Supplementary Table 2: Evidence for antimicrobial resistance in bacteria associated with farmed shrimp. List of all known publications that have studied antimicrobial resistance in farmed shrimp: the shrimp species sampled, type of sample (farmed/retail shrimp, pond water/sediment, etc), country of origin, analysis method (†indicates that the publication refers to the use of CLSI standards), bacterial species tested (if looking at isolated strains), resistance detected (in terms of antibiotic class) and molecular mechanism of resistance identified (if applicable). Publications that have studied resistance in more than one species and do not define resistance specifically in shrimp samples have been omitted. Acronyms for antibiotic classes (listed according to WHO classification):

- **Critically important for human health (‡denotes highest priority): CEPH-3/4/5‡** = 3rd/4th/5th generation cephalosporins; **GLY‡** = glycopeptides; **MAC‡** = macrolides; **QUIN‡** = quinolones; **POLY‡** = polymxyins; **AGLY** = aminoglycosides; **ANS** = ansamycins; **CARB** = carbapenems; **MONO** = monobactams; **PEN** = penicillins (natural, aminopenicillins and anti-pseudomonal).
- **Highly important for human health**: **CEPH-1/2** = 1st/2nd generation cephalosporins; **AMPH** = amphenicols; **LIN** = lincosamides; **SUL** = sulphonamides; **TET** = tetracyclines; **APEN** = penicillins (anti-staphylococcal).
- **Important for human health**: **ACYC** = aminocyclitols; **CYPOL** = cyclic polypeptides; **NIT** = nitrofurantoins.

Reference	**Species sampled**	**Sample type**	**Country of origin**	**Bacterial species tested (no. isolates)**	**Analysis method**	**Resistance detected (antibiotic class)**	**Molecular mechanism (if determined)**
(Albuquerque Costa *et al.*, 2015)	*L. vannamei*	Farmed shrimp (haemolymph)	Brazil	*Vibrio spp.* (100)	Disc diffusion†	**CEPH-3/4/5‡, MONO, PEN, CEPH-1/2, TET**	
(Arfatahery, Davoodabadi and Abedimohtasab, 2016)	Does not state species	150 wild marine shrimp, 150 farmed shrimp.	Iran	*Staphylococcus aureus* (206)	Disc diffusion†	**AGLY, PEN, TET, APEN**	
(Banerjee *et al.*, 2012)	*L. vannamei*	Farmed shrimp (clinically healthy, muscle & intestine plus pond water)	Malaysia	*Vibrio spp.* (42); *Salmonella spp.* (5)	Disc diffusion†	**MAC‡, PEN, TET, SUL**	
(de Almeida *et al.*, 2017)	*L. vannamei*	Retail shrimp	Brazil	*Enterobacteria* (5)	Disc diffusion†	**CEPH-3/4/5‡, PEN, CEPH-1/2**	
(de Macedo *et al.*, 2016)	*L. vannamei*	Fresh and frozen shrimp	Brazil	*Staphylococci* (17)	Disc diffusion†	**QUIN‡, PEN, TET, APEN**	

(de Melo *et al.*, 2011)	*L. vannamei*	Retail shrimp	Brazil	*V. parahaemolyticus* (10)	Disc diffusion	**AGLY**, **PEN**	
(De Silva *et al.*, 2018)	*L. vannamei*	Frozen retail shrimp	Korea	*Aeromonas spp.* (44)	Disc diffusion†	**QUIN**‡**, AGLY, CARB, PEN, CEPH-1/2, TET SUL, APEN**	PCR assays showed presence of *qnrB*, *qnrS*, *tetA*, *tetE*, *aac(6¢)-Ib*, *phAI-IAB*, and *intI1* gene, with 80% integron 1-positive isolates harboring *qacE2*, *dfrA1*, *orfC*, *orfD*, *aadB*, *catB3*, *oxa-10*, and *aadA1* genes.
(Dib *et al.*, 2018)	Red shrimp	Retail shrimp	Algeria	*E. coli* (4)	Disc diffusion†	**CEPH-3/4/5**‡**, AGLY PEN, CEPH-1/2, AMPH, TET, SUL**	Two strains contained plasmids. *Bla(CTM-X)* gene detected in one by PCR.
(Han *et al.*, 2015)	Not defined	Shrimp	Vietnam, Mexico, India, USA, Philippines, Ecuador and Peru	*V. parahaemolyticus* (78)	Disc diffusion†	**PEN, TET**	Plasmid-mediated *tetB* gene
(He *et al.*, 2015)	*M. ensis*, *M. rosenbergii* and *P. monodon*	Retail shrimp and aquaculture water (does not specify source)	China	*V. cholerae* (42)	Disc diffusion†	**AGLY, ANS, PEN, TET**	
(He *et al.*, 2016)	*L. vannamei*, *M. rosenbergii*, *P. monodon*, and *E. carinicauda*	Retail shrimp	China	*V. parahaemolyticus* (400)	Disc diffusion†	**AGLY, ANS, PEN, ACYC**	
(Hua and Apun, 2013)	*P monodon*	Shrimp, pond water and sediment	Malaysia	*V. parahemolyticus* (140)	Disc diffusion	**QUIN**‡**, PEN, TET**	
(Jana *et al.*, 2014)	*P. monodon*	Water and sediment samples from ponds before during and after harvest	India	Marine heterotrophs (does not state number of isolates)	Bacterial growth on antibiotic-supplemented media	**PEN, TET, AMPH**	

(Karunasagar *et al.*, 1994)	*P. monodon*	Larvae, eggs, nauplii, sea water, larval tank, algae and artemia	India	Luminous bacteria (does not state number of isolates)	Disc diffusion	**MAC‡, AGLY, AMPH, TET**, NIT	
(Le, Munekage and Kato, 2005)	*P. monodon*	Water and sediment samples from ponds	Vietnam	Heterotrophs (does not state number of isolates)	Bacterial growth on antibiotic-supplemented media	**QUIN‡**, SUL	
(Letchumanan *et al.*, 2015)	*P. indicus* and *S. subnuda*	Retail shrimp	Malaysia	*V. parahaemolyticus* (185)	Disc diffusion†	**CEPH-3/4/5‡, QUIN‡, AGLY, CARB, PEN, AMPH, TET, SUL**	PCR detection of B-lactam (*blaTEM*, *blaSHV*, *blaOXA*), tetracycline (*tetA*, *tetB*, *tetC*, *tetG*), chloramphenicol (*catA1*, *catA2*, *catA3*, *catB3*) and kanamycin (*aphA-3*) resistance genes.
(Molina-Aja *et al.*, 2002)	Peneaid shrimp	Diseased shrimp	Mexico	*Vibrio spp*. (30)	Disc diffusion	**QUIN‡, AGLY, PEN, CEPH-1/2, TET, AMPH,** NIT	
(Nawaz *et al.*, 2012)	*P. monodon*	Imported shrimp (into US)	Thailand	*Klebsiella spp* (67)	Disc diffusion†	**QUIN‡, AGLY, ANS, PEN, TET, SUL, AMPH,** CYPOL	
(Nawaz *et al.*, 2015)	*P. monodon*	Imported shrimp (into US)	Does not state	*E. coli* (105)	Disc diffusion†	**QUIN‡, AGLY, ANS, PEN, TET, AMPH**	PCR detection of mutated *gyrA*, *parA*, *parC*. *dfrA12*, *dfrA17*, *aadA2* and *aadA5* also detected within integrons.
(Nilima Priyadarshini Marhual, 2012)	*P. monodon*	Diseased farmed prawns	India	*V. alginolyticus* and *V. parahaemolyticus* (8)	Disc diffusion	**MAC‡, AGLY, PEN, CEPH-1/2, SUL,** CYPOL	
(Noor, Hasan and Rahman, 2014)	*M. rosenbergi* and *P. monodon*	Frozen retail shrimp	Bangladesh	*E. coli*, *Klebsiella*, *Shigella*, *Vibrio*, *Listeria and Staphylococci* (29)	Disc diffusion†	**CEPH-3/4/5‡, GLYP‡, MAC‡, QUIN‡, POLY‡, AGLY, PEN, AMPH, SUL, TET**	

(Otta, Karunasagar and Karunasagar, 2001)	*P. monodon*	Water from hatchery tanks	India	*Vibrio spp.* (87)	Disc diffusion	**POLY‡, PEN, CEPH-1/2, SUL, APEN**	
(Pan *et al.*, 2013)	*P. japonicus*, *P. chinensis* and *M. rosenbergii*	Retail shrimp	China	*V. vulnificus* (33)	Disc diffusion†	**AGLY, MONO, CEPH-1/2**	
(Rebouças *et al.*, 2011)	*L. vannamei*	Shrimp pond water, hatchery water, shrimp hepatopancreas	Brazil	*Vibrio spp.* (31)	Disc diffusion and broth macrodilution†	**CEPH-3/4/5‡, QUIN‡, SUL, TET**	Many resistance phenotypes were lost following plasmid curing (demonstrating that these genes were present on plasmids).
(Rocha, Sousa and Vieira, 2016)	*L. vannamei*	Farmed shrimp environment (estuary water and sediment)	Brazil	*Vibrio spp.* (70)	Disc diffusion†	**MONO, PEN, CEPH-1/2, AMPH, TET,** NIT	
(Roque *et al.*, 2001)	*Peneaus spp.*	Diseased and healthy shrimp, different tissues	Mexico	*Vibrio spp.* (144)	Disc diffusion	**QUIN‡, AMPH, SUL, TET**	
(Rortana *et al.*, 2018)	*L. vannamei*	Farmed shrimp and pond water	Thailand	*V. parahaemolyticus* (66)	Disc diffusion†	**MAC‡, PEN, TET, AMPH, SUL**	PCR detection of *qnrVC* and *pirAB-like* genes.
(S. Zhao *et al.*, 2018)	Does not state species	Farm pond water and sediment, water and larvae from hatcheries	China	*V. parahaemolyticus* (114)	Agar dilution†	**AGLY, PEN**	PCR detection of *qnrVC*, *blaCARB-17*, *blaTEM*, *floR*, *cat2*, *strA*, *strB*, *aac(3)-IV*, *tet(B)*, *tet(M)*, *arr*, *sul1*, and *sul2* genes.
(Shakir *et al.*, 2012)	*P. monodon*	Retail frozen shrimp	Thailand	*Aeromonas spp.* (317)	Broth microdilution†	**QUIN‡**	PCR detection of mutations in *qnrAB*, *gyrA*, *gyrB* and *parC*.
(Stalin and Srinivasan, 2016)	*P. monodon*	Shrimp pond sediment	India	*V. harveyi* (45)	Disc diffusion†	**GLYP‡, MAC‡, QUIN‡, AGLY, ANS, PEN, AMPH**	
(Su *et al.*, 2017)	*L. vannamei*	Shrimp gut, pond water, sediment, inflow water	China	All prokaryotes	16S amplicon sequencing and real-time	**QUIN‡, SUL, AMPH**	*sul1*, *qnrD*, *cmlA*, and *floR* were the predominant ARGs detected.

					qPCR to assess 14 AMR genes		
(Tendencia and Dela Peña, 2002)	*P. monodon*	Shrimp, pond water, sediment and farm soil	Philippines	*Vibrio spp* & other Gram negative organisms (including *Aeromonas spp.*, *Pseudomonas spp.*) (413)	Disc diffusion	**QUIN**‡, **TET**	
(Tran *et al.*, 2011)	*Penaeus spp.*	Imported frozen shrimp (into US)	India	*P. putida* (14 quinolone-resistant isolates)	Sensititre automated antimicrobial susceptibility system†	**CEPH-3/4/5**‡**, QUIN**‡**, AGLY, PEN, CEPH-1/2, SUL**	*qnrA* and *qnrB* genes detected on plasmids. Also novel substitutions in *gyrA*, *gyrB* and *parC*.
(Wong *et al.*, 2012)	Does not state species	Retail shrimp	Hong Kong	*V. parahemolyticus* (208)	Broth microdilution†	**CEPH-3/4/5**‡**, QUIN**‡**, AGLY, PEN, TET, AMPH**	IncN compatibility group plasmid detected, which carries *blaPER-1*.
(Y. Zhao *et al.*, 2018)	Freshwater shrimp	Shrimp gut, pond water and sediment	China	All prokaryotes	Metagenomic shotgun sequencing	Did not confirm phenotypic resistance.	*bacA* (conferring bacitran resistance - a **CYPOL**), *mexB* (conferring multidrug resistance to a number of antibiotics including **AGLY**, **QUIN***, **TET** and b-lactams such as **PEN** and **CEPH**s) and mexF genes detected (conferring multidrug resistance to antibiotics such as **QUIN*** and **AMPH**).
(Yano *et al.*, 2011)	*L. vannamei* and *P. monodon*	Farmed shrimp and commensal organisms	Thailand	Heterotrophs, including *L. garvieae*, *Aeromonas spp.*, *Vibrio spp.* (176 oxytetracycline-resistant isolates)	Broth microdilution†	**TET**	Resistance conferred by *tet(A)*, *tet(C)*, *tet(D)*, *tet(E)*, *tet(M)* and *tet(S)* genes.

(Yano *et al.*, 2014)	*L. vannamei* and *P. monodon*	Farmed shrimp and commensal organisms	Thailand	*V. parahaemolyticus*, *V vulnificus* and *V. cholerae* (235)	Broth microdilution†	**QUIN‡, PEN, TET**	PCR detection of *CARB-7*, *tetA*, *tetB* and *tetH*. *TetA* and *tetH* were lost after plasmid curing, suggesting their presence on plasmids.
(Yano *et al.*, 2015)	*P. monodon* and *L. vannamei*	Farmed shrimp and commensal organisms	Thailand	*Aeromonas spp.* (87)	Disc diffusion†	**CEPH-3/4/5‡, MAC‡, QUIN‡, CARB, PEN, CEPH-1/2, TET, SUL LIN**	
(Zhang, Li and Sun, 2011)	*L. vannamei*	Farm pond water and sediment, water and larvae from hatcheries	China	Heterotrophs (217)	Disc diffusion†	**MAC‡, QUIN‡, POLY‡, AGLY, PEN, CEPH-1/2, AMPH, SUL, TET**	

Supplementary Table 2 References

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