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Biotech Battlefield

Weaponizing Innovation in the Age of Genomics

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“Only by grasping the core technologies in our own hands will we be able to truly grasp the initiative in competition and development, and fundamentally guarantee our country’s economic security, defense security, and security in other [domains].”

Chinese Communist Party Chairman Xi Jinping, speaking before Chinese Academy of Sciences in 2014¹

“The vast ocean of data, just like oil resources during industrialization, contains immense productive power and opportunities. Whoever controls big data technologies will control the resources for development and have the upper hand.”

Xi Jinping, in a 2013 address to the Chinese Academy of Sciences.²

“Today, modern biotechnology that focuses on the microcosmos of the life structure can directly explore the main entity of war — human beings themselves — thus taking precise control of the battle effectiveness of enemies ... We [China] can use many modern biotechnologies directly as a means of defense and attack, and with further development, they probably will become new weapons systems.”

Col. Guo Ji-wei, The People’s Liberation Army, 2005³

“Under the leadership and strong support of the party and the government, BGI has a great foresight and leadership in the field of life sciences. We will continue to strengthen the leadership of Party building and achieve rapid development.”

BGI Chairman and Co-Founder Wang Jian, 2017⁴

1. “习近平：把关键技术掌握在自己手里 [Xi Jinping: Keep key technologies in your hands],” *Xinhua* (China), June 10, 2014. (https://www.cac.gov.cn/2014-06/10/c_1112674083.htm)

2. “‘习近平关于科技创新论述摘编’全文发布 [Full text of Xi Jinping’s Discourses on Science and Technology Innovation released],” *Xinhua* (China), March 4, 2016. (https://www.edu.cn/rd/zi_xun/201603/t20160304_1372238_7.shtml)

3. Col. Guo Ji-wei and Xue-sen Yang, “Ultramicro, Nonlethal, and Reversible: Looking Ahead to Military Biotechnology,” *Army University Press*, July-August 2005. (<https://www.armyupress.army.mil/Special-Topics/Future-Warfare-Writing-Program/Non-Fiction/Biotechnology>)

4. Deng Xueding [邓雪婷], “党建助力华大基因逐梦生命科学 [Party building helps BGI pursue its dream of life sciences],” *Nanfang Daily*, November 23, 2017. (<https://archive.ph/RJSVM>)

Introduction

In a sign of his unwavering commitment to self-reliance (自力更生), Chinese Communist Party (CCP) Chairman Xi Jinping has declared technological innovation to be the “main battlefield of the international strategic game.”⁵ Central to Xi’s vision is biotechnology, which he has identified as a critical sector in China’s bid to become a global science superpower.⁶

Xi’s broader ambitions are anchored in China’s military-civil fusion (军民融合) strategy, which aims to break down barriers between military and civilian institutions to mobilize the latter in service of the former. Specifically, military-civil fusion facilitates the direct transfer of data and cutting-edge technologies to China’s People’s Liberation Army (PLA), ensuring that China’s military capabilities keep pace with rapid civilian technological progress. Biotechnology, with its vast potential to revolutionize fields such as genomics, synthetic biology, and bioengineering, is integral to military-civil fusion.

China’s military-industrial complex has long recognized the strategic importance of biotechnology, engaging in extensive collaborations with Chinese biotechnology behemoths like BGI Group (華大集團, or BGI) and its former subsidiary, MGI Tech (深圳华大智造科技股份有限公司). These and other partnerships have yielded research with potential military applications, including efforts to enhance Chinese soldiers’ physical and cognitive abilities. The PLA’s involvement in biotechnology research extends to its collaborations with select Chinese civilian universities, which, along with entities like

BGI Group and MGI Tech, play a pivotal role in advancing China’s military-civil fusion strategy.

China’s civilian biotechnology advancements have also contributed to widespread human rights abuses, particularly in Xinjiang Province, where Chinese authorities exploit genetic data to surveil and repress ethnic minorities. These actions highlight how biotechnology, beyond its military applications, is reinforcing the authoritarian regime’s grip on society.

This report begins by exploring the growing importance of biotechnology within China’s national development strategy, with a particular focus on Xi Jinping’s prioritization of the field as pivotal to China’s military modernization. First, it examines the PLA’s increasing interest in biotechnology and its implications for China’s military capabilities. The report then delves into the ties between BGI, MGI Tech, and China’s military and state institutions, highlighting the significant risks these relationships pose to U.S. national security and global technological leadership. Finally, the report presents a series of policy recommendations designed to counter these threats, including measures to limit BGI’s and MGI’s influence and prevent their access to sensitive U.S. data and technologies.

China’s Strategic Technological Ascent — The Critical Role of Biotechnology

Xi Jinping’s “innovation-driven development strategy” underpins his goal of transforming China into a “world science and technology leader.”⁷ First articulated at the

5. “加快建设科技强国 实现高水平科技自立自强 [Accelerating the Construction of a Science and Technology Powerhouse and Achieving High-Level Scientific and Technological Self-Reliance and Self-Reliance],” *Qiushi*, April 30, 2022. (<https://archive.ph/pAqWG>)

6. Ben Murphy, Rogier Creemers, Elsa Kania, Paul Triolo, and Kevin Neville, “Xi Jinping: ‘Strive to Become the World’s Primary Center for Science and High Ground for Innovation,’” *Stanford Cyber Policy Center*, March 18, 2021. (<https://digichina.stanford.edu/work/xi-jinping-strive-to-become-the-worlds-primary-center-for-science-and-high-ground-for-innovation/#fn1>)

7. “加快建设科技强国 实现高水平科技自立自强 [Accelerating the Construction of a Science and Technology Powerhouse and Achieving High-Level Scientific and Technological Self-Reliance and Self-Reliance],” *Qiushi*, April 30, 2022. (<https://archive.ph/pAqWG>); Kumar Akhilesh, “Political Economy of STI in China: Analyzing Official Discourse on Science, Technology and Innovation-Driven Development in the Contemporary China,” *BRICS Journal of Economics*, June 12, 2024. (<https://brics-econ.arphahub.com/article/120897>)

18th National Congress of the Chinese Communist Party in 2012, Xi's strategy hinges on fully integrating China's scientific community into the CCP's broader technological agenda, with the explicit aim of winning "the battle of key core technologies."⁸ By bolstering Chinese firms' research capabilities and fostering new scientific discoveries, Xi's goals include preventing China from becoming a "vassal of other countries" and cementing China's centrality in next-generation supply chains.⁹ Biotechnology is integral to these efforts.

For the past decade, Xi has consistently emphasized to Chinese scientists and engineers that biotechnology is essential to China's national growth and security. Speaking before the Chinese Academy of Sciences and the Chinese Academy of Engineering in May 2018, Xi identified biotechnology as a "frontier field" in which China must excel.¹⁰ He highlighted the need to "achieve major breakthroughs" in several biotechnology-related fields, including synthetic biology, stem cell research, gene editing, brain science, and regenerative medicine.¹¹

In February 2020, as COVID-19 spread globally, Xi expanded his biotechnology focus by ordering party officials to "incorporate biosecurity into the national

security system."¹² In that same speech, Xi also directed cadre members to "pay more attention to basic research in heredity, genetics, virology, epidemiology, immunology, and other life sciences."

These ever-expanding scientific directives typify Xi's "comprehensive national security" (总体国家安全, or CNS) concept, which integrates all aspects of China's development — including scientific innovation — into the broader framework of state security.¹³ While ensuring political security — particularly regime stability and CCP supremacy — remains the paramount priority, biosecurity now ranks alongside nuclear, cyber, space, and military security as one of the CCP's critical strategic imperatives.¹⁴

Xi's speeches have directly shaped Chinese policy planning. China's 12th Five-Year Plan (2011-2015), crafted before Xi's rise, referenced biotechnology but focused on expanding international exchanges and cooperation in that sector and building "databases of gene resources for pharmaceuticals." By contrast, the 13th Five-Year Plan (2016-2020), under Xi's leadership, set ambitious goals for China to develop globally competitive biotechnology companies and

8. "Implementing the New Development Philosophy to Compose a New Chapter in Socialist Modernization," *Qiushi*, October 28, 2022. (http://en.qstheory.cn/2022-10/28/c_824275.htm); "Transition to Innovation-Driven Growth," *The National People's Congress of the People's Republic of China*, December 7, 2021. (http://en.npc.gov.cn.cdurl.cn/2021-12/07/c_687865.htm)

9. "习近平：把关键技术掌握在自己手里 [Xi Jinping: Keep key technologies in your hands]," *Xinhua* (China), June 10, 2014. (https://www.cac.gov.cn/2014-06/10/c_1112674083.htm)

10. "习近平：在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话 [Xi Jinping: Speech at the 19th General Assembly of the Chinese Academy of Sciences and the 14th General Assembly of the Chinese Academy of Engineering]," May 28, 2018. (<https://archive.ph/WKYy9#selection-391.2-403.94>)

11. Ibid.

12. "习近平主持召开中央全面深化改革委员会第十二次会议强调 完善重大疫情防控体制机制 健全国家公共卫生应急管理体系 李克强王沪宁韩正出席 [Xi Jinping presided over the 12th meeting of the Central Committee for Comprehensively Deepening Reforms and stressed the need to improve the system and mechanism for major epidemic prevention and control and improve the national public health emergency management system. Li Keqiang, Wang Huning and Han Zheng attended the meeting]," *Xinhua* (China), February 14, 2020. (<https://archive.ph/YEbnX>)

13. Sheena Chestnut Greitens, "Xi's Obsession: Why China Is Digging In at Home and Asserting Itself Abroad," *Foreign Affairs*, July 28, 2023. (<https://www.foreignaffairs.com/united-states/xis-security-obsession>); Sheena Chestnut Greitens, "Internal Security & Grand Strategy: China's Approach to National Security under Xi Jinping," *Statement before the U.S.-China Economic & Security Review Commission Hearing on "U.S.-China Relations at the Chinese Communist Party's Centennial" Panel on "Trends in China's Politics, Economics, and Security Policy"*, January 28, 2021. (https://www.uscc.gov/sites/default/files/2021-01/Sheena_Chestnut_Greitens_Testimony.pdf)

14. Katja Drinhausen and Helena Legarda, "'Comprehensive National Security' unleashed: How Xi's approach shapes China's policies at home and abroad," *Merics*, September 15, 2022. (<https://www.merics.org/en/report/comprehensive-national-security-unleashed-how-xis-approach-shapes-chinas-policies-home-and>)

achieve advanced biotechnology “breakthroughs.”¹⁵ By some estimates, China’s central, local, and provincial governments collectively invested \$100 billion over this period to fulfill Xi’s biotechnology research and development (R&D) directives.¹⁶

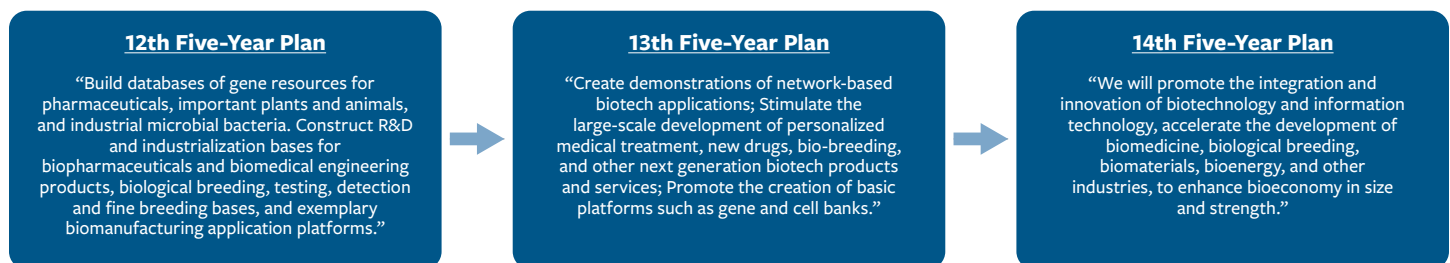
“For the past decade, Xi has consistently emphasized to Chinese scientists and engineers that biotechnology is essential to China’s national growth and security.”

China’s 14th and current Five-Year Plan (2021-2025) surpasses its predecessors by explicitly prioritizing life sciences and biotechnology as national research priorities. The plan aims for China to lead the global bioeconomy by 2035 and includes commitments to increase biotechnology-related R&D investments by more than 10 percent annually.¹⁷ The plan also prioritizes integrating biotechnology with information technology and expanding party-state control over healthcare, bioagriculture, bioenergy, biomedicine, and biosecurity.

Evolution of Chinese Biotechnology and Bioengineering Policy¹⁸

In 2024, Xi identified life sciences and biotechnology as two of China’s “new productive forces” — industries he views as crucial for revitalizing the economy and positioning China at the forefront of the next industrial revolution.¹⁹ The 2024 Government Work Report, which outlines China’s macroeconomic plans, prioritized the development of these “new productive forces” as the CCP’s top policy objective.²⁰ These announcements all but guarantee robust party-state support for China’s biotechnology sector, likely mirroring the industrial policies that previously propelled China’s telecommunications and drone sectors to global dominance.

To support China’s biotechnology ambitions, Xi has constructed a comprehensive legal and regulatory



15. “The 13th Five-Year Plan for Economic and Social Development of the People’s Republic of China (2016-2020),” *National Development and Reform Commission People’s Republic of China*, accessed November 1, 2024. (<https://en.ndrc.gov.cn/policies/202105/P020210527785800103339.pdf>)

16. Scott Moore, “China’s Role in the Global Biotechnology Sector and Implications for U.S. Policy,” *The Brookings Institution*, April 2020. (https://www.brookings.edu/wp-content/uploads/2020/04/FP_20200427_china_biotechnology_moore.pdf)

17. “Translation: Outline of the People’s Republic of China 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2035,” *CSET*, May 13, 2021. (<https://cset.georgetown.edu/publication/china-14th-five-year-plan>)

18. “Guidelines of the Twelfth Five-Year Plan for National Economic and Social Development,” *Australia Department of Industry, Science and Resources*, accessed November 1, 2024. (https://www.industry.gov.au/sites/default/files/adc/public-record/exhibit_d16.2_-_12th_national_five_year_plan_for_development_of_the_prc_-_en-cn.pdf); “The 13th Five-Year Plan for Economic and Social Development of the People’s Republic of China (2016-2020),” *National Development and Reform Commission People’s Republic of China*, accessed November 1, 2024. (<https://en.ndrc.gov.cn/policies/202105/P020210527785800103339.pdf>); “Outline of the 14th Five-Year Plan (2021-2025) for National Economic and Social Development and Vision 2035 of the People’s Republic of China,” *The People’s Government of Fujian Province*, August 9, 2021. (https://www.fujian.gov.cn/english/news/202108/t20210809_5665713.htm)

19. Craig Singleton and Amaya Marion, “Safeguarding U.S. Interests in the Face of China’s ‘New Productive Forces’ Strategy,” *Foundation for Defense of Democracies*, May 2, 2024. (<https://www.fdd.org/analysis/2024/05/02/safeguarding-u-s-interests-in-the-face-of-chinas-new-productive-forces-strategy>)

20. “Full Text: Report on the Work of the Government,” *The State Council: The People’s Republic of China*, March 13, 2024. (https://english.www.gov.cn/news/202403/13/content_WS65f0dfcc6d0868f4e8e5079.html)

framework that ensures the party-state's total control over genetic and biological resource management. Central to this framework is China's 2020 Biosecurity Law.²¹ This law broadly defines biosecurity as encompassing various sub-domains, including biosafety risk assessment; pandemic early warning detection; the prevention and control of human and animal infectious diseases; and bioterrorism and bioweapons threats. This expansive definition grants the state unparalleled oversight and direction over critical biotechnology-related sectors, enabling tight control and strategic alignment with national priorities.

In Article 53, the law declares the party-state's absolute sovereignty over China's human genetic materials, biological samples, and related resources. The law grants the party-state direct control over all activities involving China's national genetic materials, whether research institutions, companies, or individual scientists engage in them. In Articles 86 and 87, the law also obliquely references separate, non-public provisions regarding secret and/or military-related biosecurity initiatives, suggesting a potential linkage between China's broader biotechnology drive and China's military.

The law also establishes a new whole-of-party entity responsible for overseeing its implementation — the National Biosecurity Work Coordination Mechanism — consisting of representatives from various government ministries responsible for health, science and technology, agriculture, and foreign relations, as well as China's military.

Other Chinese laws, including the 2016 Cybersecurity Law, also grant extensive government access to all private sector information in China, mandating that Chinese companies provide data, "technical support,

and assistance to state security agencies."²² China's 2017 National Intelligence Law likewise obliges "all" Chinese citizens and organizations to assist in state intelligence work, further enhancing the party-state's control over private sector data.²³ These and other laws extend to companies harboring genomic or other personal data of Chinese nationals and foreigners alike, thereby advancing the genomics-related activities of not only civilian party-state entities but also the PLA and China's intelligence services.

Transforming China into a biotechnology behemoth requires more than gaining access to genomic and healthcare data; it demands analysis of these complex datasets to produce new discoveries. Accordingly, to "strengthen national defense in tandem with economic growth," the party-state, as well as China's military and intelligence services, has invested billions to enhance the country's artificial intelligence, big data, and super-computing capabilities.²⁴ Beyond providing Chinese biotechnology companies with an edge over foreign competitors, these initiatives raise serious ethical and privacy dilemmas given the PLA's stated interest in theoretical and applied genomic research.

All told, the PLA's focus on biotechnology dates back more than two decades. In 1999, PLA Colonels Qiao Liang and Wang Xianghui published *Warfare Beyond Rules*, which advocated "warfare beyond all boundaries and limitations," including the use of "biochemical," "ideological war," and other means of conflict.²⁵ Later, in a groundbreaking 2005 article titled, "Looking Ahead to Military Biotechnology," then PLA Colonel Guo Jiwei argued China needed to harness military biotechnology as an instrument of military power, including using biotechnology "as a means of defense

21. "Biosecurity Law of the P.R.C.," *China Law Translate*, October 18, 2020. (<https://www.chinalawtranslate.com/en/biosecurity-law>)

22. "2016 Cybersecurity Law," *China Law Translate*, November 7, 2016. (<https://www.chinalawtranslate.com/en/2016-cybersecurity-law>)

23. "PRC National Intelligence Law (as amended in 2018)," *China Law Translate*, June 27, 2017. (<https://www.chinalawtranslate.com/en/national-intelligence-law-of-the-p-r-c-2017>)

24. "Translation: Outline of the People's Republic of China 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2035," *CSET*, May 13, 2021. (<https://cset.georgetown.edu/publication/china-14th-five-year-plan>)

25. Ming Zhang, "China: War Without Rules," *Bulletin of the Atomic Scientists*, November 1999. (<https://journals.sagepub.com/doi/full/10.2968/055006007>)

and attack.”²⁶ Guo noted, “Biotechnological weapons can cause destruction that is both more powerful and more civilized than that caused by conventional killing methods like gunpowder or nuclear weapons.”²⁷

Guo further explained, “newly developed biotechnologies lend themselves to military purposes; for example, DNA recombination, gene modification, gene cloning, exogenous gene expression synergy, gene targeting, stem cell technology, and tissue engineering.”²⁸ With these nascent technologies in mind, Guo chillingly predicted that “direct-effect” biotechnology weapons could target adversaries “at the molecular level” to alter their “biological features.”²⁹

Guo, who wrote his 2005 article while serving as a professor at the PLA’s Third Military Medical University,³⁰ a major military R&D institute, went on to publish a 2010 book titled, “War for Biological Dominance” (制生权战争), which argued that harnessing biotechnology was crucial for “future warfare,” necessitating PLA dominance in that sector.³¹ These seminal writings inspired a generation of PLA scientists and researchers.

For instance, He Fuchu (贺福初), then president of the PLA’s Academy of Military Medical Sciences (中国人民解放军军事科学院军事医学研究院, or AMMS), asserted

in 2015 that biotechnology would become the new “strategic commanding height” of national defense, spanning biomaterials to “brain control weapons.”³² He later became vice president of the PLA’s Academy of Military Sciences (解放军军事科学院, or AMS), which oversees AMMS. Xi Jinping subsequently tasked AMS to become a “world-class military scientific research institute” focusing on defense-related research in biotechnology, artificial intelligence, and quantum computing.³³

Alongside its push to prioritize biotechnology R&D, the PLA has implemented significant shifts in its warfighting doctrine. For instance, in 2017, Zhang Shibo (张仕波), a now retired general who previously served as president of the PLA’s National Defense University, identified biology as one of seven “new domains of warfare,” specifically highlighting biotechnology’s potential to play a decisive role in “offensive” warfighting.³⁴

Also in 2017, the PLA’s National Defense University published an updated edition of its Science of Military Strategy (战略学) textbook, which debuted a section identifying biology as a new domain (新兴领域) of “military struggle.”³⁵ The textbook noted how new kinds of biological warfare, including “specific ethnic

26. Col. Guo Ji-wei and Xue-sen Yang, “Ultramicro, Nonlethal, and Reversible: Looking Ahead to Military Biotechnology,” *Army University Press*, July-August 2005. (<https://www.armyupress.army.mil/Special-Topics/Future-Warfare-Writing-Program/Non-Fiction/Biotechnology>)

27. Ibid.

28. Ibid.

29. Ibid.

30. Now known as the PLA’s Army Medical University and a major PLA research and development institute.

31. See: Guo Jiwei (郭继卫), *War for Biological Dominance* [制生权战争] (Beijing: Xinhua Press, 2010).

32. Lu Beibei [陆倍倍] and He Fuchu [贺福初], “生物科技将成为未来军事革命新的战略制高点 [Biotechnology will become a new strategic high point in the future military revolution],” *Liberation Army Daily* (China), October 6, 2015. (https://web.archive.org/web/20190813042422/http://www.81.cn/jwgz/2015-10/06/content_6709533.htm)

33. “习近平向军事科学院 国防大学 国防科技大学授军旗 致训词 [Xi Jinping presents military flag to Academy of Military Sciences, National Defense University, National Defense University of Science and Technology, and delivers a speech],” *Central Government of the People’s Republic of China*, July 19, 2017. (https://www.gov.cn/xinwen/2017-07/19/content_5211816.htm); “Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2019,” *Office of the Secretary of Defense*, May 2, 2019. (https://media.defense.gov/2019/May/02/2002127082/-1/-1/1/2019_CHINA_MILITARY_POWER_REPORT.pdf)

34. Elsa B. Kania and Wilson Vorndick, “Weaponizing Biotech: How China’s Military Is Preparing for a ‘New Domain of Warfare,’” *Defense One*, August 14, 2019. (<https://www.defenseone.com/ideas/2019/08/chinas-military-pursuing-biotech/159167>)

35. Marcus Clay and Roderick Lee, “Unmasking the Devil in the Chinese Details,” *China Aerospace Studies Institute*, January 24, 2022. (<https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/Other-Topics/2022-01-24%20SMS%202020%20in%20Perspective.pdf>)

genetic attacks” (特定种族基因攻击), could be used against entire racial and ethnic groups.³⁶

The textbook also discusses the PLA’s growing interest in gene-editing technologies, like clustered regularly interspaced short palindromic repeats (or CRISPR), focusing on human performance enhancement to boost the combat effectiveness of Chinese military personnel. Since the textbook’s publication, gene editing and military bioengineering have become key research areas for the PLA’s medical institutions.³⁷ In 2021, the U.S. Department of Commerce restricted exports of advanced technology to the PLA’s AMMS by adding AMMS to the department’s Entity List, citing the academy for developing biotechnology processes for the PLA, to include contributing to China’s “brain-control” weapons development.³⁸

Relatedly, PLA researchers have published studies on “Human Performance Enhancement Technology,” identifying CRISPR as one of three primary biotechnologies that could enhance Chinese troop effectiveness.³⁹ One PLA study specifically examined the cognitive enhancement drug Modafinil and

emphasized the “great potential” of CRISPR as a “military deterrence technology.”⁴⁰ The study further argued that China should “grasp the initiative” in developing these capabilities, which other PLA officials, such as National University of Defense Technology (NUDT) researcher Zeng Huafeng, have deemed tools of “biological deterrence” (生物威慑).⁴¹

Amid the PLA’s intensified focus on weaponizing biotechnology, U.S. national security officials have repeatedly raised alarms about China’s growing access to U.S. genomic data. In 2017, the FBI warned that China had “gained significant access to U.S. genomic data and biological samples through research partnerships, investments, mergers, and acquisitions.”⁴² The U.S. Department of Defense has also highlighted the threats posed by China’s aggressive collection of genomic data, noting that such investments in biotechnology could lead to “enhanced warfighter selection and performance and advanced human-machine teaming.”⁴³

A 2020 U.S. National Academy of Sciences report echoed these concerns, highlighting that low-cost DNA sequencing by Chinese firms could facilitate

36. Zhang Shibo [张仕波], “New Highland of War [战争新高地],” *The Science of Military Strategy* [战略学], Ed. Xiao Tianliang [肖天亮] (Washington, DC: National Defense University Press, 2017).

37. Dennis Normile, “China sprints ahead in CRISPR therapy race,” *Science*, October 6, 2017. (<https://www.science.org/doi/10.1126/science.358.6359.20>)

38. Brain control (脑控) weapons are thought to focus on brain-machine interface (脑-机接口) technology, aiming to enable seamless human-machine integration (人机融合). For additional information, please see: Elsa B. Kania, “Minds at War: China’s Pursuit of Military Advantage through Cognitive Science and Biotechnology,” *National Defense University Press*, January 9, 2020. (<https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2053585>); Addition of Certain Entities to the Entity List and Revision of an Entry on the Entity List, U.S. Department of Commerce, 86 Federal Register 71557, December 17, 2021. (<https://www.federalregister.gov/documents/2021/12/17/2021-27406/addition-of-certain-entities-to-the-entity-list-and-revision-of-an-entry-on-the-entity-list#:~:text=The%20ERC%20determined%20to%20add,Hygiene%20and%20Environmental%20Medicine%3B%20the>)

39. Elsa B. Kania, “Minds at War: China’s Pursuit of Military Advantage through Cognitive Science and Biotechnology,” *National Defense University Press*, January 9, 2020. (<https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2053585>)

40. Ibid.

41. Zeng Huafeng [曾华锋] and Shi Haiming [石海明], “Scientific and Technological Deterrence: A New Trend in the Use of Military Power [科技威慑：军事力量运用的新趋势],” *Sohu*, February 17, 2019. (https://www.sohu.com/a/295253193_358040)

42. “Prepared Statement of Edward H. You, Supervisory Special Agent, Biological Countermeasures Unit, Countermeasures and Operations Section, Weapons Of Mass Destruction Directorate, Federal Bureau Of Investigation, Safeguarding the Bioeconomy: U.S. Opportunities and Challenges,” *U.S.-Economic and Security Review Commission*, March 16, 2017. (https://www.ehdc.org/sites/default/files/resources/files/Ed_You_Testimony_USCC.pdf); David J. Lynch, “Biotechnology: the US-China Dispute Over Genetic Data,” *Financial Times* (UK), July 31, 2017. (<https://www.ft.com/content/245a7c60-6880-11e7-9a66-93fb352ba1fe>)

43. “Military and Security Developments Involving the People’s Republic of China 2020,” *Office of the Secretary of Defense*, August 21, 2020. (<https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>)

the Chinese government’s extensive collection of U.S. genetic information, with potential risks for targeting specific U.S. population subsets. The report emphasized that “[e]ven if genetic associations with behavior are not well understood at present, they will become better established as more research is conducted and more data are collected and analyzed.”⁴⁴

“Amid the PLA’s intensified focus on weaponizing biotechnology, U.S. national security officials have repeatedly raised alarms about China’s growing access to U.S. genomic data.”

In 2021, the U.S. National Counterintelligence and Security Center further cautioned that China’s collection of healthcare and genomic data posed “serious risks, not only to the privacy of Americans but also to the economic and national security of the United States.”⁴⁵

BGI: Beijing’s Backbone in Biotech and Big Brother Surveillance

BGI Group (formerly Beijing Genomics Institute) stands as the foremost embodiment of Beijing’s biotechnology ambitions. As one of the world’s largest genomics and DNA sequencing companies, BGI claims to provide its services “for the benefit of all

mankind.”⁴⁶ Yet BGI also serves as a critical military-civil fusion enabler for the CCP, integrating advanced biotechnology research and equipment with state surveillance and military applications.

BGI’s rapid ascent has been fueled by significant Chinese government support, which BGI has openly acknowledged and leveraged to attract investment. For example, in corporate filings, BGI has advertised its mission to help the CCP “seize the commanding heights of international biotechnology competition.”⁴⁷ Such statements blur the lines between BGI’s ostensible private sector status and its de facto role as an essentially state-controlled entity.

Fueled by the Party’s Purse

BGI has staunchly denied that it is owned by the Chinese government. But there is little question that the CCP’s financial backing played a major role in BGI’s rapid growth. This support has included direct capital infusions, tax incentives, and subsidies.⁴⁸ These advantages allowed BGI to undercut U.S. and European competitors by offering products at prices well below market value — a strategy reminiscent of Chinese state-backed enterprises, like Huawei.

Strategic investments from the Chinese government were particularly pivotal in driving BGI’s early and ongoing success. For example, during its first decade, BGI secured a \$1.5 billion loan from China Development Bank (2009-2010), which facilitated BGI’s purchase of 128 gene sequencing machines from

44. “Safeguarding the Bioeconomy,” *National Academies of Sciences, Engineering, and Medicine*, January 12, 2020. (<https://nap.nationalacademies.org/read/25525/chapter/1>)

45. “China’s Collection of Genomic and other Healthcare Data from America: Risks to Privacy and U.S. Economic and National Security,” *The National Counterintelligence and Security Center*, February 2021. (https://www.dni.gov/files/NCSC/documents/SafeguardingOurFuture/NCSC_China_Genomics_Fact_Sheet_2021revision20210203.pdf)

46. “资料下载 [Resources Download],” *BGI*, accessed November 1, 2024. (<https://www.genomics.cn/download.html>)

47. Kirsty Needham, “Special Report: COVID opens new doors for China’s gene giant,” *Reuters*, August 5, 2020. (<https://www.reuters.com/article/world/special-report-covid-opens-new-doors-for-chinas-gene-giant-idUSKCN2511CD>)

48. Anna Puglisi and Chryssa Rask, “China, Biotechnology, and BGI: How China’s Hybrid Economy Skews Competition,” *Center for Security and Emerging Technology*, May 2024. (<https://cset.georgetown.edu/publication/china-biotechnology-and-bgi>)

U.S. firm Illumina.⁴⁹ Afterward, Illumina accused BGI of patent infringement and illegally copying its proprietary sequencing chemistry. A series of lawsuits ensued in the United States, United Kingdom, Germany, Spain, and Finland.⁵⁰

In 2013, the Export-Import Bank of China provided BGI with a \$75 million loan to acquire California-based Complete Genomics Inc., then an emerging player in the life sciences sector.⁵¹ BGI's purchase of Complete Genomics aligned with China's 12th Five-Year Plan objectives, per Chinese government disclosures. China's National Development and Reform Commission, a powerful CCP entity responsible for national economic strategy and advancing China's dominance in the life sciences sector, cited the deal as fulfilling a Chinese government-directed "overseas acquisition" goal.⁵²

These and other preferential loans from other Chinese government-backed banks demonstrate how Beijing

has positioned BGI as not merely a business entity but a strategic asset.⁵³

Party Ties That Bind

Beyond financial support, the CCP wields significant control over BGI's operations through various other channels, mirroring its grip on state-backed firms like battery maker Contemporary Amperex Technology Co., Limited (CATL) and social media giant ByteDance, TikTok's parent company.⁵⁴ This control manifests through strategically placed senior executives and a growing framework of laws, regulations, and party structures that appear to steer day-to-day decision-making — often in ways that remain opaque to international regulators, partners, and investors. These mechanisms raise serious questions about the company's claims that it is neither "owned, funded, nor controlled by the Chinese Government."⁵⁵

49. Stephanie Kirchgaessner and Leslie Hook, "Chinese genetics group defends US bid," *Financial Times* (UK), November 26, 2012. (<https://www.ft.com/content/ead7d872-3821-11e2-a97e-00144feabdc0>); "Illumina Inc. Announces that U.S. Federal Court Issues Preliminary Injunction Against BGI Companies," *Illumina*, June 16, 2020. (<https://investor.illumina.com/news/press-release-details/2020/Illumina-Inc-Announces-that-US-Federal-Court-Issues-Preliminary-Injunction-Against-BGI-Companies/default.aspx>); "BUNDESPATENTGERICHT IM NAMEN DES VOLKES [Federal Patent Court on Behalf of the People]," September 14, 2021. (<https://juris.bundespapentgericht.de/cgi-bin/rechtsprechung/document.py?Gericht=bpatg&Art=en&sid=0e5c0274cf1af383f052eeef6cac693&nr=42311&pos=0&anz=1&Blank=1.pdf>)

50. Muireann Bolger, "Illumina Prevails Against BGI at English High Court," *Life Sciences Intellectual Property Review*, January 21, 2021. (<https://www.lifesciencesipreview.com/big-pharma/illumina-prevails-against-bgi-at-english-high-court-4334>)

51. Christina M. Sautter, "Fleeing the Family Jewels," *Tulane Law Review*, February 2016. (https://digitalcommons.law.lsu.edu/cgi/viewcontent.cgi?article=1393&context=faculty_scholarship); November 2013 Science and Technology article on Export-Import Bank loan to BGI; Complete Genomics Inc., Solicitation/Recommendation Statement under Section 14(d)(4) of the Securities Exchange Act of 1934 (Schedule 14D-9) 19 (Sept. 25, 2012). (Noting that on August 31, 2012, BGI provided a letter from the Export-Import Bank of China setting forth the bank's willingness to finance up to \$75 million for BGI to acquire CGI at a price of \$3.15 per share.)

52. Office of the United States Trade Representative, "Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974," March 22, 2018, pages 127-128. (<https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>)

53. 2017: \$217 million loan from the Export-Import Bank of China; 2017: \$20.4 million loan from the Agricultural Development Bank of China to build the National Gene Bank; February 2020: \$14.5 million loan from Minsheng Bank; May 2020: \$14.5 million loan from the Agricultural Development Bank of China; and July 2020: loans from the Postal Savings Bank of China. Office of the U.S. Trade Representative, "Findings of the Investigation into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation Under Section 301 of the Trade Act of 1974," March 22, 2018. (<https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF>); Christina Larson, "Beijing's Test Tube Baby," *Foreign Policy*, accessed November 4, 2024. (<https://foreignpolicy.com/2015/09/29/beijings-test-tube-baby-china-science-zhao-bowen-bgi-start-up-gene-mapping-dropout>); The author also located relevant information in three articles now available only on paper: An October 2017 article originally available on the Agricultural Development Bank of China website, a May 2020 China Economic Net article on Agricultural Development Bank of China's special loan to BGI, and a May 2020 Xinhuanet article on Export-Import Bank loans to BGI after the COVID-19 outbreak in 2020.

54. Craig Singleton, "Beijing's Power Play," *Foundation for Defense of Democracies*, October 23, 2023. (<https://www.fdd.org/analysis/2023/10/23/beijings-power-play>)

55. "BGI Group," *BGI*, accessed November 1, 2024. (<https://bgi-australia.com.au/bgi-group>)

BGI's origin story traces directly back to the Chinese Academy of Sciences (CAS), a Chinese government-funded and directed institution responsible for spearheading defense-related research for China's military.⁵⁶ CAS is also a key player in China's military-civil fusion ecosystem and operates dedicated military-civil fusion institutions, including a military-civil fusion big data research center and a military-civil fusion development center at its university.⁵⁷ The U.S. Department of Commerce has placed numerous arms of CAS on its Entity List for their role in supporting China's military modernization.⁵⁸

According to CAS's website, BGI originally operated as the Human Genome Research Centre at CAS's Institute of Genetics.⁵⁹ One of BGI's co-founders even described the company's relationship with CAS as consisting of "one name, two nameplates," which serves to illustrate that while BGI is nominally private, it is and has always been heavily influenced by CAS and, by extension, China's party-state and military.⁶⁰

Moreover, BGI's investment documents highlight its collaboration with China's party-state, notably China's National GeneBank, which the government

established in 2011. Today, the GeneBank is one of the world's largest repositories of genetic information, holding millions of genomic samples from both China and other countries. According to the GeneBank's website, its mission is to "store, manage, and utilize genetic resources" to "serve China's strategic needs," which, by default, include those outlined in Xi Jinping's comprehensive national security strategy.⁶¹ The GeneBank also states that while its samples are "owned by the [Chinese] government," they are "managed by BGI," further blurring the lines between the GeneBank, BGI, and the government.⁶²

BGI's presence in government-controlled innovation hubs like the Shenzhen International Biobay further solidifies its integration with the government.⁶³ These hubs are integral to military-civil fusion, facilitating the direct transfer of data and cutting-edge technologies from nominally private companies to the PLA and Chinese intelligence services. To that end, the Shenzhen International Biobay's administrative and governing units include an "Office of Party Affairs" to ensure CCP control and loyalty and an "Office of Technology Transfer," with the PLA-affiliated CAS serving on Biobay's governing board alongside BGI.⁶⁴

56. Emily de La Bruyère and Nathan Picarsic, "Defusing Military-Civil Fusion: The Need to Identify and Respond to Chinese Military Companies," *Foundation for Defense of Democracies*, May 27, 2021. (<https://www.fdd.org/analysis/2021/05/26/defusing-military-civil-fusion>)

57. "军民融合大数据研究中心 [Military-Civil Fusion Big Data Research Center]," *Chinese Academy of Sciences Institute of Computing Technology*; "国科学院大学军民融合发展中心 [Military-Civil Fusion Development Center]," *University of the Chinese Academy of Sciences*; Gan Xiao, "中国科学院众多成果亮相第三届军民融合展 [Many Achievements of the Chinese Academy of Sciences Appeared at the 3rd Military-Civil Fusion Exhibition]," *Science Net* (China), September 18, 2017.

58. "Additions of Certain Entities to the Entity List and Revision of an Entry on the Entity List," U.S. Department of Commerce, 89 Federal Register 41886, May 14, 2024. (<https://www.federalregister.gov/documents/2024/05/14/2024-10485/additions-of-entities-to-the-entity-list>); "Additions and Revisions to the Entity List and Conforming Removal From the Unverified List," U.S. Department of Commerce, 87 Federal Register 77505, December 12, 2022. (<https://www.federalregister.gov/documents/2022/12/19/2022-27151/additions-and-revisions-to-the-entity-list-and-conforming-removal-from-the-unverified-list>)

59. "中国科学院遗传所人类基因组研究中心 [Human Genome Research Center, Institute of Genetics, Chinese Academy of Sciences]," "北京华大基因研究中心有限公司 [Beijing BGI Genomics Research Center Co., Ltd.]," "历史沿革 [Historical Development]," *Beijing Institute of Genomics*, accessed November 1, 2024. (<https://www.big.ac.cn/gkjj/lsg>)

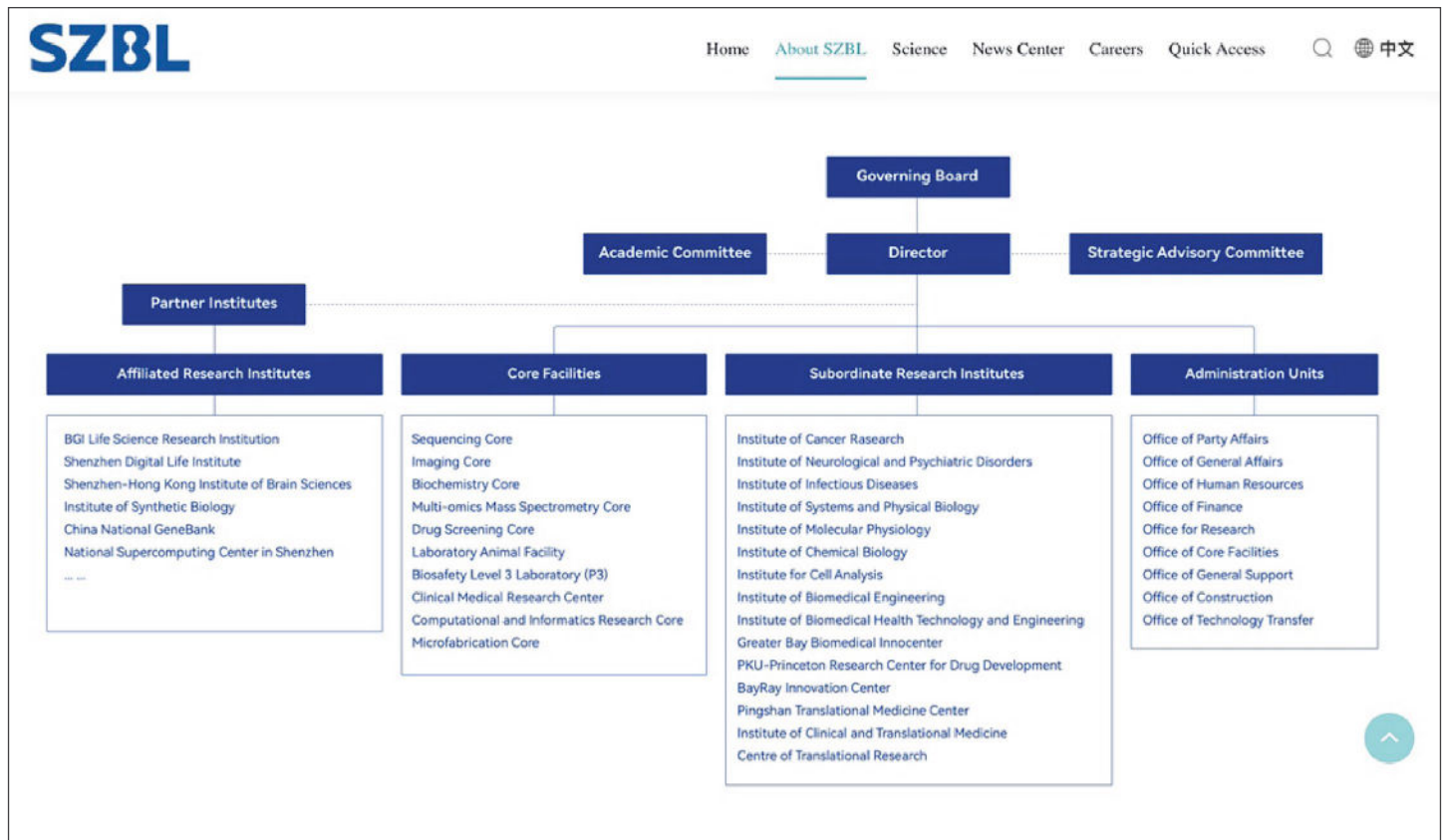
60. "华大基因的牌子 [BGI's brand]," *Caijing*, October 5, 2000. (<https://web.archive.org/web/20120923093333/https://magazine.caixin.com/2000-10-05/100080698.html>)

61. "机构介绍 [Organization Introduction]," *China National GeneBank*, accessed November 1, 2024. (<http://archive.today/F6KKL>)

62. "Introduction," *BGI*, accessed November 1, 2024. (<https://en.genomics.cn/en-about.html>)

63. Vivien Yang Swartz, "Genes build the future," *BGI*, accessed November 1, 2024. (<https://mzv.gov.cz/file/1166890/BGI.pdf>); "About SZBL," *Shenzhen Bay Laboratory*, accessed November 1, 2024. (<https://www.szbl.ac.cn/en/about/organization/leadership>)

64. "About SZBL," *Shenzhen Bay Laboratory*, accessed November 1, 2024. (<https://www.szbl.ac.cn/en/about/organization/leadership>)



Copy of the Biobay's Corporate Leadership Structure, 2024. Source: <https://www.szbl.ac.cn/en/about/organization/leadership/>

The CCP's de facto control over BGI also extends deeply into its personnel structure, ensuring alignment with government objectives. Under Xi's party-first framework, which emphasizes deepening party control across all sectors, the most important official at BGI is not necessarily its CEO, Ye Yin, or even its chairman and co-founder, Wang Jian. Instead, it is BGI's CCP commissar (or secretary), Dr. Du Yutao, a recipient of "Outstanding Party Worker" awards for her loyalty to the CCP and a delegate to the CCP's national-level 19th Congress in 2017, where Xi's new guiding ideology, known as "Xi Jinping Thought on Socialism

with Chinese Characteristics for a New Era," was written into the CCP's constitution.⁶⁵

In addition to her roles as CCP commissar and as a BGI corporate director, Du is also an active player in the CCP's "United Front" system, a network of party and state organizations that carry out influence operations both domestically and abroad. She is a member of at least four organizations and platforms that report to various tiers of the United Front Work Department, each focused on recruiting Chinese and foreign-born scientists to support China's biotechnology industry.

65. "华大集团党委书记 [Secretary of the Party Committee of BGI Group]," BGI Group, May 8, 2022. (<https://archive.ph/AdxKh#selection-3241.0-3241.8>); "盐田公职人员风采录"第7期: 盐田区民政局 孟琳琳 [Style Record of Yantian Public Officials Issue 7: Yantian District Civil Affairs Bureau Meng Linlin]," *SZ News*, February 14, 2022. (<https://archive.ph/CcBSs>); "杜玉涛 [Du Yutao]," *BGI College*, January 26, 2022 (<https://archive.ph/deiue#selection-36.13-73.3>); "中共广东省第十二届委员会委员名单 [List of members of the 12th Guangdong Provincial Committee of the Communist Party of China]," *CPC News*, August 9, 2021. (<https://archive.ph/sgKkr#selection-441.0-441.16>)

These organizations are the Shenzhen Western Returned Scholars Association, the Returned Overseas Chinese Association of Yantian District, the Guangdong Youth Federation, and the Shenzhen Youth Federation.⁶⁶ These positions endow Du with authority, both real and implied, to ensure BGI's corporate decisions align with state priorities and data-sharing mandates.

Other senior BGI personnel have deep-rooted connections to security-affiliated institutions. For instance, BGI co-founder Yang Huanming served simultaneously during the company's first decade as its legal representative while retaining an official position (and access to resources) at CAS.⁶⁷ Similarly, Wang Jian served concurrently as chairman of BGI Group and deputy director of CAS's Beijing Institute of Genomics from 2003 to 2007.⁶⁸ Likewise, Mei Yonghong, BGI's current executive vice president, previously served as deputy CCP secretary and mayor of Jinan in Shandong province, a hub for military-civil fusion initiatives.⁶⁹ Mei also held senior roles within China's Ministry of Science and Technology, including director of policy,

regulations, and system reform, placing him, along with Du, in a position to ensure implementation of key aspects of the military-civil fusion strategy.⁷⁰

There is also an extensive network of embedded party cells within BGI. These groupings of CCP officials ensure BGI's alignment with party directives and facilitate the party's access to BGI's data, research, and technology. According to Nanfang Daily, a CCP-owned newspaper, BGI had at least 25 party cells by 2017.⁷¹ Additionally, BGI's subsidiaries maintain their own CCP cells, with one Shenzhen-based subsidiary alone hosting 10 CCP cells with more than 300 party members as of 2019.⁷² Other subsidiaries, such as BGI Marine and BGI College, also have embedded cells, reinforcing CCP control across BGI's operations.⁷³

Genomics in Service of the Security State

BGI is as much a data giant as it is a biotech firm. Co-founder Wang Jian aptly described BGI as a "big data company," highlighting that its "greatest competitive power is its big data platform, computing, and

66. "杜玉涛 [Du Yutao]," *BGI College*, accessed November 1, 2024. (<https://archive.ph/deiue>); "中华全国青年联合会章程 [All-China Youth Federation Constitution]," *All-China Youth Foundation*, August 18, 2020. (<https://archive.ph/5tyYN>); "深圳欧美同学会副会长杜玉涛:愿更多海归人才用智慧和汗水耕耘深圳未来 [Du Yutao, Vice President of the Shenzhen Western Returned Scholars Association: I hope more overseas returnees will use their wisdom and sweat to cultivate Shenzhen's future]," *WRSA*, December 7, 2021. (<https://archive.vn/oIK2g>)

67. Rao Yi [饶毅], "'公私同行'的疑问: 基因组所和华大基因公司 [Questions about 'Public-Private Partnership': Genomics Institute and BGI]," *Raoyi Blog Caixin*, November 15, 2012. (<http://archive.today/McGPf>)

68. "杨焕明 [Yang Huanming]," *University of Chinese Academy of Sciences*, accessed November 1, 2024. (<https://archive.ph/Z2ua2#selection-303.8-316.0>); "历任领导 [Previous Leaders]," *BGI*, accessed November 1, 2024. (<https://web.archive.org/web/20220215225802/http://www.big.cas.cn/jggk/lrld>); "汪建 [Wang Jian]," *BGI*, accessed November 1, 2024. (<https://web.archive.org/web/20220322040751/https://www.genomics.cn/team/info.aspx?itemid=196>)

69. "Mei Yonghong," *BGI*, accessed November 1, 2024. (<https://archive.ph/A25v5>)

70. Ibid.

71. Zhang Guangyan [张光岩], "从克隆猪研发骨干到'健康中国'践行者 [From the backbone of pig cloning research and development to the practitioner of 'Healthy China']," *Southern Daily* via *CCP News*, October 7, 2017. (<https://archive.fo/jFRuZ>)

72. "深圳华大基因股份有限公司投资者关系活动记录表 [Shenzhen MGI BGI Co., Ltd. Investor Relations Activity Record]," *BGI*, June 28, 2019. (<https://archive.ph/3oPnX>); "圳华大基因股份有限公司 2018 年度社会责任报告 [Shenzhen BGI Co., Ltd. 2018 Annual Social Responsibility Report]," *BGI*, accessed July 1, 2019. (<https://web.archive.org/web/20190701182701/https://www.bgi.com/wp-content/uploads/2019/04/%E5%8D%8E%E5%A4%A7%E5%9F%BA%E5%9B%A0%E5%BC%9A2018%E5%B9%B4%E5%BA%A6%E7%A4%BE%E4%BC%9A%E8%B4%A3%E4%BB%BB%E6%8A%A5%E5%91%8A.pdf>)

73. *BGI Marine Magazine*, April 2021. (<https://archive.ph/N08ji>); "关注学生全面发展, 建立健全机制保障 [Focusing on the comprehensive development of students and establishing a sound mechanism to safeguard it]," *BGI College*, accessed November 1, 2024. (<https://archive.ph/duWXr>)

analysis capabilities.”⁷⁴ From the Chinese government’s perspective, the purpose of integrating genomics and big data extends beyond market dominance of a particular company to empowering Beijing’s police state. According to the U.S. government, BGI’s data capabilities have directly facilitated egregious human rights abuses, particularly in Xinjiang against Uyghurs and other ethnic minorities.⁷⁵

While leveraging civilian businesses for military capabilities has long been CCP doctrine, Xi has dramatically expanded these initiatives, emphasizing the integration of private sector innovation into military advancements and dual-use technologies. For example, the PLA’s 2020 Science of Military Strategy report highlights biotechnology’s critical role in military-civil fusion, emphasizing that “local enterprises are often at the forefront of biotechnology development” and urging the military to “fully utilize” these private firms.⁷⁶ The strategy also advocates for joint R&D projects between Chinese companies and the PLA as well as the construction and operation of biosafety laboratories essential to military research.

BGI reportedly hosts four Chinese government-funded “Key Laboratories” for genomic research.⁷⁷ These types of labs, often jointly supervised by the PLA and co-located within Chinese universities or defense conglomerates, play a crucial role in advancing military-civil fusion.⁷⁸ In BGI’s case, this likely includes facilitating cutting-edge research in biotechnology, biomedicine, and other life sciences.

There is ample evidence of BGI partnering with the PLA on military-relevant genomic studies. For example, in 2017, BGI researchers collaborated on sensitive research with the Third Military Medical University, the PLA’s Key Laboratory of High-Altitude Medicine, and the 18th Hospital of the PLA in Xinjiang.⁷⁹ This research focused on investigating drug interactions with genes in Han Chinese to prevent brain damage at high altitudes — which happens to be a critical issue for Chinese troops enforcing Beijing’s control in Tibet.⁸⁰ Notably, CAS has warned that brain damage and death caused by high altitude on the Tibetan plateau have severely hindered “national defense construction.”⁸¹ BGI’s joint brain damage research with the PLA also dovetails with the PLA’s other high-altitude mitigation

74. “华大基因汪建:大数据云计算支撑下的基因产业没有冬天 [Wang Jian of BGI: There will be no winter for the gene industry supported by big data and cloud computing],” *Qianlong*, December 20, 2012. (<http://archive.today/Ae0Lj>); “华大基因：红旗下出身，全世界搏击 [BGI: Born Under the Red Flag, Fighting Around the World],” *Time Weekly* (China), June 23, 2015. (<https://web.archive.org/web/20220503124329/https://www.time-weekly.com/wap-article/30162>)

75. “UHRP Welcomes New Sanctions on Chinese DNA Company BGI for Targeting Uyghurs,” *Uyghur Human Rights Project*, March 7, 2023. (<https://uhrp.org/statement/uhrp-welcomes-new-sanctions-on-chinese-dna-company-bgi-for-targeting-uyghurs>)

76. “In Their Own Words: Science of Military Strategy 2020,” *China Aerospace Studies Institute*, January 26, 2022. (<https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-01-26%202020%20Science%20of%20Military%20Strategy.pdf>)

77. Kirsty Needham, “Special Report: COVID opens new doors for China’s gene giant,” *Reuters*, August 5, 2020. (<https://www.reuters.com/article/world/special-report-covid-opens-new-doors-for-chinas-gene-giant-idUSKCN2511CD>)

78. Alex Joske, “The China Defence Universities Tracker,” *Australian Strategic Policy Institute*, November 25, 2019. (<https://www.aspi.org.au/report/china-defence-universities-tracker>)

79. Bao Liu, Jian Chen, Long Zhang, Yixing Gao, Jianhua Cui, Erlong Zhang, Gang Xu, Yan Lian, Yu Liang, Jian Wang, and Yuqi Gao, “IL-10 Dysregulation in Acute Mountain Sickness Revealed by Transcriptome Analysis,” *Frontiers*, May 29, 2017. (<https://www.frontiersin.org/articles/10.3389/fimmu.2017.00628/full>)

80. Li Jiaoyao, “China upgrades oxygen supply facilities for border troops in high-altitude Tibet,” *China Military Online* (China), February 9, 2021. (http://eng.mod.gov.cn/xb/News_213114/Videos/4878887.html)

81. “张国捷团队报道神经保护甾体对急性低压缺氧引起的食蟹猴脑损伤的保护作用和潜在机制 [Zhang Guojie’s team reports the protective effects and potential mechanisms of neuroprotective steroids against acute low-pressure hypoxia-induced brain injury in crab-eating monkeys],” *State Key Laboratory of Genetic Resources and Evolution*, December 20, 2019. (http://www.kiz.ac.cn/gre/gre7/gre73/201912/t20191223_5467586.html)

efforts in Tibet, including recent upgrades to oxygen supply facilities to enhance PLA troop readiness.⁸²

In 2019, BGI, the China National GeneBank, the PLA General Hospital, and the PLA Rocket Force Characteristic Medical Centre collaborated on a genetic study of hearing loss due to weapons training.⁸³ This research closely aligns with studies spearheaded by the Military Medical Research Institute of the PLA's Academy of Military Sciences. These include attempts to leverage biotechnology and bioengineering to produce "hearing enhancement devices" and "neurological drugs" to reverse "battlefield damage," with the goal of ensuring the army's ability to "fight and win battles."⁸⁴

In 2020, BGI employees collaborated with the PLA's Third Military Medical University on studies of brain injuries in monkeys subjected to extreme altitudes. CAS scientists praised the effort for its potential applications in future high-altitude military deployments.⁸⁵ Beyond Tibet, the PLA's Western Theater Command is actively working to increase its soldiers' ability to operate in the cold and mountainous environment along the Sino-Indian border.⁸⁶



Photo illustration of BGI Group logo. (Photo Illustration by Pavlo Gonchar/SOPA Images/LightRocket via Getty Images)

For over a decade, BGI has also collaborated closely with China's military to study fetal genomes, resulting in more than a dozen joint studies with PLA researchers aimed at refining BGI's prenatal non-invasive fetal trisomy (NIFTY) tests.⁸⁷ These tests, which detect genetic abnormalities such as Down Syndrome in early pregnancy, have been used by over 8 million women globally and are sold in at least 52 countries. While this work is focused on prenatal health, the U.S. government has warned that such genomic research and the associated genomic datasets could easily be repurposed for military applications, underscoring the potential dual-use nature of such studies.⁸⁸ A

82. Li Jiaoyao, "China upgrades oxygen supply facilities for border troops in high-altitude Tibet," *China Military Online*, February 9, 2021. (http://eng.mod.gov.cn/xb/News_213114/Videos/4878887.html)

83. Yongyi Yuan, Qi Li, Yu Su, Qiongfen Lin, Xue Gao, Hankui Liu, Shasha Huang, Dongyang Kang, N. Wendell Todd, Douglas Mattox, Jianguo Zhang, Xi Lin, and Pu Dai, "Comprehensive genetic testing of Chinese SNHL patients and variants interpretation using ACMG guidelines and ethnically matched normal controls," *European Journal of Human Genetics*, September 20, 2019. (<https://www.nature.com/articles/s41431-019-0510-6>); Kirsty Needham and Clare Baldwin, "China's gene giant harvests data from millions of women," *Reuters*, July 7, 2021. (<https://www.reuters.com/investigates/special-report/health-china-bgi-dna>)

84. Kang Yaowu [康耀武] and Kang Kaihua [康凯华], "现代生命科技与未来战争 [Modern life science and technology and future war]," *Guangming Daily* (China). (http://news.china.com.cn/2020-03/22/content_75844351.htm?itid=lk_inline_enhanced-template)

85. "张国捷团队报道神经保护甾体对急性低压缺氧引起的食蟹猴脑损伤的保护作用和潜在机制 [Zhang Guojie's team reports the protective effects and potential mechanisms of neuroprotective steroids against acute low-pressure hypoxia-induced brain injury in crab-eating monkeys]," State Key Laboratory of Genetic Resources and Evolution, December 20, 2019. (http://www.kiz.ac.cn/gre/gre7/gre73/201912/t20191223_5467586.html); Li Jiaoyao, "China upgrades oxygen supply facilities for border troops in high-altitude Tibet," *China Military Online* (China), February 9, 2021. (http://eng.mod.gov.cn/xb/News_213114/Videos/4878887.html)

86. Anushka Saxena, "Chinese soldiers gear up for winter warfare," *Australian Strategic Policy Institute*, July 16, 2024. (<https://www.aspistrategist.org.au/chinese-soldiers-gear-up-for-winter-warfare>)

87. Hong Yao, Ya Gao, Jia Zhao, Rong Zhang, Huixin Xu, Huamei Hu, Yanmei Luo, Yuying Yuan, Meili Fu, Hongyun Zhang, Hui Jiang, Wei Wang, Huanming Yang, Jian Wang, Zhiqing Liang, and Fang Chen, "Genome-wide detection of additional fetal chromosomal abnormalities by cell-free DNA testing of 15,626 consecutive pregnant women," *Science China Life Sciences*, August 2, 2018. (<https://link.springer.com/article/10.1007/s11427-017-9344-7>)

88. The Select Committee on Strategic Competition between the United States and the Chinese Communist Party, Press Release, "Moolenaar, Fox Uncover that American University Research Aids Chinese Military," September 23, 2024. (<https://selectcommitteeontheccp.house.gov/media/press-releases/moolenaar-fox-uncover-american-university-research-aids-chinese-military>); Craig Singleton, "The Middle Kingdom Meets Higher Education," *Foundation for Defense of Democracies*, December 9, 2021. (<https://www.fdd.org/analysis/2021/12/09/the-middle-kingdom-meets-higher-education>)

2024 report by the U.S. House Select Committee on Strategic Competition between the United States and the Chinese Communist Party revealed thousands of instances when Chinese affiliates leveraged ostensibly civilian, dual-use research to advance the PLA's defense and technological innovation efforts.⁸⁹

In this case, the PLA General Hospital in Beijing and the Third Military Medical University in Chongqing both played crucial roles in the 2011 clinical trials for the NIFTY test, working alongside BGI to expand the range of genetic abnormalities the test could detect. In 2018, BGI leveraged a PLA supercomputer to reanalyze NIFTY data, focusing on virus prevalence, mental illness indicators, and genetic characteristics of Tibetan and Uyghur minorities.⁹⁰ The NIFTY test's privacy policy, which permits data sharing when "directly relevant to national security or national defense security" in China, raises serious concerns that Chinese military or intelligence services could gain access to this data by simply demanding it from BGI, potentially leading to its use in military or state-security research or operations.⁹¹

Finally, BGI facilitates Chinese military collaboration with international partners as demonstrated by BGI's co-hosting of events like the 15th International Congress on Genomics in Wuhan in 2020. The event featured a



Opening ceremony of the 15th International Congress on Genomics in Wuhan in 2020. (Photo via Annual Meeting of the International Conference on Genomics website, www.icg.bio)

blend of prominent Chinese speakers, including BGI co-founder Yang Huanming, alongside researchers from several PLA institutions, such as the PLA Academy of Military Science, the PLA Army Military Medical University, and the 302nd PLA Hospital, as well as CAS researchers.⁹² Also present were prominent European geneticists, researchers, and public health experts, as well as an American Nobel laureate in chemistry.⁹³

This mix of military and academic participants underscores how BGI functions as a veneer for the PLA, providing the Chinese military with cover to engage with global partners and institutions under the guise of civilian research, thereby blurring the lines between BGI and China's military apparatus.

89. The Select Committee on Strategic Competition between the United States and the Chinese Communist Party, "CCP on the Quad: How American Taxpayers and Universities Fund the CCP's Advanced Military and Technological Research," September 2024. (<https://selectcommitteeontheccp.house.gov/media/reports/ccp-quad-how-american-taxpayers-and-universities-fund-ccps-advanced-military-and>)

90. Kirsty Needham and Clare Baldwin, "China's gene giant harvests data from millions of women," *Reuters*, July 7, 2021. (<https://www.reuters.com/investigates/special-report/health-china-bgi-dna>); Yuan Ren, Jia Zhao, Ruibing Li, Yifan Xie, Shufang Jiang, Honghui Zhou, Hongtai Liu, Yanqin You, Fang Chen, Wei Wang, Ya Gao, Yuanguang Meng, and Yanping Lu, "Noninvasive prenatal test for FGFR3-related skeletal dysplasia based on next-generation sequencing and plasma cell-free DNA: Test performance analysis and feasibility exploration," *Prenatal Diagnosis*, July 26, 2018. (<https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1002/pd.5334>); Hong Yao, Ya Gao, Jia Zhao, Rong Zhang, Huixin Xu, Huamei Hu, Yanmei Luo, Yuying Yuan, Meili Fu, Hongyun Zhang, Hui Jiang, Wei Wang, Huanming Yang, Jian Wang, Zhiqing Liang, and Fang Chen, "Genome-wide detection of additional fetal chromosomal abnormalities by cell-free DNA testing of 15,626 consecutive pregnant women," *Science China Life Sciences*, August 2, 2018. (<https://link.springer.com/article/10.1007/s11427-017-9344-7>); Hong Yao, Lei Zhang, Hongyun Zhang, Fuman Jiang, Hua Hu, Fang Chen, Hui Jiang, Feng Mu, Lijian Zhao, Zhiqing Liang, and Wei Wang, "Noninvasive prenatal genetic testing for fetal aneuploidy detects maternal trisomy X," 2012. (<https://web.archive.org/web/20240124024447/http://www.pregncare.co.il/Assets/noninvasive%20prenatal%20genetic%20testing%20for%20fetal%20aneuploidy%20detects%20maternal%20trisomy%20x.pdf>)

91. Kirsty Needham and Clare Baldwin, "China's gene giant harvests data from millions of women," *Reuters*, July 7, 2021. (<https://www.reuters.com/investigates/special-report/health-china-bgi-dna>)

92. "Omics & Global Health 组学与人人类健康," *International Conference on Genomics (ICG)*, October 25-31, 2020. (<https://web.archive.org/web/20240711011823/https://icg.bio/ICG15>); "会议已确定的部分演讲嘉宾 (按照姓氏首字母排序, 不断更新中) [Some of the confirmed speakers for the conference (in alphabetical order of last name, constantly being updated)]," accessed November 4, 2024. (<https://archive.ph/oacvN>)

93. Ibid.

BGI's Involvement in Human Rights Violations and Public Security

BGI is not just a partner to the PLA but also a key player in China's broader biometric surveillance regime, which aims to expand the government's control over its citizens. As the U.S. Government has alleged, the company plays an integral role in enabling the Chinese government's repressive measures against ethnic minorities, solidifying its status as a backbone of state-led human rights abuses.

In July 2020, the U.S. Department of Commerce sanctioned BGI affiliates Xinjiang Silk Road BGI and Beijing Liuhe BGI by adding them to the Entity List for “engaging in or enabling” human rights violations and abuses as part of “China's campaign of repression, mass arbitrary detention, forced labor and high-technology surveillance against Uyghurs, Kazakhs, and other members of Muslim minority groups in the Xinjiang Uyghur Autonomous Region (XUAR).”⁹⁴ These affiliates were specifically cited as conducting genetic analyses that furthered the Chinese government's repression of these ethnic minorities.⁹⁵

Beyond BGI's work in Xinjiang, the company's subsidiary, Forensic Genomics International (FGI), has supported China's domestic security apparatus, the Ministry of Public Security (MPS), in creating a vast national database for forensic identification.⁹⁶ Since 2017, the MPS has aimed to compile DNA data from 5 to 10 percent of China's male population, purportedly for law enforcement. However, like BGI's work in Xinjiang, this ostensible “public security database” includes DNA from individuals without criminal records and even minors, raising significant human rights concerns.⁹⁷

Affiliate Spotlight — MGI Tech

Although now a nominally independent entity, MGI Tech Co. Ltd. was founded in 2016 as BGI's manufacturing arm before spinning off in 2022. The company develops and produces genomic sequencing devices, equipment, and reagents for scientific research and medical treatments. MGI has delivered thousands of

genetic sequencers to over 70 countries and is planning a global expansion, including possible entry into the U.S. market with low-cost gene sequencers for hospitals.⁹⁸ This would not only broaden MGI's access to global health infrastructure and data networks — potentially bolstering China's military research capabilities — but could also increase international dependencies on China for critical healthcare technologies.

⁹⁴. “Addition of Certain Entities to the Entity List; Revision of Existing Entries on the Entity List,” U.S. Department of Commerce, 85 Federal Register 44159, July 22, 2020. (<https://www.federalregister.gov/documents/2020/07/22/2020-15827/addition-of-certain-entities-to-the-entity-list-revision-of-existing-entries-on-the-entity-list>); “Supplement No. 4 to Part 744 - ENTITY LIST,” *Bureau of Industry and Security*, May 19, 2023. (<https://www.bis.doc.gov/index.php/documents/regulations-docs/2326-supplement-no-4-to-part-744-entity-list-4/file>); Kirsty Needham, “Special Report: COVID opens new doors for China's gene giant,” *Reuters*, August 5, 2020. (<https://www.reuters.com/article/world/special-report-covid-opens-new-doors-for-chinas-gene-giant-idUSKCN2511CD>); Alexandra Alper and David Shepardson, “US adds units of China's BGI, Inspur to trade blacklist,” *Reuters*, March 16, 2023. (<https://www.reuters.com/markets/us/us-adds-chinese-genetics-company-units-trade-blacklist-2023-03-02>)

⁹⁵. Yvonne Lau, “China's extensive use of genetic information sounds a warning,” *Australian Strategic Policy Institute*, September 30, 2022. (<https://www.aspi.org.au/chinas-extensive-use-of-genetic-information-sounds-a-warning>)

⁹⁶. Li Haitao [李海涛], “TGF-β与IL-1β基因多态性与新疆地区汉族、维族人群OA的相关性研究 [Correlation between TGF-β and IL-1β gene polymorphisms and OA in Han and Uyghur populations in Xinjiang],” *China National Knowledge Infrastructure (CNKI)*, accessed November 4, 2024. (<https://archive.ph/J9IkA>); Bethany Allen-Ebrahimian and Zach Dorfman, “Chinese coronavirus test maker agreed to build a Xinjiang gene bank,” *Axios*, June 3, 2020. (<https://www.axios.com/2020/06/03/chinese-coronavirus-test-maker-agreed-to-build-a-xinjiang-gene-bank>)

⁹⁷. Emile Dirks and Dr. James Leibold, “Genomic surveillance,” *Australian Strategic Policy Institute*, June 17, 2020. (<https://www.aspi.org.au/report/genomic-surveillance>); Alex Joske, “Secret police: The Ministry of Public Security's clandestine foreign operations,” *Sinopsis*, January 25, 2022. (<https://sinopsis.cz/wp-content/uploads/2022/01/mps0.pdf>); “深圳华大法医科技有限公司 [Shenzhen BGI Forensic Science and Technology Co.],” *Baidu*, accessed November 4, 2024. (<https://archive.ph/3xQLC>).

⁹⁸. Huanjia Zhang, “MGITech Heads Full Steam Into US Market Despite Data Security Accusations, Image Problems,” *GenomeWeb*, December 19, 2022. (<https://www.genomeweb.com/sequencing/mgi-tech-heads-full-steam-us-market-despite-data-security-accusations-image-problems>)

Though established just eight years ago, MGI has quickly transcended its startup status and is now valued at over \$16 billion.⁹⁹ BGI's founder, Wang Jian, retains a 47 percent stake in MGI, ensuring BGI's continued influence over its strategic direction.¹⁰⁰ Like BGI, MGI's rapid rise has been accelerated by substantial capital infusions and policy support from the Chinese government — a connection that MGI did not even attempt to obscure, at least initially.

For example, MGI's investment disclosures reference the Chinese government's policies to “promote scientific research innovation,” including the provision of subsidies and tax exemptions to China's biotechnology industry.¹⁰¹ The company touts these policies as proof that investing in MGI is a safe investment that has the government's backing.

MGI's investors include several CCP-affiliated funds, such as CITIC GoldStone Fund Management Co. Ltd., Shanghai Orient Securities Capital Investment Co. Ltd., and the National Social Security Fund.¹⁰² These funds have channeled capital into industries critical to China's military-civil fusion strategy. For example, CITIC GoldStone Fund, a subsidiary of a state-owned investment bank, maintains deep ties to China's military-industrial complex, including investments

in companies like Xian TianHe Defense Technology, which manufactures reconnaissance command-and-control systems for the Chinese military.¹⁰³

Historically, the Chinese government has leveraged state-backed funds, like the National Social Security Fund, to invest in companies developing cutting-edge technologies that have both military and civilian applications — an approach criticized by the Office of the U.S. Trade Representative (USTR) as aimed at dominating “technologies that may later become critical to key military systems.”¹⁰⁴ These and other state-controlled investments underscore Beijing's view of MGI as a strategic asset aligned with the state's goals of advancing military capabilities and technological dominance.

Moreover, the relationship between MGI and China's National GeneBank exemplifies how the Chinese government's financial largesse and market manipulation policies operate in practice. According to MGI's investment disclosures, the company is a supplier to China's GeneBank, benefitting from a lucrative, government-backed contracting process that allows MGI to bid for sales at below-market rates.¹⁰⁵ These market-distorting GeneBank contracts act as

99. “MGI Tech Co Ltd Market Cap,” *InvestingPro*, accessed November 4, 2024. (<https://ng.investing.com/pro/SHSE:688114/explorer/marketcap>)

100. Jamie Smythk and Demetri Sevastopulo, “Chinese genetics company targets US despite political tensions,” *Financial Times* (UK), April 17, 2023. (<https://www.ft.com/content/cc905012-f264-4e87-8171-8e7e243c5d51>)

101. “首次公开发行股票并在科创板上市招股意向书 [Prospectus for the initial public offering of shares and listing on the Science and Technology Innovation Board],” *MGI*, accessed November 4, 2024. (http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qsII.pdf)

102. Chai Hua, “MGI Tech secures first round of funding,” *China Daily* (China), May 9, 2019. (<http://global.chinadaily.com.cn/a/201905/09/WS5cd4280ca3104842260bacee.html>); “首次公开发行股票并在科创板上市招股意向书 [Prospectus for the initial public offering of shares and listing on the Science and Technology Innovation Board],” *MGI*, accessed November 4, 2024. (http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qsII.pdf)

103. “Portfolio,” *Goldstone Investment* [金石投资], accessed November 4, 2024. (<http://www.goldstone-investment.com/en/portfolio>)

104. White House Office of Trade and Manufacturing Policy, “How China's Economic Aggression Threatens the Technologies and Intellectual Property of the United States and the World,” June 2018. (<https://trumpwhitehouse.archives.gov/wp-content/uploads/2018/06/FINAL-China-Technology-Report-6.18.18-PDF.pdf>); Emily de La Bruyère and Nathan Picarsic, “The Weaponization of Capital: Strategic Implications of China's Private Equity/Venture Capital Playbook,” *Foundation for the Defense of Democracies*, September 15, 2022. (<https://www.fdd.org/analysis/2022/09/15/the-weaponization-of-capital-chinas-private-equity-venture-capital>)

105. “发行人向华大研究院销售的产品中部分由国家基因库招标采购并由政府拨款，发行人以较低的价格竞标销售): 首次公开发行股票并在科创板上市招股意向书 [Prospectus for the initial public offering of shares and listing on the Science and Technology Innovation Board],” *MGI*, accessed November 4, 2024. (http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qsII.pdf)

quasi-subsidies, providing MGI with guaranteed revenue from the Chinese government. Similarly, China's 2021 "Buy China" policy, formalized under Order 551 by the Chinese Ministry of Finance and the Ministry of Industry and Information Technology, mandates that Chinese institutions prioritize purchasing domestically produced high-tech equipment, such as DNA sequencers and mass

spectrometers — all key products made by MGI.¹⁰⁶ This policy puts foreign competitors at a disadvantage, enabling MGI to expand its domestic market share. MGI itself acknowledges that these policies drive "domestic substitution," the replacement of foreign products with Chinese alternatives, thereby positioning the company for eventual dominance in the global DNA sequencing industry.¹⁰⁷

Key Excerpts From MGI's Investment Disclosures (With English Translation)¹⁰⁸

1-1-54 / 55	(二) 行业政策变化风险 生命科学与生物技术行业面向科学前沿并服务于国民经济社会，我国政府已经出台了一系列产业政策促进生命科学与生物技术行业的科研创新及产业化发展。尽管在未来可预期的一段时间内，我国产业政策将继续大力扶持生命科学与生物技术行业的发展，但仍可能由于国内外政治经济形势变化、宏观经济波动、技术更迭等因素，造成产业政策的不利改变，对公司的长期稳定经营造成一定的政策风险。
1-1-61 / 62	(六) 税收优惠和政府补助政策变化的风险 报告期内，公司及部分子公司享受的税收优惠政策包括高新技术企业所得 税优惠政策、软件和集成电路企业所得优惠政策及软件产品增值税即征即退 优惠政策。报告期各期公司因上述两项政策而取得的税收优惠金额分别为 3,075.43 万元、2,869.21 万元及 5,943.78 万元。此外，报告期各期公司确认为当期损益的其他政府补助分别为 2,260.80 万元、2,631.48 万元及 4,279.79 万元。报 告期各期，公司享受上述税收优惠和政府补助的合计金额分别为 5,336.23 万元、5,500.69 万元及 10,223.57 万元。如企业所得税优惠、软件销售增值税即征即退等税收优惠或政府补助政策发生不利变化，公司的经营业绩将受到一定程度的影响。

1-1-188	主要鼓励政策 2019 年 2 月，中共中央、国务院印发《粤港澳大湾区发展规划纲要》，提出打造一批产业链条完善、辐射带动力强、具有国际竞争力的战略性新兴产业集群，增强经济发展新动能。推动新一代信息技术、生物技术、高端装备制造、新材料等发展壮大为新支柱产业，在新型显示、新一代通信技术、5G 和移动互联网、蛋白类等生物医药、高端医学诊疗设备、基因检测、现代中药、智能机器人、3D 打印、北斗卫星应用等重点领域培育一批重大产业项目
	Main incentives In February 2019, the Central Committee of the Communist Party of China and the State Council issued the "Outline of the Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area", proposing to create a group of strategic emerging industrial clusters with complete industrial chains, strong radiation and driving force, and international competitiveness to enhance new momentum for economic development. Promote the development and growth of new-generation information technology, biotechnology, high-end equipment manufacturing, and new materials into new pillar industries. In new-type displays, new-generation communication technologies, 5G and mobile Internet, proteins and other biomedicine, high-end medical diagnosis and treatment equipment, and genetic testing. Cultivate a number of major industrial projects in key areas such as modern Chinese medicine, intelligent robots, 3D printing, and Beidou satellite applications



Source: http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qsII.pdf

MGI also benefits from its deeply intertwined relationship with its former parent company, BGI. According to MGI disclosures from 2021 and 2023, MGI serves as both a vendor and supplier to BGI, procuring essential materials and equipment for its own business while simultaneously providing specialized

services and support to BGI.¹⁰⁹ Beyond generating millions of dollars annually for MGI, these contracts reinforce MGI's deep integration within BGI's supply chain, which reinforces MGI's investor appeal and, in turn, the two companies' contributions to China's national security and development goals.

¹⁰⁶. Helen Chen and Grace Wang, "Going Local: Strategic Considerations for Medtech Manufacturers in China," *L.E.K. Consulting*, April 4, 2023. (<https://www.lek.com/insights/hea/cn/ci/going-local-strategic-considerations-medtech-manufacturers-china>)

¹⁰⁷. Andrew P. Han, "Life Sciences Tools Firms, Observers Sound Alarm on Near-Term China Business Outlook," *GenomeWeb*, September 21, 2023. (<https://www.genomeweb.com/business-news/life-sciences-tools-firms-observers-sound-alarm-near-term-china-business-outlook>)

¹⁰⁸. "首次公开发行股票并在科创板上市招股意向书 [Prospectus for the initial public offering of shares and listing on the Science and Technology Innovation Board]," *MGI*, accessed November 4, 2024. (http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qsII.pdf)

¹⁰⁹. See: 2021 Investment Disclosure Page(s) 301-303, 324: "首次公开发行股票并在科创板上市招股意向书 [Prospectus for the initial public offering of shares and listing on the Science and Technology Innovation Board]," *MGI*, accessed November 4, 2024. (http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qsII.pdf); See: 2023 Investment Disclosure Page(s) 116-117: "2023 Annual Financial Report," *BGI*, April 2024. (<https://file.finance.qq.com/finance/hs/pdf/2024/04/13/1219598844.PDF>)

Excerpt From BGI 2023 Investment Disclosures¹¹⁰

关联方 Affiliated party	关联交易内容 Related transaction content	本期发生额 Amount incurred in the current period	获批的交易额度 Approved transaction amount	是否超过 交易额度 Exceeded transaction amount	上期发生额 Amount incurred in the previous period
MGI	采购物料、设备、接受服务 Purchase materials, equipment, and receive services	90,434,881.12	Part of group with 8 others 845,060,000	否	132,179,596.45
华大智造 (MGI Manufacturing)	采购物料、设备、接受服务 Purchase materials and equipment and receive services	4,583,067.39	Part of group with 8 others 845,060,000	否	19,938,091.31
MGI Americas	采购物料、设备 Purchase materials and equipment	7,287,244.48	Part of group with 8 others 845,060,000	否	N/A
华大智造 (MGI Manufacturing)	提供服务、销售设备、试剂 Provide services, sell equipment, and reagents	1,815,112.54	N/A	N/A	2,028,864.47

Note: All of these investment disclosure line items are for MGI-related entanglements. The disclosure document does not explain why some line items name MGI in English, whereas others list MGI in Chinese characters.

Amid growing U.S. government scrutiny of BGI's involvement in human rights abuses, MGI has moved to publicly downplay its connection with BGI. In 2022, after Washington placed several BGI subsidiaries on the Commerce Department's Entity List for facilitating the Uyghur genocide, MGI announced its spin-off from BGI, raising more than \$300 million for its initial public offering.¹¹¹ Soon thereafter, MGI went public and listed as a separate entity on the Shanghai Stock Exchange.

In a bid to further distance itself from BGI, MGI's chief scientific officer, Rade Drmanac, emphasized in a 2023 interview with the *Financial Times*, "BGI Genomics is a completely different company ... It's sort of independent, majority-owned by investors and employees."¹¹² These rhetorical obfuscations and

regulatory maneuvers have, in essence, enabled MGI to bypass U.S. export restrictions placed on its former parent company, BGI, creating a broad loophole that undermines U.S. technology containment efforts.

Chinese Academy of Sciences Connections

Like BGI, MGI maintains deep research links with CAS. For instance, MGI is a vendor to CAS's Xi'an Institute of Optics and Precision Mechanics, supplying CAS scientists with DNA sequencers and other critical technologies for dual-use and defense-related research and development. MGI highlighted its partnerships with CAS in investment disclosures, referring to them as "established," "stable," and "long-term cooperative" relationships.¹¹³

¹¹⁰. 2023 Investment Disclosure Page(s)116-117: "2023 Annual Financial Report," BGI, April 2024. (<https://file.finance.qq.com/finance/hs/pdf/2024/04/13/1219598844.PDF>)

¹¹¹. Huanjia Zhang, "MGI Tech Planning to go Public in \$366M Chinese IPO," *GenomeWeb*, August 29, 2022. (<https://www.genomeweb.com/sequencing/mgi-tech-planning-go-public-366m-chinese-ipo>)

¹¹². Stephanie Kirchgaessner and Leslie Hook, "Chinese genetics group defends US bid," *Financial Times* (UK), November 26, 2012. (<https://www.ft.com/content/ead7d872-3821-11e2-a97e-00144feabdc0>)

¹¹³. "关于深圳华大智造科技股份有限公司首次公开发行股票并在科创板上市申请文件审核问询函之回复报告 [Reply report on the inquiry letter regarding the review of application documents for Shenzhen Huada Intelligent Manufacturing Technology Co., Ltd.'s initial public offering of shares and listing on the Science and Technology Innovation Board]," *MGI*, accessed November 4, 2024. (http://pdf.dcfw.com/pdf/H2_AN202103201474295140_1.pdf)

MGI 2021 Investment Disclosure Excerpt (With English Translation)

Xian Institute of Optics and Precision Mechanics, Chinese Academy of Sciences		
Page 8-1-18		
技术研发及自主创新方面的主要工作 Main work in technology research and development and independent innovation	对应的专利、专利申请、软著情况 “Corresponding patents, patent applications, software development”	对应的核心技术情况 “Corresponding core technology”
发行人自主研发和优化机械流体系统，致力于不同场景的大、中、小型仪器。 发行人与中国科学院长春光学精密机械与物理研究所合作研发，优化测序仪光电系统的分辨率和稳定性。 “The issuer independently develops and optimizes the mechanical fluid system and is committed to large, medium, and small instruments in different scenarios. The issuer cooperates with the Changchun Institute of Optics, Fine Mechanics, and Physics, Chinese Academy of Sciences to develop and optimize the resolution and stability of the photoelectric system of the sequencer.”	专利申请76件，其中已获授权 34件；软件著作权 11件 “76 patent applications, 34 of which have been authorized; 11 software copyrights”	测序仪光机电系统技术 “Sequencer opto-mechanical system technology”
Page 8-1-184		
此外，公司已与多个国内知名的基因测序行业的非关联方客户如北京泛生子基因科技有限公司、安诺优达基因科技（北京）有限公司、广州嘉检医学检测有限公司等行业客户及武汉大学、浙江大学、上海交通大学、中国科学院等科研院所建立了稳定长期的合作关系。	“In addition, the company has also cooperated with many well-known non-related party customers in the gene sequencing industry in China, such as Beijing Genetron Gene Technology Co., Ltd., Annoroad Gene Technology (Beijing) Co., Ltd., and Guangzhou Jiajian Medical Testing Co., Ltd., etc. Customers have established stable and long-term cooperative relations with Wuhan University, Zhejiang University, Shanghai Jiaotong University, Chinese Academy of Sciences, and other scientific research institutes.”	

Source: http://pdf.dfcfw.com/pdf/H2_AN202103201474295140_1.pdf

According to an MGI press release, these partnerships have enabled CAS to leverage MGI technology, specifically MGI’s DNBelab C4 and DNBSAQ sequencing technologies, to make “major breakthroughs” in human stem cell research. Human stem cell research, while typically focused on therapeutic and regenerative medical advances, also holds significant military potential due to its capacity to enhance human resilience, tissue regeneration, and recovery from extreme conditions, such as radiation or

combat trauma. These capabilities could be harnessed to develop stronger, more resilient soldiers, aligning with military goals to improve performance in harsh environments, including battlefield scenarios.¹¹⁴ Complementing this partnership, CAS scientists are separately working on sensitive, military-related stem cell research aimed at increasing human cells’ resistance to radiation, which CAS researchers posit could “lead to super-tough soldiers who could survive nuclear fallout.”¹¹⁵

114. “赋能科研 | 基于DNBelab C4和DNBSAQ测序技术，中科院、华大研究院等在单细胞领域重大突破在Nature发表 [Empowering Research | Based on DNBelab C4 and DNBSAQ sequencing technologies, CAS, BGI Research Institute and others published major breakthroughs in single-cell field in Nature],” MGI, March 22, 2022. (<https://www.mgi-tech.com/News/caseinfo/id/41>)

115. Stephen Chen, “Chinese team behind extreme animal gene experiment says it may lead to super soldiers who survive nuclear fallout,” *South China Morning Post* (China), March 29, 2023. (<https://www.scmp.com/news/china/science/article/3215286/chinese-team-behind-extreme-animal-gene-experiment-says-it-may-lead-super-soldiers-who-survive>)

CAS has also purchased other specialized MGI products, like the DNBSEQ-G99 sequencer and the MGIEasy Stool Microbiome DNA Extraction Kit, to enhance its ability to conduct precise, high-throughput genomic research.¹¹⁶ These devices enable large-scale genetic research, facilitating faster discoveries that could accelerate CAS's advancements in civilian and military biotechnology.

MGI has also conducted specialized training sessions for CAS scientists on DNA nanoball sequencing technology, which can sequence millions of DNA fragments in parallel to enable rapid, cost-effective analysis of large genetic datasets. Like MGI's DNBSEQ-G99 sequencer, the precision and efficiency of MGI's nanoball technology make it suitable for military applications, including large-scale data analysis or bio-surveillance, underscoring its potential role in dual-use research. Additionally, MGI has formalized its research collaboration with CAS through memoranda of understanding that outline joint research in areas such as immunology and infectious disease, both of which have significant implications for PLA-led biosecurity-related initiatives.¹¹⁷

Military-Civil Fusion University Partnerships

Beyond its partnerships with CAS and BGI, MGI also maintains research collaborations with several Chinese universities that are integral to China's military-civil fusion strategy.¹¹⁸ These ostensibly civilian universities are heavily influenced by the CCP, which directs academic research and technological innovation toward military objectives through targeted funding, strategic partnerships, and direct oversight. According to MGI's investment disclosures, these partner universities include:

- **Wuhan University** (武汉大学, or WHU): WHU maintains close ties to China's military, describing itself as "a university with a strong reputation in the defense science and technology field."¹¹⁹ WHU hosts four PLA defense laboratories, including the People's Liberation Army Cryptography Administration Bureau Cryptography Research Collaborative Innovation Centre (解放军密码管理局密码研究协同创新中心), and other Chinese government-funded and directed entities suspected of carrying out cyberattacks for China's military.¹²⁰

116. "用户测评 | 华大智造G99助力中国科学院水生所探索武汉东湖鱼类多样性监测最佳遗传标记 [User Review: MGI G99 helps the Institute of Hydrobiology, Chinese Academy of Sciences explore the best genetic markers for fish diversity monitoring in East Lake, Wuhan]," *MGI*, March 7, 2024. (<https://www.mgi-tech.com/news/caseinfo/190>); "声音 | '只想用受益匪浅这四个字来形容 [Voice | 'I would just like to describe it in four words: 'benefit']," *MGI*, July 8, 2019. (<https://www.mgi-tech.com/News/info/id/36>)

117. "HOSPITALAR 2019: 华大智造拉美亮相! [HOSPITALAR 2019: MGI's debut in Latin America!]," *MGI*, June 5, 2019. (<https://www.mgi-tech.com/News/info/id/62>)

118. "关于深圳华大智造科技股份有限公司首次公开发行股票并在科创板上市申请文件审核问询函之回复报告 [Reply report on the inquiry letter regarding the review of application documents for Shenzhen Huada Intelligent Manufacturing Technology Co., Ltd.'s initial public offering of shares and listing on the Science and Technology Innovation Board]," *MGI*, accessed November 4, 2024. (http://pdf.dcfw.com/pdf/H2_AN202103201474295140_1.pdf)

119. "科学技术发展'十二五'规划 [The 12th Five-Year Plan for Science and Technology Development]," *Wuhan University*, July 2011. (https://web.archive.org/web/20190814014525/http://innogst.whu.edu.cn/2011plan/JDiy_data/editor/attachment/2014-12/931418018998787.pdf)

120. "Wuhan University," *Australian Strategic Policy Institute*, November 18, 2019. (<https://unitracker.aspi.org.au/universities/wuhan-university>)

- **Zhejiang University** (浙江大学, or ZU): ZU hosts three PLA defense laboratories specializing in computer simulations, high-performance computing, and control science.¹²¹ ZU is also engaged in defense-related cybersecurity research, with funding support from the Ministry of State Security (MSS), China's primary civilian intelligence agency.¹²²
- **Shanghai Jiao Tong University** (上海交通大学, or SJTU): SJTU maintains at least three PLA defense laboratories focusing on materials science, naval architecture, and hydrodynamics.¹²³ SJTU's School of Information Security Engineering is notable for its connections to the PLA, with key faculty members, including the dean, having served in the PLA. SJTU is also associated with PLA Unit 61398, a notorious cyber-espionage unit implicated in numerous cyberattacks against the United States. Furthermore, SJTU contributes to the PLA Navy's development of offshore defense operations, showcasing its integral role in maritime research.

All three universities are also active participants in the China Human Proteome Organization (CNHUP), established in 2002 by CAS and the PLA's (U.S.-sanctioned) AMMS to strengthen China's genomic and proteome-related research.¹²⁴ A proteome is the set of proteins expressed by a genome, and advances in proteomics offer insight into human physiological functions, which could be harnessed for military

applications, such as developing precision-targeted biological agents or ultramicro-scale destructive weapons. He Fuchu, the former head of the PLA's Academy of Military Sciences who wrote about the importance of the PLA developing "brain weapons," serves as CNHUP's honorary chairman.

CNHUP's mission includes efforts to assist Chinese "government departments in formulating development plans for human proteomics" research in China as well as to "organize and participate in international human proteomics research programs."¹²⁵ CNHUP's members include researchers from BGI, CAS, and the PLA as well as representatives from other military-civil-fusion focused universities, such as Peking University, Sichuan University, Shanghai Jiao Tong University, and Fudan University.¹²⁶ CNHUP's members also include representatives from Nanjing University of Science and Technology — one of China's "Seven Sons of National Defense," a group of seven universities conducting research on the PLA's behalf that are subject to U.S. Department of Commerce export restrictions.¹²⁷

Harbin Institute of Technology (哈尔滨工业大学) and other PLA-related Research Initiatives

MGI also maintains a "major sales contract" with the Institute of Bioinformatics at the Harbin Institute of Technology (HIT). HIT is another one of the

121. "Zhejiang University," *Australian Strategic Policy Institute*, November 18, 2019. (<https://unitracker.aspi.org.au/universities/zhejiang-university>)

122. Bryan Krekel, Patton Adams, and George Bakos, "Occupying the Information High Ground: Chinese Capabilities for Computer Network Operations and Cyber Espionage," *Northrop Grumman Corp*, March 7, 2012. (<https://info.publicintelligence.net/USCC-ChinaCyberEspionage.pdf>)

123. "Shanghai Jiao Tong University," *Australian Strategic Policy Institute*, November 18, 2019. (<https://unitracker.aspi.org.au/universities/shanghai-jiaotong-university>)

124. "CNHUP," *Chinese Human Proteome Organization*, accessed November 4, 2024. (<http://cnhupo.org.cn>); "Members," *Chinese Human Proteome Organization*, accessed November 4, 2024. (<http://cnhupo.org.cn/members>)

125. "Purposes," *Chinese Human Proteome Organization*, accessed November 4, 2024. (<http://cnhupo.org.cn/about/purposes>)

126. "Peking University," *Australian Strategic Policy Institute*, November 20, 2019. (<https://unitracker.aspi.org.au/universities/peking-university>); "Fudan University," *Australian Strategic Policy Institute*, May 13, 2021. (<https://unitracker.aspi.org.au/universities/fudan-university>); "Sichuan University," *Australian Strategic Policy Institute*, November 19, 2019. (<https://unitracker.aspi.org.au/universities/sichuan-university>); "Shanghai Jiao Tong University," *Australian Strategic Policy Institute*, November 18, 2019. (<https://unitracker.aspi.org.au/universities/shanghai-jiaotong-university>)

127. "Members," *Chinese Human Proteome Organization*, November 4, 2024. (<http://cnhupo.org.cn/members>)

Seven Sons of National Defense.¹²⁸ HIT's areas of focus include biomedical engineering, nuclear technology, combustion, power engineering, and electronic propulsion — all critical to China's military modernization. HIT also operates a specialized

Military-Civil Fusion Research Institute in Beijing (哈尔滨工业大学军民融合研究院).¹²⁹ The U.S. Department of Commerce added HIT to its Entity List in 2020, citing its efforts to acquire U.S. technology for the PLA's missile program.¹³⁰

Excerpt From 2022 MGI Investment Disclosure

School	AKAs or other Affiliates			
Harbin Institute of Technology	Institute of Bio information, Harbin Institute of Technology			
“正在履行的重大销售合同 截至 2021 年 12 月 131 日，发行人与客户已签署 且正在履行的重大销售合同” “Major sales contracts under review. As of December 31, 2021, major sales contracts signed and being performed by the issuer and customers.”				
销售方 /Seller	客户 / Name	合同金额 / Contract Amount in Millions	合同内容/What is Contract	签署时间 / Time of Signing
发行人 Issuer	哈尔滨 工业大学,生物信息基数研究院 “Institute of Bio information. Harbin Institue of Technology”	3.760.65 57 37.6065 million yuan	试剂 . 仪器销售 Sales of reagents and instruments	2021.2

Source: http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-08-23/688114_20220823_2_0XT0qslL.pdf

128. Ryan Fedasiuk and Emily Weinstein, “Universities and the Chinese Defense Technology Workforce,” *Center for Security and Emerging Technology*, December 2020. (<https://cset.georgetown.edu/wp-content/uploads/CSET-Universities-and-the-Chinese-Defense-Technology-Workforce.pdf>); “Harbin Institute of Technology,” *Australian Strategic Policy Institute*, May 4, 2021. (<https://unitracker.aspi.org.au/universities/harbin-institute-of-technology>)

129. “哈尔滨工业大学军民融合研究院 (北京) 专职科研岗位公开招聘公告 [Harbin Institute of Technology Military-Civilian Integration Research Institute (Beijing) full-time scientific research positions open recruitment announcement],” *Harbin Institute of Technology*, January 11, 2018. (<https://web.archive.org/web/20180622121930/http://today.hit.edu.cn/news/2018/01-11/8650058010RL0.htm>)

130. U.S. Department of Commerce, Press Release, “Commerce Department to Add Two Dozen Chinese Companies with Ties to WMD and Military Activities to the Entity List,” May 22, 2020. (<https://2017-2021.commerce.gov/news/press-releases/2020/05/commerce-department-add-two-dozen-chinese-companies-ties-wmd-and.html>)

The full scope of HIT's biotechnology research is unclear. However, HIT researchers have used MGI's MGISEQ-T7 gene sequencers for government-sponsored genomic projects, including the HIT-led '100,000 Genomes Project.'¹³¹ Launched in 2017, this project aimed to sequence the genomes of 100,000 Chinese nationals, some potentially without their knowledge or consent. Participants were chosen by Chinese authorities, according to Wang Yadong, chief director of the project.¹³² In 2018, then MGI President Duncan Yu emphasized how the T7 sequencer provided a "huge boost to national genome projects," specifically citing the 100,000 Genomes Project.¹³³

The risks posed by MGI's partnership with HIT, and by extension the PLA and Ministry of Public Security, are hardly theoretical. HIT teams have published research regarding the institute's contributions to mass, provincial-level police-run DNA databases in Tibet as well as provincial-level anti-trafficking DNA databases and male ancestry investigation systems.¹³⁴ These studies have targeted men, women, children, and religious minorities for DNA collection outside

of any ongoing criminal investigation.¹³⁵ Such programs serve as an integral part of the party-state's repression of the Tibetan people, according to the U.S. Department of State, including enabling genomic surveillance to facilitate human rights abuses.¹³⁶

“Such programs serve as an integral part of the party-state's repression of the Tibetan people, according to the U.S. Department of State, including enabling genomic surveillance to facilitate human rights abuses”

More broadly, according to an unclassified bulletin from the U.S. National Counterintelligence and Security Center, “The PRC [China] has a documented history of exploiting DNA for genetic surveillance and societal control,” including the collection, via Chinese national-level programs, to obtain DNA samples, fingerprints, iris scans, and blood types from Chinese citizens.¹³⁷ This information is then incorporated into centralized and searchable databases used by Chinese authorities.

131. “MGI Introduces Groundbreaking Ultra-High-Throughput Sequencer, MGISEQ-T7, the Most Powerful Sequencer to Date,” *MGI*, October 25, 2018. (<https://en.mgi-tech.com/news/51>)

132. Sun Ye, “China Genome Project: China looking to uncover its genetic secrets in four years,” *CGTN*, December 30, 2017. (<https://news.cgtn.com/news/3d416a4d31634464776c6d636a4e6e62684a4856/share.html>); “China launches world's largest genome-wide project,” *People's Daily Online* (China), January 5, 2018. (<http://en.people.cn/n3/2018/0105/c90000-9312270.html>); Sui-Lee Wee and Paul Mozur, “China Uses DNA to Map Faces, With Help From the West,” *The New York Times*, December 3, 2019. (<https://www.nytimes.com/2019/12/03/business/china-dna-uighurs-xinjiang.html>); “新疆将启动实施全疆人口登记精准核实工作，以南疆地区为重点,” *The Paper* (China), February 22, 2017. (https://www.thepaper.cn/newsDetail_forward_1624092). (According to state media reports, the Xinjiang government authorized the Population Registration Program in February 2017 and specified that it would be carried out “in stages.”)

133. “MGI Introduces Groundbreaking Ultra-High-Throughput Sequencer, MGISEQ-T7, the Most Powerful Sequencer to Date,” *MGI*, October 25, 2018. (<https://en.mgi-tech.com/news/51>)

134. Emile Dirks, “Mass DNA Collection in the Tibet Autonomous Region from 2016–2022,” *The Citizen Lab*, September 13, 2022. (<https://citizenlab.ca/2022/09/mass-dna-collection-in-the-tibet-autonomous-region>)

135. See: San Fugui, “Efficiency Evaluation and Strategy Research of National DNA Database Construction,” (国家DNA数据库建设的效能评估及策略研究), *Harbin Institute of Technology*, December 2, 2021. (<https://d.wanfangdata.com.cn/thesis/D02402600>); Emile Dirks, “Mass DNA Collection in the Tibet Autonomous Region from 2016–2022,” *The Citizen Lab*, September 13, 2022. (<https://citizenlab.ca/2022/09/mass-dna-collection-in-the-tibet-autonomous-region>)

136. Tsewang Ngodup and Tashi Wangchuk, “Blinken remarks on mass DNA collection in Tibet, Xinjiang spark backlash from China,” *Radio Free Asia*, May 11, 2023. (<https://www.rfa.org/english/news/tibet/dna-collection-05112023155723.html>)

137. “China's Collection of Genomic and Other Healthcare Data From America: Risks to Privacy and U.S. Economic and National Security,” *The National Counterintelligence and Security Center*, February 2021. (https://www.dni.gov/files/NCSC/documents/SafeguardingOurFuture/NCSC_China_Genomics_Fact_Sheet_2021revision20210203.pdf)

Beyond Tibet, Western non-governmental organizations, including Human Rights Watch, have documented how Chinese security services have leveraged national genome programs similar to the 100,000 Genomes Project to enable state surveillance against the Uyghurs and other ethnic minorities. In China's Xinjiang province, for example, DNA from Uyghurs has been forcibly collected under the guise of public health initiatives and benign-sounding research programs, only to be used for oppressive surveillance measures.¹³⁸

Other PLA-affiliated research initiatives and institutes also utilize MGI sequencers for military-related research, according to PLA-published research papers. For example, PLA officials at the PLA's General Hospital — one of China's leading military medical institutions — use MGI's MGISEQ-2000 sequencer technology to conduct cancer and tumor-related research.¹³⁹ While such research may sound benign, like other dual-use research, it has direct warfighting implications. More specifically, by predicting, preventing, and treating these types of medical ailments, more warfighters can stay on the battlefield, and more support personnel can continue maintaining combat power and increasing battle success rates during conflict.

For example, in the context of potential nuclear warfare or operations involving radiation exposure, understanding and mitigating the effects of cancer and tumor growth could be critical for maintaining



PLA officials being briefed on MGI's MGIUS-R3 portable ultrasound diagnosis system, 2019. Source: https://www.sohu.com/a/303911665_623347

the health and operational readiness of military personnel. Moreover, cancer and tumor research could also be relevant in the context of biological warfare. If adversaries were to deploy biological agents designed to induce cancer or other long-term health effects, the PLA could leverage research like this to develop countermeasures or treatments.¹⁴⁰ Such possibilities place MGI at the heart of China's military-medical complex, reinforcing its role in advancing the PLA's capabilities in both conventional and unconventional warfare.

A cursory review of known published genomic and biomedical research reveals dozens of instances in which PLA researchers and, in some cases, HIT researchers have used MGI equipment for genetic research projects involving topics like bloodstream pathogens, stem cells, and pneumonia. A small sample includes the following papers between 2020 and 2024:

- 138.** Sun Fugui [孙富贵], “国家DNA数据库建设的效能评估及策略研究: Efficiency Evaluation and Strategy Research of National DNA Database Construction,” *China National Knowledge Infrastructure (CNKI)*, 2022. (<http://cnki.kmlib.yn.cn/kcms/detail/detail.aspx?filename=1021898647.nh&dbcode=CMFD&dbname=CMFD2022>); Emile Dirks, “Mass DNA Collection in the Tibet Autonomous Region from 2016–2022,” *The Citizen Lab*, September 13, 2022. (<https://citizenlab.ca/2022/09/mass-dna-collection-in-the-tibet-autonomous-region/>); “China: Minority Region Collects DNA from Millions: Private Information Gathered by Police, Under Guise of Public Health Program,” *Human Rights Watch*, December 13, 2017. (<https://www.hrw.org/news/2017/12/13/china-minority-region-collects-dna-millions>)
- 139.** “Nature子刊 | 华大智造DNBSEQ测序平台助力超万例中国泛癌种患者ctDNA检测研究 [Nature Sub-Publication | DNBSEQ Sequencing Platform Enables ctDNA Detection of More Than 10,000 Chinese Patients with Pan-Cancerous Diseases],” *Timedoo (肽度)*, January 4, 2021. (<https://www.timedoo.com/23229.html>); “Genetic Sequencer MGISEQ-2000,” *MGI Tech Co., Ltd.*, accessed January 7, 2025. (<https://en.mgitech.cn/Uploads/Temp/file/20200115/5e1e68f7779a5.pdf>)
- 140.** Nanak S Dhillon, Nayeon Jeon, Umut A Gurkan, Anirban Sen Gupta, Robert A Bonomo, Lawrence F Drummy, Mei Zhang, and Mark R Chance, “Military Medicine and Medical Research as a Source of Inspiration and Innovation to Solve National Security and Health Challenges in the 21st Century,” *National Library of Medicine*, September 8, 2023. (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10550252/>)

Year	Entity(s) Cited	Research Area	MGI Technology Used	Link
2020	Ethics Committee of Chinese People's Liberation Army General Hospital	Gene fusion in leukemia patients	MGEasy universal DNA library kit; MGISEQ-2000	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7536166
2020	Ethics Committee of Chinese People's Liberation Army General Hospital	Gene fusion in leukemia patients	MGEasy universal DNA library kit; MGISEQ-2000	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7536166
2021	Urology Department of the Chinese PLA General Hospital; Ethics Committee of Chinese PLA Hospital	Fibrinogen-like Protein in clear cell renal cell carcinoma	MGISEQ-2000	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8695555
2022	Ethics Committee First Medical Center of the PLA General Hospital; Funding by Artificial Intelligence Research and Development Project of the Chinese PLA General Hospital	Genotype and phenotype of IQSEC2 mutations	NanoPrep DNA Library Preparation Module; BGI MGISEQ 2000 sequencer	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9577604
2023	Ethics Committee of Fifth Medical Center of PLA General Hospital	Clinical and genomic characteristics of HmKp (emerging and highly pathogenic global health threat)	MGISEQ-2000	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9846069
2023	Ethics Committee of Chinese PLA General Hospital; CAS funded	Increasing gene sequencing output	MGISeq-T7	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10078054
2023	First Medical Center of the Chinese PLA General Hospital; Funding by Ministry of Science and Technology of the 13th Five-Year Plan of China	Cancer research	MGISEQ platform	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10024111
2023	Department of Epidemiology and Biostatistics, The Sixth Medical Center of People's Liberation Army; Biosecurity Department, Chinese People's Liberation Army	Pathogens infection in bloodstream	MGEasy Cell-free DNA Library Prep Kit; MGISEQ-2000	https://www.frontiersin.org/journals/cellular-and-infection-microbiology/articles/10.3389/fcimb.2023.1144625/full
2023	First Medical Center of the Chinese PLA General Hospital	Cancer treatment	MGISEQ platform	https://www.thelancet.com/journals/ebiom/article/PIIS2352-3964(23)00080-4/fulltext
2024	Ethical Committee of the Chinese PLA General Hospital	Epilepsy correlation with molecular regions	NanoPrep DNA Library Preparation Module; BGI MGISEQ 2000 sequencer	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11109505
2024	Biochemistry Department and the Endocrine Laboratory of the Chinese PLA General Hospital; Ethics Committee of the Chinese PLA General Hospital	Genetic connection to insulin resistance and diabetes	MGISEQ-2000	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10850558
2024	Ethics Committee of the General Hospital of the People's Liberation Army; PLA General Hospital	Lung cancer	NadPrep Plasma Cell-Free DNA Dual-Ended Molecular Tag Library Construction Kit; MGISEQ platform; MGISEQ-T7; NadPrep DNA Library Preparation Module for MGI	https://www.medrxiv.org/content/10.1101/2024.07.11.24310105v1.full

Finally, PLA officials hope to leverage MGI's specialized technology to enhance their strategic warfighting capabilities. For instance, at the 6th Great Wall International Military Medicine Forum in March 2019, Lu Fachin, a PLA General Hospital official overseeing the Ultrasound Department, showcased MGI's MGIUS-R3 portable ultrasound diagnosis system.¹⁴¹ The demonstration, attended by PLA personnel, underscored the military context. Lu emphasized that the system's portability allows for ultrasound diagnoses on "ocean-going warships and even on battlefields," signaling the PLA's intent to integrate MGI's technology into its operational warfighting capabilities.

Policy Recommendations

China's state-driven biotechnology ambitions and the expanding influence of behemoths like BGI and MGI pose a direct threat to U.S. economic and national security. These entities are deeply entwined with the PLA's efforts to revolutionize warfare through biotechnology while also positioning China as a dominant global biotech player. Unchecked, they could grant the CCP unprecedented leverage over U.S. markets, critical sectors, and even individual citizens through control of genomic data, access to dual-use technologies, and potential dependency on Chinese biotech supplies.

To counter these threats, the United States must integrate biotechnology into its broader defense and emerging technology strategies, recognizing the critical intersection of biosecurity, artificial intelligence, and advanced computing. Biosecurity should become a strategic priority comparable to semiconductors, artificial intelligence, and quantum super-computing technologies.

In parallel, the United States urgently needs a comprehensive strategy to safeguard against China's exploitation of biotechnology for strategic gain. This includes restricting BGI's and MGI's access to U.S.

markets and technology, securing sensitive data, and reducing reliance on Chinese biotech firms. By curtailing their involvement in critical U.S. sectors and limiting their access to advanced research, the United States can safeguard its own biotech capabilities and reduce its vulnerabilities. This will require specific actions in seven broad areas:

1. Enhance Executive Branch Coordination and Oversight

- Establish a dedicated Office for Biotechnology and Emerging Technologies within the National Security Council (NSC) to coordinate U.S. government efforts on the national security implications of biotechnology advancements, ensuring a unified approach to countering threats from companies like BGI and MGI, which are heavily intertwined with foreign government interests and activities.
- Direct the U.S. Department of Defense to integrate biotechnology threats into its National Defense Strategy and Defense Planning Guidance, emphasizing the strategic risk posed by dual-use technologies in conflict scenarios.
- Increase staffing at key agencies, including the National Security Council, the U.S. Department of Health and Human Services (HHS), and the U.S. Department of Commerce, to focus on the security implications of biotechnology and to monitor foreign influence in the U.S. biotech sector.
- Increase funding, dedicated staffing, and resources for the U.S. intelligence community and U.S. Defense Department enterprises to focus on biotechnology issues.
- Establish a "Biotechnology Risk Assessment Office" within the U.S. Department of Commerce to monitor foreign investments and partnerships in the U.S. biotechnology sector, particularly those involving Chinese state-backed entities, and to provide guidance on potential risks.

¹⁴¹. "全球首次，跨海3000公里 | 华大智造完成北京-南海远程超声诊断系统实地演 [The world's first 3,000-kilometer sea crossing | MGI completes Beijing-South China Sea remote ultrasound diagnostic system demonstration]," *Sohu* (China), March 26, 2019. (https://www.sohu.com/a/303911665_623347)

2. Improve Public Reporting and Transparency

- Mandate the Office of the Director of National Intelligence (ODNI) and the U.S. Department of Defense (DoD) to produce annual classified and unclassified assessments on China's use of biotechnology for military modernization, including the role of private companies like BGI and MGI in collaborating with state entities.
- Require the USTR to publish an annual "Biotechnology Market Access Report" detailing Chinese state-supported efforts to dominate global biotech markets and the implications for U.S. competitiveness and security.
- Mandate that any U.S. university or research institution receiving federal grants must publicly disclose partnerships or funding arrangements with Chinese biotech firms, ensuring transparency and accountability in academic partnerships.
- Establish a dedicated Congressional Biotech and National Security Task Force to monitor and respond to threats posed by foreign state-supported entities in the U.S. biotech sector, providing regular recommendations for legislative and regulatory action.
- Require the Department of the Treasury to conduct regular reviews of U.S. investments in China's biotech sector and report any findings to the relevant congressional committees.

3. Restrict BGI's and MGI's Access to U.S. Market and Infrastructure

- Add MGI Tech to the U.S. Entity List, thereby restricting its access to certain U.S. technologies, as well as to the U.S. Department of Defense's 1260H list, which documents Chinese military companies that operate in the United States.
- Conduct a comprehensive review, under U.S. Department of Commerce Office of Information and Communications Technology and Services (OICTS) authorities, to evaluate the national security risks posed by U.S. entities utilizing BGI and MGI sequencers.
- Enact targeted export controls on U.S. semiconductor technology used in MGI's genetic

sequencers, mirroring measures taken against Huawei to limit its access to critical components.

4. Enact Federal Procurement and Reimbursement Restrictions

- Strengthen federal procurement restrictions, through measures like the BIOSECURE Act or other executive action(s), to prohibit U.S. federal agencies from purchasing BGI and MGI sequencers, ensuring no federal funds support entities linked to the CCP.
- Utilize the U.S. Department of Commerce's OICTS authorities to prohibit BGI and MGI genetic sequencers from operating in the United States, with a phased drawdown period to ensure a smooth transition in cases where BGI and MGI sequencers are currently in use.
- Introduce legislation or enact regulatory reform to limit Medicare and Medicaid reimbursements for services using BGI and MGI technology while allowing for exemptions in cases where no viable alternatives are available.
- Amend federal grant guidelines to prohibit research partnerships with BGI and MGI in sensitive biotechnology fields. Exemptions should be allowed only with strict oversight and transparency requirements.
- Require user verification before accessing U.S. government-owned and -operated databases of genetic data, prohibiting PRC entities like BGI and MGI from accessing sensitive genetic information that could be exploited for military purposes.

5. Safeguard U.S. Genetic Data and Biosecurity

- Pass data localization legislation mandating that all genetic data collected in the United States be stored and processed domestically. The law should include exemptions for international research collaborations that meet stringent security standards and incorporate transparency requirements into their data-sharing agreements.
- Limit data sharing with foreign entities of concern by directing the U.S. Department of Commerce and HHS to review existing data-sharing agreements involving U.S. genetic data

and propose targeted restrictions to prevent unauthorized access by foreign entities, with exemptions for vetted academic collaborations.

- Require the U.S. Department of Defense to establish standards for a “trusted lab” program similar to the “trusted foundry” program, whereby DoD would identify key scientific instruments and components that should be sourced from non-foreign adversary countries, ensuring proper data protection of genetic data gathered by the lab.
- Establish a Biotech Risk Assessment Office within the U.S. National Institutes of Health to assess and mitigate national security risks associated with biotechnology partnerships and research.

6. Target Financial Flows and Investments

- Consider placing BGI and MGI on the Department of the Treasury’s Non-SDN Chinese Military-Industrial Complex Company (CMIC) list to prohibit U.S. persons from purchasing equity in BGI and MGI, severing financial ties between U.S. investors and Chinese military-linked entities.
- Restrict outbound U.S. capital from investing in China’s biotechnology sector, with an initial focus on genetic sequencing technology, to prevent U.S. funds from supporting advances that China could employ to harm U.S. interests.
- Require the Committee on Foreign Investment in the United States (CFIUS) to protect personal information by blocking transactions involving foreign adversaries where the acquisition would include the transfer of U.S. persons’ genetic data. The U.S. Department of the Treasury should also update CFIUS guidelines to specifically scrutinize acquisitions or partnerships involving foreign adversaries that could result in access to U.S. persons’ genetic data.
- Direct the USTR to include biotechnology in its trade negotiations with China and apply appropriate tariffs to imports from Chinese biotech firms, thereby ensuring the protection of the U.S. biotech industry.
- Pass legislation that provides incentives for U.S. biotech companies to expand their operations and

research domestically, reducing dependency on foreign biotech firms.

7. Counter China’s Global Biotechnology Expansion

- Mandate that no funds allocated by the United States President’s Emergency Plan for AIDS Relief be given to labs that utilize BGI and MGI technology while allowing for exemptions in cases where no viable alternatives are available. Such measures would ensure U.S. global health initiatives are not indirectly supporting entities linked to China’s military-industrial complex.
- Require the State Department to launch a global campaign, similar to its campaign against Huawei, to urge governments to remove BGI and MGI from their medical infrastructure.
- Support trusted U.S. sequencer producers in the Global South by authorizing the United States Agency for International Development (USAID) to create a Trusted Biotech Initiative, providing financing and technical support to help countries in the Global South procure trusted U.S. genetic sequencing technology as an alternative to BGI and MGI equipment.
- Congress should direct the U.S. State Department to establish an International Biotechnology Security Forum. The State Department should lead the forum with participation from USAID and the National Security Council to coordinate policy responses with allies and partners to the risks posed by Chinese biotech expansion.

Conclusion

China’s biotechnology ambitions, backed by state-driven strategies and military-civil fusion, pose complex challenges for global security, economic stability, and human rights. As Beijing continues to leverage biotech advancements for strategic gains, the United States and its allies must adopt proactive policies to safeguard critical technologies and genomic data. Addressing these risks today will ensure the resilience and security of tomorrow’s bioeconomy.

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