Complete aaRS Substrate Specificity Landscape (6 Conditions)
Asymmetric Evolution: ProRS (Kinetic/Double-Sieve) vs ThrRS (Structural/Zn Filter)

Amino Acid Substrate	Anc ProRS Catalytic	Anc ProRS Editing	Modern ProRS Catalytic	Anc ThrRS no Zn	Anc ThrRS + Zn	Modern ThrRS + Zn
ALA	0.82	0.80	0.93	0.86	0.84	0.88
ARG	0.83	0.60	0.73	0.87	0.88	0.79
ASN	0.82	0.74	0.77	0.81	0.84	0.89
ASP	0.82	0.74	0.77	0.77	0.84	0.83
CYS	0.84	0.62	0.89	0.80	0.85	0.89
GLN	0.82	0.80	0.76	0.81	0.84	0.87
GLU	0.89	0.74	0.76	0.80	0.84	0.86
GLY	0.81	0.69	0.82	0.72	0.80	0.81
HIS	0.84	0.77	0.75	0.82	0.82	0.83
ILE	0.86	0.75	0.89	0.87	0.86	0.83
LEU	0.81	0.77	0.90	0.85	0.86	0.84
LYS	0.85	0.67	0.76	0.86	0.84	0.85
MET	0.84	0.74	0.78	0.79	0.84	0.84
PHE	0.82	0.68	0.73	0.78	0.88	0.81
PRO	**0.85**	0.82	**0.95**	0.84	0.86	0.82
SER	0.83	0.74	0.88	0.78	0.84	0.95
THR	0.82	**0.87**	0.87	**0.85**	**0.89**	**0.97**
TRP	0.78	0.80	0.79	0.85	0.86	0.80
TYR	0.82	0.76	0.72	0.79	0.84	0.81
VAL	0.84	0.78	0.92	0.85	0.86	0.90

Legend: Cognate substrate

ipTM Score (Binding Affinity)

Cognate Ranks:
Anc ProRS Catalytic: #3/20 (0.850)
Anc ProRS Editing: #1/20 (0.870)
Modern ProRS Catalytic: #1/20 (0.950)
Anc ThrRS no Zn: #6/20 (0.850)
Anc ThrRS + Zn: #1/20 (0.890)
Modern ThrRS + Zn: #1/20 (0.970)

Enzyme Condition