
SARS-COV-2 AND THE SORCERER'S APPRENTICES

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At the time of writing these lines, the World Health Organization (WHO) has just released the conclusions of an international team of experts, sent to the Chinese city of Wuhan, on a mission to gather and evaluate any evidence that may answer the fundamental scientific question of where do the SARS-CoV-2 virus came from. After a quarantine of fourteen days and then another ten, what in principle should have been a systematic forensic enquiry became a sort of enforced touristic experience ¹. The team produced a lackluster document whose conclusions seem too close to the standing narrative of the Chinese authorities on this issue, and too far from providing a definitive answer to the original question ². In late 2019, the sudden appearance in Wuhan of a virus with all the hallmarks of a coronavirus from bat origin (the mammalian order known to be the largest reservoir of such type of viruses), but that displayed an enhanced ability to infect human cells thanks to a receptor-binding motif (RBM) found in the virus's spike protein (that mediates the virus entry into host cells) which happened to be quite similar to that of SARS-CoV (the virus responsible for the 2003 SARS outbreak), was an upsetting biological oddity ³. Furthermore, the spike protein of the new SARS-CoV-2 virus contains a unique cleavage site for the furin protease, an enzyme highly expressed in several human tissues such as brain, lung, pancreas, gut and kidney. The cleavage by furin renders the spike protein fully active and it is essential for the efficient infection of human lung cells. Such a cleavage site is completely absent in other coronaviruses of the same class, as well as in all coronaviruses from bats known to date ⁴. Yet, the three codons specifying the furin cleavage site are also present in two human coronaviruses (OC43; HKU1) responsible for upper respiratory tract infections (common colds). Remarkably, such codons are fitted in the right frame, within the SARS-CoV-2 genomic sequence, so as not to modify all the other functional features of the resulting spike protein ⁵. This fact begs the question of how

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a short genomic sequence, typical of endemic human coronaviruses, got into the genome of a bat coronavirus, exactly in the right place so as to endow such a virus with the ability to infect, quite efficiently, cells from several human tissues.

In 2013, following an outbreak of bird flu in humans, some scientists tried to persuade the scientific community on the benefits of performing “gain of function” virus research ⁶. The idea was to modify, deliberately, known viruses, such as the H7N9 avian flu virus, so as to endow the viruses with new biological properties that included the enhanced capacity to infect species different from their natural hosts. Behind such a bizarre proposal was the notion that this approach would lead to the proper modeling of the biological behavior of potentially dangerous viruses, within the controlled conditions of the lab, and that such information could be useful for knowing in advance how to deal with future outbreaks of new dangerous viruses. Thus, once more, some scientists were falling prey to the “sorcerer’s apprentice” syndrome. Several “gain of function research” (GOFR) experiments were performed in the United States, raising the concerns of the scientific community as well as government authorities ⁷. Anyhow, a serious warning signal rang after the publication, in 2015, of a paper describing the generation in a lab of a recombinant bat coronavirus with engineered features derived from the SARS-CoV, that endowed the bat virus with the ability to infect human cells of the respiratory tract ⁸. The public outcry led to reinforcing previous measures by the USA administration, banning the use of federal funds for supporting GOFR ⁹. Thus, it is remarkable that Anthony Fauci (the leading scientist in the current and past US Coronavirus Taskforce advising the US President) in his role as director of the US National Institute for Allergies and Infectious Diseases, approved in 2015 the outsourcing of GOFR to the Wuhan Institute of Virology (WIV) in China and, so being, federal US dollars were provided for that purpose ¹⁰. Indeed, in 2018, the US embassy in China sent several warning messages to the US State Department, informing on serious safety concerns at the WIV in relation to GOFR experiments involving bat coronaviruses ¹¹.

On the other hand, the possibility that SARS-CoV-2 were an artificially lab-derived virus, was quickly dismissed in an influential scientific correspondence published in April 2020 ¹². Moreover, in the original paper reporting the isolation and characterization of SARS-CoV-2 ³ it was mentioned the 96 per cent identity of this new coronavirus with a previously sequenced bat coronavirus (RaTG13). Thus, despite that RaTG13 spike protein lacks the RBM that confers the ability to infect human cells, it became the widely accepted source-virus from which SARS-CoV-2 evolved by “natural” means. However, despite technical inconsistencies in the reported RaTG13 genomic

sequence, there is no further sample of the RaTG13 virus available for further research and independent confirmation of data ¹³. Similarly, the publication dismissing the lab origin of SARS-CoV-2 ¹² is marred by several scientific flaws ¹⁴. Interestingly, some years ago, in research laboratories located at the Third Military University in Chongqing, and the Research Institute for Medicine of the Nanjing Command (both facilities run by military authorities) two further bat coronaviruses were discovered (ZC45 and ZXC21) whose sequenced genomes are now known to be 89 per cent and 97 per cent identical to that of the SARS-CoV-2. Thus, starting from this fact, in the Zenodo website (managed by CERN: zenodo.org) it has been published and thoroughly presented the case that ZC45/ZXC21 could be the real biological frame or blueprint for engineering a new coronavirus, that resulted to be the SARS-CoV-2 ¹⁵. Moreover, in the same website it was published an apparent scholarly rebuttal to the aforementioned report. Although clotted in scientific jargon, the rebuttal contains mostly rhetoric arguments and the author does not provide information about his academic/research affiliations ¹⁶.

I am not sponsoring any wild conspiracy theory about a hidden biological war to achieve world supremacy. However, the fact is that GOFR has been going on in China for several years and, therefore, it could be expected that both the relevant knowledge and the relevant reagents were likely to be shared between groups with similar research interests, at least within that country. As mentioned, by 2018 there were serious concerns about bio-safety at the WIV premises and, obviously, GOFR requires the highest degree of bio-safety measures for preventing any mishap that could lead to the scape of engineered viruses from the premises. Thus, my point is that there is enough evidence that warrants a serious enquiry on whether or not SARS-CoV-2 could be the result of GOFR and the current pandemic. On the other hand, there are strong motives for major players in the hierarchy of scientific power for denying, as a matter of fact, the possibility of a lab origin for the SARS-CoV-2 virus. Indeed, those involved in funding, promoting and performing GOFR with bat coronaviruses are unlikely to support an exhaustive enquiry on this issue. Moreover, those high above in the scientific bureaucracy involved in the detour of public money for funding GOFR outside the USA, are also unwilling to sponsor a serious enquiry. Interestingly, the only US national participating in the WHO-sponsored team sent to China, Peter Daszak, has obvious conflict of interest, as he was involved in research leading to the isolation of bat coronaviruses able to bind receptors present in human cells, as well as being an early supporter of GOFR ¹⁷.

It is not surprising that the WHO team's visit to China resulted a fiasco, as it gave no specific answer to the main question. Further, they were quick to sponsor the notion that SARS-CoV-2 or its closest ancestor, might have been introduced into China from abroad ^{1,2}. Sweet music to the ears of the Chinese authorities, indeed. The team's conclusion: "there is a need of further investigation on the SARS-CoV-2 origin in collaboration with the Chinese authorities," is consistent with the lack of leadership displayed by the WHO throughout the pandemic. According to Peter Ben Embarek, chair of the investigation team (and food safety and animal disease specialist at WHO), the idea that the virus came from a laboratory-related incident was "extremely unlikely" and "isn't a hypothesis we suggest implies further study." Furthermore, Embarek claimed that while "accidents do happen... there had been no publication or research of this virus or one close to this virus, anywhere in the world ¹⁸." Therefore, it is also not surprising that a manuscript by established scientists with a track record in virology and vaccine development, that provides exactly the evidence that contradicts Embarek's remarks, has had a hard time finding space in mainstream, peer-reviewed journals, but nevertheless it has been published ¹⁹. However, perfunctory texts, aimed at dismissing the lab-accident hypothesis, kept being readily published in prestigious journals ²⁰.

Anyhow, the world populations at large, including the inhabitants of China, deserve a thorough and serious investigation that clarifies the origin of SARS-CoV-2 beyond any doubt. For scientists this is an unavoidable ethical obligation and a necessary duty for the sake of science.

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