Humans are dramatically and possibly irrevocably altering the global ecosystem, resulting in ecological boundaries between humans and non-human primates (NHPs) that are porous and increasingly blurred. By 2050 it is estimated that 9.6 billion humans will cover the earth (Gerland et al. 2014). In almost all countries where NHPs naturally occur, humans have converted forest habitats into an agriculture-dominated landscape to serve the demand for meat, palm oil or fruits (Estrada et al. 2017). This dramatic shift in landscape ecology has resulted in an ever-growing human–domestic livestock–NHP interface. Estrada et al. (2017) estimated that approximately 60% of all known NHP taxonomic families are threatened with extinction and a further 75% of all NHP species-populations are decreasing. The speed and the extent of these anthropocentric ecological changes are the main drivers for emerging infectious diseases of wildlife (Daszak et al. 2000) and spillovers from wildlife to humans (Karesh et al. 2012).

This volume has emerged out of the recognition that the human–monkey interface far exceeds the one shared between humans and great apes. Millions of monkeys share habitat with more than a billion humans. There are currently 315 recognized monkey species distributed across the planet compared to seven recognized great ape species (Mittermeier 2013; Nater et al. 2017). Studies of synanthropic monkeys, such as macaques (Macaca spp.), baboons (Papio spp.), vervets (Cercopithecus spp.) or capuchins (Cebus spp. and Sepajus spp.), which thrive in the ecological niches that humans make as they alter the habitat, provide critical insights into the field of One Health (Oberste et al. 2012). Monkeys’ behaviour, ecology and health
are often impacted by their mutual and extensive overlap with humans. Studies have shown that in some species of macaques, population densities and birth rates increase when these behavioural and ecologically flexible monkeys occupy the same environment as humans (see Chap. 2). In contrast, great ape populations are known to suffer when they overlap with human populations (Walsh et al. 2003). Certainly, not all monkeys are as successful as macaques or baboons and the majority of monkey species are critically endangered (Estrada et al. 2017). But there is no denying that the large number of monkey genera and monkeys’ ability to maintain very large groups while exploiting human habitats yields a monkey–human interface that far exceeds the one shared between humans and their closest relatives, the great apes. Moreover, large numbers of monkeys are kept as pets and for decades certain species of monkeys have been used for basic and applied research. Taken together, these contexts further extend and intensify the contact rate between humans and monkeys.

The use of monkeys in biomedical research underscores the potential for humans and monkeys to share pathogens. Several examples exist where baboons have become naturally infected with pathogens that are known to infect and cause disease in humans (Nasher 1988; Drewe et al. 2012; Mafuyai et al. 2013; Knauf et al. 2018; Thiele et al. 2018; Imwong et al. 2019) (Chaps. 4 and 5). Macaques, the Darwinian superstars of the NHP-world, known for their ability to co-exist in virtually any environment, are naturally infected with malaria parasites (Imwong et al. 2019), multi-resistant bacteria (Chap. 7), as well as one of the most feared and presumably misunderstood pathogens, the Macacine herpesvirus 1 (Chap. 8). However, the role that monkey species play as a natural pathogen source and disease reservoir for human infection is in many cases not well understood (e.g. Chagas and Trypanosomiasis, Chap. 15).

For humans, the term ‘Neglected Tropical Diseases’ is used to describe diseases that affect the poorest and marginalized populations which have limited access to healthcare (Hotez and Kamath 2009). However, the term doesn’t refer to the frequency and/or intensity of research on a given disease. As a consequence, the World Health Organization categorizes well-studied diseases such as rabies (Chap. 11) or soil-transmitted helminths (Chap. 13) as Neglected Tropical Diseases in humans. In this book, and in contrast to the term ‘Neglected Tropical Diseases’ in humans, we apply the term ‘Neglected Diseases’ to pathogens in monkeys that, in our view, are truly under-studied.

Providing the framework for all the chapters in this book is the concept of One Health, which recognizes the connections between human, animal and environmental health and is widely accepted in public health. A common misconception of One Health is that its directionality is artificially skewed in favour of human health. As the authors throughout this volume demonstrate, that is certainly not the case. Pathogens can be transmitted in all directions and there are numerous examples where wild NHPs acquired diseases from humans (reviewed in (Dunay et al. 2018)) or share diseases with livestock as documented with Reston ebolavirus (Chap. 12). The current 2019 coronavirus outbreak (Wu et al. 2020), which likely has its origin in wildlife (Andersen et al. 2020), is the most recent reminder that our understanding of diseases in the context of natural ecosystems is key to disease management and elimination. Knowledge on biodiversity and (in this case human) behaviour is as important as the
full molecular characterization of a pathogen. Chapters 2 and 3 discuss these aspects and issue a call to overcome the widespread silo mentality in monkey disease research.

Multidisciplinary teamwork requires a vocabulary that is clear and understandable across all disciplines (Hallmaier-Wacker et al. 2017). This volume includes contributions from researchers representing numerous disciplines including primatology, veterinary and human medicine, microbiology, ecology and epidemiology. Traditionally, different disciplines use the same term in different ways. Finding a common language is, therefore, the first step when multidisciplinary teams are created. In an ecologist’s understanding, for example, the term ‘parasites’ is mostly inclusive of any viruses, bacteria or parasites. In medicine, however, the term ‘parasites’ is used to describe protozoa, helminths and ectoparasites. In this book, and to overcome translation errors between the disciplines, we applied a single language across all chapters. In general, we followed the definitions used in medical and infectious diseases research. Table 1.1 provides a list of terms and how they are used across all chapters in this book.

**Table 1.1** List of terms that are used in divergent ways across the different research disciplines and the definition of the term and how it is used in this book

| Terminology       | Definition                                                                 | References                      |
|-------------------|---------------------------------------------------------------------------|---------------------------------|
| Primate           | Non-human primates and humans                                             | Mittermeier (2013)              |
| Non-human primate | Non-human primates excluding humans                                       | Mittermeier (2013)              |
| Ape               | Great- (gorilla, chimpanzee, bonobo, orangutan) and small-apes (gibbons and siamangs) | Mittermeier (2013)              |
| Bacterium         | A unicellular prokaryotic microorganism that has its own metabolism       | Quinn et al. (2016)             |
| Virus             | A nonliving submicroscopic infectious agent that contains RNA or DNA surrounded by proteins. It depends on a living cell for replication | Quinn et al. (2016)             |
| Parasite          | A protozoa, helminth or ectoparasite that lives on or in and at the expenses of a larger organism called the host | Bowman (2009)                  |
| Macroparasite     | Helminths and all ectoparasites                                           | Quinn (2016)                    |
| Microparasite     | Parasites that are not seen by the naked eye (e.g. protozoa)              | Quinn (2016)                    |
| Pathogen          | A microbe that is capable of causing host damage                           | Casadevall and Pirofski (1999)  |
| One Health        | Recognizes that the health of humans, animals and ecosystems is connected and involves a coordinated, collaborative, interdisciplinary and cross-sectoral approach to fight infectious diseases. The approach is based on the Manhattan Principles (Cook et al. 2004) | Zinsstag (2012)                 |
| Eco(system) Health| Presupposes that human survival depends on healthy and diverse ecosystems. It strives for the health of people, animals and ecosystems by promoting discovery and understanding through transdisciplinary action-research | Zinsstag (2012)                 |
| Global Health     | Collaborative transnational research and actions for promoting health for all | Beaglehole and Bonita (2010)    |
| Team science      | Research collaboration among investigators from different disciplines who work interdependently to share leadership and responsibility | Tebes and Thai (2018)           |
Many chapters deal with pathogens that infect wild and captive monkeys alike, such as tapeworms (Chap. 14), morbilliviruses (Chap. 9) and simian foamy viruses (Chap. 10). However, some of the pathogens such as the bacterium *Chlamydia trachomatis* (Chap. 6) are not yet reported as natural infections in free-living NHPs. Infection pathways are complex and they depend on multiple factors such as animal density, animal behaviour, the immune and nutritional status, the ecology and dynamics of the disease or the infectious dose (Plowright et al. 2017).

We sincerely hope that this book will inspire and foster new research collaborations on diseases in monkeys. Compared to the critical situation in great apes, many monkey species have a realistic chance of survival in a human-dominated landscape. This, however, requires monitoring of disease transmission between monkeys and humans while also protecting remaining habitats. Monkey health is a team sport (Chap. 3), and this book should motivate primatologists, conservationists, behaviour scientists, physicians, veterinarians and disease researchers to collaborate. In chap. 16, Wolf and colleagues provide a detailed example of these types of collaborations in action at Gombe National Park in Tanzania.

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