Conservation Genetics and Systems Science in the One Health context

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"One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems." (www.who.int) In the same way, systems science is an interdisciplinary approach that studies the complexity of systems in nature, social or any other scientific field. Combining these two concepts, we aim at understanding the factors influencing health and disease in populations that are interconnected in cultural and environmental settings for the conservation of ecosystem, human and animal health.

For biodiversity conservation and public health newly emerging zoonotic disease outbreaks pose serious risks. Predictions of emerging diseases often neglect the role of opportunistic expanders and, at present, there is limited information available for expanding species and their zoonotic pathogens in Austria and neighbouring countries. Pathogens are omnipresent and by definition detrimental to their hosts, thus exerting high selection, which can result in reciprocal adaptation between the antagonists, an evolutionary arms race.

Metagenomic next generation sequencing (mNGS) is a pathogen-agnostic detection method, and in combination with open-source platforms well suited to identify microbes from genomic data. mNGS is a powerful tool to simultaneously retrieve One Health genomic information of (i) the host including its immune genes and microbiome, and (ii) pathogens present in the collected samples. In my presentation I will give examples of host immune response to emerging disease, e. g., dromedaries to Middle-East Respiratory Syndrome Corona Virus (MERS - CoV) infection. I will also give a preview about our current pathogen detection by screening Illumina short reads in wild felids.