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Tracking antibiotic resistance along the Silk Road

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Information on the bacterial communities that inhabit wild-animal species, some of which facing extinction in the near future, as well as information on the spreading of antibiotic resistance into relatively pristine ecosystems, remains scarce. Accordingly, the goal of this study was to evaluate if wild or feral animals, inhabiting remote areas of the globe (from the Tibetan plateau to the Gobi desert), carry antibiotic resistant bacteria. During the SilkRoad2010 expedition (CIBIO and Chinese Academy of Sciences), faecal samples were collected from nine iconic mammal species, most of which endangered or in the verge of extinction. Faecal samples (0.1ml) were plated in different selective culture media (e.g. Slanetz-Bartley agar for *Enterococcus* spp., MacConkey agar for *Enterobacteriaceae* and non fermenter Gram negative bacteria, XLD and SS agar for *Salmonella*), with/without antibiotic supplements, before and after a pre-enrichment step. Different bacteria morphotypes were selected for further characterization. Susceptibility to several antibiotics was tested by disk diffusion method (CLSI). Two hundred and seventy bacterial isolates (97 Gram positive and 173 Gram negative) were collected from 22 faecal samples, from different animal species: Mongolian wild ass, Dhole, Mongolian gazelle, Przewalski horse, Gray marmot and Bactrian camel. Different antibiotic resistance rates were detected amongst *Enterococcus* spp: tetracycline-49,5% (48/97), erythromycin-36% (35/97), High Level of Resistance (HLR) to gentamicin -15,5% (15/97), ampicillin - 6% (6/97), and Quinupristin/dalfopristin -23,7% (23/97). Decreased susceptibility (n=10) and resistance (n=6) to vancomycin were observed. Among Gram negative lactose fermentors, resistance was observed for ampicillin - 39% (31/79), ampicillin+clavulanic acid - 15% (12/79) and cefotaxime -16,5%. (13/79). Variable susceptibility to aminoglycosides was observed: gentamicin-19% (21/108); tobramycin-16% (20/123). Two isolates (obtained from Bactrian camel and Gray marmot) showed resistance to imipenem. Although preliminary, results emerging from this study show that even though inhabiting remote areas with extremely low human pressure, the critically endangered Silk Road fauna surprisingly harbours bacteria carrying antibiotic resistance. As so, drug resistance, far from limited to hospitals, may be spreading into the most remote areas of the globe.

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