Antimicrobial Resistance Genes Report

Contents

1 About

This report contains all the resistance related genes found when searching the genome with CARD, NCBI-amr and Resfams datases. Additionally, Resfams hmm file have been addded to Prokka datases, thus, this report also contains a general report of non drug related resistance genes.

2 NCBI-amr

NCBI has produced a hmm file of curated AMR genes. This database was incorporated into Prokka databases. Therefore, we are able to easily retrieve genes annotated from this curated dataset.

This dataset is not exclusive to drug related genes and it contains several types of resistance factors such as resistance against heavy metals. Therefore, it not possible to create an antibiogram from this dataset. However, all resistance genes from this dataset and its protein ID (local protein ID) are shown in Table 2.

3 Resfams

These elements were annotated from the Resfams database. This database contains genes related to antibiotic resistance genes as well as genes related to environmental stress resistance. Similar to NCBI-amr results, we can't create an antibiogram using this database but it is extremely informative in terms of environmental resistance to stress. This data are summarised in Table **??**.

4 CARD results

CARD is a curated database which hosts drug resistance genes of pathogenic bacteria. Therefore, an antibiogram can be infered using data provenient from this database.

In Table 1 we can clearly see all resistance gene names found in the query genome and its target drug classes. In addition, each ARO accession are disponibilized to the user in order to gather more information about each gene. This ARO can be searched in CARD database.

In summary, the query genome possesses the following resistance genes: **oqxa, oqxb, crp, fosa6, klebsiella_pneumoniae_acra, shv-11**. And, these genes together confer resistance to the following drug classes: **fluoroquinolone_antibiotic, glycylcycline, tetracycline_antibiotic, diaminopyrimidine_antibiotic, nitrofuran_antibiotic, macrolide_antibiotic, penam, fosfomycin, cephalosporin, rifamycin_antibiotic, phenicol_antibiotic, triclosan, carbapenem**

Table 1: CARD resistance genes annotated and its target drug classes

Name	Drug_Class	Resistance_Mechanism	ARO_Accession
oqxa	fluoroquinolone_antibiotic glycylcycline tetracycline_antibiotic diaminopyrimidine_antibiotic nitrofuran_antibiotic		aro:3003922
oqxb	fluoroquinolone_antibiotic glycylcycline tetracycline_antibiotic diaminopyrimidine_antibiotic nitrofuran_antibiotic	antibiotic_efflux	aro:3003923
crp	macrolide_antibiotic fluoroquinolone_antibiotic penam		aro:3000518
fosa6	fosfomycin	antibiotic_inactivation	aro:3004111
klebsiella_pneumoniae_acra	fluoroquinolone_antibiotic cephalosporin glycylcycline penam tetracycline_antibiotic rifamycin_antibiotic phenicol_antibiotic triclosan	antibiotic_efflux	aro:3004041
shv-11	carbapenem cephalosporin penam	antibiotic_inactivation	aro:3001070

Table 2: Resistance genes annotated from NCBI-amr curated database

Local Protein ID	Annotated Gene Product
bbchbeka_01952	tet_mfs_42:_tetracycline_efflux_mfs_transporter_tet(42)
bbchbeka_02759	sdr_dihy_bifunc:_bifunctional_dihydropteridine_reductase/dihydrofolate_reductase_tmpr
bbchbeka_03334	sdr_dihy_bifunc:_bifunctional_dihydropteridine_reductase/dihydrofolate_reductase_tmpr
bbchbeka_03450	rama_tf:_rama_family_antibiotic_efflux_transcriptional_regulator
bbchbeka_03797	emrb:_multidrug_efflux_mfs_transporter_subunit_emrb
bbchbeka_03936	tet_mfs_a_b_c_d:_tet(a)/tet(b)/tet(c)_family_tetracycline_efflux_mfs_transporter
bbchbeka_03962	aac_6p_iz:_aminoglycoside_n-acetyltransferase_aac(6')-iz
bbchbeka_04018	signal_transduction_histidine-protein_kinase_baes
bbchbeka_04119	chl_hydrolase:_chloramphenicol_hydrolase
bbchbeka_04324	bla_subclass_b3:_subclass_b3_metallo-beta-lactamase
bbchbeka_04579	stat:_streptothricin_n-acetyltransferase_stat
bbchbeka_04910	blasrt:_srt/sst_family_class_c_beta-lactamase
bbchbeka_05167	erm41:_23s_rrna_(adenine(2058)-n(6))-methyltransferase_erm(41)
bbchbeka_05226	vanr_acdegln:_vanr-abdegln_family_dna-binding_response_regulator

Table 3: Resistance genes annotated from Resfams database

Local Protein ID	Annotated Gene Product
bbchbeka_00021	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_00113	pf00165.18_bacterial_regulatory_helix-turn-helix_proteins%2c_arac_family_[aro:3000000]
bbchbeka_00164	pf07690.11_major_facilitator_superfamily_[aro:0010002]
bbchbeka_00584	pf13527.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_00621	pf01047.17_marr_family_[aro:3000718]
bbchbeka_00965	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_01258	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_01415	pf12706.2_beta-lactamase_superfamily_domain_[aro:3000001]
bbchbeka_01467	pf13508.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_01500	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_01561	pf13508.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_01779	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_01983	pf13508.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_02017	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_02187	pf13508.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_02193	tigr01730_rnd_mfp:_efflux_transporter%2c_rnd_family%2c_mfp_subunit
bbchbeka_02234	pf01047.17_marr_family_[aro:3000718]
bbchbeka_02245	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_02491	pf00903.20_glyoxalase/bleomycin_resistance_protein/dioxygenase_superfamily_[aro:3000000]
bbchbeka_02602	pf01553.16_acyltransferase_[aro:3000000]
bbchbeka_02725	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_02812	pf13527.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_02851	pf07690.11_major_facilitator_superfamily_[aro:0010002]
bbchbeka_02897	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_03257	pf00753.22_metallo-beta-lactamase_superfamily_[aro:3000004]

bbchbeka_03641	pf12802.2_marr_family_[aro:3000718]
bbchbeka_03794	pf12847.2_methyltransferase_domain_[aro:3000000]
bbchbeka_03925	pf13508.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_03954	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_03970	pf07690.11_major_facilitator_superfamily_[aro:0010002]
bbchbeka_04015	tigr01730_rnd_mfp:_efflux_transporter%2c_rnd_family%2c_mfp_subunit
bbchbeka_04048	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_04145	pf00753.22_metallo-beta-lactamase_superfamily_[aro:3000004]
bbchbeka_04150	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_04160	pf00903.20_glyoxalase/bleomycin_resistance_protein/dioxygenase_superfamily_[aro:3000000]
bbchbeka_04209	pf00583.19_acetyltransferase_(gnat)_family_[aro:3000000]
bbchbeka_04332	pf00903.20_glyoxalase/bleomycin_resistance_protein/dioxygenase_superfamily_[aro:3000000]
bbchbeka_04372	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_04387	pf00903.20_glyoxalase/bleomycin_resistance_protein/dioxygenase_superfamily_[aro:3000000]
bbchbeka_04395	pf00903.20_glyoxalase/bleomycin_resistance_protein/dioxygenase_superfamily_[aro:3000000]
bbchbeka_04490	pf01636.18_phosphotransferase_enzyme_family_[aro:3000000]
bbchbeka_04545	soxr:_mutant_efflux_regulatory_protein_conferring_antibiotic_resistance_[aro:3000836]
bbchbeka_04844	pf00582.21_universal_stress_protein_family_protein
bbchbeka_04985	pf13302.1_acetyltransferase_(gnat)_domain_[aro:3000000]
bbchbeka_05247	tigr01730_rnd_mfp:_efflux_transporter%2c_rnd_family%2c_mfp_subunit