

Supplemental Table 3

This table shows the sites in mature tRNA sequences at which the FANTOM4 short RNA data show overrepresented mismatches. The first five columns show the chromosome, strand, start position, end position, and name of the tRNA. The sixth column shows the position at which overrepresented mismatches were found, with the seventh position showing the nucleotide in the DNA sequence, and the eighth column the mismatched nucleotide found most often in the RNA sequence. The ninth and tenth column show the corresponding *p*-value before and after correcting for cross-mapping, respectively. The eleventh column shows the site annotation, using the following notation:

- U: Uridine between the 5' arm of the acceptor stem and the D arm
- D: Guanine in the D arm
- Y: Pyrimidine located on the 5' side of the anticodon loop
- W: Wobble position of the anticodon
- R: Purine next the the anticodon on the 3' side
- V: Pyrimidine located in the variable arm next to the 5' arm of the TYC stem
- A: Adenosine located in the TYC arm
- N: Not a site known to be usually modified

These sites were taken from Donald Voet & Judith R. Voet, Biochemistry, Third Edition (2004), Figure 32-9.

chromosome	strand	start	end	tRNA	position	DNA	RNA	<i>p</i> -value		Annotation
								before correcting for cross-mapping	after correcting for cross-mapping	
chr1	-	16879088	16879160	tRNA-Val	16879091	G	C	1.60E-08	2.87E-09	N
chr1	-	16879088	16879160	tRNA-Val	16879093	G	C	1.60E-08	2.87E-09	N
chr1	-	16879088	16879160	tRNA-Val	16879096	G	C	6.51E-06	1.50E-06	N
chr1	+	17071665	17071736	tRNA-Glu	17071720	A	T	5.18E-16	5.17E-05	A
chr1	+	94085717	94085801	tRNA-Arg	94085724	G	T	6.70E-07	1.65E-51	N
chr1	+	94085717	94085801	tRNA-Arg	94085747	C	T	1.00E+00	2.70E-06	Y
chr1	+	94085717	94085801	tRNA-Arg	94085785	A	G	5.38E-226	0.00E+00	A

chr1	-	143550793	143550864	tRNA-Gln	143550794	C	A	1.67E-05	8.68E-05	N
chr1	-	143550793	143550864	tRNA-Gln	143550802	C	G	1.32E-28	1.48E-30	N
chr1	-	144090677	144090748	tRNA-Gln	144090678	C	A	1.67E-05	8.68E-05	N
chr1	-	144090677	144090748	tRNA-Gln	144090686	C	G	1.32E-28	1.48E-30	N
chr1	-	144106879	144106951	tRNA-Lys	144106893	A	T	6.77E-186	1.54E-291	A
chr1	-	144109221	144109292	tRNA-Gly	144109235	A	T	3.29E-169	1.63E-75	A
chr1	-	144109221	144109292	tRNA-Gly	144109286	G	T	3.45E-14	3.88E-91	N
chr1	-	144110590	144110661	tRNA-Glu	144110604	A	T	3.04E-07	6.35E-06	A
chr1	+	146185653	146185726	tRNA-Asn	146185694	A	G	7.45E-02	4.02E-02	N
chr1	+	146185653	146185726	tRNA-Asn	146185705	G	A	6.51E-06	1.50E-06	N
chr1	+	146220095	146220166	tRNA-His	146220094	G	A	3.66E-04	1.61E-06	N
chr1	-	146241469	146241540	tRNA-His	146241539	G	A	3.66E-04	1.61E-06	N
chr1	+	146614739	146614812	tRNA-Asn	146614796	A	G	2.75E-04	3.26E-05	A
chr1	-	146864938	146865011	tRNA-Asn	146864952	A	G	9.78E-03	3.28E-03	A
chr1	-	146864938	146865011	tRNA-Asn	146864978	C	T	1.27E-48	1.47E-64	Y
chr1	-	146864938	146865011	tRNA-Asn	146864979	G	T	2.91E-82	2.93E-92	N
chr1	-	146864938	146865011	tRNA-Asn	146864984	A	T	1.00E+00	2.32E-10	N
chr1	-	146864938	146865011	tRNA-Asn	146864991	T	G	6.18E-148	8.71E-202	N
chr1	-	146864938	146865011	tRNA-Asn	146864993	G	T	4.81E-84	1.13E-121	D
chr1	-	147026980	147027053	tRNA-Asn	147026994	A	G	9.78E-03	3.28E-03	A
chr1	-	147026980	147027053	tRNA-Asn	147027020	C	T	1.27E-48	1.47E-64	Y
chr1	-	147026980	147027053	tRNA-Asn	147027021	G	T	2.91E-82	2.93E-92	N
chr1	-	147026980	147027053	tRNA-Asn	147027026	A	T	1.00E+00	2.32E-10	N
chr1	-	147026980	147027053	tRNA-	147027033	T	G	6.18E-148	8.71E-	N

				Asn					202	
chr1	-	147026980	147027053	tRNA-Asn	147027035	G	T	4.81E-84	1.13E-121	D
chr1	-	147565179	147565251	tRNA-Val	147565197	T	A	4.51E-06	1.67E-05	N
chr1	-	148284006	148284076	tRNA-Ala	148284047	G	T	1.46E-06	1.06E-07	N
chr1	-	148284006	148284076	tRNA-Ala	148284061	G	C	7.14E-07	2.58E-06	N
chr1	+	151910350	151910421	tRNA-Met	151910405	A	T	2.50E-02	9.38E-29	A
chr1	-	157378025	157378098	tRNA-Arg	157378039	A	G	2.36E-107	4.29E-08	A
chr1	-	159636114	159636186	tRNA-Val	159636128	A	T	5.30E-05	7.45E-08	A
chr1	-	159676585	159676656	tRNA-Gly	159676599	A	T	1.55E-13	9.17E-14	A
chr1	-	159676585	159676656	tRNA-Gly	159676604	G	T	1.77E-05	2.43E-05	N
chr1	-	159677239	159677310	tRNA-Asp	159677253	A	T	2.34E-200	0.00E+00	A
chr1	-	159677239	159677310	tRNA-Asp	159677301	A	G	1.52E-01	2.93E-06	N
chr1	+	159679718	159679788	tRNA-Gly	159679772	A	T	1.51E-41	1.30E-54	A
chr1	-	159683999	159684070	tRNA-Gly	159684013	A	T	8.16E-169	1.96E-271	A
chr1	-	159683999	159684070	tRNA-Gly	159684064	G	T	2.73E-12	2.99E-08	N
chr1	-	159684657	159684728	tRNA-Asp	159684671	A	T	2.34E-200	0.00E+00	A
chr1	-	159684657	159684728	tRNA-Asp	159684719	A	G	1.52E-01	2.93E-06	N
chr1	+	159687091	159687161	tRNA-Gly	159687145	A	T	1.51E-41	1.30E-54	A
chr1	-	159691380	159691451	tRNA-Gly	159691394	A	T	8.16E-169	1.96E-271	A
chr1	-	159691380	159691451	tRNA-Gly	159691445	G	T	2.73E-12	2.99E-08	N
chr1	-	159692038	159692109	tRNA-Asp	159692052	A	T	2.34E-200	0.00E+00	A
chr1	-	159692038	159692109	tRNA-Asp	159692100	A	G	1.52E-01	2.93E-06	N
chr1	+	159694522	159694592	tRNA-Gly	159694576	A	T	1.51E-41	1.30E-54	A
chr1	-	159698790	159698861	tRNA-Gly	159698804	A	T	8.16E-169	1.96E-271	A

chr1	-	159698790	159698861	tRNA-Gly	159698855	G	T	2.73E-12	2.99E-08	N
chr1	-	159699448	159699519	tRNA-Asp	159699462	A	T	2.34E-200	0.00E+00	A
chr1	-	159699448	159699519	tRNA-Asp	159699510	A	G	1.52E-01	2.93E-06	N
chr1	+	159701882	159701952	tRNA-Gly	159701936	A	T	1.51E-41	1.30E-54	A
chr1	-	159706171	159706242	tRNA-Gly	159706185	A	T	8.16E-169	1.96E-271	A
chr1	-	159706171	159706242	tRNA-Gly	159706236	G	T	2.73E-12	2.99E-08	N
chr1	-	159706829	159706900	tRNA-Asp	159706843	A	T	2.34E-200	0.00E+00	A
chr1	-	159706829	159706900	tRNA-Asp	159706891	A	G	1.52E-01	2.93E-06	N
chr1	-	159760261	159760331	tRNA-Gly	159760275	A	T	1.43E-94	6.02E-126	A
chr1	+	159767527	159767598	tRNA-Gly	159767531	G	T	8.32E-13	2.97E-14	N
chr1	+	159767527	159767598	tRNA-Gly	159767582	A	T	1.67E-168	1.04E-51	A
chr1	-	159848360	159848443	tRNA-Leu	159848408	T	A	1.10E-02	5.37E-03	N
chr1	-	159848360	159848443	tRNA-Leu	159848419	A	T	1.17E-02	2.37E-02	N
chr1	+	159858089	159858162	tRNA-Asn	159858101	G	A	7.59E-117	2.74E-11	N
chr1	+	159858089	159858162	tRNA-Asn	159858102	A	C	1.69E-104	3.54E-03	N
chr1	+	159858089	159858162	tRNA-Asn	159858110	G	C	8.44E-165	9.35E-161	N
chr1	+	159858089	159858162	tRNA-Asn	159858114	C	T	1.00E+00	1.02E-06	N
chr1	+	159858089	159858162	tRNA-Asn	159858124	T	G	1.11E-14	2.09E-18	N
chr1	+	159858089	159858162	tRNA-Asn	159858127	A	T	1.63E-226	4.46E-207	N
chr1	+	165950586	165950657	tRNA-Pro	165950620	G	T	1.21E-02	1.88E-02	R
chr1	+	165950586	165950657	tRNA-Pro	165950641	A	T	2.32E-08	1.33E-25	A
chr1	-	178450899	178450971	tRNA-Val	178450934	A	G	0.00E+00	0.00E+00	R
chr1	-	178450899	178450971	tRNA-Val	178450935	C	G	0.00E+00	0.00E+00	N
chr1	-	178450899	178450971	tRNA-	178450938	T	G	0.00E+00	0.00E+00	N

				Val						
chr1	+	202742278	202742350	tRNA-Lys	202742334	A	G	0.00E+00	7.99E-193	A
chr1	-	202742781	202742853	tRNA-Lys	202742795	A	G	0.00E+00	0.00E+00	A
chr1	+	220704970	220705042	tRNA-Thr	220704996	T	C	1.35E-03	1.37E-03	N
chr1	+	220704970	220705042	tRNA-Thr	220705026	A	T	5.00E-24	3.10E-28	A
chr1	+	247134677	247134782	tRNA-Leu	247134736	T	G	1.00E+00	3.45E-05	N
chr1	+	247134677	247134782	tRNA-Leu	247134738	C	A	1.66E-01	2.86E-05	N
chr1	+	247134677	247134782	tRNA-Leu	247134766	A	T	1.00E+00	1.25E-11	A
chr2	+	27127154	27127242	tRNA-Tyr	27127226	A	T	3.66E-58	1.76E-114	A
chr2	+	27127586	27127658	tRNA-Ala	27127618	A	G	2.30E-05	5.37E-07	W
chr2	+	27127586	27127658	tRNA-Ala	27127621	A	T	8.40E-06	9.77E-09	R
chr2	+	30131072	30131144	tRNA-Leu	30131091	A	C	2.81E-06	5.42E-06	N
chr2	+	30131072	30131144	tRNA-Leu	30131099	T	G	7.15E-12	8.89E-13	N
chr2	+	42891180	42891272	tRNA-Ile	42891256	A	G	8.50E-25	3.25E-07	A
chr2	-	70329627	70329697	tRNA-Gly	70329641	A	T	0.00E+00	0.00E+00	A
chr2	-	130811171	130811242	tRNA-Glu	130811185	A	G	4.48E-03	2.55E-07	A
chr2	+	156965527	156965598	tRNA-Ala	156965558	C	T	3.29E-07	1.98E-10	W
chr2	+	156965527	156965598	tRNA-Ala	156965582	A	T	4.03E-07	1.41E-15	A
chr2	-	156965905	156965975	tRNA-Gly	156965919	A	T	2.22E-93	6.45E-139	A
chr3	-	45705495	45705567	tRNA-Arg	45705509	A	G	1.82E-19	6.12E-49	A
chr3	-	45705495	45705567	tRNA-Arg	45705533	A	G	1.00E+00	8.90E-03	W
chr3	-	126895867	126895938	tRNA-Glu	126895932	G	A	3.60E-07	6.95E-07	N
chr3	+	170972712	170972784	tRNA-Val	170972768	A	T	2.30E-05	6.45E-06	A
chr4	-	40603500	40603572	tRNA-Gln	40603558	A	C	2.57E-05	5.93E-06	N

chr4	-	40603500	40603572	tRNA-Gln	40603559	T	G	1.26E-07	2.27E-08	N
chr5	-	141754172	141754243	tRNA-Asp	141754237	A	C	1.88E-22	1.32E-27	N
chr5	+	180533256	180533328	tRNA-Val	180533288	C	G	1.00E+00	4.28E-04	W
chr5	+	180533256	180533328	tRNA-Val	180533312	A	T	4.79E-05	3.54E-74	A
chr5	-	180548022	180548094	tRNA-Val	180548060	A	G	2.06E-04	3.88E-08	W
chr5	-	180548460	180548531	tRNA-Pro	180548474	A	T	3.30E-08	3.28E-06	A
chr5	-	180548460	180548531	tRNA-Pro	180548498	T	G	6.30E-12	4.92E-17	W
chr5	+	180566474	180566545	tRNA-Ala	180566508	A	T	2.48E-06	7.62E-10	R
chr5	+	180567361	180567433	tRNA-Lys	180567417	A	T	1.71E-187	0.00E+00	A
chr5	-	180581585	180581657	tRNA-Lys	180581599	A	T	6.04E-187	1.18E-41	A
chr5	-	180582001	180582073	tRNA-Val	180582015	A	T	4.09E-05	3.62E-07	A
chr6	-	26413697	26413780	tRNA-Ser	26413711	A	T	5.13E-277	0.00E+00	A
chr6	-	26413697	26413780	tRNA-Ser	26413716	G	C	4.77E-01	3.98E-04	N
chr6	-	26427309	26427380	tRNA-Trp	26427355	G	T	4.87E-01	6.26E-03	N
chr6	-	26427309	26427380	tRNA-Trp	26427371	G	T	5.07E-07	3.36E-17	N
chr6	+	26436347	26436419	tRNA-Arg	26436403	A	G	1.50E-19	2.34E-08	A
chr6	-	26439651	26439722	tRNA-Trp	26439697	G	T	4.87E-01	3.59E-06	N
chr6	-	26439651	26439722	tRNA-Trp	26439713	G	T	1.16E-06	3.02E-26	N
chr6	-	26641124	26641197	tRNA-Thr	26641138	A	T	5.00E-04	9.57E-03	A
chr6	+	26645705	26645777	tRNA-Arg	26645761	A	G	1.50E-19	3.40E-21	A
chr6	+	26661710	26661781	tRNA-Ala	26661744	A	T	4.89E-02	4.88E-02	R
chr6	+	26662329	26662402	tRNA-Ile	26662362	A	G	2.88E-05	8.17E-07	W
chr6	+	26662329	26662402	tRNA-Ile	26662386	A	T	9.21E-08	3.53E-09	A
chr6	+	26664753	26664825	tRNA-	26664809	A	T	3.67E-187	5.20E-19	A

				Lys						
chr6	-	26680071	26680143	tRNA-Ala	26680081	C	G	1.00E+00	2.10E-02	N
chr6	-	26680071	26680143	tRNA-Ala	26680106	A	T	8.40E-06	1.26E-02	R
chr6	-	26680071	26680143	tRNA-Ala	26680109	A	G	2.30E-05	2.40E-02	W
chr6	-	26829200	26829273	tRNA-Ile	26829214	A	T	9.21E-08	5.74E-04	A
chr6	-	26829200	26829273	tRNA-Ile	26829238	A	G	2.88E-05	3.59E-04	W
chr6	-	26853234	26853307	tRNA-Ile	26853263	A	T	3.48E-03	1.04E-03	N
chr6	-	26853234	26853307	tRNA-Ile	26853268	A	G	5.16E-04	8.27E-04	N
chr6	+	26888811	26888884	tRNA-Ile	26888844	A	G	2.88E-05	3.59E-04	W
chr6	+	26888811	26888884	tRNA-Ile	26888868	A	T	9.21E-08	5.74E-04	A
chr6	+	27167500	27167571	tRNA-Pro	27167555	A	T	3.30E-08	5.44E-04	A
chr6	+	27238029	27238102	tRNA-Thr	27238058	G	T	3.02E-23	5.09E-28	N
chr6	+	27238029	27238102	tRNA-Thr	27238086	A	T	5.00E-04	3.94E-02	A
chr6	-	27252973	27253046	tRNA-Ile	27252987	A	T	9.21E-08	1.15E-34	A
chr6	-	27252973	27253046	tRNA-Ile	27253011	A	G	2.88E-05	4.52E-18	W
chr6	+	27285607	27285688	tRNA-Ser	27285670	C	A	3.41E-09	1.21E-73	N
chr6	-	27289602	27289674	tRNA-Arg	27289616	A	G	1.50E-19	6.54E-04	A
chr6	+	27290931	27291003	tRNA-Arg	27290987	A	G	1.50E-19	6.58E-03	A
chr6	-	27313329	27313402	tRNA-Ile	27313343	A	T	9.21E-08	3.32E-06	A
chr6	-	27313329	27313402	tRNA-Ile	27313367	A	G	2.88E-05	4.25E-05	W
chr6	+	27349718	27349791	tRNA-Ile	27349759	C	G	5.25E-06	6.31E-05	N
chr6	+	27349718	27349791	tRNA-Ile	27349768	G	C	2.39E-07	9.39E-09	N
chr6	-	27350969	27351042	tRNA-Ile	27351007	A	G	2.88E-05	4.00E-03	W
chr6	-	27350969	27351042	tRNA-Ile	27351024	G	C	1.15E-10	1.73E-11	D

chr6	-	27350969	27351042	tRNA-Ile	27351027	G	C	1.20E-11	2.63E-11	N
chr6	-	27356028	27356100	tRNA-Val	27356042	A	T	1.46E-05	6.45E-07	A
chr6	+	27373754	27373835	tRNA-Ser	27373819	A	T	4.47E-09	2.42E-10	A
chr6	-	27410748	27410820	tRNA-Lys	27410762	A	G	5.71E-02	3.11E-03	A
chr6	-	27410748	27410820	tRNA-Lys	27410805	G	C	1.00E+00	3.71E-04	N
chr6	-	27410748	27410820	tRNA-Lys	27410807	C	A	1.00E+00	4.74E-02	N
chr6	-	27410748	27410820	tRNA-Lys	27410808	T	G	1.08E-02	9.27E-03	N
chr6	+	27555432	27555503	tRNA-Asp	27555487	A	T	3.29E-200	2.06E-27	A
chr6	+	27579502	27579573	tRNA-Asp	27579557	A	T	3.65E-201	5.39E-43	A
chr6	+	27637942	27638028	tRNA-Arg	27637973	T	C	9.83E-46	1.02E-48	N
chr6	+	27637942	27638028	tRNA-Arg	27637974	T	G	9.83E-46	1.02E-48	W
chr6	-	27659215	27659286	tRNA-Asp	27659229	A	T	2.94E-206	1.42E-69	A
chr6	-	27667572	27667644	tRNA-Lys	27667586	A	G	9.21E-08	4.40E-05	A
chr6	+	27707179	27707272	tRNA-Ile	27707186	G	T	1.00E+00	5.04E-09	N
chr6	+	27707179	27707272	tRNA-Ile	27707256	A	G	7.13E-21	2.37E-73	A
chr6	+	27744341	27744414	tRNA-Ile	27744374	A	G	2.88E-05	6.18E-04	W
chr6	+	27744341	27744414	tRNA-Ile	27744398	A	T	9.21E-08	7.60E-04	A
chr6	-	27746323	27746395	tRNA-Arg	27746337	A	G	1.50E-19	2.53E-08	A
chr6	-	27756864	27756936	tRNA-Val	27756902	A	G	5.47E-01	8.00E-11	W
chr6	-	27760453	27760526	tRNA-Thr	27760467	A	T	5.00E-04	1.68E-04	A
chr6	-	27760453	27760526	tRNA-Thr	27760491	A	G	6.88E-12	3.37E-02	W
chr6	+	27763946	27764019	tRNA-Ile	27763979	A	G	2.88E-05	5.97E-04	W
chr6	+	27802452	27802525	tRNA-Thr	27802507	C	A	5.06E-02	3.20E-02	N
chr6	-	27978665	27978735	tRNA-	27978679	A	T	4.70E-93	2.50E-	A

				Gly					221	
chr6	+	28288794	28288875	tRNA-Ser	28288859	A	T	4.80E-259	0.00E+00	A
chr6	-	28550308	28550381	tRNA-Thr	28550322	A	T	3.02E-02	1.43E-03	A
chr6	-	28550308	28550381	tRNA-Thr	28550346	T	G	3.16E-04	1.46E-43	W
chr6	-	28564749	28564822	tRNA-Thr	28564787	C	G	7.81E-06	5.34E-26	W
chr6	-	28564749	28564822	tRNA-Thr	28564789	C	T	4.31E-02	8.30E-03	Y
chr6	-	28618870	28618942	tRNA-Arg	28618884	A	T	1.48E-02	5.17E-03	A
chr6	+	28665135	28665206	tRNA-Gln	28665184	A	C	1.24E-03	4.97E-07	N
chr6	-	28673096	28673177	tRNA-Ser	28673110	A	T	9.32E-260	1.45E-82	A
chr6	-	28723963	28724036	tRNA-Thr	28723977	A	T	5.00E-04	1.81E-10	A
chr6	-	28723963	28724036	tRNA-Thr	28724001	C	G	7.81E-06	3.60E-50	W
chr6	-	28723963	28724036	tRNA-Thr	28724003	C	T	4.68E-02	1.35E-07	Y
chr6	-	28723963	28724036	tRNA-Thr	28724007	C	G	1.99E-02	1.21E-02	N
chr6	-	28733993	28734064	tRNA-Ala	28734007	A	T	6.24E-19	2.85E-22	A
chr6	+	28805071	28805142	tRNA-Ala	28805105	A	T	2.42E-05	1.14E-07	R
chr6	-	28818708	28818780	tRNA-Arg	28818722	A	G	5.61E-17	4.31E-03	A
chr6	-	28818708	28818780	tRNA-Arg	28818771	G	T	4.07E-04	1.30E-03	N
chr6	+	28823500	28823572	tRNA-Lys	28823556	A	G	4.05E-03	1.37E-05	A
chr6	-	28834120	28834191	tRNA-Ala	28834158	T	C	5.02E-02	1.51E-03	W
chr6	-	28887828	28887899	tRNA-Ala	28887887	T	C	2.30E-02	3.17E-08	N
chr6	-	28887828	28887899	tRNA-Ala	28887890	A	C	3.44E-01	1.40E-04	N
chr6	-	28914200	28914271	tRNA-Ala	28914233	G	C	4.84E-01	7.27E-04	N
chr6	-	28914200	28914271	tRNA-Ala	28914235	A	T	1.05E-05	4.16E-08	R
chr6	-	28939441	28939512	tRNA-Ala	28939474	G	C	4.84E-01	6.94E-06	N

chr6	-	28939441	28939512	tRNA-Ala	28939476	A	T	1.05E-05	7.82E-11	R
chr6	+	28957144	28957216	tRNA-Arg	28957151	G	T	4.31E-03	5.08E-05	N
chr6	+	28957144	28957216	tRNA-Arg	28957200	A	G	5.61E-17	4.87E-06	A
chr6	-	29019378	29019459	tRNA-Leu	29019392	A	T	2.11E-11	1.86E-02	A
chr6	+	29020331	29020403	tRNA-Met	29020387	A	T	2.64E-03	6.61E-07	A
chr6	+	29026785	29026857	tRNA-Lys	29026841	A	G	0.00E+00	0.00E+00	A
chr6	-	29057428	29057500	tRNA-Phe	29057436	G	T	2.16E-04	3.08E-25	N
chr6	-	29057428	29057500	tRNA-Phe	29057438	C	A	1.65E-07	4.62E-42	N
chr6	-	29057428	29057500	tRNA-Phe	29057440	C	G	1.00E+00	5.70E-42	N
chr6	-	29057428	29057500	tRNA-Phe	29057442	A	T	6.28E-11	6.81E-38	A
chr6	+	29057955	29058026	tRNA-Glu	29058010	A	T	1.35E-06	8.24E-03	A
chr6	+	29064758	29064839	tRNA-Leu	29064818	G	A	9.89E-08	4.55E-07	N
chr6	+	58257213	58257286	tRNA-Ile	58257270	A	T	9.21E-08	2.12E-02	A
chr6	-	58276451	58276523	tRNA-Met	58276494	A	C	4.49E-11	4.96E-12	N
chr6	-	58276451	58276523	tRNA-Met	58276495	C	T	4.49E-11	4.96E-12	N
chr6	-	58276451	58276523	tRNA-Met	58276497	G	A	4.49E-11	4.96E-12	N
chr6	-	126143086	126143157	tRNA-Glu	126143100	A	T	1.47E-06	2.90E-04	A
chr6	+	144579377	144579459	tRNA-Leu	144579401	G	T	1.00E+00	9.08E-08	N
chr7	+	98905243	98905314	tRNA-Trp	98905250	G	T	3.49E-05	2.75E-21	N
chr7	+	138675986	138676058	tRNA-Arg	138676016	C	T	1.35E-20	1.39E-95	Y
chr7	+	138675986	138676058	tRNA-Arg	138676041	G	T	1.00E+00	7.64E-17	N
chr7	+	138675986	138676058	tRNA-Arg	138676042	A	G	0.00E+00	0.00E+00	A
chr7	+	148874564	148874635	tRNA-Cys	148874605	A	G	1.10E-03	1.09E-03	N
chr8	+	59667352	59667422	tRNA-	59667369	T	G	1.21E-03	3.58E-03	N

				Glu						
chr8	+	67188156	67188248	tRNA-Tyr	67188232	A	T	1.71E-55	1.36E-152	A
chr8	+	67188777	67188865	tRNA-Tyr	67188849	A	T	3.26E-55	3.30E-11	A
chr8	+	67188978	67189050	tRNA-Ala	67189010	A	G	2.30E-05	5.77E-26	W
chr8	+	67188978	67189050	tRNA-Ala	67189013	A	T	8.40E-06	1.47E-26	R
chr8	-	96351061	96351142	tRNA-Ser	96351075	A	T	1.00E+00	1.48E-13	A
chr8	-	124238651	124238723	tRNA-Met	124238665	A	T	9.46E-56	1.21E-115	A
chr8	-	124238651	124238723	tRNA-Met	124238697	G	T	1.24E-12	4.57E-66	N
chr9	-	14423938	14424009	tRNA-His	14423952	A	T	8.40E-03	2.42E-03	A
chr10	-	22558444	22558517	tRNA-Asn	22558458	A	G	3.97E-03	7.15E-04	A
chr10	+	69194267	69194348	tRNA-Ser	69194347	G	T	0.00E+00	0.00E+00	N
chr11	+	9253366	9253439	tRNA-Leu	9253393	A	C	1.82E-01	3.41E-03	N
chr11	+	59075343	59075428	tRNA-Arg	59075412	A	G	3.76E-03	3.78E-02	A
chr11	+	59075804	59075886	tRNA-Leu	59075877	C	T	4.30E-04	2.32E-02	N
chr11	+	59080478	59080550	tRNA-Lys	59080534	A	G	0.00E+00	5.83E-113	A
chr11	-	59081546	59081618	tRNA-Phe	59081556	C	A	2.52E-07	6.97E-03	N
chr11	-	59081546	59081618	tRNA-Phe	59081560	A	T	1.94E-10	1.03E-02	A
chr11	-	59084384	59084456	tRNA-Lys	59084398	A	G	0.00E+00	4.79E-220	A
chr11	-	59090429	59090501	tRNA-Phe	59090439	C	A	1.12E-11	3.75E-05	N
chr11	-	59090429	59090501	tRNA-Phe	59090441	C	G	1.55E-10	5.17E-04	N
chr11	+	65872167	65872248	tRNA-Ser	65872197	C	T	1.46E-01	1.29E-27	Y
chr11	+	65872167	65872248	tRNA-Ser	65872232	A	T	1.19E-259	4.18E-128	A
chr11	+	75624205	75624276	tRNA-Pro	75624260	A	T	1.07E-08	5.54E-03	A
chr11	-	75624517	75624588	tRNA-Pro	75624531	A	T	3.91E-08	1.22E-17	A

chr11	-	75624517	75624588	tRNA-Pro	75624552	G	T	4.12E-10	2.19E-10	R
chr11	+	121935865	121935937	tRNA-Lys	121935921	A	G	9.21E-08	9.98E-03	A
chr12	+	27734573	27734645	tRNA-Lys	27734627	C	A	3.30E-03	1.24E-03	N
chr12	+	94953930	94954001	tRNA-Asp	94953937	A	G	1.28E-01	5.04E-03	N
chr12	+	94953930	94954001	tRNA-Asp	94953985	A	T	1.18E-198	5.57E-147	A
chr12	+	97421412	97421483	tRNA-Asp	97421419	A	T	1.00E+00	1.22E-03	N
chr12	+	97421412	97421483	tRNA-Asp	97421465	C	A	1.00E-24	2.61E-18	N
chr12	+	97422161	97422232	tRNA-Trp	97422168	G	T	5.18E-06	9.72E-06	N
chr12	+	97422161	97422232	tRNA-Trp	97422216	A	T	3.90E-04	2.81E-05	A
chr12	-	123972254	123972325	tRNA-Ala	123972289	A	T	2.48E-06	6.87E-06	R
chr12	-	123977844	123977915	tRNA-Asp	123977858	A	T	3.76E-205	0.00E+00	A
chr12	-	123977844	123977915	tRNA-Asp	123977906	A	G	2.12E-01	1.07E-05	N
chr12	-	123978342	123978414	tRNA-Phe	123978350	G	T	5.52E-04	2.92E-04	N
chr12	-	123978342	123978414	tRNA-Phe	123978352	C	A	8.99E-07	2.77E-08	N
chr12	-	123978342	123978414	tRNA-Phe	123978356	A	T	2.01E-15	3.28E-13	A
chr12	-	123990146	123990217	tRNA-Asp	123990160	A	T	1.86E-200	6.19E-30	A
chr12	+	123990465	123990536	tRNA-Ala	123990520	A	T	6.14E-08	1.09E-02	A
chr13	-	30146101	30146174	tRNA-Asn	30146115	A	T	1.22E-02	4.72E-11	A
chr13	-	40532874	40532945	tRNA-Glu	40532888	A	G	3.42E-03	6.91E-04	A
chr13	-	93999905	93999977	tRNA-Phe	93999913	G	T	1.33E-03	7.67E-10	N
chr13	-	93999905	93999977	tRNA-Phe	93999915	C	A	2.74E-06	5.39E-17	N
chr13	-	93999905	93999977	tRNA-Phe	93999919	A	T	7.76E-11	2.81E-17	A
chr14	-	20151789	20151861	tRNA-Thr	20151803	A	T	6.33E-102	1.61E-15	A
chr14	+	20171005	20171076	tRNA-	20171036	T	G	9.13E-12	9.68E-06	W

				Pro						
chr14	+	20171005	20171076	tRNA-Pro	20171060	A	T	2.32E-08	1.22E-03	A
chr14	-	20191098	20191191	tRNA-Tyr	20191112	A	T	1.19E-54	1.42E-31	A
chr14	-	20201191	20201284	tRNA-Tyr	20201205	A	T	1.19E-54	4.61E-42	A
chr14	+	20221272	20221360	tRNA-Tyr	20221344	A	T	1.19E-54	5.89E-14	A
chr14	+	20222015	20222086	tRNA-Pro	20222046	T	G	9.15E-12	2.46E-29	W
chr14	+	20222015	20222086	tRNA-Pro	20222070	A	T	9.27E-08	2.65E-39	A
chr14	+	22468750	22468822	tRNA-Arg	22468806	A	G	1.50E-19	2.14E-31	A
chr14	-	57776366	57776438	tRNA-Lys	57776380	A	T	1.56E-187	9.48E-226	A
chr14	+	101853182	101853255	tRNA-Ile	101853215	A	G	2.88E-05	2.35E-07	W
chr14	+	101853182	101853255	tRNA-Ile	101853239	A	T	1.05E-07	5.86E-10	A
chr15	-	38673315	38673396	tRNA-Ser	38673329	A	T	1.05E-259	0.00E+00	A
chr15	-	43278096	43278167	tRNA-His	43278166	G	A	6.49E-10	2.06E-17	N
chr15	+	43280641	43280712	tRNA-His	43280640	G	A	1.50E-08	1.58E-07	N
chr15	-	63948454	63948525	tRNA-Gln	63948468	A	T	2.03E-01	1.08E-10	A
chr15	+	76939959	76940031	tRNA-Lys	76940015	A	T	2.17E-186	5.95E-78	A
chr15	+	87679308	87679380	tRNA-Arg	87679315	G	T	1.13E-03	4.51E-05	N
chr15	+	87679308	87679380	tRNA-Arg	87679364	A	T	2.79E-14	4.25E-16	A
chr16	-	626737	626807	tRNA-Gly	626751	A	T	0.00E+00	0.00E+00	A
chr16	+	3140676	3140748	tRNA-Arg	3140683	G	T	2.81E-06	4.19E-06	N
chr16	+	3140676	3140748	tRNA-Arg	3140732	A	G	5.61E-17	7.38E-56	A
chr16	+	3142902	3142974	tRNA-Arg	3142932	C	T	1.35E-20	4.83E-14	Y
chr16	+	3142902	3142974	tRNA-Arg	3142958	A	T	1.38E-57	1.69E-57	A
chr16	-	3147407	3147479	tRNA-Lys	3147421	A	T	2.45E-186	3.31E-42	A

chr16	+	3148924	3148995	tRNA-Pro	3148955	T	G	6.30E-12	1.62E-15	W
chr16	+	3148924	3148995	tRNA-Pro	3148979	A	T	8.13E-08	1.76E-03	A
chr16	+	3162050	3162121	tRNA-Pro	3162084	G	T	1.21E-02	2.62E-03	R
chr16	+	3162050	3162121	tRNA-Pro	3162105	A	T	2.32E-08	7.32E-26	A
chr16	+	3165693	3165765	tRNA-Lys	3165749	A	T	1.88E-187	3.96E-26	A
chr16	-	3172636	3172707	tRNA-Pro	3172650	A	T	1.06E-07	8.62E-24	A
chr16	-	3174134	3174205	tRNA-Pro	3174148	A	T	1.77E-09	6.84E-10	A
chr16	-	3174134	3174205	tRNA-Pro	3174172	T	G	6.30E-12	8.26E-19	W
chr16	+	3178095	3178166	tRNA-Pro	3178126	T	G	9.15E-12	7.38E-18	W
chr16	+	3178095	3178166	tRNA-Pro	3178150	A	T	1.77E-09	1.47E-09	A
chr16	+	3179635	3179706	tRNA-Pro	3179690	A	T	1.75E-07	1.72E-10	A
chr16	+	3181502	3181574	tRNA-Lys	3181558	A	T	3.67E-187	1.68E-34	A
chr16	+	3181990	3182061	tRNA-Pro	3182021	A	G	1.13E-05	6.34E-04	W
chr16	+	14287251	14287322	tRNA-Thr	14287258	G	C	1.00E+00	1.90E-55	N
chr16	+	14287251	14287322	tRNA-Thr	14287274	G	A	2.43E-08	2.66E-20	N
chr16	+	14287251	14287322	tRNA-Thr	14287275	T	C	1.88E-07	5.34E-20	N
chr16	+	14287251	14287322	tRNA-Thr	14287279	T	A	1.00E+00	1.12E-02	N
chr16	+	14287251	14287322	tRNA-Thr	14287280	C	T	4.61E-08	7.24E-11	Y
chr16	+	14287251	14287322	tRNA-Thr	14287306	A	T	8.89E-05	2.94E-05	A
chr16	-	22114533	22114614	tRNA-Leu	22114547	A	T	7.14E-17	7.12E-102	A
chr16	+	22215962	22216043	tRNA-Leu	22216027	A	T	5.95E-11	3.57E-13	A
chr16	-	69369615	69369685	tRNA-Gly	69369630	G	T	1.99E-14	3.17E-14	N
chr16	-	69370443	69370513	tRNA-Gly	69370457	A	T	8.77E-94	4.74E-36	A
chr16	+	69380098	69380168	tRNA-	69380145	G	A	3.40E-272	3.15E-	N

				Gly					289	
chr16	+	69380098	69380168	tRNA-Gly	69380146	G	A	2.99E-03	8.87E-04	N
chr16	+	69380098	69380168	tRNA-Gly	69380148	T	A	4.62E-279	2.60E-296	N
chr16	+	69380911	69380981	tRNA-Gly	69380965	A	T	1.32E-94	4.37E-41	A
chr16	-	85975129	85975201	tRNA-Met	85975143	A	G	0.00E+00	0.00E+00	A
chr17	+	7963198	7963270	tRNA-Lys	7963254	A	G	0.00E+00	0.00E+00	A
chr17	+	7969789	7969859	tRNA-Gly	7969843	A	T	6.04E-93	2.72E-71	A
chr17	-	7982924	7983005	tRNA-Ser	7982938	A	T	2.50E-02	7.98E-03	A
chr17	-	7983495	7983568	tRNA-Thr	7983559	G	T	1.00E+00	2.71E-10	N
chr17	+	8030401	8030472	tRNA-Trp	8030408	G	T	2.05E-06	6.37E-05	N
chr17	+	8030401	8030472	tRNA-Trp	8030456	A	C	1.00E+00	2.30E-02	A
chr17	+	8030909	8030990	tRNA-Ser	8030974	A	T	6.10E-261	1.02E-140	A
chr17	+	8031203	8031276	tRNA-Thr	8031236	A	G	6.88E-12	5.79E-03	W
chr17	+	8031203	8031276	tRNA-Thr	8031260	A	T	1.64E-05	1.26E-07	A
chr17	+	8031636	8031709	tRNA-Ile	8031669	A	G	2.88E-05	3.60E-06	W
chr17	+	8031636	8031709	tRNA-Ile	8031693	A	T	9.66E-08	4.28E-08	A
chr17	+	8065591	8065662	tRNA-Gly	8065595	G	T	2.26E-41	1.76E-49	N
chr17	+	8065591	8065662	tRNA-Gly	8065646	A	T	1.67E-168	3.40E-33	A
chr17	-	8066281	8066352	tRNA-Asp	8066295	A	T	2.50E-200	1.42E-35	A
chr17	-	8066281	8066352	tRNA-Asp	8066343	A	T	1.26E-03	1.67E-03	N
chr17	-	8066876	8066947	tRNA-Pro	8066890	A	T	9.27E-08	3.37E-18	A
chr17	-	8066876	8066947	tRNA-Pro	8066911	G	T	1.21E-02	3.46E-02	R
chr17	-	8070278	8070351	tRNA-Thr	8070342	G	T	1.00E+00	9.27E-04	N
chr17	-	8071034	8071107	tRNA-Ile	8071048	A	T	3.26E-07	1.38E-07	A

chr17	-	8071034	8071107	tRNA-Ile	8071072	A	G	2.88E-05	2.20E-02	W
chr17	+	15349410	15349483	tRNA-Sup	15349451	G	C	7.43E-40	4.35E-40	N
chr17	+	15349410	15349483	tRNA-Sup	15349459	T	A	1.60E-42	2.14E-45	N
chr17	+	15349410	15349483	tRNA-Sup	15349460	G	C	1.60E-42	2.14E-45	N
chr17	+	19352086	19352157	tRNA-Trp	19352093	G	T	2.77E-02	3.00E-07	N
chr17	+	19352086	19352157	tRNA-Trp	19352109	G	A	8.58E-01	6.92E-05	N
chr17	+	19352086	19352157	tRNA-Trp	19352110	T	A	3.78E-01	3.61E-06	N
chr17	+	19352086	19352157	tRNA-Trp	19352114	A	G	4.64E-03	1.73E-08	N
chr17	+	19352086	19352157	tRNA-Trp	19352115	C	T	1.00E+00	4.16E-05	Y
chr17	+	19352086	19352157	tRNA-Trp	19352140	A	C	9.27E-05	8.81E-06	N
chr17	+	19352086	19352157	tRNA-Trp	19352141	A	G	9.70E-24	9.18E-28	A
chr17	+	26901213	26901284	tRNA-Thr	26901220	G	C	1.00E+00	3.01E-46	N
chr17	+	26901213	26901284	tRNA-Thr	26901236	G	A	2.43E-08	1.14E-16	N
chr17	+	26901213	26901284	tRNA-Thr	26901237	T	C	1.88E-07	5.33E-16	N
chr17	+	26901213	26901284	tRNA-Thr	26901242	C	T	1.16E-09	2.33E-17	Y
chr17	+	26901213	26901284	tRNA-Thr	26901268	A	T	7.80E-03	4.59E-05	A
chr17	-	34161560	34161633	tRNA-Asn	34161574	A	G	1.06E-02	1.71E-06	A
chr17	-	34243501	34243572	tRNA-Cys	34243542	A	G	1.77E-15	2.51E-10	N
chr17	-	34243501	34243572	tRNA-Cys	34243544	T	C	4.61E-16	3.62E-11	N
chr17	-	34243501	34243572	tRNA-Cys	34243546	T	C	7.47E-17	4.69E-12	N
chr17	-	34243501	34243572	tRNA-Cys	34243548	C	T	2.74E-17	1.82E-12	N
chr17	-	34279071	34279142	tRNA-Cys	34279085	A	T	1.00E+00	2.36E-02	A
chr17	-	34563513	34563584	tRNA-Cys	34563527	A	T	9.99E-01	3.41E-03	A
chr17	-	34564270	34564341	tRNA-	34564284	A	T	9.99E-01	2.20E-02	A

				Cys						
chr17	-	35527079	35527152	tRNA-Sec	35527141	C	T	1.36E-02	4.28E-03	N
chr17	+	56218375	56218445	tRNA-Sup	56218435	T	C	5.91E-09	5.94E-10	N
chr17	-	63446475	63446547	tRNA-Arg	63446489	A	G	2.36E-92	9.86E-91	A
chr17	+	70541596	70541668	tRNA-Arg	70541626	C	T	8.90E-14	2.16E-28	Y
chr17	+	70541596	70541668	tRNA-Arg	70541652	A	T	4.24E-259	2.60E-297	A
chr17	-	70542121	70542193	tRNA-Arg	70542135	A	G	1.68E-31	7.64E-30	A
chr17	-	70542121	70542193	tRNA-Arg	70542161	C	T	8.90E-14	2.30E-10	Y
chr17	+	70542803	70542875	tRNA-Arg	70542810	G	T	1.26E-03	3.94E-04	N
chr17	+	70542803	70542875	tRNA-Arg	70542859	A	T	5.61E-17	6.62E-03	A
chr19	-	1334361	1334433	tRNA-Phe	1334371	C	A	3.23E-07	4.19E-04	N
chr19	-	1334361	1334433	tRNA-Phe	1334375	A	T	1.94E-10	5.76E-04	A
chr19	+	1334562	1334635	tRNA-Asn	1334619	A	G	3.97E-03	1.76E-06	A
chr19	+	4675082	4675153	tRNA-Gly	4675086	G	T	1.19E-37	3.38E-58	N
chr19	+	4675082	4675153	tRNA-Gly	4675137	A	T	2.53E-169	7.10E-259	A
chr19	-	4675647	4675719	tRNA-Val	4675661	A	T	1.10E-08	2.44E-10	A
chr19	+	38359803	38359876	tRNA-Thr	38359810	G	T	1.00E+00	2.76E-11	N
chr19	+	38359803	38359876	tRNA-Thr	38359836	A	G	6.88E-12	2.70E-06	W
chr19	+	38359803	38359876	tRNA-Thr	38359860	A	T	5.05E-05	1.54E-17	A
chr19	-	44594648	44594740	tRNA-Ile	44594662	A	T	3.37E-63	3.11E-74	A
chr19	-	50673699	50673785	tRNA-Sec	50673714	A	T	2.87E-231	9.73E-249	A
chr19	-	54729745	54729817	tRNA-Lys	54729753	T	C	1.16E-09	1.48E-09	N
chr20	+	17803142	17803219	tRNA-Gln	17803215	G	T	4.56E-12	5.02E-13	N
chr20	-	48385749	48385830	tRNA-Leu	48385799	T	G	1.99E-133	2.49E-137	N

chr20	-	48385749	48385830	tRNA- Leu	48385801	T	C	3.16E-131	2.05E- 135	N
chr21	-	17748978	17749048	tRNA- Gly	17748992	A	T	1.51E-41	7.79E-11	A