

MIMGLVQLLGVILSVSLISCLGKRLINFISLFGSGICCLIVGSYAYINDINYLDSPPIVSNTSNATMENTATD
SLQWISVTFLVISAFLTYFGIKVLPWILIGEYHNKIRATASGLSAGTGYIIGFLANKFFLDMVNNFTLPGVF
WFYGSVGVGFTVLLYFVLPETEGKSLFEITEHFAGGDKLRRSVRRKKLSGNINNAFEPEDMNGNGMNES

>CbowGR5

GSLSDTANSSKKIICNILQNSLNSSIKQELWIYLSLATTNKIQCSACSFFKINKTLITSAVSVGTTYLVILAQF
NDK

>CbowGR6

MLIGSALTFRLLKQVSNRLENISRMKVNDPTQWRSVRKDYNRLTELCQTVNKRLSAIVIVCFLTNLVFLLIQ
LFLSLGKMDNFVEKIYFYMSFLLIIMRIVGVCILGGEVYEEWKNLSFFLNCVVTSAYNEEVERMTCHVVS

WELSLSGKNYFKISRGLILKIAGAIVTYELVLIQFYKNVIEQ

>CbowGR7

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>CbowGR9

MSCDGVERCADRIVTTCYMNLDILEKSPIREEILSFTEYVEQLTPVFSAVGFFQVNQKVLSSLFSAVISYFIHIIQFNNSGL

>CbowGR10

MSCDRVEKSAQKLLATSHCLQASVQDDNIRTELFHLWEFIEELLPKFSASGFFRINQHIIPAFLSAMTSYIHIIIIQFEM

Sequences of IRs from coleopteran species used to reconstruct phylogenetic tree

>PbreIR25a

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GILDTLCKNYGSMLEDRSPPHIVLDNTMTGLISETVKSFTKALQLPTISGSFGQEGDLRQWRDIDDSQQD
YLIQIMPPADVPEIVRTIVINQNISNAAILFDNSYVMDHKFKSLLQNVATRHVIRPIQDEASIRDQLQNL
KLDIVNFFILGSLVNVKRVLDAAADSINYNFRKFAWHSITQDKGDLKCACKNATVLFAPLTDTKYQDRL
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KDQIETPTYGPMYIASNGQSFMEFNMQLSAVSIRSGSSDKSLNLGTWKAGFNNNISLIDPEFMRNYTADI
VYRVATVLQPPFIMVDEQAPKGYSGYCIDLIDEIANILKFDYEIFTAPDGKFGNMDLKGWNWGVVKELM
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MWIFDRWSPYSYQNNREKYKDDEEKREFNLKECLWFCMTSLTPQGGGEAPKNLSGRLVAATWWLFGFI
IIASYTANLAAFLTVSRLDTPVESLDDLSKQYKIYAPLNGSSSMYFERMANIEAKFYDIWKDMSLNDS
LSDVERAQLAVWDYPVSDKYTKMWQAMKEAGLPNTLEEAVERVASRSSEGFAYLGDATDIRYLELT
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DGISIQNIGGVFIVFVGIGLASITLAFEYWWYKYRKTSKVITIETPSQPNHKRKQKPENTEQTLAPRKLY
PRSRF

>PbreIRx

MRTLLVLLTAIVSVKSYLDDCSVGLLQDDDDQIKKIAFMAESELGFENMIEPVTAFRSYDTLTVTCHMID
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FTVFYEDNESLARVSEILKRERELSISIKQLDAMGTGNYPILKEAWRSGHTRFVIDCKVDNLIQLLQQA
QQVGMMTSRYYYIITNPDLQTVDLPEYKYSDTNITGVRIIDPEAEATKRLVGMINQKQIDLELDPSHAQII
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SEGHRDTFNLDIHLESDGLVKVATWNLTGDKFLVGDDDDYDLHDLSFVVITALTEPYGMLTDSQVSLVG
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VYELVEKASKSNIKYGAKNKGATMNFRRDSNNDDFKKIYNYMIANEKQVMVGDNKEGVLRAEREPYA
FFMESVSIEYEIQRHCNLSKVGDLLDEKGYGIAMRKDSPYRHKLN TAVLKLQENGKISDLKRKWEER
KGGGQCSGEVESQEAKPLTLKNVGGVFWVTVGGVAVAVVLVFMFLHVMKESIKHKAAFWAELSEEL
KFYMKFKGLVKPVRLKKGDSKSPDDSDKSEKSEQHEMQGEANGRSYGFLPELIKQPLE

>PbreIR93a

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STSCKESLDCHIEELLYSFARALDAATLEELELSSQVSDEEWD AIRPTKSERRTYLLNSIKIDLTKNGICGS
CLTWEIWTADTWGKEFSFPPHDKFKLIKVGFWKLSSGATMNNVLFPHVVHGMGKSFSVLTLHNPPWQ
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KQVFMAAFAYTITDENKAVVNFTIPITTQPYTLTATPKELSRALLFISPFTFNTWLCLLAAIGTMGPILYCI
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FLTFPNNDKPVTTIDELLNQRDTVTSIAPSTYYEYEIKISNEPKYQALYHGSLQNVGNMDKMLTNIELG
KHVHIDWKLRLQYIMKRRFSLKGTCSLSLGTQDFFDERLGLVVS PDNPYLKRINREIKRLHQVGLIEKW
LKDYLPKRDKCFKTRSNSNVNNHTVNLDDMQGCFVLFVFGCFISLLLICGERFYHKEYQIKRERNIVQPFV

S

>PbreIR8a

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SDNESVIDKACHGFSNGGEILIDITWTGSDDVNEICKDMNPYIRIDVSISPFLKLLDKYLDERNCTDVAL
IFDDPRQVDEALYYWIDTQKSRMVITDTLEHASAKRLKRLRPIPNNYAIIGNTEVVVLKLFGIARQEGLFRL
ADRWNLVFLDFNYKQILSHLLPYEYISLVTLSEEVCCSLLEIPNCVCPNNFITQKQFVIHTLTLVIDVVKL
KRNNKAFTSIACNETKNDAEILVSFTEILTSHVDRNKNIIESSNNALRLNLEGNIDMIENNVITKIGSYSDAS
GFSVESGKLIKPIRTFYRVGITHAIPWSYKEIDLETNTTTWQGYCVDFLAELAKIMEFDYELVEPERGTFG
ERDDDQGFQDGVVVDLQRGETDLAITALIMTADREEVIDFVAPYFEQSGISIVMRKPVRKTSLFKFMTVLK
LEVWLSIVGALIVTGFMWFLDKYSPYSAQNKKAYPYPTRDFTLKESEFWFALTSFTPQGGGEAPKSLSG
RTLVAAYWLFVVLMATFTANLAAFLTVEMMQTPVQSLEQLAKQSRINYTVVSSDTHQYFINMKNAE
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>PbreIR21a

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VFVTNSSLWRVNEFLSSEESREFINLLVIAPSTGSKIKRKEPCYVLYTHELYVDGIGSSTTNILASWTNGSL
TKKGVKLFSSKIKNGFSGHRFITSVGHQSPFVIKRGPNEDGEVLWDGIEIRLLKMLAGFYNTIDIKSIKE
DPHKSAAEQVVDVSVKSGIANVGLSGIYLTNERLDKLDVSYPHSYDCAAFISLTSTALPRYRAIMGPFHWT
VWLTLTSVYLLAIFPLTFADRHTLKHLIKQPQNVENIFWYVFGTFTNSFSLGKDSWANSSKITPRLLMGFY
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DIESGLLNITKAFFWPYAFLGSRAQLDYIVQTNFTTTNKRSLHISSECFVPFGVSIVFAKGTIYKDVVDK
GISYHIESGFMKKFEQDIKWDFVRSPTGKLLQANSSTSSKIYTEDRSLTLDDTQGMFLLLGAZYLFGLLS
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GEENVHDNNQNY

>PbreIR40a

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LIYVPVIHKPPWHFVIYRNDTFQVLGGRDDKLLCLIAENLKFRYEYIDPPERIQGSSFSNGTFEGVLGLI
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GVKLVKDFSDVAVIAGRETFFDIQRFGPINFHLSEKINTAYSAIAFQLGCPYVENVNKILMAIFEAGILTK
MTEDEYEKLGKQQIVEKKLEGGENSPSIAENEHRKIEAVESRQKLKAINIRMLQGAFYLLFIGHVAAA
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>PbreIR76b

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TLSPRTDSSRILFATWWIFITILTAFTANLTAFLTLRFTLPIASVSDIGTKKYSWVSHKGSIAEAALENDV
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GGFIVSTIAFMCELLYIRCNGRHQSSDQRPDALFVITKNSKGNKLDNYLFPFFFFFFYHAIFKPPFPNSD

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>PbreIR75a

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PVGGNKNILIKPFSPKVWYMFILLIFITTALLKILLSVLHAFEMVDDKSWSLVILILLSTICLEGSPIESHFLS
FRVFVYTCLLSSMMLYNYSSNVVSILLTKPAPNIKSLADLRKANIKLGVENIPNYYPKPESELLTTNDFNA
VLNLSEAIVAIAKGGDFAYYTEPATRYKLLQERLTFLEACSLVEIDLVPVAFVTVMARKKMEFKELLKIT YR
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>AcorIR21a

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>AcorIR41a

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PAPRLASGLATPFVSFSMELWIMTLSSYFLASVALLIVLSVTISDENDKKRNVNIMLSLSLAGRIFLLQSF
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>AcorIR75q

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FTPDRLLIVDYIAPTTPTRAKFIFRAPPLSYVRNVFTQPFDKMVWYASFLLLAVISIIVYVIVKWEWSSSKF
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VECASGYKIVADIFQESEKGLREIEYWQIIDPWMMAVKKNSSYKELVKVAYRKLHESGIQNREYRRLYAK
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>AcorIR75x

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FRYTSVDGFTKLSYGASKCLFEYCNANVTYLGTEFFGYKDKTGNYNGIVGALMRGEIDTSGSPMFTRIE
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KLTISDVILVSLEVLQQGTYMDFQRMSSRILILTLVFAFFIFIAYSGNIVAMLQAQVELKSTKELVDSRLD
LGAEDINFMQLFLSQDQDAVGKQVYQKIGENGYYPYLAAGMEKVRKGFAYHAELAEAYYMYREKYTN
NEMCCLQEVEGYFQYLRGYSVTRKRSPYKEIFKTGLLKVDEYGLKLRHYNLWYIKPICKTKGSNVGSV
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>AcorIRx

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DSEAWWHGPSLRNYLNVANVKGYTGLIKFDPKGYRSDFEADIELKSEGLTKIGTWNTDGLIIERPEKK
DPLPDDLSDVRGRTLNVVSALTRPYGLMKQATTRLYGNDQYEGYGIDLIHELKELGFGYKIIPQEDGVN
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FSPQVWLLLIVAWIFVSLSLFVMGRSPSEWQNPYPYCIEPEYLINQFTFKNSFWFTVGSMLMQGTELAP
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MENYINENNQNE

>HoblIR25a

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ALGKLYPRSRF

>HoblIR76b

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>HobIIIR93a

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SIKAYDWQSVVILYDDSLGRDFVTRVLTSLTIDTKEVTGGGTAVSLIKLDKHNTGLDKTSIKNTLSTIAAR
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>HobIIIR68a

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>HobIIIR8a

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>HobIIIR75a

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>HobIIIR40a

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>HobIIIR21a

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>CforIR25a

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>CforIR8a

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>CforIR76b

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>CforIR40a

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>CforIR41a

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>CforIR64a

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>CforIR68a

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>CforIR75c

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>CforIR75q.1

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>CforIR75s

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>CforIR93a

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>CbowIR6

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>CbowIR75q

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>CbowIR8a

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>CbowIR41a

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P

>CbowIR5

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>CbowIR2

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>CbowIR64a

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>CbowIR68a

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>TcasIR40a

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>TcasIR21a

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SGKLLAANSYGKSLKALTVD DRALTLD DDTQGMFLLLIGIFLLGGASLLSEWMGGCLHLCKGKR NQSAT
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>TcasIR93a

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RTRQTYNWN S AFILYDDTL SRDQVTRVVSITAQYSNLRVNA AASFVKLETRLPMDEIRRQVKEILSSV
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VNNDTCTGGIQCHCEEILSGFTRALDEAILFEWETSSQVSDEEWEAIRPSKLD RRNSLLQG IKTFL LQRGQ
CDNCTSWLMKTGDTWGREYQQNGTDSGGLISVGNWRPSDGP SMSDELFP HIVHGFRKRNLPIVTFHNP
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VAFLTFPKIDIPITTIDELLAHSGTVTWSMPKGSYLERTLKYTTTEPRFRYLFDKKVEVGNFKNMIEDIENG
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QPFTT

>TcasIR64a.1

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SWSFLFLFTLGAFCCQGATCHPQLLSSRTL SIFVFLFCILTYQFYASIVSYLLIDPPRKINNLKDLSDSNLR
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>TcasIR64a.2

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TASIVILKMVTTFERNRYHSTSETSWLSFLFTLGALCQQGSPWVPKMACGRIT AISIFLLSLIYQFYASAI
VSHLLMKPTNKIRNLKDLTDSSLKVGCEDIYNKDLFAHTTDKVLKDLYAKKIYKGKNTSHFFPPEKGLD
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>TcasIR64a.3

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PA

>TcasIR75q.1

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FIPTNRNSDL SGVNITVS YVVT KPDY PFDVEDYRFRHLEAFSKLSYAMVYPMLEMLNCTKKFIQRSSWG
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LFKKKKIKFLVQ

>TcasIR75q.2

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VALLQSTSDSIKNLEDLLNSRIKLGVEDIVYAHYYFENAQEPVRKAIYQQKVAPKGQKPNFMTAEEGIRK
VQQGFFAFHVELSTGYKIIGEVFQEGEKCGLKEIEYVNLIWPATQKKSPYKEVMKIGMRKMHEGTGVQ
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>TcasIR75s

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SCIVITNNDNLNHLTDKRDIIHDSIAKVNYVLVQHLSDTINASLEYSVRGTWGYKDNGSQWSGMIGELTR
NEADIGGTALFLTSDRIRVIDYIAMTTPTRSKFIFRQPKLSYVANVFTLPFDASVWASVCGLLVIIAGLLYV
VVRWEWKKKDYVQVVVFFAFWVDFPSSVFCRTNRTSRKFTILGSXVFITFGALCQQGSSSVFIPSIPGRIT
LIFLLVSLMFLYTSYSANIVALLQSSSSSIQTLQDILNSRLDVGVDNTVFNHFYFPNATEPIRRAIYQQKVAP
PGQKPKFYPIEEGIRKMRQGLFAFHVETGPGYKFVSEIFREDEKCGLQEIQYLQVPDPWLAIQKNSSYKK
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>TcasIR8a

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ATRTRFYELLQQEVDNDLVFKENFGLHVNINGVIETGDEKVAEYNYKTGVTVLDGKKVEPITPFFRIGIT
HALPWSYKETDSSGNTYWTGYCVDFTTELSKLMGFGYEFVEPKSGTFGKKRDGVWDGVVGDLATGET
DLAITALIMTADREEVIDYVAPYFEQTGITVMRKPVRKTSLFKFMTVLKLEVWLSIVGALIVTGFMVWF
LDKYSPPYSARNKKAYPYPTREFTLKESEFWFALTSFTPPQGGGEAPKALSGRTLVAAYWLFVVLMLATFT
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QYRVWDYPIREQYGHILLAINDSNPVANASEGFRIVNEHTDADFIFIHDSSEIKYEISKNCNLTEVGEVFA
ERP YAVAVQQGSHLQDEISK TILNLQDRFFEQLQAKYWNHSGKGSCPTTDDNEGITLES LGGVFIATLF
GLALAMITLVGEVLYYRRKSKIQNSETKKPKTVQTSENWKTD T LMPVSLINKDKQSVTIGTEFKPVNRN
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>TcasIR25a

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ETVKSFTAALGLPTISASFGQEGDLRQWRNIDENEKEYLVQISPPADVIPIIRSLVLSKNVTNAAILFDDSF
VMDHKYKSLQNVATRHHVIAPIKEADKIGDQLRQLRKLDIVNFFILGSFENIKRVLDAADSVGFFNRKFS
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QRISEILNFDYEITPVGDQKFGNMDENGKWNGVVRELMEKRADIGLGSM SVMAERENVIDFTVPYYDL
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EAGLPNTLDEAVKRVKDSRSSEGFAYLG DATDIRYLEITSCDLQMVGE EFSRKPYAIAVQQGSPLKDQF
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>TcasIR41a.1

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VGEHHGSELMSAVQFALKYNMTPVPVINEKDYWGDIFPNW SGNLLGNLVDDKADVGFSAlytweFC
YHFLELSKPLVRTGITCLVPAPKLSERWLTPLSYSSYLWFCIILT LVIAIFVLSVLVFCYNHNKTLNLNYPL
KRKTTYIHFLESA VTI VLKPVFQQSLTLRELPIEIASKLLMGLVLL LALFLTSSYGSLATVMTIPTYENAIN
TVEDFANSGLDWGATQDAWIMSIQNAEEQRYVKIVSKFHPISEEELFQFSKSGKFGFSIERLPFEDYAIGD
YIKEDVIDNFHLMKEDLYWEQC VIMLRKNSVLLPALDLFILKIFEAGLISHWQNEAVDLYMNP KVQRAV
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>TcasIR41a.2

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SKINEPVLLDVWYSQNH SFRQENDLFPNKL TNQNRVLKIGTLSYEPYSVIGKLT VNXSPYYLNLGKDD
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>TcasIR68a

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WYEITTVPFPTQITSILIPRRLDIWTKSKFRKGIDLFRDKTSDLRNQTLKVA AFSHIPGTTKSLQEKTARTVI
GNFSGTEVEILQTVSAAMNFHCELYEPVNV DVDLWGGKQSSGKYTGLVGEMVSTNADIALGDLYYTPY
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SQVLEIHTKRKKIIILSICPEIEKLDSNLKYTKMREQYKPPRFEGQSIGLYQFSEPFNSVLYTY SMLLLVSLP
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SLDPITKLIGENFELVND SNEAVDRVAQG VFAYFENSYYLKEALVKRQLRFQIARTTQNQSEREMRDIAR
EDRNLHIMTDCVIKMPISIGLQKNSPIKPRVDKYIRRVLEAGLIKKWLQDVMASILNAEVQSTQEEMKAI
MNMKKKFFGAIVALFIGYFISVVVLIVENVYFHHFVKRNPHYNKYTRSIHHVKKAE