

Is 2020 the year when primatologists should cancel fieldwork?

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Abstract

Year 2020 has brought the greatest global pandemic to hit the world since the end of the First World War. The severe acute respiratory syndrome coronavirus 2 and the resulting disease named coronavirus disease 2019 has brought the world to its knees both financially and medically. The American Society of Primatologists has postponed their annual meetings from the end of May 2020 until the end of September 2020, while the International Primatological Society have postponed their biennial congress from August 2020 to August 2021, which has also resulted in their 2022 meetings in Malaysia being pushed back until 2023. Here, I explore the potential dangers of pursuing any primate fieldwork during this pandemic on our study species, their ecosystems, and local peoples. I believe that the risk of bringing this virus into our study ecosystems is too great and that primatologists should cancel all field research until the pandemic ends or a vaccine/reliable treatment is widely available. This is the year we all must become One Health practitioners!

KEYWORDS

Covid-19, Field Research, One Health, Pandemic, SARS-Cov-2

As we rang in the start of 2020, none of us could have imagined that our world was about to be thrust into chaos by what history will likely view as the worst global pandemic since the end of the First World War. Global healthcare systems, economies, and stock markets have been brought to their knees. Many countries have shut down most nonessential services and asked residents to shelter in place. A new world reality has sprung where many of us only go out when we must. Toilet paper, medical masks, gloves, and hand sanitizers have become highly sought-after items with a huge secondary market. We have been told to limit our outings to procure essential items like food and medicine. Social media taglines, such as “#StayHome” and “#FlattenTheCurve” have become the norm. If 2020 was atypical year for field primatologists, many would be starting to get ready to head to their field sites to conduct research. Field research teams consisting of PI's, graduate students, and field assistants would be getting ready for a summer of data collection. But we know now that 2020 is not a normal year. I am sure many

primatologists are wondering if travel bans and government orders to stay home will last through the field season, and how these issues may impact primate fieldwork in 2020. I am here to suggest to all primatologists that 2020 should be the year we take a big step to protect our study species, research ecosystems, and local peoples by deciding to postpone all fieldwork until the pandemic ends and/or a vaccine/reliable treatment becomes widely available. I understand that many will consider this an unpopular stance as there are many confounding issues including grant money use, tenure clocks, gaps in data, graduate student progression, and timelines, among many others, but for the sake of the species, we study and the communities we often work in this needs to be done.

Primates as an order are some of the most threatened wildlife species on the planet. In 2017, it was estimated that ~60% of primate species were threatened with extinction, and ~75% of primate species were experiencing population declines (Estrada et al., 2017). It is likely that in the 3 years since this study was published that the

situation has likely gotten worse and not better. Every 2 years, the International Primatological Society assembles at their biennial congress and primate conservationists meet to decide on the 25 most endangered primate species (Schwitzer et al., 2019). Many of these species have such low populations that having estimates of 1,000 or fewer individuals remaining is not uncommon. Since Wallis and Lee (1999) sounded the alarm on the risk that humans may introduce diseases to primates via field research, primate conservationists, and field researchers have started to understand that our presence in the field can potentially risk both the short and long-term health of our study species. Studies of recent coronavirus outbreaks severe acute respiratory syndrome (SARS), Middle East respiratory syndrome-related coronavirus (MERS), and SARS-related coronavirus 2 (SARS-CoV-2) have all been shown to be experimentally infective to at least some species of nonhuman primates. SARS showed the potential to cause serious disease in African green, macaques (cynomolgus and rhesus), and common marmosets (Subbarao & Roberts, 2006). MERS is infective to *Rhesus macaques* and marmosets with more severe pneumonia only being observed in marmosets (van Doremalen & Munster, 2015; Leist and Cockrell, 2020). Much of the early data of primate susceptibility and morbidity to coronavirus disease 2019 (COVID-19) are a mix of both published and papers still under peer review. Early research on *R. macaques* (*Macaca mulatta*) suggests that they can be infected with SARS-CoV-2 and develop symptoms like those seen in humans (Shan et al., 2020), while data from cynomolgus macaques (*M. fascicularis*) suggest that they can be infected with the virus but were mostly asymptomatic (Rockx et al., 2020). Using a novel approach, Melin, Janiak, Marrone, Arora, and Higham (2020) modeled the susceptibility of nonhuman primate species based on the similarity of their angiotensin-converting enzyme 2 (ACE-2) gene sequences from published nonhuman primate sequences. Their results (still in the peer-reviewed process) show that all Old World apes and monkeys possess the same 12 ACE-2 genes which have been identified as being critical for binding of the SARS-CoV-2 virus in humans (Melin et al., 2020). The results are more encouraging for prosimians and New World monkeys showing that based on the ACE-2 gene, these primate species may be less susceptible to the virus (Melin et al., 2020). On the basis of data from SARS and MERS in New World monkeys, I would suggest that it is too soon to celebrate and deem these primate taxa immune to SARS-CoV-2 infection and COVID-19. Melin et al. (2020) rightfully declare that we need to limit the exposure of nonhuman primate populations to humans during this pandemic. Newly released research that has finished the peer-reviewed process suggests that the severity of COVID-19 increases with age in *R. macaques* which is something we have also seen in humans (Yu et al., 2020).

Some may suggest that we are being over cautious by canceling field seasons as we do not know for sure whether infection with SARS-CoV-2 in most nonhuman primate species mirrors the infection viral progression in humans. For most primates species, we have little to no data on the route of infection, the receptors targeted by the virus, the age-related severity of the illness, if host morbidity and mortality approach the same levels as has been seen in humans, and

whether higher viral loads in the host are associated with the severity of the infection (Gretebeck & Subbarao, 2015). However, the studies by Melin et al. (2020), Rockx et al. (2020), Shan et al. (2020), and Yu et al. (2020) suggest that at least some primate taxa could be greatly impacted by SARS-CoV-2 outbreaks, and in my opinion, this is too great a risk to take.

Gillespie and Leendertz (2020) have already suggested that great ape field research be limited during the pandemic and that where possible great ape tourism be suspended until the pandemic ends. They go one step further and suggest that any field research with great apes that continues should follow the IUCN guidelines for best practices to monitor the health and control disease in great ape populations (Gilardi et al., 2015). Many popular great ape/primate tourism sites have already been shut down as a result of this pandemic including the Virunga National Park in Rwanda, Tanjung Puting National Park in Indonesia, and Sepilok in Malaysia (Figure 1) risking huge losses to local economies that rely on the conservation dollars provided by the tourism. This has been done to preserve the long-term safety of the species these sites are trying to protect. Bat researchers have taken their research recommendations one step further for 2020. The IUCN Bat Specialists Group has called for the suspension of any field activities that include the handling of bats, or any research activities that would occur <3 m from roosting sites (www.iucnbsg.org). Today I am writing this commentary to suggest that field primatologists follow the example of our bat colleagues and suspend all field research until the pandemic ends or a vaccine/reliable treatment is widely available. Why am I suggesting more stringent measures than those proposed by Gillespie and Leendertz (2020) or the IUCN bat specialist group? First, the recommendations made by Gillespie and Leendertz were made in March and the global situation with COVID-19 has changed dramatically. China has seen a second wave of cases after reopening its borders to citizens who had been outside of the country. Overall, the number of countries reporting outbreaks has also grown to include primate hotspots such as Ecuador, Uganda, Indonesia, Malaysia, and others. Even countries like Singapore who seemed to have a grasp on the pandemic have seen



FIGURE 1 Pig-tailed macaque (*Macaca nemestrina*) at a Sepilok Feeding Station Sabah, Malaysia

spikes in the number of cases and the number of fatalities. Second, field primatologists have a responsibility to protect our study species, as well as protecting the people and ecosystems they share. A holistic approach to ecosystem health where people are also included in the equation is one of the main tenets behind the concept of One Health. Some veterinarians and One Health advocates have suggested that SARS-CoV-2 and COVID-19 could result in the first modern era pandemic to evolve into a zoonotic (Gollakner, & Capua, 2020). Primatologists coming from foreign countries or large metropolitan areas (i.e., habitat country primatologists) risk bringing COVID-19 to their field sites and the results could be catastrophic. It is now likely that COVID-19 is infective to other wildlife species with media reporting that a tiger at the Bronx Zoo in the United States tested positive for the virus and was symptomatic. If true, this indicates that humans have the potential to pass the virus to many species of wildlife, and that wildlife species may be able to then transmit it to each other. Recent evidence suggesting that infective virus can be passed through both urine and feces is also troubling given the lack of true bathrooms at most field sites (Sun et al., 2020, Xiao et al., 2020). This suggests that we have no way of knowing for sure what could happen to the ecosystems where we conduct our field research if COVID-19 were introduced. We could end up with another catastrophic event like the Ebola epidemic during early 2000s which contributed to a massive decline in Central African wildlife (Leroy et al., 2004). Many zoos worldwide have shut down to protect their staff and animals because of COVID-19.

Primatologists have a responsibility to help conserve and protect our study species from introduced disease, but to cancel field research, other invested parties must also agree to help. Funding agencies should recognize that field research is not advisable for the near future and allow funding to be carried over into the next safe field season. Colleges and universities should support their faculty and students by stopping funding, tenure, and thesis completion clocks for projects that are reliant on field research. Efforts should also be made to support and pay local collaborators, students, and field assistants who rely on primatologists to provide them with stable incomes. I also realize that not every field primatologist can cancel research for all of 2020. In those cases, I would suggest that research should at least be rescheduled until later in the year when we will hopefully have a better sense of where this pandemic is headed, and any research done at that point follow the IUCN guidelines for best practices to monitor the health and control disease in great ape populations (Gilardi et al., 2015) no matter what primate species is being studied.

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