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Short Communication

COVID-19: The Origin

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In December 2019, cases of the third zoonotic human coronavirus epidemic were reported in China. They triggered the curiosity of local medical officers who-in the absence of evidence showing the presence of typical pathogens-had collected lower respiratory tract samples to conduct a sharp sequencing analysis revealing (in January 2020) the presence of a novel coronavirus named SARS-CoV-2 [1]. Similarly, to severe acute respiratory syndrome coronavirus (SARS-CoV) [2-4] and Middle East respiratory syndrome coronavirus (MERS-CoV) [5,6]. SARS-CoV-2 viral pneumonia is associated with symptoms such as fever, difficulty breathing, and bilateral lung infiltration in the most severe cases [7]. SARS-CoV and MERS-CoV have caused more than 10,000 cumulative cases in the past two decades, with mortality rates of 10% for SARS-CoV and 37% for MERS-CoV [8,9]. At the time of revision of this editorial (November 26, 2021), it was established that SARS-CoV-2 alone caused more than 260,200,000 and 5,100,000 cumulative cases and deaths, respectively [10]. The first confirmation of the cause of the novel viral pneumonia was carried out on January 8, 2020, and the relatively sluggish response in Wuhan, China, and in the rest of the world to this emergence represents contributory factors to the pandemic spread. At the minimum, one month has passed [1,7] between the identification of the first cases, the involvement of local authorities, and reports of the Chinese Centers for Disease Control (China CDC). In the same way, the USA missed its window for taming COVID-19 by taking 54 days from the report of the first American case in Seattle (Jan. 20, 2020) to declare a national emergency on March 13, 2020 [11,12]. The key to containing a communicable threat such as COVID-19 is to be proactive. The earlier the action, the smaller the scale and the cost.

Preliminary investigations suggested that the first cluster of patients was connected to Huanan South China Seafood Market located in Wuhan (Hubei Province). The market was consequently closed and decontaminated on the 1st of January 2020 [13]. Warnings about potential emergent diseases from animal origins in wet markets or bush meat had been made from various sources since the first SARS and Ebola virus epidemics [14]. These were unheeded. Since the outbreak of SARS in 2003, several SARS-CoV have been discovered in their natural reservoir host which has been bat [15-18]. Additionally, some of them can successfully infect humans [19-21]. Concertedly, it is legitimate to speculate on a probable bat origin of the SARS-CoV-2 especially when it was proven that (i) SARS-CoV and SARS-CoV-2 share 76.9% sequences identity, (ii) SARS-CoV-2 is 96% identical at the whole-genome level to a bat coronavirus, and (iii) SARS-CoV-2 uses the same cell entry receptor-angiotensin converting enzyme II (ACE2)-as SARS-CoV [22]. Today, the intermediate host of the SARS-CoV-2 remains unknown (Figure 1). Aware of the fact that snakes, birds, and other small mammals were sold at the Huanan South China Seafood Market, several hypotheses were made on their probable implications. Thus, WHO reported that environmental samples taken from the market were positive for SARS-CoV-2, but did not find any association with an animal [23]. Based on codon usage snakes were suggested to serve as the possible source [24], which was disputed by other scientists [25]. Then, the pangolin was the latest suspected animal as scientists found that its coronavirus attends a 99% genetic match to the one circulating in people. However, the research only highlighted the similarities of the specific site known as the receptor-binding domain (RBD) while a whole-genome comparison found that the

pangolin and human viruses share 90.3% of their DNA [26]. Nowadays, it is known that only 1.9% of the patients in Wuhan had a history of direct contact with wildlife [27]. Most importantly, pieces of evidence suggest that the Seafood Market played an early role in spreading SARS-CoV-2, but whether it was the origin of the outbreak remains uncertain. In fact, 3 of the first four cases confirmed to have SARS-CoV-2 infections had no link to the market (Figure 1). The same report highlighted that up to 35% cases, including the earliest ones were not connected to the market (14 of the first 41) [1]. In another report providing the details of the early cases, 21 of 47 patients (almost 45%) were not linked to Hunan market [28]. Thus, the possibility that the initial jump into people happened elsewhere is gradually evocated, and investigations led by WHO are ongoing [29] to elucidate the pandemic's origin.

Figure 1: Pathway summary of the COVID-19's possible origin.

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