

SUPPLEMENTARY MATERIAL

Table S1 – Description of number of bacterial origins, publication data and host taxonomy information of cephalosporinases reported in wild animals

Beta-lactamase	Number of Paper	Bacteria species (with Sequence Typing)	Geographical Location		Host Taxonomy			Reference
			Continents	Countries	Birds	Mammals	Others	
CTX-M-1	48	<p><i>Citrobacter freundii</i></p> <p><i>E. coli</i> (ST10, ST1122, ST1140, ST1142, ST1143, ST1144, ST115, ST117, ST1199, ST12, ST1204, ST1284, ST1304, ST131, ST1431, ST1462, ST155, ST156, ST1586, ST162, ST1640, ST167, ST1670, ST1683, ST1730, ST1968, ST205, ST2198, ST2199, ST224, ST23, ST2607, ST34, ST3625, ST373, ST3778, ST3781, ST38, ST398, ST4306, ST4720, ST540, ST58, ST648, ST681, ST69, ST744, ST744, ST847, ST857, ST88, ST90)</p> <p><i>Enterobacter cloacae</i></p>	Asia Europe North America South America	<p>Austria, Bangladesh, Belgium, Brazil, Canada, Chile, Czech Republic, England, France, Germany, Ireland, Latvia, Netherlands, Pakistan, Poland, Portugal, Serbia, Slovakia, Spain, Sweden, Switzerland, Turkey, USA</p>	<p><i>Accipiter gentilis</i>, <i>Accipiter nisus</i>, <i>Aegypius monachus</i>, <i>Alopochen aegyptiaca</i>, <i>Anas platyrhynchos</i>, <i>Anas strepera</i>, <i>Ardea cinerea</i>, <i>Bubo bubo</i>, <i>Buteo buteo</i>, <i>Buteo jamaicensis</i>, <i>Buteo lineatus</i>, <i>Buteo platypterus</i>, <i>Chroicocephalus ridibundus</i>, <i>Ciconia ciconia</i>, <i>Circus pygargus</i>, <i>Columba livia</i>, <i>Corvus brachyrhynchos</i>, <i>Corvus corax</i>, <i>Corvus corone</i>, <i>Corvus frugilegus</i>, <i>Corvus splendens</i>, <i>Croicocephalus ridibundus</i>, <i>Cygnus olor</i>, <i>Dendrocopos major</i>, <i>Falco sparverius</i>, <i>Falco tinnunculus</i>, <i>Fulica atra</i>, <i>Gyps fulvus</i>, <i>Hieraaetus fasciatus</i>, <i>Hieraaetus pennatus</i>, <i>Larus argentatus</i>, <i>Larus cachinnans</i>, <i>Larus canus</i>, <i>Larus fuscus</i>, <i>Larus marinus</i>, <i>Larus michahellis</i>, <i>Leucophaeus pipixcan</i>, <i>Megascops asio</i>, <i>Megascops choliba</i>, <i>Melopsittacus undulates</i>, <i>Milvus migrans</i>, <i>Milvus milvus</i>, <i>Morus bassanus</i>, <i>Spheniscus magellanicus</i>, <i>Strix aluco</i>, <i>Strix varia</i>, <i>Tyto alba</i>, <i>Vanellus vanellus</i></p>	<p><i>Canis lupus signatus</i>, <i>Capreolus capreolus</i>, <i>Cervus elaphus</i>, <i>Rattus norvegicus</i>, <i>Sus scrofa</i></p>	<p><i>Rutilus rutilus</i>, <i>Coregonus lavaretus</i></p>	<p>(Flavia Zendri et al., 2020, Zurfluh et al., 2019, Ngaiganam et al., 2019, Desvars-Larrive et al., 2019, Mughini-Gras et al., 2019, Hathcock et al., 2019, Jamborova et al., 2018a, Batalha de Jesus et al., 2019, Velhner et al., 2018, Hessman et al., 2018, Atterby et al., 2017, Mohsin et al., 2017, Wasyl et al., 2018, Mateus-Vargas et al., 2017, Sellera et al., 2017, Mathys et al., 2017a, Timonin et al., 2017, Cristóvão et al., 2017, Vergara et al., 2017, Yılmaz and Dolar, 2017, Alcalá et al., 2016, Monteiro et al., 2016, Alonso et al., 2016, Schaufler et al., 2016, Stedt et al., 2015, Hasan et al., 2015, Bonnedahl et al., 2015, Rouffaer et al., 2014, Abgottsson et al., 2014, Loncaric et al., 2014, Veldman et al., 2013, Hernandez et al., 2013, Guenther et al., 2013b, Kmet et al., 2013, Guenther et al., 2013a, Stephan and Hächler, 2012, Simões et al., 2012, Wallensten et al., 2011, Literak et al., 2010a, Pinto et al., 2010, Literak et al., 2010b, Simões et al., 2010, Radhouani et al., 2010, Poeta et al., 2009, Bonnedahl et al., 2009, Dolejska et al., 2009, Poeta et al., 2008, Costa et al., 2006)</p>
CTX-M-2	8	<p><i>E. coli</i> (ST10, ST101, ST1011, ST1158, ST117, ST2277, ST2485, ST359, ST38, ST4187, ST4188, ST4190, ST457, ST57, ST58, ST617, ST642, ST648, ST69, ST93), <i>Kluyvera ascorbata</i></p>	Africa, Central America, Europe, South America	<p>Argentina, Brazil, Central African Republic, Chile, England, Latvia, Netherlands, Nicaragua</p>	<p><i>Amazona aestiva</i>, <i>Caracara plancus</i>, <i>Columba livia</i>, <i>Coragyps atratus</i>, <i>Larus argentatus</i>, <i>Larus dominicanus</i>, <i>Larus fuscus</i>, <i>Leucophaeus pipixcan</i></p>	<p><i>Nasua nasua</i>, <i>Gorilla gorilla gorilla</i></p>	-	<p>(de Carvalho et al., 2020, Marcos Paulo Vieira et al., 2019, Batalha de Jesus et al., 2019, Hasan et al., 2016, Liakopoulos et al., 2016, Stedt et al., 2015, Báez et al., 2015, Janatova et al., 2014)</p>

CTX-M-3	14	<i>Aeromonas hydrophila</i> , <i>Citrobacter</i> spp., <i>E. coli</i> (ST1079, ST350, ST744), <i>Klebsiella oxytoca</i> , <i>Klebsiella</i> spp.	Asia, Europe, North America, South America	Austria, Canada, Chile, China, England, Latvia, Netherlands, Poland, Spain, Sweden, USA	<i>Alopochen aegyptiaca</i> , <i>Anas</i> <i>platyrhynchos</i> , <i>Bucephala clangula</i> , <i>Corvus frugilegus</i> , <i>Larus</i> <i>argentatus</i> , <i>Larus fuscus</i> , <i>Larus</i> <i>michahellis</i> , <i>Leucophaeus pipixcan</i> , <i>Uria aalge</i>	<i>Myotis daubentonii</i> , <i>Plecotus auratus</i> , <i>Rattus norvegicus</i> , <i>Atelerix algirus</i>	<i>Chelydra</i> <i>serpentine</i>	(Nowakiewicz et al., 2020, Desvars-Larrive et al., 2019, Darwich et al., 2019, Mughini-Gras et al., 2019, Zou et al., 2019, Hessman et al., 2018, Mathys et al., 2017a, Deng et al., 2016, Stedt et al., 2015, Bonnedahl et al., 2015, Báez et al., 2015, Loncaric et al., 2014, Veldman et al., 2013, Hernandez et al., 2013)
CTX-M-8	8	<i>Citrobacter freundii</i> , <i>E. coli</i> (ST10, ST212, ST2705, ST345, ST4138, ST48, ST56, ST58, ST602, ST648), <i>Enterobacter</i> <i>cloacae</i>	Africa, Europe, South America	Algeria, Brazil, Chile, Peru, Spain	<i>Amazona aestiva</i> , <i>Bubo</i> <i>magellanicus</i> , <i>Caracara plancus</i> , <i>Columba livia</i> , <i>Coragyps atratus</i> , <i>Larus michahellis</i> , <i>Mergus</i> <i>octosetaceus</i> , <i>Strix rufipes</i>	<i>Leopardus pardalis</i>	-	(Fuentes-Castillo et al., Furlan et al., 2020, Marcos Paulo Vieira et al., 2019, Fuentes-Castillo et al., 2019, Batalha de Jesus et al., 2019, Brahmi et al., 2018, Borges et al., 2017, Stedt et al., 2015)
CTX-M-9	11	<i>E. coli</i> (ST13, ST131, ST167, ST2346, ST38, ST502, ST58, ST648), <i>K. pneumoniae</i> , <i>Salmonella enterica</i> serovar Agona	Africa, Asia, Europe, South America	Algeria, Austria, Chile, Germany, Guinea, Mongolia, Netherlands, Poland, Portugal, Spain	<i>Anthropoides virgo</i> , <i>Aegypius</i> <i>monachus</i> , <i>Larus argentatus</i> , <i>Larus</i> <i>audouinii</i> , <i>Larus cachinnans</i> , <i>Larus</i> <i>fuscus</i> , <i>Larus michahellis</i> , <i>Leucophaeus pipixcan</i> , <i>Milvus</i> <i>migrans</i>	<i>Canis lupus</i> <i>signatus</i> , <i>Rattus</i> <i>norvegicus</i> , <i>Rattus</i> <i>rattus</i>	<i>Pagellus acarne</i>	(Desvars-Larrive et al., 2019, Brahmi et al., 2018, Schaufler et al., 2018, Stedt et al., 2015, Bonnedahl et al., 2015, Antilles et al., 2015, Guenther et al., 2013a, Simões et al., 2012, Literak et al., 2010a, Guenther et al., 2010b, Simões et al., 2010)
CTX-M-11	1	<i>E. coli</i> (ST1312)	Asia	Bangladesh	<i>Aythya fuligula</i>	-	-	(Hasan et al., 2012)
CTX-M-14	31	<i>E. coli</i> (ST1196, ST10, ST117, ST131, ST1485, ST155, ST167, ST2253, ST2973, ST38, ST405, ST448, ST453, ST58, ST609, ST69, ST744, ST7936, ST88, ST896), <i>K. pneumoniae</i> , <i>Proteus</i> <i>mirabilis</i>	Africa, Asia, Europe, North America, South America	Argentina, Bangladesh, Brazil, Canada, Chile, China, England, Guinea, Mongolia, Netherlands, Pakistan, Portugal, Russia, Spain, Sudan, Sweden, Switzerland, USA	<i>Aegypius monachus</i> , <i>Anas</i> <i>platyrhynchos</i> , <i>Aythya fuligula</i> , <i>Chroicocephalus brunnicephalus</i> , <i>Chroicocephalus ridibundus</i> , <i>Coragyps atratus</i> , <i>Corvus</i> <i>brachyrhynchos</i> , <i>Corvus corax</i> , <i>Corvus splendens</i> , <i>Cygnus olor</i> , <i>Larus argentatus</i> , <i>Larus canus</i> , <i>Larus dominicanus</i> , <i>Larus fuscus</i> , <i>Larus marinus</i> , <i>Larus michahellis</i> , <i>Leucophaeus pipixcan</i> , <i>Pastor</i> <i>roseus</i> , <i>Sylvia atricapilla</i> , <i>Tringa</i> <i>tetanus</i> , <i>Vultur gryphus</i> Linnaeus	<i>Vulpes zerda</i> , <i>Rattus rattus</i> , <i>Canis</i> <i>lupus signatus</i>	<i>Rutilus rutilus</i> , <i>Coregonus</i> <i>lavaretus</i>	(Flavia Zendri et al., 2020, Fuentes- Castillo et al., 2020, de Carvalho et al., 2020, Feng et al., 2019, Mughini-Gras et al., 2019, Ahlstrom et al., 2019, Zou et al., 2019, Jamborova et al., 2018a, Schaufler et al., 2018, Hessman et al., 2018, Atterby et al., 2017, Guenther et al., 2017, Raza et al., 2017, Cristóvão et al., 2017, Vergara et al., 2017, Liakopoulos et al., 2016, Stedt et al., 2015, Hasan et al., 2015, Bonnedahl et al., 2015, Hasan et al., 2014, Gonçalves et al., 2014, Bonnedahl et al., 2014, Abgottspoon et al., 2014, Veldman et al., 2013, Hernandez et al., 2013, Silva et al., 2011, Wallensten et al., 2011, Bonnedahl et al., 2010, Hernandez et al., 2010, Costa et al., 2008, Costa et al., 2006)
CTX-M-14a	7	<i>E. coli</i> (ST2001, ST117, ST131, ST877)	Europe	Portugal, Spain	<i>Milvus migrans</i> , <i>Tyto alba</i>	<i>Neovison vison</i> , <i>Lynx pardinus</i>	-	(Alonso et al., 2017a, Cristóvão et al., 2017, Alcalá et al., 2016,

								Monteiro et al., 2016, Gonçalves et al., 2012, Poeta et al., 2008)
CTX-M-14b	1	Not specified	Europe	England, Latvia, Netherlands, Spain, Sweden	<i>Larus michahellis, Larus argentatus, Larus fuscus</i>	-	-	(Stedt et al., 2015)
CTX-M-15	68	<i>Aeromonas caviae, Aeromonas hydrophila, Citrobacter freundii</i> (ST265), <i>E. coli</i> (ST10, ST1139, ST1139, ST1193, ST12, ST120, ST1251, ST1303, ST131, ST1408, ST1421, ST1431, ST1485, ST155, ST156, ST165, ST1664, ST1706, ST1722, ST1727, ST1788, ST2, ST202, ST205, ST2141, ST224, ST226, ST23, ST2521, ST2687, ST2688, ST2689, ST2914, ST297, ST305, ST3135, ST3268, ST34, ST345, ST3476, ST3479, ST3482, ST3487, ST3488, ST349, ST350, ST354, ST361, ST3716, ST3780, ST3782, ST38, ST4016, ST405, ST410, ST4184, ST4185, ST4186, ST4189, ST44, ST46, ST4684, ST472, ST48, ST491, ST5005, ST540, ST559, ST58, ST602, ST617, ST636, ST648, ST69, ST7097, ST716, ST721, ST744, ST746, ST767, ST853, ST90, ST93), <i>Enterobacter cloacae</i> (ST279), <i>Enterobacter hormaechei</i> (ST114), <i>Enterobacter xiangfangensis</i> (ST114), <i>Escherichia fergusonii</i> , <i>K. pneumoniae</i> (ST1211, ST14, ST219, ST307, ST377, ST39, ST405, ST584), <i>Klebsiella oxytoca</i> , <i>Morganella morganii</i> , <i>Proteus vulgaris</i> , <i>Providencia</i> spp., Only ARG	Africa, Asia, Central America, Europe, North America, South America	Algeria, Argentina, Austria, Bangladesh, Belgium, Brazil, Canada, Central African Republic, Chile, Croatia, Czech Republic, England, France, Gabon, Germany, Guinea, Ireland, Latvia, Mongolia, Netherlands, Nicaragua, Pakistan, Peru, Poland, Portugal, Russia, Senegal, Serbia, Spain, Sudan, Sweden, Switzerland, Tunisia, Turkey, USA	<i>Accipiter nisus, Anas clypeata, Anas crecca, Anas penelop, Anas platyrhynchos, Anastomus oscitans, Anser albifrons, Anser fabalis, Ardea cinereal, Bubo bubo, Bubulcus ibis, Buteo buteo, Caracara plancus, Carduelis carduelis, Carduelis chloris, Chroicocephalus brunnicephalus, Chroicocephalus ridibundus, Ciconia Ciconia, Columba livia, Coragyps atratus, Corvus brachyrhynchos, Corvus frugilegus, Corvus splendens, Croicocephalus ridibundus, Cygnus olor, Falco naumanni, Fulica atra, Larus argentatus, Larus cachinnans, Larus canus, Larus delawarensis, Larus dominicanus, Larus fuscus, Larus glaucescens, Larus marinus, Larus michahellis, Leucophaeus pipixcan, Megascops choliba, Melopsittacus undulates, Merops apiaster, Milvus migrans, Morus bassanus, Netta rufina, Pastor roseus, Phalacrocorax carbo, Rupornis magnirostris, Serinus serinus, Strix aluco, Sylvia melanocephala, Taeniopygia guttata, Turdus merula</i>	<i>Desmodus rotundus, Epomops franqueti, Erinaceus europaeus, Gorilla gorilla gorilla, Macaca Sylvanus, Megaloglossus woermanni, Myotis daubentoniid, Nasua nasua, Ovis orientalis musimon, Plecotus auratus, Rattus norvegicus, Rattus rattus, Sus scrofa, Tapirus terrestris, Vulpes zerda</i>	<i>Abramis brama, Bothrops alternatus, Chelonia mydas, Coregonus lavaretus, Mytilus galloprovincialis, Pagellus acarne, Perca fluviatilis, Rutilus rutilus, Salmo trutta, Sardina pilchardus, Sarpa salpa</i>	(Flavia Zendri et al., 2020, de Carvalho et al., 2020, Nowakiewicz et al., 2020, Mbehang Nguema et al., 2020, Ben Yahia et al., 2020, Feng et al., 2019, Zurfluh et al., 2019, Ngaiganam et al., 2019, Desvars-Larrive et al., 2019, Darwich et al., 2019, Mughini-Gras et al., 2019, Goldberg et al., 2019, Ahlstrom et al., 2019, Mairi et al., 2019, de Carvalho et al., 2018, Jamborova et al., 2018b, Batalha de Jesus et al., 2019, Benavides et al., 2018, Oteo et al., 2018, Bouaziz et al., 2018, Ben Yahia et al., 2018, Brahmi et al., 2018, Schaufler et al., 2018, Hessman et al., 2018, Atterby et al., 2017, Mohsin et al., 2017, Taous Bachiri et al., 2018, Wasyl et al., 2018, Mathys et al., 2017b, Guenther et al., 2017, Mathys et al., 2017a, Raza et al., 2017, Bachiri et al., 2017, Vergara et al., 2017, Yilmaz and Dolar, 2017, Hasan et al., 2016, Liakopoulos et al., 2016, Parker et al., 2016, Jones-Dias et al., 2016, Loncaric et al., 2016, Atterby et al., 2016, Schaufler et al., 2016, Stedt et al., 2015, Hasan et al., 2015, Bonnedahl et al., 2015, Báez et al., 2015, Rashid et al., 2015, Rouffaer et al., 2014, Hasan et al., 2014, Janatova et al., 2014, Bonnedahl et al., 2014, Abgottspon et al., 2014, Loncaric et al., 2014, Veldman et al., 2013, Hernandez et al., 2013, Maravić et al., 2013, Zurfluh et al., 2013, Klimes et al., 2013, Hasan et al., 2012, Poirel et al., 2012, Literak et al., 2010a, Guenther et al., 2010a, Bonnedahl et al., 2010, Hernandez et al., 2010,

								Simões et al., 2010, Ivan Literak et al., 2009, Bonnedahl et al., 2009, Dolejska et al., 2009)
CTX-M-16	2	<i>Serratia marcescens</i> , <i>Raoultella terrigena</i>	Asia, Europe	Bangladesh, Spain	<i>Accipiter nisus</i> , <i>Corvus splendens</i>	-	-	(Darwich et al., 2019, Hasan et al., 2015)
CTX-M-17	1	<i>Enterobacter cloacae</i>	Asia	Bangladesh	<i>Corvus splendens</i>	-	-	(Hasan et al., 2015)
CTX-M-18	1	<i>Citrobacter freundii</i>	Asia	Bangladesh	<i>Corvus splendens</i>	-	-	(Hasan et al., 2015)
CTX-M-22	1	<i>E. coli</i> (ST10, ST131, ST3476, ST359, ST4187, ST4188, ST540, ST744)	South America	Chile	<i>Leucophaeus pipixcan</i>	-	-	(Báez et al., 2015)
CTX-M-24	3	<i>E. coli</i> (ST38)	Asia, Europe	Mongolia, Sweden, Switzerland	<i>Larus argentatus</i> , <i>Milvus migrans</i>	-	<i>Rutilus rutilus</i>	(Guenther et al., 2017, Stedt et al., 2015, Abgottspon et al., 2014)
CTX-M-27	7	<i>E. coli</i> (ST131, ST2245, ST38, ST405)	Europe, North America	Czech Republic, England, Sweden, Switzerland, USA	<i>Corvus brachyrhynchos</i> , <i>Corvus frugilegus</i> , <i>Croicocephalus ridibundus</i> , <i>Larus argentatus</i> , <i>Larus canus</i> , <i>Larus fuscus</i> , <i>Larus marinus</i> , <i>Phalacrocorax carbo</i>	-	<i>Centrarchidae</i> , <i>Coregonus lavaretus</i> , <i>Rutilus rutilus</i> , <i>Salmo trutta</i>	(Flavia Zendri et al., 2020, Jamborova et al., 2018b, Atterby et al., 2017, Stedt et al., 2015, Bonnedahl et al., 2014, Abgottspon et al., 2014, Zurfluh et al., 2013)
CTX-M-32	13	<i>E. coli</i> (ST10, ST131, ST1845, ST38, ST681, ST853)	Central America, Europe, North America	Belgium, Canada, Ireland, Latvia, Netherlands, Nicaragua, Poland, Portugal, Spain, Sweden, USA	<i>Anas platyrhynchos</i> , <i>Bubulcus ibis</i> , <i>Buteo buteo</i> , <i>Columba livia</i> , <i>Corvus brachyrhynchos</i> , <i>Corvus corax</i> , <i>Croicocephalus ridibundus</i> , <i>Cygnus atratus</i> , <i>Falco tinnunculus</i> , <i>Larus argentatus</i> , <i>Larus cachinnans</i> , <i>Larus canus</i> , <i>Larus delawarensis</i> , <i>Larus fuscus</i> , <i>Larus marinus</i> , <i>Larus michahellis</i> , <i>Tringa totanus</i>	<i>Vulpes vulpes</i>	-	(Díaz-Jiménez et al., 2020, Mughini-Gras et al., 2019, Jamborova et al., 2018a, Atterby et al., 2017, Hasan et al., 2016, Monteiro et al., 2016, Stedt et al., 2015, Rouffaer et al., 2014, Veldman et al., 2013, Poirel et al., 2012, Simões et al., 2010, Radhouani et al., 2010, Poeta et al., 2008)
CTX-M-55	13	<i>E. coli</i> (ST117, ST1193, ST155, ST162, ST165, ST212, ST2973, ST366, ST453, ST48, ST58, ST744, ST90, ST93)	Africa, Asia, Europe, North America, South America	Bangladesh, Brazil, Canada, Chile, China, Latvia, Mongolia, Sudan, Sweden, Switzerland	<i>Aegypius monachus</i> , <i>Anas platyrhynchos</i> , <i>Coragyps atratus</i> , <i>Corvus corone</i> , <i>Corvus frugilegus</i> , <i>Corvus splendens</i> , <i>Croicocephalus ridibundus</i> , <i>Larus argentatus</i> , <i>Larus canus</i> , <i>Larus marinus</i> , <i>Leucophaeus pipixcan</i> , <i>Vultur gryphus</i> Linnaeus	<i>Ailuropoda melanoleuca</i> , <i>Nasua nasua</i> , <i>Vulpes zerda</i>	-	(Fuentes-Castillo et al., 2020, de Carvalho et al., 2020, Feng et al., 2019, Zurfluh et al., 2019, Söderlund et al., 2019, Zhou et al., 2018, Hessman et al., 2018, Atterby et al., 2017, Stedt et al., 2015, Hasan et al., 2015, Bonnedahl et al., 2015, Ho et al., 2013, Guenther et al., 2013a)
CTX-M-56	1	<i>E. coli</i> (ST212)	South America	Brazil	<i>Asio clamator</i>	-	-	(de Carvalho et al., 2020)
CTX-M-64	1	<i>E. coli</i> (ST48)	Africa	Sudan	-	<i>Vulpes zerda</i>	-	(Feng et al., 2019)
CTX-M-65	7	<i>E. coli</i> (ST156, ST58, ST602), <i>Salmonella enterica</i> serovar Infantis (ST32)	Asia, Europe, South America	Brazil, Chile, China, Netherlands, Sweden, Switzerland	<i>Anas platyrhynchos</i> , <i>Bubo magellanicus</i> , <i>Larus argentatus</i> , <i>Larus fuscus</i> , <i>Turdus merula</i> , <i>Vultur gryphus</i> Linnaeus	<i>Myrmecophaga tridactyla</i>	-	(Furlan et al., 2020, Fuentes-Castillo et al., 2020, Zurfluh et al., 2019, Fuentes-Castillo et al., 2019, Zou et al., 2019, Hessman et al., 2018, Stedt et al., 2015)
CTX-M-79	1	<i>E. coli</i>	Asia	Bangladesh	<i>Corvus splendens</i>	-	-	(Hasan et al., 2015)

CTX-M-124	2	<i>E. coli</i> (ST5842, ST648)	North America	Canada, USA	<i>Corvus brachyrhynchos</i> , <i>Corvus corax</i> , <i>Larus delawarensis</i>	-	-	(Jamborova et al., 2018a, Poirel et al., 2012)
CTX-M	10	<i>Aeromonas veronii</i> , <i>Citrobacter freundii</i> , <i>E. coli</i> (ST131, ST2541, ST297, ST68), <i>Enterobacter cloacae</i> , <i>Enterobacter spp.</i> , <i>K. pneumoniae</i> , <i>Klebsiella oxytoca</i> , <i>Serratia fonticola</i> , <i>Stenotrophomonas maltophilia</i> , <i>Stenotrophomonas nitritireducens</i> , Only ARG	Asia, Europe, North America, South America	Canada, Chile, Pakistan, Portugal, Saudi Arabia, Slovenia, Spain, USA	<i>Accipiter nisus</i> , <i>Anas platyrhynchos</i> , <i>Aquila chrysaetos</i> , <i>Aquila fasciata</i> , <i>Bubo bubo</i> , <i>Bubulcus ibis</i> , <i>Carduelis yemenensis</i> , <i>Chroicocephalus ridibundus</i> , <i>Ciconia Ciconia</i> , <i>Circus gallicus</i> , <i>Clamator glandarius</i> , <i>Columba livia</i> , <i>Coragyps atratus</i> , <i>Corvus brachyrhynchos</i> , <i>Corvus corax</i> , <i>Dendrocopos major</i> , <i>Falco tinnunculus</i> , <i>Fulica atra</i> , <i>Gyps fulvus</i> , <i>Hieraaetus pennatus</i> , <i>Larus argentatus</i> , <i>Larus fuscus</i> , <i>Milvus migrans</i> , <i>Psittacus erithacus</i> , <i>Streptopelia turtur</i> , <i>Strix aluco</i> , <i>Tyto alba</i>	<i>Capreolus capreolus</i> , <i>Leopardus guigna</i> , <i>Papio hamadryas</i> , <i>Rattus norvegicus</i> , <i>Rattus rattus</i>	-	(Sacristán et al., 2020, Bueno et al., 2020, Sen et al., 2019, Oteo et al., 2018, Raza et al., 2017, Križman et al., 2017, Hassan and Shobrak, 2015, Himsforth et al., 2015, Dias et al., 2014, Martiny et al., 2011)
SHV-2	4	<i>E. coli</i> (ST212, ST4038), <i>K. pneumoniae</i> (ST39)	Europe, North America, South America	Argentina, Canada, Czech Republic, Spain	<i>Chroicocephalus ridibundus</i> , <i>Corvus brachyrhynchos</i> , <i>Corvus corax</i> , <i>Larus dominicanus</i> , <i>Larus michahellis</i>	-	-	(Jamborova et al., 2018a, Vergara et al., 2017, Liakopoulos et al., 2016, Dolejska et al., 2009)
SHV-2a	2	<i>E. coli</i> (ST617)	South America, North America	Argentina, Canada	<i>Corvus brachyrhynchos</i> , <i>Larus dominicanus</i>	-	-	(Liakopoulos et al., 2016, Parker et al., 2016)
SHV-5	2	<i>Citrobacter freundii</i> , <i>E. coli</i>	Africa, Europe	Algeria, Portugal	<i>Corvus corax</i> , <i>Tyto alba</i>	-	Not specified	(Brahmi et al., 2018, Pinto et al., 2010)
SHV-7	1	<i>Enterobacter cloacae</i>	North America	USA	<i>Larus delawarensis</i>	-	-	(Poirel et al., 2012)
SHV-12	25	<i>Aeromonas caviae</i> , <i>Aeromonas hydrophila</i> , <i>Citrobacter freundii</i> , <i>E. coli</i> (ST10, ST1079, ST1086, ST1128, ST1158, ST117, ST1431, ST155, ST156, ST410, ST453, ST457, ST540, ST542, ST57, ST665, ST746), <i>K. pneumoniae</i> , <i>Proteus mirabilis</i> , <i>Providencia alcalifaciens</i>	Europe, North America, Oceania	Australia, Belgium, Croatia, Czech Republic, Germany, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, USA	<i>Aquila chrysaetos</i> , <i>Ardea cinerea</i> , <i>Branta canadensis</i> , <i>Branta leucopsis</i> , <i>Buteo buteo</i> , <i>Chroicocephalus novaehollandiae</i> , <i>Chroicocephalus ridibundus</i> , <i>Ciconia Ciconia</i> , <i>Columba livia</i> , <i>Croicocephalus ridibundus</i> , <i>Cuculus canorus</i> , <i>Gyps fulvus</i> , <i>Larus argentatus</i> , <i>Larus canus</i> , <i>Larus marinus</i> , <i>Larus michahellis</i> , <i>Milvus milvus</i> , <i>Strix aluco</i> , <i>Sturnus unicolor</i> , <i>Sylvia atricapilla</i> , <i>Tyto alba</i>	<i>Capreolus capreolus</i> , <i>Erinaceus europaeus</i> , <i>Lynx pardinus</i> , <i>Martes foina</i> , <i>Meles meles</i> , <i>Rattus norvegicus</i> , <i>Vulpes vulpes</i>	<i>Coregonus lavaretus</i> , <i>Mytilus galloprovincialis</i> , <i>Sparus aurata</i>	(Darwich et al., 2019, Mughini-Gras et al., 2019, Ahlstrom et al., 2019, Alonso et al., 2017a, Dolejska et al., 2018, Atterby et al., 2017, Alonso et al., 2017b, Cristóvão et al., 2017, Vergara et al., 2017, Alcalá et al., 2016, Bonnedahl et al., 2014, Abgottsporn et al., 2014, Veldman et al., 2013, Maravić et al., 2013, Guenther et al., 2013b, Zurfliuh et al., 2013, Radhouani et al., 2013, Gonçalves et al., 2012, Garmyn et al., 2011, Silva et al., 2011, Wallensten et al., 2011, Literak et al., 2010a, Dolejska et al., 2009, Costa et al., 2006)

SHV-14	1	<i>K. pneumoniae</i>	North America	USA	Not specified	-	-	(Bonnedaahl et al., 2014)
SHV-28	2	<i>K. pneumoniae</i> (ST307), <i>Proteus mirabilis</i>	Africa, Europe	Guinea, Spain	<i>Accipiter gentilis</i> , <i>Serinus serinus</i> , <i>Strix aluco</i>	<i>Erinaceus europaeus</i> , <i>Rattus rattus</i>	-	(Darwich et al., 2019, Schaufler et al., 2018)
SHV-62	2	<i>K. pneumoniae</i> (ST502, ST1211)	Africa	Central African Republic, Guinea	-	<i>Gorilla gorilla gorilla</i> , <i>Rattus rattus</i>	-	(Schaufler et al., 2018, Janatova et al., 2014)
SHV-102	1	<i>K. pneumoniae</i>	North America	USA	Not specified	-	-	(Bonnedaahl et al., 2014)
SHV-110	1	<i>K. pneumoniae</i> (ST377)	Europe	Spain	<i>Larus michahellis</i>	-	-	(Ahlstrom et al., 2019)
SHV-167	1	<i>E. coli</i>	Europe	Spain	<i>Bubo bubo</i>	-	-	(Darwich et al., 2019)
SHV	1	<i>E. coli</i>	Europe	Spain	<i>Anas platyrhynchos</i> , <i>Bubo bubo</i> , <i>Bubulcus ibis</i> , <i>Ciconia ciconia</i> , <i>Coragyps atratus</i> , <i>Larus fuscus</i> , <i>Milvus migrans</i>	-	-	(Oteo et al., 2018)
TEM-15	1	<i>E. coli</i> (ST23)	Europe	Austria	<i>Corvus frugilegus</i>	-	-	(Loncaric et al., 2014)
TEM-19	1	<i>E. coli</i> (ST2967), <i>K. pneumoniae</i>	North America	USA	Not specified	-	-	(Bonnedaahl et al., 2014)
TEM-20	1	<i>E. coli</i>	Europe	Portugal	<i>Buteo buteo</i>	-	-	(Pinto et al., 2010)
TEM-24	1	<i>E. coli</i> , <i>Enterobacter cloacae</i>	Africa	Algeria	-	-	<i>Pagellus acarne</i> , <i>Sardina pilchardus</i> , <i>Trachurus trachurus</i>	(Brahmi et al., 2018)
TEM-33	1	<i>E. coli</i> (ST361)	Asia	Pakistan	<i>Fulica atra</i>	-	-	(Mohsin et al., 2017)
TEM-52	9	<i>E. coli</i> (ST167, ST1844)	Europe, North America	Belgium, Canada, Netherlands, Portugal	<i>Anser anser domesticus</i> , <i>Larus cachinnans</i> , <i>Larus fuscus</i> , <i>Leucophaeus pipixcan</i>	Not specified	<i>Sparus aurata</i>	(Mughini-Gras et al., 2019, Cristóvão et al., 2017, Monteiro et al., 2016, Bonnedahl et al., 2014, Garmyn et al., 2011, Simões et al., 2010, Poeta et al., 2008, Costa et al., 2008, Costa et al., 2006)
TEM-52b	2	<i>E. coli</i> , <i>Enterobacter cloacae</i>	Africa, Europe	Czech Republic, Senegal	-	<i>Sus scrofa</i> , <i>Rattus rattus</i>	-	(Literak et al., 2010b, Ivan Literak et al., 2009)
TEM-52c	1	<i>E. coli</i>	Europe	Netherlands	<i>Larus argentatus</i> , <i>Philomachus pugnax</i>	-	-	(Veldman et al., 2013)
TEM-84	1	<i>E. coli</i>	Europe	Spain	<i>Larus michahellis</i>	-	-	(Vergara et al., 2017)
TEM-135	1	<i>E. coli</i>	Europe	Belgium	<i>Buteo buteo</i>	-	-	(Rouffaer et al., 2014)
TEM-161	1	<i>E. coli</i>	Europe	Poland	-	<i>Sus scrofa</i>	-	(Wasył et al., 2018)
TEM-176	1	<i>E. coli</i> (ST58, ST361), <i>Enterobacter xiangfangensis</i> (ST114)	Europe	Austria	-	<i>Rattus norvegicus</i>	-	(Desvars-Larrive et al., 2019)
PER-1	1	<i>Aeromonas caviae</i>	Europe	Croatia	-	-	<i>Mytilus galloprovincialis</i>	(Maravić et al., 2013)

PER-2	1	Only ARG	South America	Chile	Not specified	-	-	(Bueno et al., 2020)
CMY-2	31	<i>Citrobacter freundii</i> , <i>E. coli</i> (ST10, ST101, ST131, ST1485, ST162, ST1625, ST167, ST1850, ST195, ST204, ST2064, ST224, ST2721, ST351, ST357, ST3727, ST38, ST410, ST4564, ST540, ST58, ST617, ST68, ST7207, ST7348, ST83, ST93, ST963), <i>Enterobacter cloacae</i> , <i>K. pneumoniae</i> , <i>Proteus mirabilis</i> , <i>Salmonella enterica</i> serovar Heidelberg, Only ARG	Africa, Asia, Europe, North America, South America	Argentina, Austria, Brazil, Canada, Denmark, England, France, Italy, Netherlands, Poland, Portugal, Saudi Arabia, Slovakia, Spain, Switzerland, Tunisia, USA	<i>Accipiter gentilis</i> , <i>Anas platyrhynchos</i> , <i>Caracara plancus</i> , <i>Carduelis carduelis</i> , <i>Chroicocephalus genei</i> , <i>Chroicocephalus ridibundus</i> , <i>Ciconia Ciconia</i> , <i>Corvus brachyrhynchos</i> , <i>Corvus corax</i> , <i>Corvus frugilegus</i> , <i>Cygnus olor</i> , <i>Larus argentatus</i> , <i>Larus delawarensis</i> , <i>Larus dominicanus</i> , <i>Larus fuscus</i> , <i>Larus glaucescens</i> , <i>Larus marinus</i> , <i>Larus michahellis</i> , <i>Rupornis magnirostris</i> , <i>Streptopelia decaocto</i> , <i>Strix aluco</i> , <i>Sylvia melanocephala</i> , <i>Tringa tetanus</i> , <i>Turdus merula</i> , <i>Tyto alba</i>	<i>Atelerix algirus</i> , <i>Canis lupus</i> , <i>Capra hircus</i> , <i>Capreolus capreolus</i> , <i>Cervus elaphus</i> , <i>Erinaceus europaeus</i> , <i>Loxodonta Africana</i> , <i>Martes foina</i> , <i>Meles meles</i> , <i>Mustela vison</i> , <i>Oryctolagus cuniculus</i> , <i>Ovis orientalis musimon</i> , <i>Rattus norvegicus</i> , <i>Sus scrofa</i> , <i>Vulpes vulpes</i>	<i>Perca fluviatilis</i>	(Furlan et al., 2020, Flavia Zendri et al., 2020, Bertelloni et al., 2020, Migura-Garcia et al., 2019, Ben Said et al., 2019, Desvars-Larrive et al., 2019, Darwich et al., 2019, Mughini-Gras et al., 2019, Turchi et al., 2019, Sen et al., 2019, Jamborova et al., 2018a, Jamborova et al., 2018b, Batalha de Jesus et al., 2019, Alonso et al., 2017a, Wasyl et al., 2018, Aberkane et al., 2017, Vergara et al., 2017, Liakopoulos et al., 2016, Alcalá et al., 2016, Aberkane et al., 2016, Atterby et al., 2016, Hassan and Shobrak, 2015, Alves et al., 2014, Abgottspon et al., 2014, Loncaric et al., 2014, Veldman et al., 2013, Kmet et al., 2013, Poirel et al., 2012, Martiny et al., 2011, Aarestrup et al., 2004)
CMY-16	2	<i>Salmonella enterica</i> serovar Corvallis (ST1541)	Europe	Germany	<i>Milvus migrans</i>	-	-	(Villa et al., 2015, Fischer et al., 2013)
CMY-42	1	<i>E. coli</i>	North America	Canada	<i>Corvus brachyrhynchos</i> , <i>Corvus corax</i>	-	-	(Jamborova et al., 2018a)
CMY-67	1	<i>Citrobacter freundii</i>	Europe	Germany	<i>Passer domesticus</i>	-	-	(Osieka et al., 2018)
CMY-135	1	<i>Citrobacter freundii</i> (ST265)	South America	Brazil	-	-	<i>Chelonia mydas</i>	(Goldberg et al., 2019)
CMY	7	<i>E. coli</i> (ST1167, ST224, ST405, ST4307, ST744), <i>Enterobacter asburiae</i> , <i>Proteus mirabilis</i> , Only ARG	Africa, Europe, North America, South America	Chile, Côte d'Ivoire, Germany, Spain, USA	<i>Accipiter gentilis</i> , <i>Aix sponsa</i> , <i>Anas acuta</i> , <i>Anas arolinensis</i> , <i>Anas discors</i> , <i>Anas platyrhynchos</i> , <i>Anas strepera</i> , <i>Aquila fasciata</i> , <i>Ardea cinerea</i> , <i>Chroicocephalus ridibundus</i> , <i>Ciconia Ciconia</i> , <i>Coragyps atratus</i> , <i>Cygnus olor</i> , <i>Falco tinnunculus</i> , <i>Gyps fulvus</i> , <i>Larus fuscus</i> , <i>Pernis apivorus</i>	<i>Didelphis virginiana</i> , <i>Pan troglodytes verus</i> , <i>Procyon lotor</i>	-	(Worsley-Tonks et al., 2020, Bueno et al., 2020, Oteo et al., 2018, Mathys et al., 2017b, Mathys et al., 2017a, Schaufler et al., 2016, Albrechtova et al., 2014)
DHA-1	5	<i>Citrobacter freundii</i> , <i>K. pneumoniae</i> (ST11, ST1735, ST502), <i>Salmonella enterica</i> serovar Agona (ST13)	Africa, Europe, Oceania	Algeria, Australia, Germany, Guinea, Spain	<i>Chroicocephalus novaehollandiae</i> , <i>Larus audouinii</i>	<i>Ovis orientalis musimon</i> , <i>Rattus rattus</i>	Not specified	(Brahmi et al., 2018, Schaufler et al., 2018, Papagiannitsis et al., 2017, Loncaric et al., 2016, Antilles et al., 2015)
DHA	2	<i>E. coli</i> , <i>Enterobacter asburiae</i>	Africa, Asia	Côte d'Ivoire, Saudi Arabia	<i>Gracula religiosa</i>	<i>Pan troglodytes verus</i>	-	(Hassan and Shobrak, 2015, Albrechtova et al., 2014)

ACT-14	1	<i>E. coli</i>	Africa	Sudan	-	<i>Vulpes zerda</i>	-	(Feng et al., 2019)
ACT-16	2	<i>Enterobacter cloacae</i> (ST279), <i>Enterobacter hormaechei</i> (ST114)	South America	Brazil	-	-	<i>Bothrops alternatus</i> , <i>Chelonia mydas</i>	(Goldberg et al., 2019, de Carvalho et al., 2018)
ACT-23	1	<i>Enterobacter cloacae</i>	Europe	Norway	<i>Larus hyperboreus</i>	-	-	(Literak et al., 2014)
ACT-36	1	<i>E. coli</i> , <i>Escherichia fergusonii</i> , <i>Klebsiella oxytoca</i>	Africa	Tunisia	<i>Bubulcus ibis</i> , <i>Himantopus himantopus</i> , <i>Nycticorax nycticorax</i>	-	-	(Ben Yahia et al., 2020)
ACT	3	<i>E. coli</i> (ST224), <i>Enterobacter asburiae</i> , Only ARG	Africa, Europe, North America	Côte d'Ivoire, Germany, USA	<i>Accipiter gentilis</i>	<i>Canis latrans</i> , <i>Didelphis virginiana</i> , <i>Pan troglodytes verus</i> , <i>Procyon lotor</i>	-	(Worsley-Tonks et al., 2020, Schaufler et al., 2016, Albrechtova et al., 2014)
ACC-2	1	<i>E. coli</i> , <i>Escherichia fergusonii</i>	Africa	Tunisia	<i>Bubulcus ibis</i>	-	-	(Ben Yahia et al., 2020)
ACC	2	<i>Hafnia alvei</i> , Only ARG	Europe, North America	Spain, USA	<i>Anas platyrhynchos</i> , <i>Apus apus</i> , <i>Aquila fasciata</i> , <i>Buteo buteo</i> , <i>Falco peregrinus</i>	<i>Didelphis virginiana</i>	-	(Worsley-Tonks et al., 2020, Oteo et al., 2018)
FOX-3	1	<i>Aeromonas caviae</i>	Europe	Croatia	-	-	<i>Mytilus galloprovincialis</i>	(Maravić et al., 2013)
FOX-5	1	<i>K. pneumoniae</i>	North America	USA	<i>Larus delawarensis</i>	-	-	(Poirel et al., 2012)
FOX	1	<i>Aeromonas eucrenophila</i> , <i>Aeromonas salmonicida</i> , <i>Aeromonas veronii</i>	Europe	Portugal	<i>Circaetus gallicus</i>	<i>Cervus elaphus</i>	<i>Colubridae</i>	(Dias et al., 2014)
MOX	1	<i>Aeromonas salmonicida</i> , <i>Aeromonas veronii</i>	Europe	Portugal	<i>Circaetus gallicus</i> , <i>Strix aluco</i>	-	-	(Dias et al., 2014)
BIL	1	Only ARG	North America	USA	-	<i>Didelphis virginiana</i> , <i>Procyon lotor</i>	-	(Worsley-Tonks et al., 2020)
EBC	1	<i>Citrobacter freundii</i> , <i>Enterobacter asburiae</i>	Africa	Côte d'Ivoire	-	<i>Pan troglodytes verus</i>	-	(Albrechtova et al., 2014)

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