



# Rising to the occasion: outlining Ethnobiologists' response to the coronavirus (COVID-19) pandemic

F. Merlin Franco, Rainer W. Bussmann

## Editorial

The COVID-19 pandemic has emerged as the greatest threat to humankind so far in the 21<sup>st</sup> Century. As of 27<sup>th</sup> May 2020, there were 5,717,726 reported cases, and 352,983 fatalities (WHO 2020). The pandemic is not just a health crisis anymore, because lockdowns and other restrictions have greatly affected economic activities, which in turn affects cash flows in local and regional scales. Closure of businesses lead to widespread rise in unemployment, further leading to socio-economic problems, and reduction of public expenditure available for healthcare (McKee & Stuckler 2020). The health and economic impacts are predicted to be even much more serious in indigenous communities who live in remote areas and suffer institutional apathy (Ferrante & Fearnside 2020). Such a situation underlines the need for Ethnobotanists to rise to the situation and complement the ongoing efforts from our communities and local governments in combating COVID-19 and its impacts.

## Plants, ethnobotany and COVID-19

COVID-19 was preceded by the last Ebola outbreak that led to the loss of more than 11,000 lives. Unlike COVID-19, Ebola had a high mortality rate of close to 50%. Ebolaviruses belong to the Filovirus genus of Filoviridae, and are transmitted to humans from animals, with guinea pigs, primates, bats, and ticks widely believed to be the sources (Feldman & Klenk 1996). Recently, Dovich et al. (2019) recorded the spill-over of filoviruses from bats to people in Nagaland of Northeast India. The local participants had a history of participating in annual bat hunts (Mani et al. 2017), where they would have come into contact with various viruses including filoviruses from bat reservoir. One of the hypotheses put forward by Dovich et al. (2019) to explain the failure to detect human filovirus infections in Asia is that these

filoviruses could have been causing asymptomatic infections in humans. We do not know the nature of these infections. They could have gone entirely unnoticed or symptoms, like in most symptomatic cases of SARS-CoV2 would be a mild flu. If such infections are more common than previously known, it would be logical for the local communities to have prospected the resources in their environment for medicinal plants that could be used to alleviate the symptoms.

The relationship between the prevalence of diseases and medicinal plants, and the ability of local pharmacopoeias to respond to emerging diseases, is a widely understood concept in Ethnobiology. The original pharmacopoeia of the Waoroni people of Ecuador was highly specialised in the treatment of diseases endemic to the community (Davis & Yost 1983). The local pharmacopoeias of Peru have evolved in response to contemporary trends, incorporating new remedies to strengthen their ability meet local healthcare needs (Bussmann & Sharon 2006). Plants used to treat flu and respiratory ailments in various local communities have been studied routinely by ethnobiologists (Caceresa et al. 1993).

## Correspondence

**F. Merlin Franco<sup>1</sup>, Rainer W. Bussmann**

<sup>1</sup>Institute of Asian Studies, Universiti Brunei Darussalam, Brunei Darussalam.

<sup>2</sup> Department of Ethnobotany, Institute of Botany Iliia State University, Tbilisi, Georgia

\*Corresponding Author: F. Merlin Franco;  
merlin.francis@ubd.edu.bn

**Ethnobotany Research & Applications  
20:06 (2020)**

Like Filoviridae, viruses of Coronaviridae also have a long history of infecting humans. They are known to target the respiratory, gastrointestinal, hepatic, and central nervous systems; the Severe Acute Respiratory Syndrome (SARS) outbreak of 2002 in China and the Middle East Respiratory Syndrome (MERS) in the Kingdom of Saudi Arabia in 2012 are two major infectious diseases of this century caused by Coronaviruses closely related to SARS-CoV-2 (Chen et al. 2020). SARS-CoV-2 is also believed to have transmitted to humans from bats following natural evolution (Andersen et al. 2020; Benvenuto et al. 2020). However, the pathogenicity of viruses belonging to Coronaviridae are generally believed to be low (Kahn & McIntosh 2005). Hypothetically speaking, local communities residing in areas with prevalence of Coronaviridae vectors / reservoirs could have also developed plant-based remedies both for curative as well as preventive purposes (Lozano 1998).

Synthetic compounds structurally derived from plant metabolites, such as Chloroquine phosphate and their analogues are being deployed in the treatment of Covid-19, although their efficacy has not been proven (Nature Plants 2020). Generally, the simple transfer of traditional knowledge on the treatment of diseases, as well as plant derived compounds used for completely different indications, to treat COVID-19, is highly problematic (Maldonado et al. 2020). However, traditional medicines that are known to be efficient against Coronavirus-like infections could be deployed in a complementary manner (Luo et al. 2020; Ni et al. 2020).

A significant percentage of COVID-19 patients are known have cytokine storm syndrome, and researchers recommend 'existing, approved therapies with proven safety profiles' to treat the condition (Mehta et al. 2020). Curcumin, the principal curcuminoid of turmeric (*Curcuma longa* L.) is known for its capability to block cytokine release (Sordillo & Helson 2015). Plants of the genus *Curcuma* form an important ingredient in many traditional formulations of South and Southeast Asia (Sanatombi & Sanatombi 2017; Subositi & Wahyono 2019). In addition, a wide variety of species that are traditionally used as foods, might be used to strengthen the immune system, and thus help to prevent the manifestation of COVID-19 (Fan et al. 2020). Ethnobiologists should study the relevance of such formulations in complementing existing protocols to combat COVID-19. However, as ethnobiologists we also need to keep in mind that the COVID-19 pandemic will most likely have a profound influence on the future of our discipline (Vandebroek et al. 2020).

### **Be mindful of the parasitic wedge**

An important theory in Biocultural Diversity is the Parasitic Stress Theory which predicts pathogen induced evolution of religious and linguistic diversity (Fincher & Thornhill 2008). The influence of diseases like COVID-19 on human culture is profound, beyond the elimination of apparent cultural practices such as handshakes, hugs, eating out, etc. Ethnobiologists have routinely studied the relationship between culture and ecology, and it is important to study the possible impacts COVID-19 might have on the relationship between local people and culturally important species including species such as bats that are traditionally hunt. The Parasitic Stress Theory also predicts the rise of ethnocentrism and xenophobia, and fragmentation of societies (Thornhill & Fincher 2014; Karinen et al. 2019). As researchers constantly working with diverse group of people, ethnobiologists should be watchful for signs of xenophobia and work with our communities and local governments in combating it.

### **The long road ahead**

The pandemic has inflicted massive financial and health burdens on the local communities with whom ethnobiologists routinely collaborate. We urge fellow ethnobiologists to work with our respective communities to help them cope up with the situation. Ethnobiology has always been a dynamic discipline, capable of responding to emerging challenges including meeting healthcare needs in the post-world war times to addressing decline of biological and cultural diversities. We call upon fellow ethnobiologists to collaborate with communities who are known to have a long history of interaction with zoonotic viruses, to document the plants used for curative and preventive purposes. However, we also caution against romanticizing traditional plant-based remedies, and researchers should take extra care not to distract ongoing efforts to find effective treatments and vaccine against the pandemic.

### **Literature cited**

- Andersen KG, Rambaut A, Lipkin WI, Holmes EC, Garry RF. 2020. The proximal origin of SARS-CoV-2. *Nature Medicine* DOI: 10.1038/s41591-020-0820-9
- Benvenuto D, Giovanetti M, Ciccozzi A, Spoto S, Angeletti S, Ciccozzi M. 2020. The 2019-new coronavirus epidemic: Evidence for virus evolution. *Journal of Medical Virology* 92(4). doi: 10.1002/jmv.25688
- Bussmann RW, Sharon D. 2006. Traditional medicinal plant use in Northern Peru: Tracking two thousand years of healing culture. *Journal of Ethnobiology and Ethnomedicine* 2:47 doi: 10.1186/1746-4269-2-47

- Caceresa A, Figueroa L, Taracena AM, Samayoa B. 1993. Plants used in Guatemala for the treatment of respiratory diseases. 2: Evaluation of activity of 16 plants against Gram-positive bacteria. *Journal of Ethnopharmacology* 31(1):77-82. doi: 10.1016/0378-8741(93)90053-8
- Chen Y, Liu Q, Guo D. 2020. Emerging coronaviruses: Genome structure, replication, and pathogenesis. *Journal of Medical Virology* 92(4). doi: 10.1002/jmv.25681
- Davis EW, Yost JA. 1983. The ethnobotany of the Waorani of Eastern Ecuador. *Botanical Museum Leaflets* 3:159-217.
- Dovih P, Laing ED, Chen Y, Low DHW, Ansil BR, Yang X, Shi Z, Broder CC, Smith GJD, Linster M, Ramakrishnan U, Mendenhall IH. 2019. Filovirus-reactive antibodies in humans and bats in Northeast India imply zoonotic spillover. *PLoS Neglected Tropical Diseases* 13(10): e0007733. doi: 10.1371/journal.pntd.0007733
- Fan Y, Zhang Y, Tariq A, Jiang X, Ahmad Z, Zhihao Z, Idrees M, Azizullah A, Adnan M, Bussmann, RW. 2020. Food as medicine: a possible preventive measure against coronavirus disease (COVID-19). *Phytotherapy Research*. (Accepted). doi: 10.1002/ptr.6770
- Feldmann H, Klenk HD. 1996. Filoviruses. In: *Medical Microbiology*. 4th edition. Edited by S Baron. University of Texas Medical Branch at Galveston, Chapter 72.
- Ferrante L, Fearnside P. 2020. Protect Indigenous peoples from COVID-19. *Science*. 368:251. doi: 10.1126/science.abc0073
- Fincher CL, Thornhill R. 2008. A parasite-driven wedge: infectious diseases may explain language and other biodiversity. *Oikos* 117:1289-1297.
- Kahn JS, McIntosh K. 2005. History and recent advances in Coronavirus discovery. *The Pediatric Infectious Disease Journal* 24(11): p S223-S227. DOI: 10.1097/01.inf.0000188166.17324.60
- Karinen AK, Molho C, Kupfer TR, Tybur JM. 2019. Disgust sensitivity and opposition to immigration: Does contact avoidance or resistance to foreign norms explain the relationship? *Journal of Experimental Social Psychology* 84:103817.
- Lozano GA. 1998. Parasitic stress and self-medication in wild animals. *Advances in the Study of Behavior* 27:291-317.
- Luo H, Tang Q, Shang Y, Liang S, Yang M, Robinson N, Liu J. 2020. Can Chinese medicine be used for prevention of corona virus disease 2019 (COVID-19)? A review of historical classics, research evidence and current prevention programs. *Chinese Journal of Integrative Medicine*. doi: 10.1007/s11655-020-3192-6
- Maldonado C, Paniagua-Zambrana N, Bussmann RW, Zenteno-Ruiz FS, Fuentes AF. 2020. La importancia de las plantas medicinales, su taxonomía y la búsqueda de la cura a la enfermedad que causa el coronavirus (COVID-19). The importance of medicinal plants, their taxonomy and the search for a cure for the disease caused by the coronavirus (COVID-19). *Ecología en Bolivia* 55(1):1-5.
- Mani RS, Dovih DP, Ashwini MA, Chattopadhyay B, Harsha PK, Garg KM, Sudarshan S, Puttaswamaiah R, Ramakrishnan U, Madhusudana SN. 2017. Serological evidence of Lyssavirus infection among bats in Nagaland, a north-eastern state in India. *Epidemiology and Infection* 145:1635-1641. doi: 10.1017/S0950268817000310
- McKee M, Stuckler D. 2020. If the world fails to protect the economy, COVID-19 will damage health not just now but also in the future. *Nature Medicine* 26:640-642. doi: 10.1038/s41591-020-0863-y
- Mehta P, McAuley D, Brown M, Sanchez E, Tattersall R, Manson J. 2020. COVID-19: consider cytokine storm syndromes and immunosuppression. *The Lancet* 395. doi: 10.1016/S0140-6736(20)30628-0
- Nature Plants (Editorial) 2020. Redeploying plant defences. *Nature Plants* 6:177. doi: 10.1038/s41477-020-0628-0
- Ni L, Zhou L, Zhou M, Zhao J, Wang DW. 2020. Combination of western medicine and Chinese traditional patent medicine in treating a family case of COVID-19 in Wuhan. *Frontiers of Medicine*. doi: 10.1007/s11684-020-0757-x
- Sanatombi R, Sanatombi K. 2017. Nutritional value, phytochemical composition, and biological activities of edible *Curcuma* species: A review. *International Journal of Food Properties* 20:sup3, S2668-S2687. DOI: 10.1080/10942912.2017.1387556
- Sordillo PP, Helson LL. 2015. Curcumin suppression of cytokine release and cytokine storm. A potential therapy for patients with Ebola and other severe viral infections. *In vivo* 29(1):1-4.
- Subositi D, Wahyono S. 2019. Study of the genus *Curcuma* in Indonesia used as traditional herbal medicines. *Biodiversitas* 20:1356-1361.
- Thornhill R, Fincher CL. 2014. The parasite-stress theory of values and sociality: Infectious disease, history and human values worldwide. Cham, Springer International Publishing.

Vandebroek I, Pieroni A, Stepp J, Hanazaki N, Ladio A, Alves RR, Picking D, Delgoda R, Maroyi A, van Andel T, Quave C, Paniagua-Zambrana NY, Bussmann RW, Odonne G, Abbasi A, Albuquerque U, Baker J, Kutz S, Timsina S, Shigeta M, Oliveira T, Hurrell J, Arenas P, Puentes J, Hugé J, Yeşil Y, Jean Pierre L, Olango TM, Dahdouh-Guebas. 2020. Reshaping the future of ethnobiology research after the Covid-19 pandemic. *Nature Plants*. doi: 10.1038/s41477-020-0691-6

WHO. 2020. Coronavirus disease (COVID-19). Situation Report 127. (Accessed 27.05.2020)