TheBaseballNerd 87 points · 1 day ago · *edited 1 day ago*

> It is improbable that SARS-CoV-2 emerged through laboratory manipulation of a related SARS-CoV-like coronavirus. As noted above, the RBD of SARS-CoV-2 is optimized for binding to human ACE2 with an efficient solution different from those previously predicted.

They're saying here that if this was an engineered virus, the binding domain (the region of the virus that initially binds to a human cell and allows it to infect that cell) would be more optimized. COVID-19's binding domain only sorta-okay binds.

> Furthermore, if genetic manipulation had been performed, one of the several reverse-genetic systems available for betacoronaviruses would probably have been used. However, the genetic data irrefutably show that SARS-CoV-2 is not derived from any previously used virus backbone.

Scientists don't just build a virus like a factory builds a car. What they do is more analogous to taking a Honda Civic and swapping out the engine and wheels. In this case, the Civic would be the "backbone" that the "new" car is built on. What the authors are saying here is that there are no known backbones to COVID-19 globally. The chances of this specific group in China creating a brand new backbone is essentially zero.

> Instead, we propose two scenarios that can plausibly explain the origin of SARS-CoV-2: (i) natural selection in an animal host before zoonotic transfer; and (ii) natural selection in humans following zoonotic transfer.

Honestly, this is mostly semantics. They're trying to say that either COVID-19 mutated in an animal and inadvertently became more efficient at infecting humans *or* it accidentally infected a human and *then* mutated to become more efficient at infecting humans. Chicken or the egg type of thing in a way.

> We also discuss whether selection during passage could have given rise to SARS-CoV-2.

"Passage" is simply infecting cells in a petri dish with a virus over and over again (new cells each time because obviously the virus will kill the original cells). When you passage a virus, you will always be putting evolutionary pressure on that virus to gain mutations that make it more efficient at infecting those cells (that's all the virus sees and there's an unlimited supply, so why not?). So, in theory, you could passage a virus on human lung cells and make it more adept at infecting human lung cells. But, earlier in the paper they show that passaging a coronavirus would not lead to COVID-19.

Did that help?

EDIT: I should clarify that passaging's *primary* purpose is not to induce mutations, but rather maintain a stock of virus. You passage a virus to create more for your experiments. Mutations are usually a negative effect of passaging and labs try to avoid passaging too many times.