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The Capability Existed

What pre-2019 coronavirus engineering can and cannot establish

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Summary

Well before the emergence of Covid-19, scientists had demonstrated the technical capability to reconstruct and manipulate SARS-like coronaviruses. In 2003, researchers reported recovery of infectious SARS coronavirus from a full-length cDNA. Baric's later review described how reverse genetics and synthetic biology could be used not only to reconstruct viruses but also to modify characteristics including virulence, host range and transmissibility. The 2018 DEFUSE proposal further shows that ambitious manipulation of bat coronaviruses was being contemplated before the pandemic. None of this proves that SARS-CoV-2 was engineered or released from a laboratory. It establishes that the capability existed and that any credible inquiry into the pandemic's origins had to examine laboratory research alongside natural spillover.

Introduction

Debate over the origin of Covid-19 often collapses three separate questions. First, did scientists possess the capability to construct or substantially modify a SARS-like coronavirus before 2019? Second, was that capability actually used to produce SARS-CoV-2? Third, if laboratory work contributed to the virus, did its emergence result from accident, negligence or deliberate release? Evidence bearing on one question does not automatically answer the others.

This paper addresses the first question. The documentary and scientific record makes the answer clear: the relevant capability existed. Establishing that point is important because technical impossibility was sometimes invoked to marginalize laboratory-origin hypotheses before the underlying records had been examined. Recognition of capability is not a verdict on origin. It is the starting point for a serious inquiry and for assessing whether high-consequence biological research was governed, documented and investigated with the seriousness it required.

The capability came first

Long before Covid-19, coronavirus researchers had shown that published genetic sequences could be converted into infectious laboratory constructs. Ralph Baric and colleagues developed reverse-genetics systems that divided a coronavirus genome into manageable DNA fragments, assembled them into a full-length copy and recovered infectious virus. Their work had obvious scientific value: researchers could study viral replication, test candidate treatments and anticipate how emerging viruses might behave.

The same work had equally obvious dual-use implications. Once a viral genome could be reconstructed from sequence information, access to a natural sample was no longer always necessary. As DNA synthesis became cheaper and assembly techniques more reliable, barriers that had once limited such work to a small number of specialist laboratories began to fall. Baric explicitly discussed both the benefits and the risks of synthetic viral genomics. The warning was therefore not retrospective. The capability and its possible misuse were visible well in advance. None of this identifies the origin of SARS-CoV-2. It establishes the prior technical possibility that any serious origin inquiry had to examine.

The 2018 DEFUSE proposal illustrates the governance problem. The proposal sought funding to sample bat coronaviruses and conduct experiments involving spike proteins and cleavage sites. Its existence does not prove that SARS-CoV-2 was created under the project: the proposal was rejected, and a proposal is not evidence that its experiments occurred. It does show, however, that technically ambitious coronavirus manipulation was being contemplated across institutional and national boundaries under the language of pandemic prevention. That alone justified stronger disclosure, records preservation and genuinely external review than the system supplied.

Preparedness can create the risk it promises to control

Biodefence research rests on a real argument. To defend against a threat, scientists must understand it. Some experiments can reveal which mutations alter host range, pathogenicity or immune escape; the resulting knowledge may improve surveillance and countermeasure development. But the argument becomes circular when the act of preparing for a pathogen also increases the probability of its creation, misuse or accidental release.

This is the biodefence paradox. A programme can reduce one category of risk while increasing another. Its net value therefore cannot be inferred from its stated purpose. It must be demonstrated through evidence about benefits, biosafety, security, alternatives and the consequences of failure. Labels such as pandemic preparedness or gain of function do not settle that assessment. Nor should the scientists and agencies sponsoring the work be the sole judges of whether it is acceptable.

Existing oversight has often depended on narrow definitions, institutional self-assessment and confidential review. Work may be divided among funders, universities, contractors and foreign partners, leaving no institution fully accountable for the whole programme. Review committees can contain the same professional community whose grants, publications and reputations benefit from approval. Even when formal requirements are met, the public may be unable to learn what experiments were proposed, what risks were identified, what incidents occurred or why particular work was allowed to proceed.

What capability does not prove

The strongest argument is also the narrowest. Demonstrated capability is not evidence of use in a particular event. A rejected research proposal is not proof that the proposed experiments were conducted. Similarity between an envisioned experiment and a later virus is not, by itself, proof of authorship or release. The record justifies investigation, not a predetermined verdict.

That discipline is important because the documentary record is already consequential without embellishment. By 2003, researchers had reported recovery of infectious SARS coronavirus from a full-length cDNA assembled through reverse genetics. Baric's subsequent synthesis of the field described tools capable of modifying virulence, transmissibility, host range and pathogenesis. The factual claim is therefore substantial but bounded: the relevant capability existed well before 2019, while the public record considered here does not establish that it was used to create SARS-CoV-2.

Covid-19 left an accountability deficit

More than six years after the outbreak began, central questions remain contested partly because the institutions involved were permitted to investigate themselves. Records emerged slowly, often through litigation, legislative inquiries or leaks. Definitions were altered in public argument. Conflicts of interest were treated as attacks on expertise rather than reasons for stronger process. The result was predictable: even technically sound statements lost authority because the institutions making them had not earned confidence in their independence.

This does not establish a laboratory origin for SARS-CoV-2 or prove intentional release. It establishes something institutionally important: the systems meant to resolve such questions were not credible enough to produce broadly accepted answers. Scientific uncertainty is unavoidable. Institutional opacity is a choice.

An accountability agenda

CGHA proposes a practical standard for high-consequence biological research.

- **Independent review.** Projects capable of increasing pathogenicity, transmissibility, host range or immune evasion should be reviewed by bodies institutionally separate from the funder and research team, with members drawn from biosafety, security, ethics, public health and risk analysis.
- **Public registries.** Funded proposals, principal investigators, partner institutions, broad experimental aims, risk assessments and review decisions should be recorded in a searchable registry. Legitimate security redactions should be narrow, explained and time limited.
- **Whole programme assessment.** Review should follow the work across grants, subcontractors, countries and successive experiments. Dividing a programme among institutions must not divide accountability.
- **Records preservation and incident reporting.** Laboratory notebooks, sequence data, databases, communications and biosafety records relevant to an outbreak must be preserved automatically. Significant accidents and protocol deviations should be reported to an independent authority.

- **Evidence discipline.** Official reports should distinguish observation, inference and proof. Absence of proof should not be presented as proof of absence; theoretical possibility should not be presented as demonstrated harm.
- **Post-event autopsy.** After a major outbreak, an inquiry independent of operational agencies should examine research funding, biosafety, intelligence, public-health decisions and countermeasure regulation. Its purpose should be learning and accountability, not retrospective protection of institutions.

The test is legitimacy

Synthetic biology will continue to advance, and much of it will be beneficial. A blanket ban would sacrifice useful science while driving risky work into less visible settings. But scientific promise is not a substitute for governance. The more consequential the capability, the stronger the obligation to justify it, document it and subject it to adversarial review.

The lesson of Covid-19 is not that every allegation is true. It is that authorities repeatedly asked the public to trust conclusions produced by systems whose conflicts, secrecy and incomplete records made trust difficult. Restoring legitimacy begins by building institutions that can answer hard questions without protecting either official narratives or oppositional ones. Capability without accountability is not preparedness. It is an unmanaged risk.

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