## P. freudenrichii lcts\_e **Ucts** Glycolyse LACZ glc\_\_D D\_LACt2 LDH\_D Wood-Werkman lac\_\_D pathway pyr L\_LACt2r LDH\_L lac\_ accoa PTAr mmcoa\_ actp yoaa ACKr MME ac 2131pyrpp TCA TCA mmcoa\_\_\_R ppcoa **↓**fum MMM2 PTA2 OOR3r succoa ppap akg FRD2rpp PPAKr SUCC PPCSCT ppa ac\_e ppa\_e succ\_e