

# PARASITOLOGY

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## Free-living amoebae as vectors of bacteria, viruses, fungi and protozoa

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Free-living amoebae (FLA) can be found in specimen both in the environment and in samples from patients. In addition to their role as pathogens, FLA are known to serve as host and vehicles for the transfer of various intracellular organisms (fungi, viruses, bacteria, other eukaryotes), some of them being natural human pathogens. They act as reservoir or vehicle of microorganisms like *Legionella* sp., *Listeria monocytogenes*, *Pseudomonas aeruginosa*, *Mycobacterium* sp., *Cryptosporidium* sp. and members of the Parachlamydiaceae. In the cyst-stage of the FLA these intracellular organisms are protected against any adverse environment (FLA as “Trojan horse”). This may lead to risks to health in terms of the development of pathogenicity/virulence and antibiotic resistance (FLA as “Trainings ground”). In most documented cases the microscopic observation of the host amoebae and their endocytobionts or endoparasites has been based on cultural methods. Light microscopy followed by electron microscopy and fluorescence microscopy are the suitable methods to decide whether the microorganisms are really able to proliferate within their host amoebae (FLA as reservoirs) or whether they are only transported (FLA as vectors). “Co-cultivation” of different microorganisms with a range of pathogenic and apathogenic FLA is a promising approach to determine the role of FLA in the field of emerging pathogens. Furthermore these microorganisms within the FLA may serve as interesting parasite host models. This approach will be proven by our findings regarding several intracellular bacteria and viruses, especially the so called Giant viruses (e.g. Mimiviruses and Pandoraviruses). Similar to the Mimiviruses the story of Pandoraviruses which infect FLA began years before their genomic affiliation with the investigation of a keratitis patient that led to the isolation of obligate intra-amoebal microorganisms from the contact lens cases. This endocytobiont was described in 2008, without understanding (or even having the idea of) their affiliation to viruses at that time. These Pandoraviruses had low similarity on the morphological or genomic level with other previously described viral families or species. The characteristic structure of the *Pandoravirus virion* was unique and unexpected. It was documented that the Pandoraviruses, similar to the Mimiviruses, replicated concomitantly within the Acanthamoebae. Their size of >1 µm, their unusual morphology and their genome with approximately 2.5 MB make them extraordinary viruses. Their genome is as unparalleled as it is large and exceeds even that of parasitic microsporidia, for example *Enterocytozoon* sp. In any case, *Pandoravirus* replaced *Mimivirus*, as the largest known virus so far, as regards the genome.

### Biography

Patrick Scheid is a Lecturer of Zoology/Parasitology at the University of Koblenz-Landau, Germany. He is the Head of the Laboratories of Parasitology and Cell-Culture (Virology) at the Central Institute of the German Military Medical Service at Koblenz. Currently his researches focus on the so called free living amoebae (FLA) either as human pathogens or reservoirs and vehicles of pathogenic microorganisms. He holds the greatest collection of free-living amoebae in Germany and collaborates with researchers worldwide. He has published more than 100 articles in scientific journals and scientific books on infectious diseases.

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