	Primary Active Transporters					
	3.A.1 The ATP-binding Cassette (ABC) Superfamily					
ATPase	Permease	binding protein	substrate			
RPA0049	?		?			
RPA0055	RPA0057, RPA0056	RPA0058	glycerol-3-phosphate			
RPA0099, RPA0098	RPA0101, RPA0100	RPA0102	oligopeptides/dipeptides			
?	?	RPA0106	benzoate & lignin monomers? (related to ABC transporters for branched chain amino acids)			
RPA0129	RPA0128, RPA0127	RPA0126	sugar			
RPA0131	RPA0132	?	sulfate/molybdenum			
RPA0149	RPA0150	RPA0151	iron, hemin, cobalamine			
RPA4160	RPA4159, RPA4158	?	spermidine/putrescine			
RPA0196	RPA0197**		?			
RPA0203	RPA0204, RPA0205		heme export(cycV,W,Z or ccmA,B,C)			
RPA0469	RPA0468	RPA0470	nitrate/sulfate family			
?	?	RPA0485	branched chain amino acids			
?	?	RPA0580	branched chain amino acids			
RPA0573	RPA0574		multidrug efflux?			
RPA0666*, RPA0665	RPA0667, RPA0666*	RPA0668	benzoate & lignin monomers? (related to ABC transporters for branched chain amino acids)			
RPA0682*	RPA0682*, RPA0683	RPA0681 (8.A.1.3.1 - HlyD)	drug efflux			
RPA0691, RPA0690 (phnK & L	?	?	phosphonate?			
RPA0700(phnC)	RPA0698, RPA0697(phnE1 & E2	RPA0699(phnD)	phosphonate			
RPA0722	RPA0723	RPA0720? Not same op.	iron, hemin, cobalamine			
RPA0747	RPA0749, RPA0748	RPA0750	sulfate			
RPA0758,RPA0755	RPA0760, RPA0759	RPA0761	dipeptides/oligopeptides			
?	?	RPA0762	dipeptide/oligopeptide			
?	?	RPA0806	branched chain amino acids			
RPA0858	RPA0859	RPA0860	Fe+3 or Mn/Zn??			
RPA0883	RPA0882	RPA0884	sulfates/nitrate?			
RPA0919*	RPA0919*		efflux - peptide/lipid/multidrug			
RPA0988, RPA0989	RPA0986, RPA0987	RPA0985	branched chain amino acids			
RPA1135*	RPA1135*		long chain fatty acids(multidrug/protein/lipid efflux family)			
RPA1214**	RPA1216, RPA1215	RPA1218	di-/oligopeptides - RPA1218 shares a putative divergent promoter with RPA1217, carboxypeptidase G2			
RPA1232, RPA1233	RPA1230, RPA1231	RPA1235	branched chain amino acids - RPA1234 - acyl CoA ligase			
RPA1253, RPA1254	RPA1251, RPA1252	RPA1250	formamide - related to branched chain amino acids ABC transporters			
RPA1364	RPA1363**	RPA1362	sulfate esters			
RPA1386	RPA1384	RPA1385	phosphonate			
RPA1391	?		glutamine? - this is from smel			
RPA1398, RPA1399	RPA1396, RPA1397	RPA1395	maltose/trehalose			
RPA1408	RPA1409	RPA1410	taurine?			
RPA1416, RPA1417	RPA1418,RPA1419	RPA1415	branched chain amino acids			
RPA1426	RPA1427		efflux - peptide/lipid/multidrug - cell division components			
RPA1444, RPA1445	RPA1447, RPA1448	RPA1446	Dipeptide/oligopeptide/nickel			
RPA1470**	RPA1472, RPA1471	RPA1473	dipepetides			
RPA1479	RPA1477, RPA1478	RPA1476	?			
RPA1566*, RPA1567	RPA1565, RPA1566*	RPA1564	branched chain amino acids			
RPA1650	RPA1649	RPA1648 (8.A.1.3.1 - HlyD Family)	efflux - lipoproteins?			
?	?	RPA1651	branched chain amino acids			
?	?	RPA1655	branched chain amino acids			
RPA1735*	RPA1735*		pseudogene? Too short, blast hits all 250 aa longer			
RPA1738**	RPA1740, RPA1739	RPA1741	branched chain amino acids			
RPA1751, RPA1752	RPA1749, RPA1750	RPA1748	branched chain amino acids			
?	?	RPA1789	branched chain amino acids			
RPA1792*, RPA1791	RPA1793, RPA1792*		branched chain amino acids			
?	?	RPA1798	branched chain amino acids			
?	?	RPA1873	branched chain amino acids			
RPA2005*	RPA2005*		efflux - peptide/lipid/multidrug, probably lipid			

?RPA4650	?RPA4649**	RPA2014	polyamines			
?	?	RPA2037	branched chain amino acids			
RPA2040	RPA2039*	RPA2039*	proline/glycine/betaine/choline			
RPA2041	RPA2042	RPA2043	nitrate/taurine			
RPA2063(nosF)	RPA2064(nosY)	RPA2062(nosD)	copper			
?	?	RPA2081	cobalamin/Fe+3 siderophores			
RPA2114(nrtC)	RPA2113(nrtB)	RPA2112(nrtA)	nitrate			
RPA2118	RPA2119	RPA2120	hemin			
RPA2190**	?		?			
?	?	RPA2193	branched chain amino acids			
RPA2275, RPA2276	RPA2277, RPA2278		branched chain amino acids			
RPA2310	RPA2309	RPA2308	Fe+3 siderophores with tonB RPA2307 on strand			
RPA2330**	RPA2328, RPA2329	RPA2327	Dipeptide/oligopeptide			
RPA2360	RPA2361	RPA2359	amino acid?			
RPA2382	RPA2384, RPA2383	RPA2385	Fe+3 siderophores			
RPA2393	?		pseudogene, frameshift			
RPA2413, RPA2414	RPA2411, RPA2412	RPA2410	urea/short chain amides			
RPA2418	?		pseudogene? Too short			
RPA2465 (sufC)	?	?	iron/heme?			
RPA2497	RPA2498	RPA2499	nitrate/taurine or aliphatic sulfonates			
RPA2563	RPA2561, RPA2562	RPA2560	amino acids, prefers polar aas			
?	?	RPA2608	aliphatic sulfonates?			
RPA2610	RPA2611	RPA2613	aliphatic sulfonates?			
?	?	RPA2618	aliphatic sulfonates?			
RPA2622	RPA2623	RPA2624	aliphatic sulfonates?			
?	RPA2629, RPA2630	RPA2628	amino acids, prefers polar aas			
RPA2633	RPA2632	RPA2631	nitrate?			
?	?	RPA2641 (dup of RPA2646)	not part of preceeding operon but with isochorismatase, bidi prom with LysR?			
RPA2643**	RPA2645, RPA2644	RPA2646	oligopeptide			
?	?	RPA2666	dipeptide/olipeptide/nickel			
RPA2679	RPA2678	RPA2677	aliphatic sulfonates? nitrates?			
RPA2926	RPA2927		lipoprotein release			
RPA3057**	??	??	?			
?	?	RPA3093	branched chain amino acids			
?	?	RPA3217	branched chain amino acids			
RPA3265*	RPA3265*		efflux - peptide/lipid/multidrug			
RPA3294, RPA3293	RPA3296, RPA3295	RPA3297	branched chain amino acids			
RPA3385	RPA3383	RPA3384	nitrate/taurine or aliphatic sulfonates			
RPA3471	RPA3469, RPA3468	RPA3470	sugar			
?	?	RPA3486	branched chain amino acids			
RPA3508	RPA3509		multidrug efflux?			
RPA3609**	?		?			
RPA3666, RPA3665	RPA3668, RPA3667	RPA3669	urea/short chain amides/branched chain amino acids			
RPA3688**	RPA3690, RPA3689	RPA3692, RPA3691	peptides			
?	?	RPA3707	nitrate			
RPA3719, RPA3720	RPA3721, RPA3722	RPA3723, RPA3724, RPA3725	branched chain amino acids			
?	?	RPA3736	phosphate			
RPA3789	RPA3788	RPA3790	drug (antibiotic)efflux?			
RPA3808, RPA3809	RPA3806, RPA3807	RPA3810	branched chain amino acids			
RPA3962	RPA3963	RPA3961	amino acid or toluene efflux?			
RPA3991*	RPA3991*		multidrug/protein/lipid - efflux?			
RPA4013**	?		?			
RPA4022, RPA4023	RPA4020, RPA4021	RPA4019	branched chain amino acids			
RPA4026, RPA4025	RPA4028, RPA4027	RPA4029	branched chain amino acids			
RPA4037, RPA4038	RPA4035, RPA4036	RPA4034	branched chain amino acids			
RPA4041, RPA4046	RPA4043, RPA4044	RPA4045?	branched chain amino acids			
RPA4087***	RPA4087***, RPA4086	RPA4088 (8.A.1.3.1 - HlyD family)	protein(toxin)/multidrug efflux?			
?	RPA4153**	RPA4152	iron/thiamine/???			

RPA4163	RPA4162	RPA4164	nitrate/taurine			
?	?	RPA4170	branched chain amino acids			
RPA4237	RPA4238	RPA4236	amino acid or toluene efflux?			
RPA4265*	RPA4265*		multidrug/protein/lipid - efflux of beta-1,2-glucan			
RPA4398, RPA4399	RPA4400, RPA4401	RPA4397	branched chain amino acids			
RPA4409, RPA4408	RPA4407, RPA4406	RPA4404	sugar			
RPA4575**	RPA4576, RPA4577		sugar			
RPA4650	RPA4649**	RPA4648	spermidine/putrescine			
?	?	RPA4686	ornithine/arginine/lysine			
RPA4715	RPA4716	RPA4717	molybdate			
RPA4730**	?		?			
RPA4777	RPA4779, RPA4778	RPA4780	phosphate			
?	?	RPA4788	sugar/glycerol-3-phosphate			
?	?	RPA4797	lysine/arginine/ornithine			
?	?	RPA4807	branched chain amino acids			
RPA4809	RPA4810**		putrescine, spermidine? Related to att E,F,&G			
?	?	RPA4813	branched chain amino acids			
	3.A.2 The H+- or Na+-translocating F-type, V-type and A-type ATPase (F-ATPase) Superfamily					
	RPA0843-7 & RPA0175-9		FoF1 ATPsynthase			
	.A.3 The P-type ATPase (P-ATPase) Superfamily					
	RPA1259		Na+/K+/H+			
	RPA2893		Ca++/Mo++?			
	RPA3260		Zn++/Cd++			
RPA3004	RPA3003	RPA3002	K+/H+ exchange			
	RPA2333		Cu++			
	RPA1660		Cu++			
	RPA0013		Cu++			
	3.A.5 The Type II (General) Secretory Pathway (IISP) Family (3.A.5.1.1)					
RPA0209 (FtsY)	RPA0245 (SRP-54)	RPA0510 (SecA)	pilus proteins			
		RPA2163 (SecA) partial	proteins			
RPA2830 (SecF) (2.A.6.4.1)	RPA2831 (SecD) (2.A.6.4.1)	RPA2832 (YajC)				
RPA2887 (SecG)	RPA3230 (SecY)	RPA3275 (secE)				
RPA3678 (1.B.22.1.1)	RPA4736(FtsE)					
	3.A.6 The Type III (Virulence-related) Secretory Pathway (IIISP) Family					
	Flagellar protein export system (3.A.6.1.2)					
RPA1264 (FliF)	RPA1267 (FliN)	RPA1633 (ATPase)	proteins			
RPA1638 (FlhA)	RPA3205 (FlhB related)	RPA3890 (FliP)				
RPA3883 (FlhB)	RPA3884 (FliR)	RPA3885 (FliQ)				
	3.A.7 The Type IV (Conjugal DNA-Protein Transfer or VirB) Secretory Pathway (IVSP) Family					
	Conjugal DNA-protein transfer complexes (3.A.7.1.1)					
TraG	RPA2235	RPA4132	DNA/protein			
	TRB system (3.A.7.4.1)					
TrbB RPA4113	RPA2233	RPA4124	DNA/protein			
TrbC	RPA2232	RPA4123	DNA/protein			
TrbD	RPA2231	RPA4122	DNA/protein			
TrbE	RPA2230	RPA4121	DNA/protein			

TrbJ	RPA2229	RPA4120	DNA/protein			
TrbK	RPA2228	RPA4119	DNA/protein			
TrbL	RPA2227	RPA4118	DNA/protein			
TrbF	RPA2226	RPA4117	DNA/protein			
TrbG	RPA2225	RPA4116	DNA/protein			
TrbI	RPA2224	RPA4115	DNA/protein			
	LvhB system (3.A.7.5.1)					
	RPA3681 (LvhB11, TrbB, VirB11)		DNA/protein			
	3.A.10 The H+-translocating Pyrophosphatase (H+-PPase) Family					
	RPA2731		H+			
	3.A.11 The Bacterial Competence-related DNA Transformation Transporter (DNA-T) Family					
	RPA2904		DNA			
	3.A.12 The Septal DNA Translocator (S-DNA-T) Family					
	RPA0279		DNA			
	Electrochemical Potential-driven (Secondary) Transporters					
	2.A.1 The Major Facilitator Superfamily (MFS) (COG0477)					
		The Membrane Fusion Protein (MFP) Family (8.A.1.1.1)				
	RPA0026 (2.A.1.2.X) (COG2270)		sugar?			
	RPA0087 (2.A.1.30.1)		diterpenoids			
	RPA0226 (2.A.1.2.X)		arabinose efflux?			
	RPA0514 (2.A.1.3.X)	RPA0515	multi-drug efflux			
	RPA0619 (2.A.1.25.2)		beta-lactams ampG permease and sginal transducer			
	RPA0737 (2.A.1.11.1)		oxalate/formate			
	RPA0788 (2.A.1.3.X)		drug efflux			
	RPA0851 (2.A.1.6.X)		shikimate/4methyphthalate/sugar/citrate			
	RPA1079 (2.A.1.14.4)		4-methylmuconolactone?			
	RPA1143 (2.A.1.20.2)		sugar efflux?			
	RPA1493 (PucC)		light harvesting pigments efflux			
	RPA1531 (Bch2)		light harvesting pigments efflux			
	RPA1547 (LhaA)		light harvesting pigments efflux			
	RPA1639 (2.A.1.X.X)		oxalate/formate?			
	RPA1692 (2.A.1.11.1)		oxalate/formate			
	RPA1880 (2.A.1.3.X)		drug efflux			
	RPA1925 (2.A.1.3.X)		drug efflux			
	RPA1944 (2.A.1.11.1)		oxalate/formate			
	RPA2099 (2.A.1.30.1)		diterpenoids			
	RPA2198 (2.A.1.X.X)		drug efflux?			
	RPA2342 (2.A.1.6.X)		shikimate/4methyphthalate/sugar/citrate			
	RPA2459 (2.A.1.13.X)		monocarboxylate			
	RPA2878 (2.A.1.36.1)		drug efflux			
	RPA3094 (2.A.1.2.4)		drug efflux			
	RPA3128 (2.A.1.X.X)		drug efflux/sugar?			
	RPA3262 (2.A.1.11.1)		oxalate/formate			
	RPA3405 (2.A.1.2.X) (COG2814)		sugar/drug efflux			
	RPA3454 (2.A.1.11.1)		oxalate/formate			
	RPA3516 (2.A.1.2.7)		drug eflux			
	RPA3542 (2.A.1.3.X)	RPA3543	drug efflux			
RPA3699 - iron utilization prt.	RPA3698 (2.A.1.3.X)	RPA3697	drug efflux			
	RPA3965 (2.A.1.27.1)		phenyl proprionate			
RPA4107 - OMF (1.B.17.X.X)	RPA4106 (2.A.1.3.X)	RPA4105	drug efflux			
	RPA4317 (2.A.1.35.1)		multi-drug efflux			

	RPA4511 (2.A.1.X.X)		?			
	RPA4662 (2.A.1.1.15)		sugar			
	RPA4800 (2.A.1.X.X)		oxalate/formate			
	RPA4801 (2.A.1.2.7)		metabolite/drug efflux			
	RPA4808 (2.A.1.14.7)		D-galactonate			
	2.A.3.3 The Cationic Amino Acid Transporter (CAT) Family					
	RPA0587		cationic amino acids			
	2.A.4 The Cation Diffusion Facilitator (CDF) Family					
	RPA0220		Co++, Zn++, Cd++, cations			
	RPA1939		Co++, Zn++, Cd++, cations			
	RPA2440		Co++, Zn++, Cd++, cations			
	2.A.6 The Resistance-Nodulation-Cell Division (RND) Superfamily (COG0841)					
1.B.17 The Outer Membrane Factor (OMF) Family		The Membrane Fusion Protein (MFP) Family (8.A.1.2.1) (COG0845)				
	or4049, or4050 - frameshift	RPA3020	nonfunctional	nonfunctional		
	RPA3746 (COG1033)		Hydrophobe/Amphiphile			
	RPA0096	RPA0095	multidrug efflux	??TetR and Hypo		
	RPA1021	RPA1020	cation/heavy metal efflux	or1695 ArsR family; or1698 OMP assembly?		
	RPA1420	RPA1421	Ag++/heavy metal efflux	or5222 ConHypo		
	RPA1498	RPA1497	multidrug efflux	or2097 Hypothetical		
	RPA1754	RPA1755	cation/heavy metal efflux			
	RPA1808	RPA1807	Ag++/heavy metal efflux			
	RPA1961	RPA1959, RPA1960	cation/heavy metal efflux			
	RPA1968	RPA1967	cation/heavy metal efflux			
RPA2054	RPA2056	RPA2055	Ag++/heavy metal efflux	or2548 Hypothetical		
RPA2373	RPA2372	RPA2371	multidrug efflux	or2787 Hypothetical		
RPA2572	RPA2574, RPA2575	RPA2573	cation/heavy metal/multidrug efflux	or2959 ConHypo		
	RPA2736	RPA2735	multidrug efflux			
	RPA2956	RPA2955	multidrug efflux			
	RPA3483	RPA3482	cation/heavy metal efflux			
	RPA3733 (COG1033)		Hydrophobe/Amphiphile			
	RPA3775	RPA3776	multidrug efflux	or7127 TetR family		
	RPA3903	RPA3904	multidrug efflux			
	RPA4095	RPA4096	multidrug efflux	or6685ConHypo		
	RPA4414	RPA4415	cation/heavy metal efflux	or6629 TetR family; or6630 poss oxidored.		
	RPA4479	RPA4480	Ag++/heavy metal efflux	or6570 Hypothetical		
	RPA4680	RPA4679, RPA4682	cation/heavy metal efflux	or0841 OMP assembly		
RPA1810			efflux			
RPA2581			efflux			
	2.A.7 The Drug/Metabolite Transporter (DMT) Superfamily					
	RPA0161 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA0518 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA0601 (2.A.7.2.X; COG0697)		drug/metabolites			
	RPA0602 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA0725 (2.A.7.1.X; C0G2076)		drug/metabolites			
	RPA0810 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA1773 (2.A.7.1.X; C0G2076)		drug/metabolites			
	RPA2034 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA2151 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA2284 (2.A.7.1.X; C0G2076)		drug/metabolites			
	RPA2650 (2.A.7.2.X; COG0697)		drug/metabolites			
	RPA2976 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA3181 (2.A.7.3.X; COG0697)		drug/metabolites			
	RPA4299 (2.A.7.3.X; COG0697)		drug/metabolites			

	RPA4300 (2.A.7.3.X; COG0697)		drug/metabolites			
	2.A.9 The Cytochrome Oxidase Biogenesis (Oxa1) Family					
	RPA0632		protein export			
	2.A.14 The Lactate Permease (LctP) Family					
	RPA1136 (2.A.14.1.2)		lactate			
	2.A.20 The Inorganic Phosphate Transporter (PiT) Family					
	RPA2281		phosphate			
	2.A.23 The Dicarboxylate/Amino Acid:Cation (Na+ or H+) Symporter (DAACS) Family					
	RPA0552 (2.A.23.1.3)		Na+/dicarboxylate			
	RPA2448 (2.A.23.1.3)		Na+/dicarboxylate			
	2.A.27 The Glutamate:Na+ Symporter (ESS) Family					
	RPA2262 (2.A.27.1.2)		Na+/glutamate			
	2.A.36 The Monovalent Cation:Proton Antiporter-1 (CPA1) Family					
	RPA0388		Na+/H+			
	RPA0520		Na+/H+			
	2.A.37 The Monovalent Cation:Proton Antiporter-2 (CPA2) Family					
	RPA1795		K+			
	RPA3843		K+			
	RPA3844		K+			
	2.A.41 The Concentrative Nucleoside Transporter (CNT) Family					
	RPA2168 (2.A.41.2.2)		nucleoside/H+			
	2.A.44 The Formate-Nitrite Transporter (FNT) Family					
	RPA3201 (2.A.44.2.1)		formate uptake			
	2.A.45 The Arsenite-Antimonite (ArsB) Efflux Family					
	RPA2258 (2.A.45.1.1)		arsenite			
	RPA3398 (2.A.45.1.1)		arsenite			
	2.A.46 The Benzoate:H+ Symporter (BenE) Family					
	RPA2798 (2.A.46.1.1)		benzoate			
	2.A.49 The Ammonium Transporter (Amt) Family					
	RPA0273 (2.A.49.1.1)		ammonium			
	RPA0275 (2.A.49.1.1)		ammonium			
	2.A.50 The Glycerol Uptake (GUP) Family					
	RPA0266 (2.A.50.1.1)		D-alanine ?			
	RPA2577 (2.A.50.1.1)		D-alanine ?			
	RPA3121 (2.A.50.1.1)		D-alanine ?			
	2.A.51 The Chromate Ion Transporter (CHR) Family					
	RPA0585		chromate			
	RPA3497		chromate			
	RPA3498		chromate			
	2.A.52 The Ni2+-Co2+ Transporter (NiCoT) Family					
	RPA0724 (2.A.52.1.1)		Ni++/Co++			
	2.A.53 The Sulfate Permease (SulP) Family					

	RPA4326		sulfate			
	2.A.55 The Metal Ion (Mn2+-iron) Transporter (Nramp) Family					
	RPA0811 (2.A.55.3.1)		Mn++/Fe++/Cd++/Co++/Zn++/Ni++:H+			
	RPA2706 (2.A.55.3.1)		Mn++/Fe++/Cd++/Co++/Zn++/Ni++:H+			
	RPA3291 (2.A.55.3.1)		Mn++/Fe++/Cd++/Co++/Zn++/Ni++:H+			
	2.A.56 The Tripartite ATP-independent Periplasmic Transporter (TRAP-T) Family					
DctQ - 4TM IMP (COG3090)	DctM - 12TM IMP (COG1593)	DctP - binding protein (COG1638)				
RPA1783?	RPA1784	RPA1782	C4-dicarboxylate/H+			
RPA1977	RPA1976	RPA1975	glutamate/Na+ ?			
RPA2048	RPA2049	RPA2047	C4-dicarboxylate/H+			
RPA2542	RPA2541	RPA2543	C4-dicarboxylate/H+ ?			
RPA2781*	RPA2781*	RPA2782	C4-dicarboxylate/H+			
RPA3459* ?	RPA3459*	RPA3458	C4-dicarboxylate/H+			
RPA4509* ?	RPA4509*	RPA4510 (COG2358)	glutamate/Na+ ?			
RPA4555	RPA4554	RPA4556	C4-dicarboxylate/H+			
	2.A.59 The Arsenical Resistance-3 (ACR3) Family					
	RPA3553 (2.A.59.1.1)		arsenite			
	2.A.62 The NhaD Na+:H+ Antiporter (NhaD) Family					
	RPA2704 (2.A.62.1.1)		Na+/H+??			
	2.A.63 The Monovalent Cation (K+ or Na+):Proton Antiporter-3 (CPA3) Family					
	RPA2789, RPA2790, RPA2791, RPA2792, RPA2793, RPA2794 (2.A.(		H+/K+			
	2.A.64 The Twin Arginine Targeting (Tat) Family					
	RPA2849, RPA2848, RPA2847 (2.A.64.1.1)		protein secretion			
	2.A.66.1 The Multi Antimicrobial Extrusion (MATE) Family					
	RPA0800		multidrug efflux			
	RPA0949		multidrug efflux			
	RPA1691		multidrug efflux			
	RPA4763		multidrug efflux			
	2.A.66.2 The Polysaccharide Transport (PST) Family					
	RPA3348		polysaccharide			
	RPA4205		polysaccharide			
	RPA4589		polysaccharide			
	2.A.66.4 The Mouse Virulence Factor (MVF) Family					
	RPA0456		?proteins			
	RPA3977		?proteins			
	2.A.69 The Auxin Efflux Carrier (AEC) Family					
	RPA2670 (2.A.69.2.1)		malonate			
	2.A.72 The K+ Uptake Permease (KUP) Family					
	RPA2011 (2.A.72.1.1)		K+ uptake			
	RPA3008 (2.A.72.1.1)		K+ uptake			
	RPA3027 (2.A.72.1.1)		K+ uptake			
	2.A.76 The Resistance to Homoserine/Threonine (RhtB) Family					
	RPA0900		homoserine/homoserine lactone/threonine efflux			
	RPA1283		homoserine/homoserine lactone/threonine efflux			
	RPA2794		homoserine/homoserine lactone/threonine efflux			

	2.A.78 The Branched Chain Amino Acid Exporter (LIV-E) Family					
	RPA1127 (2.A.78.1.1)		branched chain amino acid efflux			
	2.A.80 The Tripartite Tricarboxylate Transporter (TTT) Family					
TctB 4TM (COG?)	TctA 12TM (COG3333)	TctC binding protein (COG3181?)				
RPA2319	RPA2320	RPA2321	tricarboxylates/tartrate			
RPA3496	RPA3495	RPA3494	tricarboxylates/tartrate			
		RPA0686	?			
		RPA4694	?			
	2.C.1 The TonB-ExbB-ExbD/TolA-TolQ-TolR (TonB) Family of Auxiliary Proteins for Energization of Outer Membrane Receptor (OMR)-mediated Active Transport					
ExbB/TolQ/MotA (COG0811)	TonB/TolA (COG0810)	ExbD/TolR (COG0848)				
RPA0154	RPA0156	RPA0155	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
RPA1117(tolQ)	RPA1119(tolA); RPA1120 (tolB)	RPA1118(tolR)	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
RPA1239	RPA1241	RPA1240	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
RPA1350 (exbB2)	RPA1346	RPA1351	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
RPA2127	RPA2129	RPA2128	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
RPA3278	RPA3276?	RPA3277	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
RPA3478	RPA3476	RPA3477	H+/iron siderophores/vitaminB12/colicins/Cu++/Co++/biopolymers			
	Channels/Pores					
	1.A.1 The Voltage-gated Ion Channel (VIC) Superfamily					
	RPA0123		K+			
	RPA2821		K+			
	RPA4233		K+			
	1.A.8 The Major Intrinsic Protein (MIP) Family					
	RPA2485 (1.A.8.3.1)		H2O			
	1.A.11 The Chloride Channel (ClC) Family					
	RPA1465		Cl-			
	RPA3953		Cl-			
	1.A.22 The Large Conductance Mechanosensitive Ion Channel (MscL) Family					
	RPA2687 (1.A.22.1.1)		large conductance mechanosensitive channel			
	1.A.23 The Small Conductance Mechanosensitive Ion Channel (MscS) Family					
	RPA4389		small conductance mechanosensitive channel			
	1.A.35 The CorA Metal Ion Transporter (MIT) Family					
	RPA3727		Mg++/Co++			
	RPA4441		Mg++/Co++			
	1.B.4 The Brucella-Rhizobium Porin (BRP) Family					
	RPA0538		sugars/ions?			
	RPA2419		sugars/ions?			
	RPA3423		sugars/ions?			
	1.B.6 The OmpA-OmpF Porin (OOP) Family (COG2885)					
	RPA0213		?			
	RPA1123		?			
	RPA1774		?			
	RPA3371		?			
	RPA4678		?			
	RPA4784		?			

	1.B.12 The Autotransporter (AT) Family					
	RPA1685 (1.B.12.5.1)		protein?			
	RPA1936 (1.B.12.5.1)		protein?			
	RPA2162 (1.B.12.5.1)		protein?			
	RPA3548 (1.B.12.5.1)		protein?			
	RPA3857 (1.B.12.8.1)		protein?			
	RPA4011 (1.B.12.5.1)		protein?			
	1.B.14 The Outer Membrane Receptor (OMR) Family					
	or4207, 4208 pseudo gene		Fe+3 siderophores/heme			
	RPA0153		Fe+3 siderophores/heme			
	RPA0407		Fe+3 siderophores/heme			
	RPA0765		Fe+3 siderophores/heme			
	RPA1059		Fe+3 siderophores/heme			
	RPA1816		Fe+3 siderophores/heme			
	RPA1823		Fe+3 siderophores/heme			
	RPA1845		Fe+3 siderophores/heme			
	RPA1876		Fe+3 siderophores/heme			
	RPA2026		Fe+3 siderophores/heme			
	RPA2124		Fe+3 siderophores/heme			
	RPA2307		Fe+3 siderophores/heme			
	RPA2378		Fe+3 siderophores/heme			
	RPA2380		Fe+3 siderophores/heme			
	RPA2398		Co++/Mg++			
	RPA2745		Fe+3 siderophores/heme			
	RPA3280		Fe+3 siderophores/heme			
	RPA3414		Fe+3 siderophores/heme			
	RPA3480		Fe+3 siderophores/heme			
	RPA3840		Fe+3 siderophores/heme			
	RPA4385		Fe+3 siderophores/heme			
	RPA4387		Fe+3 siderophores/heme			
	RPA4430		Fe+3 siderophores/heme			
	RPA4757		Fe+3 siderophores/heme			
	RPA4803		Fe+3 siderophores/heme			
	1.B.18 The Outer Membrane Auxiliary (OMA) Protein Family					
	RPA3360		polysaccharide			
	RPA4833		polysaccharide			
	1.E.14 The LrgA Holin (LrgA Holin) Family					
	RPA0544		?			
	Uncharacterized Systems					
	9.A.8 The Ferrous Iron Uptake (FeoB) Family					
	RPA4635		Fe++			
	9.A.10 The Oxidase-dependent Fe2+ Transporter (OFeT) Family					
	RPA1643		Fe++			
	9.A.19 The Mg2+ Transporter-E (MgtE) Family					
	RPA3163 (9.A.19.2.1)		Mg++/Co++			
	9.B.3 The Putative Bacterial Murein Precursor Exporter (MPE) Family					
	RPA3531 (FtsW)		Lipid-linked murein precursor			

	9.B.4 The Putative Efflux Transporter (PET) Family					
	(9.B.4.1.2)	MFP Family (8.A.1.1.1)				
	RPA1324	RPA1325	fusaric acid			
	RPA1953	RPA1951	fusaric acid			
	RPA2708	RPA2709	fusaric acid			
	9.B.20 The Putative Mg2+ Transporter-C (MgtC) Family					
	RPA0863		Mg++			
	RPA2025		Mg++			
	9.B.22 The Putative Permease (PerM) Family					
	RPA0548		?			
	RPA2771		?			
	RPA3845		?			
	RPA4221		?			
	9.B.30 The Hly III (Hly III) Famil					
	RPA1585		small molecules and H2O			
	9.B.31 The YqiH (YqiH) Family					
	RPA3119		?			
	9.B.37 The HlyC/CorC (HCC) Family of Putative Transporters					
	RPA0445		Mg++			
	RPA0502		?			
	RPA2812		?			
	9.B.38 The Stationary-phase Anti-death (SAD) Family					
	RPA0198 (9.B.38.1.1)		acetate			
	Unknown Family (COG0701)					
	RPA3558		arsenite?			
	Unknown Family (COG0730)					
	RPA0364		?			
	RPA0813		?			
	Unknown Family (COG0795)					
	RPA3061		?			
	RPA3062		?			
** - genes containing 2 fused domains						
*** - genes containing 3 fused domains						
	lines in purple are pseudogenes					
	classified in energy metabolism					
	classified in transcription					