

Genomic surveillance

Inside China's DNA dragnet

Emile Dirks and James Leibold



About the authors

Emile Dirks is a PhD candidate in political science at the University of Toronto.

Dr James Leibold is an Associate Professor and Head of the Department of Politics, Media and Philosophy at La Trobe University and a non-resident Senior Fellow at ASPI.

Acknowledgements

The authors would like to thank Danielle Cave, Derek Congram, Victor Falkenheim, Fergus Hanson, William Goodwin, Bob McArthur, Yves Moreau, Kelsey Munro, Michael Shoebriidge, Maya Wang and Sui-Lee Wee for valuable comments and suggestions with previous drafts of this report, and the ASPI team (including Tilla Hoja, Nathan Ruser and Lin Li) for research and production assistance with the report. ASPI is grateful to the Institute of War and Peace Reporting and the US State Department for supporting this research project.

What is ASPI?

The Australian Strategic Policy Institute was formed in 2001 as an independent, non-partisan think tank. Its core aim is to provide the Australian Government with fresh ideas on Australia's defence, security and strategic policy choices. ASPI is responsible for informing the public on a range of strategic issues, generating new thinking for government and harnessing strategic thinking internationally.

ASPI International Cyber Policy Centre

ASPI's International Cyber Policy Centre (ICPC) is a leading voice in global debates on cyber and emerging technologies and their impact on broader strategic policy. The ICPC informs public debate and supports sound public policy by producing original empirical research, bringing together researchers with diverse expertise, often working together in teams. To develop capability in Australia and our region, the ICPC has a capacity building team that conducts workshops, training programs and large-scale exercises both in Australia and overseas for both the public and private sectors. The ICPC enriches the national debate on cyber and strategic policy by running an international visits program that brings leading experts to Australia.

ASPI's International Cyber Policy Centre has no core funder. Rather, it is supported by a mixed funding base that includes sponsorship, research and project support from across governments, industry and civil society.

Important disclaimer

This publication is designed to provide accurate and authoritative information in relation to the subject matter covered. It is provided with the understanding that the publisher is not engaged in rendering any form of professional or other advice or services. No person should rely on the contents of this publication without first obtaining advice from a qualified professional.

ASPI

Tel +61 2 6270 5100

Email enquiries@aspi.org.au

www.aspi.org.au

www.aspistrategist.org.au

[facebook.com/ASPI.org](https://www.facebook.com/ASPI.org)

[@ASPI_ICPC](https://twitter.com/ASPI_ICPC)

© The Australian Strategic Policy Institute Limited 2020

This publication is subject to copyright. Except as permitted under the *Copyright Act 1968*, no part of it may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior written permission. Enquiries should be addressed to the publishers. Notwithstanding the above, educational institutions (including schools, independent colleges, universities and TAFEs) are granted permission to make copies of copyrighted works strictly for educational purposes without explicit permission from ASPI and free of charge.

First published June 2020.

ISSN 2209-9689 (online)

ISSN 2209-9670 (print)

Cover image: DNA molecules with binary code, 3d render: iStockphoto/ymgerman.



Genomic surveillance

Inside China's DNA dragnet

Emile Dirks and James Leibold

Policy Brief
Report No. 34/2020



Contents

What's the problem?	03
What's the solution?	03
Executive summary	04
China's national Y-STR database	07
Building comprehensive social control	11
Corporate complicity	17
Human rights violations	21
1. Lack of legal authority	21
2. Lack of informed consent	22
3. Lack of privacy	23
Recommendations	25
Appendix 1: Data sources	26
Appendix 2: How Y-STR samples are collected	27
1. Preparatory meetings	27
2. Creating family trees	27
3. Compulsory collection of blood samples	29
4. Data sharing with public security bureaus	33
Appendix 3: Estimating the scale of Y-STR sample collection	34
Appendix 4: Companies participating in national Y-STR data collection	38
Notes	42

What's the problem?

The Chinese Government is building the world's largest police-run DNA database in close cooperation with key industry partners across the globe. Yet, unlike the managers of other forensic databases, Chinese authorities are deliberately enrolling tens of millions of people who have no history of serious criminal activity. Those individuals (including preschool-age children) have no control over how their samples are collected, stored and used. Nor do they have a clear understanding of the potential implications of DNA collection for them and their extended families.

Earlier Chinese Government DNA collection campaigns focused on Tibet and Xinjiang, but, beginning in late 2017, the Ministry of Public Security expanded the dragnet across China, targeting millions of men and boys with the aim to 'comprehensively improve public security organs' ability to solve cases, and manage and control society'.¹ This program of mass DNA data collection violates Chinese domestic law and global human rights norms. And, when combined with other surveillance tools, it will increase the power of the Chinese state and further enable domestic repression in the name of stability maintenance and social control.

Numerous biotechnology companies are assisting the Chinese police in building this database and may find themselves complicit in these violations. They include multinational companies such as US-based Thermo Fisher Scientific and major Chinese companies like AGCU Scientific and Microread Genetics. All these companies have an ethical responsibility to ensure that their products and processes don't violate the fundamental human rights and civil liberties of Chinese citizens.

What's the solution?

The forensic use of DNA has the potential to solve crimes and save lives; yet it can also be misused and reinforce discriminatory law enforcement and authoritarian political control. The Chinese Government and police must end the compulsory collection of biological samples from individuals without records of serious criminal wrongdoing, destroy all samples already collected, and remove all DNA profiles not related to casework from police databases. China must enact stringent restrictions on the collection, storage, use and transfer of human genomic data.

The Chinese Government must also ensure that it adheres to the spirit of the International Covenant on Civil and Political Rights (1966), the International Declaration on Human Genetic Data (2003), the Universal Declaration on the Human Genome and Human Rights (1997) and the Convention on the Rights of the Child (1989), as well as China's own Criminal Law (2018). National and international legal experts have condemned previous efforts to enrol innocent civilians and children in forensic DNA databases, and the UN Special Rapporteur on the right to privacy should investigate the Chinese Government's current collection program for any violations of international law and norms.²

Foreign governments must strengthen export controls on biotechnology and related intellectual property and research data that's sold to or shared with the Chinese Government and its domestic public and private partners. Chinese and multinational companies should conduct due diligence and independent audits to ensure that their forensic DNA products and processes are not being used in ways that violate the human and civil rights of Chinese citizens.

Executive summary

Forensic DNA analysis has been a part of criminal investigations for more than three decades. Dozens of countries have searchable DNA databases that allow police to compare biological samples found during forensic investigations with profiles stored in those databases. China is no exception.

In 2003, China's Ministry of Public Security began building its own forensic DNA database.³ Like other such databases, it contains samples taken from criminal offenders and suspects. However, since 2013, Chinese authorities have collected DNA samples from entire ethnic minority communities and ordinary citizens outside any criminal investigations and without proper informed consent. The Chinese Government's genomic dataset likely contains more than 100 million profiles and possibly as many as 140 million, making it the world's largest DNA database, and it continues to grow (see Appendix 3).

This ASPI report provides the first comprehensive analysis of the Chinese Government's forensic DNA database and the close collaboration between Chinese and multinational companies and the Chinese police in the database's construction. It draws on more than 700 open-source documents, including government bid tenders and procurement orders, public security bureaus' Weibo and Weixin (WeChat) posts, domestic news coverage, social media posts, and corporate documents and promotional material (see Appendix 1). This report provides new evidence of how Xinjiang's well-documented biosurveillance program is being rolled out across China, further deepening the Chinese Government's control over society while violating the human and civil liberties of millions of the country's citizens.

The indiscriminate collection of biometric data in China was first reported by Human Rights Watch.⁴ Beginning in 2013, state authorities obtained biometric samples from nearly the entire population of the Tibetan Autonomous Region (3 million residents) under the guise of free annual physical exams (Figure 1).⁵ In 2016, a similar program was launched in Xinjiang, where data from nearly all of the region's 23 million residents was collected.⁶

Figure 1: Blood being collected as part of the free physical exam projects in Lhasa, Tibet Autonomous Region, May 2013, and Urumqi, Xinjiang Uyghur Autonomous Region, February 2018



Sources: 'Tibet: People's physical examination to protect the health of the people on the plateau' (西藏: 全民体检为高原百姓保健康), *Government of China Web* (中国政府网), 15 May 2013, [online](#); 'Xinjiang National Health Checkup: Cover the last mile and benefit the furthest family' (新疆全民健康体检: 覆盖最后一公里 惠及最远一家人), *Xinhuanet* (新华网), 9 February 2019, [online](#).

In those minority regions, DNA collection was only one element of an ongoing multimodal biometric surveillance regime, which also includes high-definition photos, voiceprints, fingerprints and iris scans, which are then linked to personal files in police databases. In both Xinjiang and Tibet, authorities intentionally concealed the reasons for biometric collection.⁷ When that data was combined with an extensive system of security cameras⁸ and intrusive monitoring of local families,⁹ the Chinese Government was able to extend its control over these already tightly monitored communities.

Such programs, however, were only the beginning. Starting in late 2017, Chinese police expanded mass DNA data collection to the rest of the country. Yet in contrast to the wholesale approach adopted in Tibet and Xinjiang, authorities are using a more cost-efficient but equally powerful method: the collection of DNA samples from selected male citizens. This targeted approach gathers Y-STR data—the ‘short tandem repeat’ or unique DNA sequences that occur on the male (Y) chromosome. When these samples are linked to multigenerational family trees created by the police, they have the potential to link any DNA sample from an unknown male back to a specific family and even to an individual man.

In this report, we document hundreds of police-led DNA data-collection sorties in 22 of China’s 31 administrative regions (excluding Hong Kong and Macau) and across more than a hundred municipalities between late 2017 and April 2020. Evidence suggests that, in some locations, blood collection has occurred in preschools (Figure 2) and even continued during the Covid-19 pandemic.¹⁰

Figure 2: One of more than 1,500 blood samples collected from kindergarten and elementary school students in Xiabaishi Township, Fujian Province, June 2019



Source: ‘Xiabaishi police energetically launch male ancestry inspection system development work’ (下白石派出所大力开展男性家族排查系统建设工作), *Gugang Huangqi Weixin* (古港黄崎威信), 4 June 2019, [online](#).

The scale and nature of this program are astounding. We estimate that, since late 2017, authorities across China have sought to collect DNA samples from 5–10% of the country’s male population, or roughly 35–70 million people (Figure 3, and see Appendix 3). These ordinary citizens are powerless to refuse DNA collection and have no say over how their personal genomic data is used. The mass and compulsory collection of DNA from people outside criminal investigations violates Chinese domestic law and international norms governing the collection, use and storage of human genetic data.

Figure 3: Blood collection in Garze Tibetan Autonomous Prefecture, Sichuan Province, August 2019, and Binhe Township, Zhongwei, Ningxia Hui Autonomous Region, June 2018



Sources: 'Batang police department continued to carry out information collection work of male family tree investigation system' (巴塘县公安局持续开展男性家族排查系统信息采集工作), *Batang Police WeChat* (巴塘县公安局微信), 20 August 2019, [online](#); 'Actively carry out DNA blood sample collection' (积极开展DNA血样采集工作), *Binhe National Security Web* (滨河治安安保), 13 June 2018, [online](#).

The corporate world is profiting handsomely from this new surveillance program. Leading Chinese and multinational companies are providing the Chinese police with the equipment and intellectual property needed to collect, store and analyse the Y-STR samples. Key participants include Thermo Fisher Scientific, which is a US-headquartered biomedical and bioinformatics company, and dozens of Chinese companies, including AGCU Scientific, Forensic Genomics International, Microread Genetics and Highershine (see Appendix 4). Under China's 2019 Regulations on Human Genetic Resource Management,¹¹ if these companies partner with public security bureaus to develop new forensic products, any results and patents must be shared with the police. The continued sale of DNA profiling products and processes to China's public security bureaus is inconsistent with claims that these companies have made to improve the quality of life and wellbeing of the communities they serve.

China's national Y-STR database

In 2003, China's Ministry of Public Security established a national DNA database for police forensic work.¹² Over the following decade, police collected DNA samples during criminal investigations. However, by the early 2010s, Chinese authorities began to engage in the mass collection of DNA from even wider groups. This included not only programs in Tibet and Xinjiang, which were the first to start, but also more targeted efforts elsewhere. Between 2014 and 2016, the Public Security Bureau of Henan Province collected DNA samples from 5.3 million men, or roughly 10% of the province's male population.¹³ The province's police saw the project as a massive improvement in their ability to conduct forensic investigations and extend state surveillance over even more of Henan's population.

The success of that project encouraged its expansion nationwide and, on 9 November 2017, the Ministry of Public Security held a meeting in Henan's provincial capital, Zhengzhou, calling for the construction of a nationwide Y-STR database (Figure 4).¹⁴

Figure 4: Ministry of Public Security Meeting on Promoting Nationwide Y-STR Database Construction, Zhengzhou, Henan Province, November 2017



Source: 'The Criminal Investigation Bureau of the Chinese Academy of Sciences made an experienced introduction at the on-site promotion meeting for the construction of the Y-STR DNA database' (厅刑侦局在全国Y-STR DNA数据库建设现场推进会上作经验介绍), Shaanxi Public Security Party Construction Youth League (陕西公安党建青联), 10 November 2017, [online](#).

Data collection quickly expanded across the country. Between November 2017 and April 2020, documented instances of police-led Y-STR sample collection have been found in 22 of China's 31 administrative regions (excluding Hong Kong and Macau) and in more than a hundred municipalities.¹⁵ Those are only the instances for which we have direct evidence. Given the national scope of this program, these figures are certainly an underestimate.

Unlike autosomal STR data, which is present in the DNA of both males and females, Y-STRs (the short tandem repeats on Y chromosomes) are found only in male DNA.¹⁶ Passed directly from father to son, they aren't recombined with every successive generation. There's therefore little variation in Y-STRs, apart from random mutations, and the Y-STR profile of a man will be nearly identical to that of his

patrilineal male blood relatives. This means that forensic traces drawn from Y-STR data can point only to a genetically related group of men and not to an individual man.

However, when combined with accurate genealogical records (family trees) and powerful next-generation gene sequencers,¹⁷ Y-STR analysis can be a powerful tool. Because surnames are usually inherited from fathers, men who share a common surname are likely to share a common paternal ancestor and a common Y-STR profile.¹⁸ Likewise, if the Y-STR profiles of two men match, their surnames are likely to match, too. Therefore, if a Y-STR database contains a large representative sample of DNA profiles and corresponding family records, even an unknown male's data can potentially be matched to a family name and even an individual, so long as investigators have on file the Y-STR data of that male's father, uncle or even third cousin (Figure 5).

Figure 5: Illustration of shared Y-STR profile among patrilineal male relatives (translated)



Source: "The 'hero' behind the murder case of the girl from the Southern Medical University: What is the Y-STR family investigation technique?" (南医大女生被害案背后“功臣”: Y-STR家系排查技术是什么), *Youku Video Net* (优酷影视网), 25 February 2020, [online](#). Partially translated from Chinese by ASPI.

For the Chinese Government, Y-STR analysis presents a more cost-effective and efficient method of building a national genetic panopticon. Unlike in Tibet and Xinjiang, authorities don't need to collect DNA samples from all Chinese citizens in order to dramatically increase their genomic surveillance capacity. Authorities in Henan achieved 98.71% genetic coverage of the province's total male population by collecting Y-STR samples from 10% of the province's men and developing family trees for nearly all of the province's patrilineal families.¹⁹ Following a similar program nationally, Chinese authorities could achieve genetic coverage for nearly all men and boys in China.

This is highly disturbing. In China's authoritarian one-party system, there's no division between policing crime and suppressing political dissent. A Ministry of Public Security-run national database of Y-STR samples connected to detailed family records for each sample would have a chilling impact not only on dissidents, activists and members of ethnic and religious minorities, but on their extended family members as well.

Figure 6: Meeting on Y-STR database construction, Suide County, Shaanxi Province, March 2019



Source: Lu Fei (路飞), 'The successful completion of the training and mobilisation meeting of the Suide County public security bureaus for work on building a male ancestry inspection system' (绥德县公安局男性家族排查系统建设工作动员部署及应用培训会圆满完成), *Meipian* (美篇网), 28 March 2019, online.

The Chinese state has an extensive history of using threats and violence against the families of regime targets in order to stamp out opposition to the Communist Party. Leaked documents obtained by the International Consortium of Investigative Journalists²⁰ and *The New York Times* reveal that authorities in Xinjiang collect information on family members of detainees in the region's re-education camps,²¹ and a detainee's release is conditional upon the behaviour of their family members outside the camps.²² The repression of family members extends far beyond Xinjiang. Parents²³ and children²⁴ of prominent human rights lawyers, and the siblings of overseas government critics,²⁵ are routinely detained and tortured by Chinese police.

By forcing a dissident's family to pay the price for their relative's activism, these tactics cruelly yet effectively increase the cost of resistance.²⁶ A police-run Y-STR database containing biometric samples and detailed multigenerational genealogies from all of China's patrilineal families is likely to increase state repression against the family members of dissidents and further undermine the civil and human rights of dissidents and minority communities.

Figure 7: Genealogical records collected from a single extended family, Hanjia Village, Liaoning Province, March 2018, and a meeting of police officers concerning family records in Weinan, Shaanxi Province, August 2018



Sources: 'Wolong Police Station carrying out Y-bank construction' (卧龙派出所深入开展Y库建设), *Meipian* (美篇网), 15 March 2018, online; 'To implement the spirit of the Heyang meeting, the Huazhou District Public Security Bureau went to Fuping to learn the process of the construction of a male family investigation system', (落实合阳会议精神·华州区公安局赴富平实地学习男性家族排查系统建设), Huazhou Criminal Investigation Bureau (华州刑侦), 10 August 2018, online.

We also know that Chinese researchers are increasingly interested in forensic DNA phenotyping. This computational analysis of DNA samples—also known as ‘biogeographic ancestry inferences’²⁷—allows investigators to predict the biogeographical characteristics of an unknown sample, such as hair and eye colour, skin pigmentation, geographical location, and age. Chinese scientists have been at the forefront of these controversial methods,²⁸ claiming to be able to identify whether a sample belongs to an ethnic Uyghur or a Tibetan, among other ethnic groups.²⁹ Scientists have warned about the potential for ethnic discrimination,³⁰ yet Chinese scientists are using these methods to assist the Chinese police in targeting ethnic minority populations for greater surveillance,³¹ while Chinese and foreign companies are competing to provide the Chinese police with the tools to do their work.³²

Figure 8: Blood collection in Xi’an, Shaanxi Province, April 2020, and Tongchuan, Shaanxi Province, February 2019



Sources: ‘The technical squadron of the Criminal Police Brigade of the Huyi Branch Bureau fully endeavoured to ensure the smooth progress of the construction of the Y library’ (鄠邑分局刑警大队技术中队全力保障Y库建设工作顺利进行), *Meipian* (美篇网), 2 April 2020, [online](#); ‘Chen Jiashan Police Station catches up and surpasses, and completes the Y library information collection task’ (陈家山派出所追赶超越 全面完成Y库信息采集任务), *Meipian* (美篇网), 24 February 2019, [online](#).

A national database containing the genetic information of tens of millions of ordinary Chinese citizens is a clear expansion of the already unchecked authority of the Chinese Government and its Ministry of Public Security. Chinese citizens are already subjected to extensive surveillance. Even beyond Tibet and Xinjiang, religious believers and citizen petitioners across China are added to police databases to track their movements,³³ while surveillance cameras have expanded across the country’s rural and urban areas.³⁴ The expansion of compulsory biometric data collection only increases the power of the Chinese state to undermine the human rights of its citizens.

Building comprehensive social control

A range of justifications have been provided by Chinese authorities for the mass collection of DNA samples from boys and men across China. Some of those reasons can be found in a notice released online on 1 April 2019 by the Public Security Bureau in Putian, Fujian Province:

Blood Collection Notice

In order to cooperate with the foundational investigative work of the seventh national census and the third generation digital ID cards, our district's public security organs will on the basis of earlier village ancestral genealogical charts, select a representative group of men from whom to collect blood samples.

This work will not only help carry on and enhance the genealogical culture of the Chinese people, but will also effectively prevent children and the elderly from going missing, assist in the speedy identification of missing people during various kinds of disasters, help police crack cases, and to the greatest extent retrieve that which is lost for the masses. This is a great undertaking that will benefit current and future generations, and we hope village residents will enthusiastically cooperate.³⁵



From this and other similar notices found across the Chinese internet, it can be difficult to assess the primary motive behind this program. Yet there are clear indications that it is the forensic and social control applications of the program—commonly referred to as the construction of a ‘male ancestry inspection system’—which most interest authorities. An 18 November 2019 article from *People's Daily Hubei* states:

The construction of a male ancestry investigation system is currently important work being carried out across the country by the Ministry of Public Security. Through foundational work such as illustrative mapping of male ancestral families, the extraction of biological specimens, and the collection of samples and building of databases, we will further understand and grasp the information of male individuals. In this way we will strengthen the use of male hereditary marker DNA technology, continue to increase the efficiency of the investigative screening of criminal offenders, comprehensively improve public security organs' ability to solve cases, and manage and control society, and maximise the efficiency of criminal technologies to crack cases.³⁶

At first glance, it might appear that Chinese police are engaged in the mass screening of local men as part of ongoing forensic investigations. So-called 'DNA dragnets' are rare but not unheard of: in 2012, Dutch police collected Y-STR data through cheek swabs from 6,600 male volunteers as part of an investigation into the 1999 rape and murder of a teenage girl,³⁷ while Y-STR samples were collected from 16,000 men as part of a criminal investigation into the 2011 murder of an Italian teenager.³⁸

Yet such mass screenings are highly controversial. Both the Forensic Genetics Policy Initiative³⁹ and the Irish Council for Civil Liberties⁴⁰ note that police pressure can transform the 'voluntary' submission of samples into compulsory acts, while the American Civil Liberties Union has condemned police-led DNA dragnets in the US as 'a serious intrusion on personal privacy'.⁴¹ Best practices require that DNA samples collected in such mass screenings should be connected to a specific criminal investigation, provided only by volunteers in the geographically restricted area in which the offence took place, and be destroyed following the completion of the investigation.

The Chinese Government's program of male DNA data collection violates all of those principles. In none of the hundreds of instances of police-led mass DNA collection-related work uncovered in our research is data collection described as part of an ongoing forensic investigation. Nor are any of the men or boys targeted for DNA collection identified as criminal suspects or as relatives of potential offenders. Finally, China's authoritarian political system makes refusing police requests for DNA samples impossible.

Figure 9: Blood collection in Kaifeng, Henan Province, August 2019 (cropped), and Ordos, Inner Mongolia, October 2018 (still image from video)



Sources: 'Xinghua Camp has taken several measures to complete the Y-DNA blood collection task' (杏花营所多项举措完成DNAY库采血任务), *Meipian* (美篇网), 14 August 2019, [online](#); 'Albas police station actively carries out blood collection work of Y library construction' (阿尔巴斯派出所积极开展Y库建设采血工作), *Meipian* (美篇网), 24 October 2018, [online](#).

Instead, the Chinese Government’s national Y-STR database appears to be part of larger efforts to deepen comprehensive social control and develop multimodal biometric profiles of individual citizens. Those profiles would allow state security agents to link personal information to biometric profiles, including DNA samples, retinal scans, fingerprints and vocal recordings.⁴² When completed, such a system could allow Chinese police to connect biometric data from any unknown sample to identifying personal information.

As in the earlier campaigns in Tibet and Xinjiang, DNA collection occurs in a range of places, including private homes,⁴³ schools,⁴⁴ streets,⁴⁵ shops⁴⁶ and village offices⁴⁷ (see Appendix 2 for a full description of the collection process). Unlike in those two regions, the current program seems aimed at all Chinese men and boys, irrespective of ethnicity or religious faith. Yet there’s evidence that in one case police targeted ethnic Hui Muslims at a local cultural event, in a possible extension of the anti-Muslim campaign that began in Xinjiang (Figure 10).

Figure 10: DNA sample collection in a private residence in Jinhua, Zhejiang Province, September 2018, and at a Hui ethnic minority community centre in Shiyan, Hubei Province, October 2019



Sources: ‘The Baima Police Station of the County Public Security Bureau went to the jurisdiction to carry out blood collection work’ (县公安局白马派出所到辖区开展血液采集工作), Pujiang County Public Security Bureau (浦江县公安局), 28 September 2018, [online](#); ‘The Hubeikou Police presented safety lectures to the Hui ethnic people on the spot and collected male blood samples during the holy Ramadan festival of the Hui ethnic people’ (湖北口派出所利用回族群众圣纪节日·给到场回族群众做法制安全讲座·并采集男性血样), *Hexie Hubeikou Microblog* (和谐湖北口微博), 10 October 2019, [online](#).

The scale of data collection is enormous. Tens of thousands of DNA samples have been collected in single localities. In Tunliu County in Chanzhi, Shanxi Province, local authorities recommended collecting blood samples from 36,000 men,⁴⁸ or roughly 26% of the county’s male residents; in Laoting County in Tangshan, Hebei Province, 56,068 samples were recommended for collection from the county’s 320,144 men;⁴⁹ and an invitation for bids for the construction of a Y-STR database for the Xian’an District of Xianning, Hubei Province, states that 40,000 blood samples were collected from the district’s roughly 300,000 male residents.⁵⁰ These figures alone—a mere fraction of the total size of the Chinese Government’s current DNA collection program—represent some of the largest targeted DNA dragnets in police history.

More disturbing still is the compulsory collection of DNA samples from children (Figure 11).⁵¹ Unconnected to any criminal investigation, police have collected blood samples from students at schools across China, including in Shaanxi,⁵² Sichuan,⁵³ Jiangxi,⁵⁴ Hubei,⁵⁵ Fujian,⁵⁶ and Anhui.⁵⁷ In a single township in Fujian, more than 1,500 blood samples were taken from students at local kindergartens and elementary schools.⁵⁸ In some cases, teachers have been enlisted to assist in DNA collection.⁵⁹

Figure 11: Collecting blood samples from students, Poyang County, Jiangxi Province, November 2018, and Yunxi County, Hubei Province, March 2019



Sources: 'Actively cooperate with students in collecting DNA samples' (积极配合做好学生DNA样本信息采集工作), *Dongxi Primary School Web* (东溪小学王网), 14 November 2018, [online](#); 'Safety management: Nine-year standard school in Shangjin Town actively cooperates with DNA information collection' (安全管理: 上津镇九年一贯制学校积极配合做好DNA信息采集工作), Nine-year Standard School in Shangjin Town *WeChat* account (上津镇九年一贯制学校), 22 March 2019, [online](#).

These accounts are in keeping with a 2017 *Wall Street Journal* investigation that found that police in rural Qianwei, Sichuan Province, collected DNA samples from male schoolchildren without explanation (Figure 12).⁶⁰ This is a clear violation of Article 16 of the UN's Convention on the Rights of the Child (to which China is a signatory) against the 'arbitrary or unlawful interference with [a child's] privacy'⁶¹ and an abuse of the authority police have over vulnerable adolescents.

Figure 12: Police-led DNA collection from middle and elementary school students in Shifan County, Sichuan Province, September 2019, and in Hanzhong County, Shaanxi Province, October 2019



Sources: 'Shigu Junior High School actively cooperates with the public security police to do a good job of collecting DNA samples from teenagers' (师古初中积极配合公安民警做好青少年DNA样本采集工作), *Shifang City Government Web* (什邡市人民政府), 12 September 2019, [online](#); 'This elementary school in Nanzheng District has launched the collection of student DNA samples' (南郑区这个小学·开展了学生DNA样本采集), *Eastday* (东方咨询), 12 October 2019, [online](#).

While DNA samples are taken from men and boys outside of a police investigation, data samples are stored permanently in the Ministry of Public Security's National Public Security Organ DNA Database (Figure 13).⁶²

Figure 13: National Public Security Organ DNA Database screenshot (cropped)

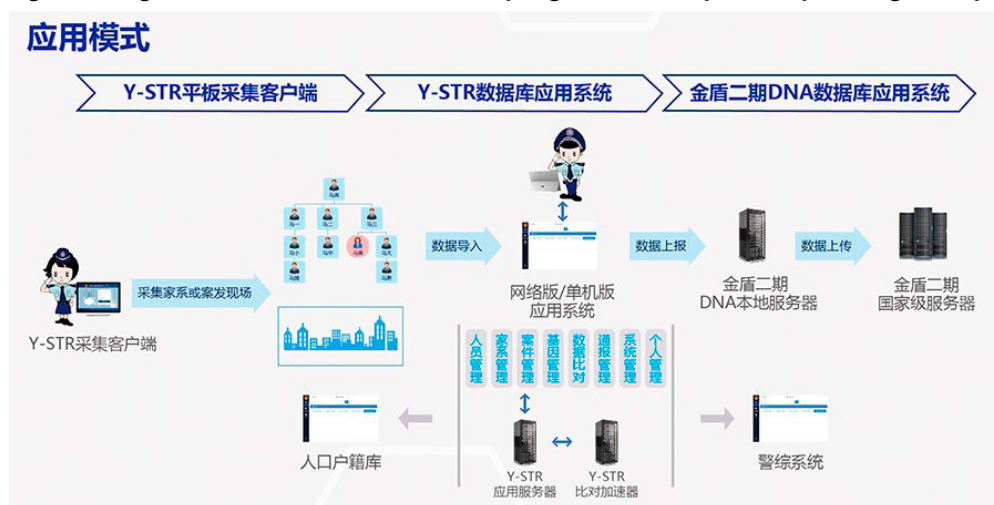


Source: 'Public Security Organ DNA Database Application System' (公安机关DNA数据库应用系统), Beijing Haixin Kejin High-Tech Co. Ltd (北京海鑫科金高科技股份有限公司), [online](#).

Like the FBI's Combined DNA Index System (CODIS) in the US,⁶³ China's national database permits DNA samples collected by police to be compared with samples stored in hundreds of local and provincial databases across the country. This database also contains additional core STR loci (locations on a chromosome) for enhanced discriminatory capacity tailored to the ethnic make-up of China's population.⁶⁴

The Chinese Government's DNA database feeds into a constantly evolving program of state surveillance under the banner of the Golden Shield Project, which is led by the Ministry of Public Security. The project seeks to make the personal information of millions of Chinese citizens, including forensic and personal data, available to local police officers nationwide.⁶⁵ According to the website of Highershine Biological Information Technology Co. Ltd, a company that builds Y-STR databases for the Ministry of Public Security, its databases allow DNA data to be compared with non-genetic data on Chinese citizens contained in the national personal residence database system and the comprehensive police database system, which are both part of China's Golden Shield Project (Figure 14).

Figure 14: Highershine's National Public Security Organ Male Family Ancestry Investigation System



Source: 'National Public Security Male Family Investigation System collects clients' (全国公安男性家族排查系统采集客户端), China Highershine (北京海华鑫安生物), [online](#).

Evidence already suggests that this new DNA database is being integrated with other forms of state surveillance and ‘stability maintenance’ social control operations.⁶⁶ Local officials in Sichuan Province have linked Y-STR data collection to the Sharp Eyes Engineering Project,⁶⁷ which is a national surveillance program aimed at expanding video monitoring across rural and remote areas.⁶⁸ The Chinese company Anke Bioengineering has also spoken of building a ‘DNA Skynet’,⁶⁹ in an apparent allusion to another national surveillance program.⁷⁰

Corporate complicity

Chinese and multinational companies are working closely with the Chinese authorities to pioneer new, more sophisticated forms of genomic surveillance. According to Ping An Securities, China's forensic DNA database market generates ¥1 billion (US\$140 million) in sales each year and is worth around ¥10 billion (US\$1.4 billion) in total.⁷¹ Competition is intense. While multinational companies currently dominate equipment sales, domestic players are making significant inroads, and biotechnology is listed as a critical sector in the Chinese Government's Made in China 2025 strategy.⁷² More than two dozen Chinese and multinational companies are known to have supplied local authorities with Y-STR equipment and software (see Appendix 4).

One of the key domestic producers of Y-STR analysis kits is AGCU Scientech Inc.,⁷³ which is a subsidiary of one of China's largest and fastest growing biotech companies, Anhui Anke Bioengineering (Group) Co. Ltd.⁷⁴ AGCU's founder and Anke's vice president is Dr Zheng Weiguo.⁷⁵ After working for Thermo Fisher affiliate Applied Biosystems and other companies in the US, he was invited by the Ministry of Public Security to help develop the Chinese Government's DNA database in 2004 and set up AGCU in the city of Wuxi under the Thousand Talents Program in 2006.⁷⁶ He now serves as an expert judge for this Chinese Government talent recruitment program and has been awarded numerous state prizes for his scientific and patriotic contributions.⁷⁷

AGCU has partnered with public security bureaus across China to apply for patents for Y-STR testing kits⁷⁸ and in 2018 entered into an exclusive distribution partnership with US biotech company Verogen to sell Illumina's next-generation DNA sequencers in China.⁷⁹ AGCU is now actively promoting Illumina next-generation solutions at domestic and international trade fairs organised by the Ministry of Public Security (Figure 15).⁸⁰

Figure 15: An AGCU engineer discusses Y-STR data systems at the Public Security Bureau of Pingxiang, Jiangxi Province, August 2018



Source: 'Pingxiang City Public Security Bureau Male Family Investigation System Construction Promotion Conference and "FamilyCraftsman" training class' (乡市公安机关男性家族排查系统建设工作推进会暨“家系工匠”培训班), *Meipian* (美篇网), 17 August 2018, [online](#).

Other players include Forensic Genomics International,⁸¹ which is a fully owned subsidiary of the Beijing Genomic Institute Group—a company with an increasingly global footprint. In August 2018, Forensic Genomics International signed a strategic partnership agreement with the Public Security Bureau of Xi’an⁸² and has worked with other public security bureaus to build Y-STR databases as part of this national program.⁸³ Another company is Microread Genetics Co. Ltd, a leading life sciences company with a joint genetic lab in Kazakhstan,⁸⁴ which has won contracts to provide public security bureaus with Y-STR testing kits⁸⁵ and database construction services.⁸⁶

Beijing Hisign Technology Co. Ltd is also providing Y-STR database solutions to the Ministry of Public Security.⁸⁷ Founded by former People’s Liberation Army member Liu Xiaochun,⁸⁸ Hisign has developed a range of big-data biometric surveillance products used to collect, store and analyse finger (palm) patterns, facial scans and forensic DNA samples (Figure 16).⁸⁹ Its Y-STR databases, which the company boasts can be ‘seamlessly connected with the DNA National Library’ and which can ‘provide intelligent family tree mapping’, are used by the public security bureaus of eight provinces, autonomous regions and directly administered cities.⁹⁰

Figure 16: Hisign’s Y-STR database genealogical mapping function



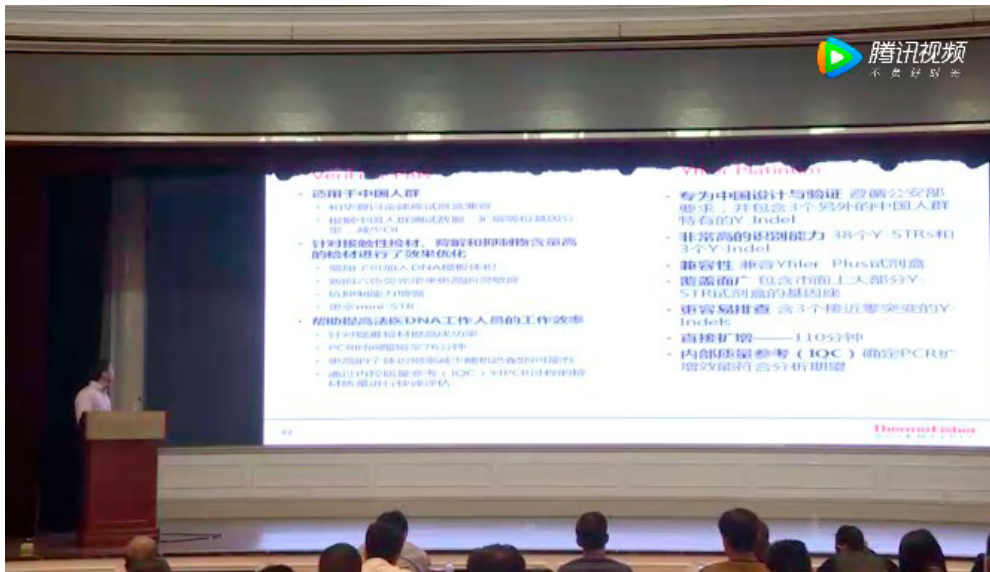
Source: 'YSTR database application system' (YSTR数据库应用系统), Hisign Technology (北京海鑫科金高科技股份有限公司网), online.

A number of leading multinational companies are also providing DNA sequencers and other forensic technologies to public security bureaus across China. They include the China subsidiaries of Thermo Fisher Scientific and Eppendorf. Of those companies, Thermo Fisher’s role is most prominent. This corporate giant has 5,000 employees in China, which contributed over 10% of the company’s US\$25 billion in revenue in 2019.⁹¹

The company’s involvement in biometric surveillance in Xinjiang is well documented.⁹² But, while it has vowed to stop selling human identification products in the region,⁹³ Thermo Fisher’s extensive involvement in the Ministry of Public Security’s national DNA database program is less well known.

One week before the launch of the national Y-STR data program, representatives from Thermo Fisher joined Chinese academics and police officials at a conference held by the Forensic Science Association of China in Chengdu, Sichuan, from 1 to 3 November 2017 (Figure 17).⁹⁴ Recorded presentations from the conference give a clear sense of how closely Thermo Fisher has worked with the Ministry of Public Security to improve police collection of Y-STR data.

Figure 17: Presentation on forensic Y-STR kits designed for the Chinese market by a representative of Thermo Fisher, Chengdu, Sichuan Province, November 2017



Source: 'Dr Zhong Chang' (钟昌博士), *Tencent Video* (腾讯视频), 8 November 2017, online.

In a talk by Dr Zhong Chang, a researcher at Thermo Fisher, two of the company's DNA kits—the VeriFiler Plus PCR amplification kit⁹⁵ and Yfiler Platinum PCR amplification kit⁹⁶—are described as having been created in direct response to the Ministry of Public Security's need for enhanced discriminatory capacity tailored to the ethnic make-up of China's population.⁹⁷ More disturbingly, Thermo Fisher's Huaxia PCR amplification kit was developed specifically to identify the genotypes of Uyghur, Tibetan and Hui ethnic minorities.⁹⁸

Such kits have been instrumental to the current national Y-STR collection program aimed at ordinary men and boys, and numerous local public security bureaus have purchased Thermo Fisher Y-STR analysis kits as part of the construction of male ancestry investigation systems⁹⁹ and Y-STR databases.¹⁰⁰

Thermo Fisher may defend these sales, as it did to Human Rights Watch in 2017, on the grounds that it's impossible 'to monitor the use or application of all products' that it makes.¹⁰¹ That may be true, but the company is clearly aware of how its products are being used, and it actively promotes its close collaboration with the Chinese police in its Chinese-language publicity material. In a profile of Gianluca Pettiti, Thermo Fisher's former head of China operations and current President of Specialty Diagnostics,¹⁰² the company boasts: 'In China, our company is providing immense technical support for the construction of the national DNA database, and has already helped to build the world's largest DNA database.'¹⁰³ Similarly, in 2018, the company's Senior Director of Product Management, Lisa Calandro, discussed the 'sinicizing' of their forensic science product line for the Chinese market.¹⁰⁴

Even if multinational companies object to the use of their genetic products as part of China's surveillance regime, new legislation puts them at risk of acting as the handmaidens of repressive practices. Under China's 2019 Regulations on Human Genetic Resource Management, any patents emerging from joint research projects must be shared between foreign-owned and Chinese entities.¹⁰⁵ That means that, if Chinese or international biomedical companies partner with the public security

bureaus, their research results and patents must be shared with the police. Furthermore, Article 16 of the Regulations grants the Chinese state sweeping powers to make use of DNA datasets created by public or private researchers for reasons of 'public health, national security and the public interest'. This means that any genetic data or processes in China may be used by Chinese authorities in ways these companies might have never intended.

Human rights violations

The Chinese Government's genomic surveillance program is out of step with international human rights norms and best practices for the handling of human genetic material.¹⁰⁶ Article 9 of the UN Universal Declaration on the Human Genome and Human Rights states that 'limitations to the principles of consent and confidentiality may only be prescribed by law, for compelling reasons within the bounds of public international law and the international law of human rights',¹⁰⁷ while Article 12 of the UN International Declaration on Human Genetic Data states that the collection of genetic data in 'civil, criminal or other legal proceedings' should be 'in accordance with domestic law consistent with the international law of human rights'.¹⁰⁸

The Chinese Government's DNA dragnet is also a clear violation of the International Covenant on Civil and Political Rights' prohibition against 'arbitrary or unlawful interference' with a person's privacy,¹⁰⁹ and Article 16 of the UN Convention on the Rights of the Child (to which China is a signatory) against the 'arbitrary or unlawful interference with [a child's] privacy'.¹¹⁰

There are three areas in particular where this program appears to violate the human rights of Chinese citizens:

1. Lack of legal authority

The compulsory collection of biological samples among non-criminal offenders is not currently authorised under Chinese law. Article 132 of the revised 2018 Criminal Procedures Law only permits the collection of fingerprints, blood and urine samples from victims or suspects in criminal proceedings.¹¹¹ Chinese authorities are aware of this issue. Chinese scholars and experts have warned about the lack of a clear legal basis for the collection of biometric samples by police outside criminal investigations,¹¹² while others have cautioned about the potential for mass social unrest if compulsory collection should occur.¹¹³

Figure 18: Blood collection in Tongchuan, Shaanxi Province, February 2019 (cropped), and Xi'an, Shaanxi Province, January 2020



Sources: 'Wangjiabian Police Station solidly carried out the security work of opening the school campus' (王家砭派出所扎实开展开学校园安保执勤工作), *Meipian* (美篇网), 20 February 2019, [online](#); 'The Zoukou Police Station combined with the "Millions of Police Entering Tens of Millions Community" activity, went deep into the jurisdiction to carry out male "Y" blood sample collection work' (零口派出所结合“百万警进千万家”活动·深入辖区开展男性“Y”系血样采集工作), *Meipian* (美篇网), 14 January 2020, [online](#).

The compulsory collection of DNA samples in China has sparked controversy in the past. The mass DNA screening of 3,600 male university students by police in 2013 following a spate of campus thefts was condemned as disproportionate and a violation of China's Criminal Law.¹¹⁴ When discussing the creation of a nationwide Y-STR database in 2018, Pei Yu of the Hubei Police Academy warned that the 'large-scale coercive collection of blood' from ordinary civilians would violate both Chinese domestic law and international norms and suggested that this would be a major legal hurdle for Chinese authorities.¹¹⁵

Police notices and social media posts make it clear that the authorities are worried about potential pushback. Posters urge public cooperation, while police are told to carry out careful propaganda work aimed at dispelling any concerns about blood collection.¹¹⁶ Yet online posts suggest that some still question the legal basis of this program.¹¹⁷

2. Lack of informed consent

Outside of a criminal investigation, the voluntary submission of genetic samples requires prior, free and informed consent.¹¹⁸ The Chinese Government's current program of compulsory Y-STR data collection isn't part of any criminal investigation. Yet there's no evidence in the sources reviewed for this report that Chinese authorities sought people's consent before collecting Y-STR samples; nor are those who have given samples likely to be aware of how this program could subject them and their families to greater state surveillance and potential harm.

Figure 19: Blood collection in Shangrao, Jiangxi Province, October 2019 (cropped), and Lantian County, Xi'an, Shaanxi Province, January 2019



Sources: 'Xianshan Primary School: District public security bureau visits the school to collect blood samples' (仙山小学:区公安局到校进行血样采集), *Meipian* (美篇网), 1 November 2019, [online](#); '(Striving for "Safety Vessel" Lantian Public Security in Action: Public Security police keeping the peace at the end of the Spring Festival' (争创“平安鼎”蓝田公安在行动: 年终岁尾春节至·公安民警守平安), *Meipian* (美篇网), 30 January 2019, [online](#).

Police provide contradictory explanations or speak in vague generalities about the purpose of the DNA collection program. A local resident, for example, expressed confusion about why men in his village were being targeted for blood collection in a 2019 social media post.¹¹⁹ Other posts express concern about being compelled to provide biometric samples. In a post made in late 2018, a netizen reported that men were being required to submit blood samples to police when applying to change their residency permits.¹²⁰ Extensive police powers (both legal and extra-legal) make it virtually impossible for someone to refuse a request for biometric data in China.¹²¹

3. Lack of privacy

Despite some assurances that personal information will be protected,¹²² police are given a wide remit to make use of genetic resources. DNA collected in Tibet and Xinjiang as part of a free ‘physicals for all’ program was used to enhance biosurveillance over those ethnic minority populations, without the knowledge of those from whom DNA samples were taken.¹²³ Legal experts and ordinary citizens have also expressed concerns about the lack of robust privacy protections when it comes to Y-STR sample collection.¹²⁴

Figure 20: Blood collection in Yantai, Shandong Province, March 2019, and Yulin, Shaanxi Province, April 2019



Sources: ‘Xiaoyang Police Station of Haiyang City: Check and fill the vacancies for the construction of the Y library’ (海阳市小纪派出所: 对Y库建设工作进行查漏补缺), *Shuimu Web* (水母网), 28 March 2019, [online](#); ‘Recent work trends of Sanchuankou Police Station of Public Security Bureau of Zizhou County’ (子洲县公安局三川口派出所近期工作动态), *Meipian* (美篇网), 7 May 2019, [online](#).

Online posts note that police blood collection outside of a criminal investigation constitutes an infringement on personal privacy.¹²⁵ In one post, a father claimed that a police officer threatened to revoke his residency permit if he didn’t provide a Y-STR sample for his child.¹²⁶ The father wrote that, when he expressed confusion about the purpose of the program, he was asked: ‘Don’t you trust the government?’

A nationwide program of male DNA collection not only represents a serious challenge to the privacy of those whose profiles are contained in the database, but also undermines the privacy of their relatives, who may be unaware that their personal information is contained in the family trees that police have created as part of this project.¹²⁷

These concerns about legality, consent and privacy are all the more evident when the Chinese Government’s program is compared with two other national DNA collection programs: the UK’s National DNA Database, which until recently stored DNA samples taken from people merely suspected (but not convicted) of recordable offences, and a 2015 law in Kuwait, which would have required all residents and visitors to Kuwait to provide DNA samples to the government. Both programs were highly controversial.

In a 2008 ruling by the European Court of Human Rights, the UK’s program was found to have ‘fail[ed] to strike a fair balance between the competing public and private interests’.¹²⁸ Likewise, the UN Human Rights Committee’s 2016 periodic review of Kuwait raised concerns about the ‘compulsory nature and the sweeping scope’ of the program, the ‘lack of clarity on whether necessary safeguards are in place

to guarantee the confidentiality and prevent the arbitrary use of the DNA samples collected' and 'the absence of independent control'.¹²⁹

In both cases, the collection regime was dramatically scaled back or scrapped altogether. In the UK, the European Court's ruling led to the UK's Protection of Freedoms Act in 2012¹³⁰ and the subsequent destruction of 1.76 million DNA profiles taken from people innocent of any criminal offence.¹³¹ In the case of Kuwait, the law was eventually found to violate constitutional protections of personal liberty and privacy by the country's supreme court in 2017.¹³²

The criticisms leveled against the UK's and Kuwait's DNA programs could easily apply to the Chinese Government's current campaign of mass DNA collection, but a similar outcome is highly unlikely. China lacks independent courts that can check the power of the Chinese Government, the Communist Party and domestic security forces.¹³³ Nor has the Chinese Government been receptive to criticisms of earlier mass DNA collection programs made by international human rights organisations.¹³⁴ Finally, China's authoritarian political system lacks a free press, opposition political parties and a robust civil society that can openly challenge the legality of this program.¹³⁵

Recommendations

DNA analysis is now considered the gold standard for police forensics. Recent innovations in DNA sequencing and big-data computing make the process of analysing biometric samples more efficient and cost-effective. Yet forensic DNA collection has also been linked to the abuse of police power,¹³⁶ and even commercial genealogical websites can lead to the loss of genetic privacy for the relatives of those who have voluntarily uploaded their data.¹³⁷ In order to defend against possible abuses, compulsory police collection and storage of biometric data must be strictly limited to those convicted of serious criminal wrongdoing.

As detailed in this report, there's no evidence that Chinese authorities are adhering to these standards. Unconstrained by any checks on the authority of its police, the Chinese Government's police-run DNA database system is extending already pervasive surveillance over society, increasing discriminatory law enforcement practices and further undermining the human rights and civil liberties of Chinese citizens. The tools of biometric surveillance and political repression first sharpened in Xinjiang and Tibet are now being exported to the rest of China.

In the light of our report, ASPI recommends as follows:

- The Chinese Government should immediately cease the indiscriminate and compulsory collection of DNA samples from ordinary Chinese civilians, destroy any biological samples already collected, and remove the DNA profiles of people not convicted of serious criminal offences from its forensic databases.
- The UN Special Rapporteur on the right to privacy should investigate possible human rights violations related to the Chinese Government's DNA data collection program and broader programs of biosurveillance.
- Governments and international organisations should consider tougher export controls on equipment and intellectual property related to forensic DNA collection, storage and analysis being sold in Chinese markets.
- Biotechnology companies should ensure that their products and services adhere to international best practices and don't contribute to human rights abuses in China, and must suspend sales, service and research collaborations with Chinese state authorities if and when violations are identified.

Appendix 1: Data sources

In chronicling the Chinese Government’s latest DNA dragnet, this report draws on more than 700 Chinese-language open-source documents that refer to the current program of Y-STR data collection, as well as related research on the forensic applications of Y-STR analysis in China and materials concerning China’s domestic forensic science market.

The sources listed in Table 1 don’t include the Chinese- and English-language sources we have cited concerning China’s broader systems of surveillance and governance, China’s earlier biometric data collection programs in Xinjiang and Tibet, or reports on DNA collection programs outside of China.

Table 1: List of primary data sources

Type of source	Number of sources
Government websites and notices discussing the current program of Y-STR data collection	106
Weibo posts made by local public security bureaus concerning the current program of Y-STR data collection	143
Government tenders and procurement orders for Y-STR kits and database-construction-related services	106
Promotional material produced by companies involved in the current program of Y-STR data collection	23
Patent applications for Y-STR kits jointly developed by AGCU Sciencetech Inc. and public security bureaus	5
Domestic Chinese news coverage and online posts about the current program of Y-STR data collection	56
Posts on the photo-sharing site <i>Meipian</i> concerning the current program of Y-STR data collection	240
Videos of Y-STR sample collection	6
Public Weixin (WeChat) posts concerning the current program of Y-STR data collection	54
Chinese-language forum posts discussing the concerns of Chinese citizens about compulsory DNA data collection	9
Chinese academic articles on Y-STR data collection	9
Total	757

Documented instances of police-led Y-STR data collection have been found in 22 of China’s 31 administrative regions (excluding Hong Kong and Macau),¹³⁸ and in more than a hundred municipalities. It’s important to note that this total is likely to be an underestimate; instances of DNA collection may go unreported, and the true scale of the program is likely to be much greater. Data collection also appears to be continuing in some locations.

Appendix 2: How Y-STR samples are collected

The Chinese Government's Y-STR data collection program appears to happen mostly in rural areas or townships and villages located on the periphery of cities. This may be because it is easier for police to produce accurate genealogies of patrilineal families and collect samples from multiple members of the same family in rural areas, where multiple generations of a single family are more likely to live in close proximity.¹³⁹ Furthermore, many current urban residents are first- or second-generation migrants who can trace their ancestry back to extended families living in rural areas. Greater genetic coverage of Chinese men is more likely to be achieved by focusing on their ancestral families, rather than recent migrants to major cities. Finally, Chinese authorities may be focusing on rural areas because they believe their program will face less public scrutiny there than in more developed urban areas.

No matter where data collection occurs, this program is broken down into four stages:

1. Preparatory meetings

Local Y-STR data-collection work begins with meetings led by the public security bureaus where police officers and other government officials are introduced to the role Y-STR data collection can play in combating crime and strengthening 'social management' (Figure 21).¹⁴⁰

Figure 21: Local officials meeting to discuss male ancestry inspection systems, Anlu, Hubei Province, September 2019, and Weinan, Shaanxi Province, August 2018



Sources: 'Chendian Township held a training seminar on mobilisation of the male family tree investigation system' (陈店乡举办男性家族排查系统建设工作动员业务培训会), Anlu Government (安陆政府网), 3 September 2019, [online](#); 'Weinan Municipal Public Security Bureau's male family investigation system construction site promotion meeting was successfully held in Heyang' (渭南市公安局男性家族排查系统建设现场推进会在合阳圆满召开), Meipian (美篇网), 9 August 2018, [online](#).

During these meetings, officers are organised into subgroups responsible for particular data-collection-related tasks. Meetings end with the signing of letters of responsibility, which lay out the obligations government offices have for completing Y-STR data-collection work.

2. Creating family trees

The next step is creating family trees for local men and boys. Collecting accurate genealogical information on local patrilineal families is of vital importance. This information will be used to identify a representative sample of men and boys from whom to collect genetic data and, in the future, will allow police to connect Y-STR data from an unknown male to a particular patrilineal surname and all the men sharing that name.

To collect genealogical information on male family members, police officers visit individual families, often accompanied by village cadres.¹⁴¹ Through these visits, police try to map out family genealogies going back from five to eight generations (Figure 22).¹⁴²

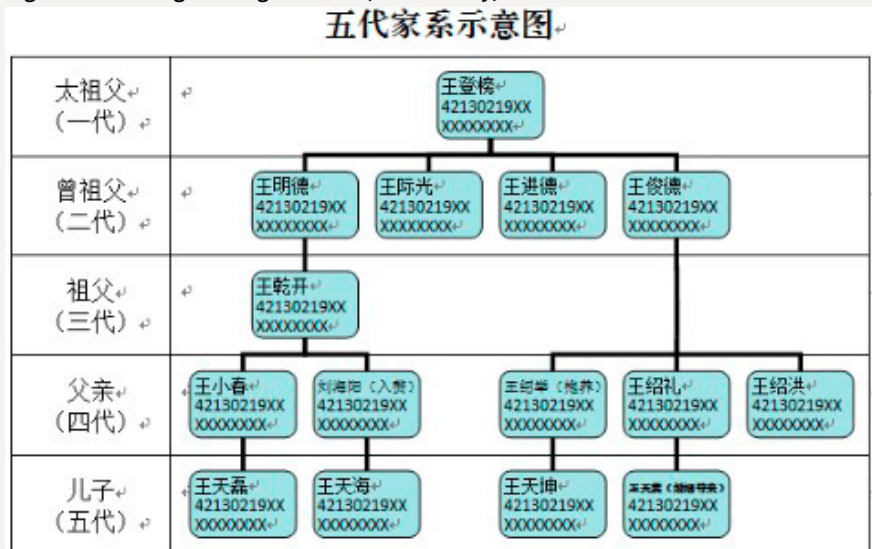
Figure 22: Collecting genealogical data by hand, Chaohu, Anhui Province, April 2018, and Jinan, Shandong Province, September 2018



Sources: 'Huailin town carried out male family tree survey and mapping' (槐林镇开展男性家族家系调查和图谱绘制工作), Chaohu Government (巢湖政府网), 10 April 2018, [online](#); 'The Chengguan Office successfully completed the Y library information collection task' (城关所圆满完成Y库信息采集任务) Chegguan Police Station (城关派出所), 29 September 2018, [online](#).

A mock illustration of these family trees is found in a 21 August 2018 government notice on Y-STR data collection in Sui County, Hubei Province, where names, mobile numbers and ID card numbers are collected (Figure 23).

Figure 23: Mock genealogical chart, Sui County, Hubei Province



Source: 'Notice of the County Government Office on printing and distributing the work plan for the construction of the "Y-STR" DNA database in Sui County' (县人民政府办公室关于印发随县"Y-STR"DNA数据库建设工作方案的通知), Sui County Government (随县政府网), 4 September 2018, [online](#). This mock chart captures five generations of a single patrilineal family with the names, phone numbers and presumably state ID numbers to be recorded for each individual identified.

Family trees are first drawn by hand,¹⁴³ and police officers and local officials work with members of targeted families to ensure accuracy (Figure 24).¹⁴⁴ Not all local males are targeted, however. According to the same 2018 work notice from Sui County, only information on permanent residents in the rural or semi-rural counties, townships or 'villages within cities' of these municipalities is recorded.¹⁴⁵

Figure 24: Completed family trees, Luliang, Shanxi Province, June 2018, and Baoji, Long County, Shaanxi Province, October 2018 (cropped)



Sources: 'Lin County Public Security Bureau Y-STR DNA Family Investigation System Construction Database' (临县公安局:Y-STR DNA家族排查系统建设数据库), *Meipian* (美篇网), 26 June 2018, [online](#); Caojiawan Police Station of Long County Public Security Bureau completed the first male family survey map (陇县公安局曹家湾派出所完成首张男性家族系调查图谱), *Meipian* (美篇网), 10 October 2018, [online](#).

After family trees are checked for errors, the finished charts are entered into computer databases using the commercially available genealogical mapping software 'Ancestry Artisan' (Figure 25).

Figure 25: Inputting genealogical information, Tongchuan, Shaanxi Province, August 2018 (cropped)



Source: 'Chengguan Police Station completed the construction of male Y DNA bank' (城关派出所全面完成男性Y库建设工作), *Nanyuan Police* (南苑警务网), 8 August 2018, [online](#).

3. Compulsory collection of blood samples

Based on the family trees, a non-random sample of local men is targeted for compulsory Y-STR data collection (Figure 26). Estimates for the proportion of local men targeted vary from roughly 8.1% in Dongsheng District, Lingqiu County, Shanxi Province¹⁴⁶ and 9.6% in Ordos, Dongsheng District, Inner Mongolia,¹⁴⁷ to 25.4% in Tongchuan, Yijun County, Shaanxi Province¹⁴⁸ and 26.4% in Changzhi, Tunliu County, Shanxi Province.¹⁴⁹

Figure 26: Blood collection in Tongchuan, Shaanxi Province, June 2019, and Zhangzhou, Fujian Province, April 2019



Sources: 'Tongchuan police: Hongqiao Yuhua Police Station completed the annual DNA blood sample information collection task' (铜川公安:虹桥玉华派出所完成全年DNA血样信息采集任务), Hongqiao Yuhua Police Station (虹桥玉华派出所), 9 June 2018, [online](#); "Changtai: Blood Collection Notice" (长泰:采血通告), *Soho* (搜狐网), 20 April 2019, [online](#).

Samples are taken in the form of blood via a pinprick to the finger,¹⁵⁰ and blood is collected on a paper card, which is then inserted into an envelope (Figure 27). This method of sample collection allows large amounts of data to be collected in the absence of storage space.¹⁵¹

Figure 27: Blood collection cards and envelopes, Tongchuan, Shaanxi Province, June 2019 (cropped), and Xi'an, Zhouzhi County, Shaanxi Province, May 2019



Source: 'Jiufeng has taken multiple measures, combined points with points, broken common rules, and promoted quickly to strive to complete the construction of male family trees as soon as possible' (九峰所多策并举、点面结合、打破通例、快速推动、争取早日全面完成男性家系建设工作), *Meipian* (美篇网), 24 May 2019, [online](#).

In some cases, blood is collected from individuals in their community, as shown in a video from 17 May 2019 of a police officer in Anqing, Anhui Province, taking blood from an elderly man (Figure 28).

Figure 28: Screen capture taken from video of blood collection in Anqing, Anhui Province, May 2019



Source: 'In order to build the Y-DNA bank and not affect the farming time of the masses, the auxiliary policemen from Liuping Police Station entered the field on 17 May to collect blood samples for the Y-DNA bank from the people in the jurisdiction and publicise safety precautions', (为了Y库建设工作和不影响群众农耕时间5月17日柳坪派出所民辅警走进田间地头·为辖区群众采集Y库血样和宣传安全防范), Susong Liuping Police (宿松柳坪派出所), video, 17 May 2019, [online](#).

In other cases, samples are collected simultaneously from numerous men at a designated location. A July 2019 video (possibly from Sichuan Province) shows dozens of men—many holding what appear to be copies of their family trees—having their blood taken by public security officers (Figure 29).

Figure 29: Screen capture taken from video of blood collection in Sichuan Province, July 2019 (cropped)



Source: 'Rural: What are you doing together? It turns out collecting blood samples!' (农村:大家围在一起干嘛了,原来是在采集血样!), *Tencent Video* (腾讯视频), video, 15 July 2019, [online](#).

Uniformed police officers aren't the only ones who conduct blood collection. In a June 2019 video shot at a village government office in the Fuling District of Chongqing, local officials are seen recording identifying information for numerous men on sample collection envelopes before collecting blood samples (Figure 30).

Figure 30: Screen capture taken from video of blood collection in Fuling District, Chongqing Municipality, June 2019 (cropped)



Source: 'The staff went to the village to collect DNA blood samples, which greatly conveniences the people' (工作人员到村里面进行DNA血样采集·极大的方便了人民群众), *Haokan Video* (好看视频), 11 June 2019, online.

According to the website of Bosun Life—a Beijing-based company that builds Y-STR databases—one person is selected for Y-STR collection out of a family of five to six, while two people are selected from a family of up to fifty.¹⁵²

Figure 31: Blood collection in Ningde, Zhejiang Province, April 2019



Source: 'Nodded attention! Male family blood sample collection work started' (点头人注意! 男性家族血样采集工作开始了), *Sohu* (搜狐网), 30 April 2019, online.

Local governments are under intense pressure to meet DNA sample-collection targets set by superiors higher up in the state, and there's evidence that systems of rewards and punishments have been instituted to ensure that sample-collection quotas are met.¹⁵³

4. Data sharing with public security bureaus

Once local blood collection is complete, data is entered into specialised police-run Y-STR databases (Figure 32). Numerous requests for tenders and procurement orders for the construction of Y-STR databases have been found for local public security bureaus across China.¹⁵⁴

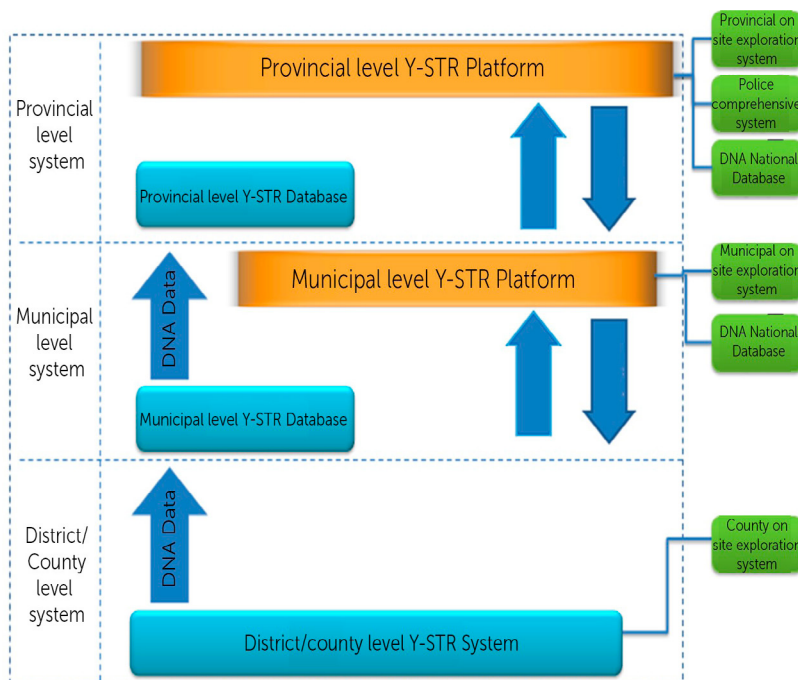
Figure 32: Data entry, Wulanhaote, Inner Mongolia, September 2019



Source: 'Collection of blood samples from male families' (男性家族血样采集工作), *Meipian* (美篇网), 17 September 2019, online.

In turn, these local databases are connected to a network of provincial Y-STR databases and the national forensic DNA database, as stated in government tenders (Figure 33).¹⁵⁵

Figure 33: Data sharing between public security bureaus using Yingdi's Y-STR database system (translated)



Source: 'Solution pages of police equipment' (解决方案列表), *Yingdi* (武汉英迪科技发展有限公司), online. Translated from Chinese by ASPI.

Appendix 3: Estimating the scale of Y-STR sample collection

While we know Y-STR samples have been collected from males across China, it's difficult to determine how many boys and men in total have been targeted. However, a rough estimate can be produced. This requires first calculating the size of the pool from which samples could be taken. The scale of the Henan Y-STR database gives us a good indication of the proportion of men and boys who may have been targeted. Between 2014 and 2016, 5.3 million Y-STR profiles were collected from a total male population of roughly 49.6 million, or roughly 10% of all males. This was believed to have given authorities nearly 98.71% coverage of the province's male population.¹⁵⁶

In some cases, precise figures indicating the scale of male data collection in particular localities are available. By comparing the total number of Y-STR samples collected to the population of local males (roughly estimated to be half the total local population), we're able to estimate the percentage of men and boys from whom biometric data may have been taken (Table 2).

Table 2: Local data on Y-STR sample collection

Locality (province)	Total population	Estimated male population	No. of Y-STR samples collected	Samples as % of estimated male population
Donglan County, Hechi (Guangxi)	223,500	111,750	10,841 ^a	9.7%
Laoting County, Tangshan (Hebei)	500,000	320,144	56,068 ^b	17.5%
<i>(Note: Figures for male population come from original source. Figures for samples are recommended collection targets.)</i>				
Xian'an District, Xianning (Hubei)	628,000	314,000	40,000 ^c	12.7%
<i>(Note: Figures in the original source list a lower total male population of 270,000.)</i>				
Dongsheng District, Ordos (Inner Mongolia)	262,900	131,450	12,667 ^d	9.6%
<i>(Note: Figures for male population come from original source.)</i>				
Yaozhou District, Tongchuan (Shaanxi)	236,100	118,050	26,000 ^e	22.0%
Yijun County, Tongchuan (Shaanxi)	92,100	46,050	11,735 ^f	25.4%
Yintai District, Tongchuan (Shaanxi)	209,500	104,750	12,000 ^g	11.4%
Yulin, Jia County (Shaanxi)	269,700	134,850	24,608 ^h	18.2%

Changzhi, Tunliu County (Shanxi) <i>(Note: Figure for samples is the government's projected estimate for total samples collected.)</i>	273,000	136,500	36,036 ⁱ	26.4%
Datong, Lingqiu County (Shanxi) <i>(Note: Figure for samples is the government's projected estimate for total samples collected.)</i>	245,858	122,929	10,000 ^j	8.1%

Sources

- a '142 fugitives have been reported by this place listed by the Ministry of Public Security' (公安部挂牌整治的这个地方已有142网逃人员归案), *Guangxi News* (广西新闻网), 11 April 2019, [online](#).
- b 'Actively carry out DNA blood sample collection' (积极开展DNA血样采集工作), *Meipian* (美篇网), 13 June 2018, [online](#).
- c 'Tender announcement of Xian'an District Male Family Investigation System Construction (Y-DNA Bank) Project' (咸安区男性家族排查系统建设(Y库)项目招标公告), *Xian'an District Public Resources Electronic Trading Platform* (咸安区公共资源电子交易平台), 27 November 2019, [online](#).
- d 'Dongsheng District Government affairs information (Issue 44)' (东胜区政务信息第44期), Dongsheng Government website (东胜政府网), 29 May 2019, [online](#).
- e 'Yaozhou Branch took the lead in completing the Y-bank blood sample collection' (耀州分局率先完成Y库血样采集工作), *Meipian* (美篇网), 25 February 2019, [online](#).
- f 'The construction of the male family tree investigation system of the Yijun County police was praised by local government' (宜君县公安局男性家族排查系统建设工作获市局红字通报表扬), *Meipian* (美篇网), 28 August 2018, [online](#).
- g 'Tongchuan City Public Security Bureau Indo-Taiwan Branch mobilised all the police to win the Y-DNA library construction' (川市公安局印台分局全警动员打赢Y库攻坚战), *Meipian* (美篇网), 1 March 2019, [online](#).
- h 'Jia county police leading in completing the task of building a male family tree investigation system' (佳县公安局率先完成全市公安机关男性家族排查系统建设任务), 1 November 2019, [online](#).
- i 'Bulletin on the progress of collection of blood samples from male families' (男性家族血样采集工作进展情况通报), *Meipian* (美篇网), 5 November 2018, [online](#).
- j 'Blood sample collection' (血样采集), *Meipian* (美篇网), 23 November 2018, [online](#).

We know from government records that, in areas where Y-STR data collection has occurred, anywhere from roughly 8.1% to 26.4% of all males have been targeted. The wide variation in those figures may reflect efforts to collect more data than needed.

Government procurement orders can also be used to estimate the scale of Y-STR sample collection (Table 3). Some of those orders provide precise figures for the number of Y-STR sample-collection cards local authorities have purchased. By comparing the number of sample-collection cards to the local male population (roughly estimated to be half the total local population), we can estimate the percentage of local men who may have been targeted for DNA data collection.

Table 3: Government bid invitations and procurement orders for Y-STR blood sample collection cards

Locality (province)	Total population	Estimated male population	No. of Y-STR blood sample cards purchased or requested	Samples as % of estimated male population
Lu'an, Anhui <i>(Note: According to the contract, this order seems to be supplementing an earlier order, hence the smaller figure.)</i>	5,882,000	2,941,000	35,000 ^a	1.1%
Wuhu, Fanchang County (Anhui)	269,000	134,500	28,000 ^b	20.8%
Fuyang, Taihe County (Anhui)	1,773,000	886,500	100,000 ^c	11.2%
Fuyang, Yingshang County (Anhui)	1,295,000	647,000	100,000 ^d	15.4%
Fuzhou, Changle District (Fujian)	725,000	362,500	44,000 ^e	12.1%
Hezhou (Guangxi)	2,072,600	1,036,300	130,000 ^f	12.5%
Wuzhou, Teng County (Guangxi)	1,079,800	539,900	40,000 ^g	7.4%
Tongren (Guizhou)	3,168,800	1,584,400	168,300 ^h	10.6%
Changde (Hunan)	5,827,000	2,913,500	500,000 ⁱ	17.1%
Shaoyang, Longhui County (Hunan)	1,200,000	600,000	118,000 ^j	19.6%
Pingxiang (Jiangxi)	1,933,200	966,000	73,000 ^k	7.5%
Shangrao (Jiangxi)	7,810,000	3,905,000	500,000 ^l	12.8%
Hanzhong (Shaanxi)	3,437,000	1,718,500	269,201 ^m	15.6%
Xianyang, Xunyi County (Shaanxi)	267,100	133,550	35,000 ⁿ	26.2%
Heze (Shandong)	8,765,000	4,382,500	600,000 ^o	13.6%
Ningbo, Xiangshan County (Zhejiang)	541,700	270,850	70,000 ^p	25.8%

Sources

- a 'Supplementary samples inspection project contract of the male family tree analysis system of the four districts of Lu'an City' (六安市辖四区男性家庭排查建设系统样本补充检验项目合同), *Liu'an Public Resources Trading Center* (六安市公共资源交易中心), 1 April 2020, [online](#).
- b 'Fanchang County police purchased male family tree investigation system construction, sample inspection and storage service project contract record' (繁昌县公安局购置男性家族排查系统建设样本检验入库项目合同案), Wuhu Public Resources Trading Center (芜湖市公共资源交易中心), 9 December 2019, [online](#).
- c 'Transaction announcement of Taihe County police male family tree inspection project' (太和县公安局男性家族排查系统样本检测项目 成交公告), Taihe Government website (太和县政府网), 16 May 2019, [online](#).
- d 'The blood sample test service project of the male family screening system of Yingshang County Public Security Bureau was announced' (颍上县公安局男性家族排查系统血样检测服务项目中公示), *Bidcenter.com.cn* (采招网), 18 October 2019, [online](#).
- e 'Changle District police male family screening system construction personnel inspection reagent project' (长乐区公安局男性家族排查系统建设人员检验试剂项目), Fuzhou Changle Government website (福州市长乐区政府网), 6 Jan 2020, [online](#).
- f Guangxi Guichun Project Management Consulting Co. Ltd, 'About Hezhou City Public Security Bureau male family exclusion system' (广西桂春工程项目管理咨询有限公司关于贺州市公安局男性家族排除系统), *Wangyou Bidding Website* (网优招投标网), 3 December 2019, [online](#).
- g 'Result announcement of Yunzhilong Tendering Group Co. Ltd DNA blood sample collection card purchase' (云之龙集团有限公司DNA血样采集卡采购WZZC2019-J1-30001-YZLW结果公告), China Government Procurement website (中国政府采购网), 10 April 2019, [online](#).
- h 'Tongren City Public Security Bureau male family investigation system database construction service purchase project' (铜仁市公安局男性家族排查系统数据库建设务采购项目), *Tongren Public Resources Trading Center* (铜仁市公共资源交易中心), 4 February 2020, [online](#).
- i 'Changde police male family tree investigation system construction and inspection service project' (常德市公安局男性家族排查系统建设检测务项目), *Changde Government Procurement Network* (常德市政府采购网), 2009, [online](#).
- j 'Announcement on the completion of the blood sample collection card and consumables procurement project for the construction of the Longhui Police male family screening system' (隆回县公安局男性家族排查系统建设血样采集卡及耗材采购项目成交公告), *Longhui Government Procurement Network* (隆回县政府采购网), 19 March 2020, [online](#).

- k 'Pingxiang City male family investigation system construction service project results publicity [Winning bidder: Wuxi AGCU Biotechnology Co. Ltd]' (乡市男性家族排查系统建设服务项目结果公示 [中标单位:无锡中德美联生物技术有限公司]), *Pingxiang City Government Procurement Network* (乡市政府采购网), 28 December 2018, [online](#).
- l 'Shangrao City Finance Bureau's complaint handling decision on the construction service project of the male family investigation system of the Public Security Bureau of Shangrao City (No. SRJYZFCG-2019-076 #)' (上饶市财政局关于上饶市公安局男性家庭排查系统建设服务项目(编号: SRJYZFCG-2019-076#)的投诉处理决定书), *Jiangxi Government Procurement Network* (江西政府采购网), 10 January 2020, [online](#).
- m 'Hanzhong City Public Security Bureau professional inspection and consumables procurement project' (汉中市公安局专业检测及耗材采购项目), Shaanxi Provincial Government Procurement Center (陕西省汉中市政府采购中心), 15 April 2020, [online](#).
- n 'Announcement on procurement results of X-Yi County Public Security Bureau male family tree investigation Y-DNA blood collection card project' (关于旬邑县公安局男性家族排查Y系血液采集卡项目的采购结果公告), *Bilibili Web* (必联网), 01 April 2019, [online](#).
- o 'Shangrao City Finance Bureau's complaint handling decision on the construction service project of the male family investigation system of the Public Security Bureau of Shangrao City (No. SRJYZFCG-2019-076 #)' (上饶市财政局关于上饶市公安局男性家庭排查系统建设服务项目(编号: SRJYZFCG-2019-076#)的投诉处理决定书), *Jiangxi Government Procurement Network* (江西政府采购网), 10 January 2020, [online](#).
- p 'Notice on the change of bidding documents for the project of Public Security Bureau of Xiangshan County establishing male Y chromosome database' (象山县公安局建立男性Y染色体数据库项目招标文件更改通知), Ningbo Public Resources Trading Center (宁波市公共资源交易中心), 6 September 2019, [online](#).

From these records, we can estimate that local authorities have purchased enough Y-STR analysis kits to collect samples from anywhere between roughly 7.4% and 26.2% of all local males. The wide variation in these figures may again reflect efforts to collect more data than needed.

The large proportion of men and boys targeted for data collection in some localities may be offset by lower levels of data collection in other areas. We have also considered the possibility that in some areas of the country data collection might not be taking place. While we know that this is a nationwide campaign, we don't yet have precise figures for the number of municipalities in which data collection has occurred. For example, mass Y-STR collection doesn't so far seem to be taking place in first-tier cities such as Beijing or Shanghai.

Based on these considerations, and the scale of the earlier provincial Y-STR database built by the Henan Public Security Bureau,¹⁵⁷ we therefore estimate that the Chinese Government may be seeking to collect Y-STR profiles from as many as one out of every 10 males in China.

The proportion of men and boys within individual families targeted for Y-STR sample collection also gives us clues about the possible scale of this program. There are indications that the authorities aim to collect samples from at least two men from every family of six to 50 people, and a further one or two samples from families of more than 50 members.¹⁵⁸ It isn't clear how rigorously police are adhering to these standards, but at a minimum this suggests that the Chinese Government aims to collect Y-STR samples from roughly five out of every 100 men.

We therefore conservatively estimate that authorities aim to collect DNA samples from around 5-10% of China's total male population of roughly 700 million. Based on these calculations, a completed nationwide system of Y-STR databases will likely contain at least 35–70 million genomic profiles.

How do these tens of millions of Y-STR samples relate to the Chinese Government's broader genomic surveillance capabilities? According to a report by the Chinese insurance company Ping An, in 2016 Chinese authorities possessed DNA records for 44.35 million people, including 40.7 million from forensic databases, 1.49 million from crime-scene databases, 594,000 from missing people databases, and 513,000 in so-called 'base level' DNA databases.¹⁵⁹ To those numbers we can add the roughly 23 million profiles taken in Xinjiang and 3 million in Tibet, for a new total of roughly 70 million—a total slightly lower than the figure of 80 million cited in recent Chinese press reports¹⁶⁰ but identical to that provided on the website for Hisign Technology.¹⁶¹

If we add the estimated 35–70 million Y-STR profiles to the 70 million profiles authorities already possess,¹⁶² the Chinese Government likely has 105–140 million profiles on file. That doesn't include DNA profiles currently being enrolled in the 'newborn genebank' that is being trialed in the Guangxi Zhuang Autonomous Region and Chongqing.¹⁶³

Appendix 4: Companies participating in national Y-STR data collection

Table 4 lists Chinese and multinational companies that are known to provide the equipment, consumables, services and intellectual property used by the Ministry of Public Security and public security bureaus across China as part of the ongoing national program of Y-STR data collection.

Table 4: Chinese and multinational companies involved in the Y-STR data collection program

Company	Product(s) sold
Yuanqi Technology 北京沅启科技有限公司	Y-STR database construction ^a
Yingdi Technology Development 武汉英迪科技发展有限公司	Y-STR database construction ^b
Highershine 北京海华鑫安生物信息技术有限责任公司	Y-STR database construction ^c
AGCU Scientech 无锡中德美联生物技术有限公司	Y-STR kits; Y-STR database construction ^d
Health Gene Technologies 宁波海尔施基因科技有限公司	Y-STR database construction ^e
Dianan Technology 杭州典安科技有限公司	Y-STR kits; Y-STR database construction ^f
Kelitai Technology 重庆科立泰科技有限公司	Y-STR kits ^g
Huizhong Hengan Biotechnology 北京汇众恒安生物科技有限公司	Y-STR kits ^h
Shengyuan Police Investigation Equipment 泉州圣源警用侦察设备有限公司	Y-STR database construction ⁱ
Wis-Tong Technology 北京中际慧通科技有限公司	Y-STR kits ^j ; Y-STR database construction ^k
Enwei Tiancheng Technology 北京恩威天诚科技有限公司	Y-STR kits ^l
Juzheng Technology 江西巨正科技有限公司	Y-STR kits ^m
China National Scientific Instruments and Materials 中国科学器材有限公司	Y-STR kits ⁿ

Hisign Technology 北京海鑫高科指纹技术有限公司	Y-STR kits ^o ; Y-STR database construction ^p
Yuandongli Information Technology 郑州源动力信息科技有限公司	Y-STR database construction ^q
Microread Genetics 苏州阅微基因技术有限公司	Y-STR database construction ^r
Shiji Chang'an Electronic Technology 郑州世纪长安电子技术有限公司	Y-STR database construction ^s
Zhongtai Ruida Technology 武汉中泰瑞达科技有限公司	Y-STR kits ^t ; Y-STR database construction ^u
Xindun Kewei Police Technology 湖南鑫盾科威警用科技有限公司	Y-STR kits ^v
APG Bio 潍坊环亚生物医药科技有限公司	Y-STR database construction ^w
Chengdu Wofute Technologies 成都沃夫特科技有限公司	Y-STR kits ^x
Bosun Life 北京博晟思远生物科技有限公司	Y-STR database construction ^y
Yongtai Anda Technology 北京永泰安达科技有限公司	Y-STR database construction ^z
Forensic Genomics International 深圳华大法医科技有限公司	Y-STR kits ^{aa}
Eppendorf China Limited 艾本德中国有限公司	Y-STR kits ^{bb}
Thermo Fisher Scientific (China) Co. Ltd. 赛默飞世尔科技(中国)有限公司	Y-STR kits ^{cc}

Sources

- a 'Y-STR database construction solution' (Y-STR数据库建设解决方案), Beijing Yuanqi Technology Co. Ltd (北京沅启科技有限公司), [online](#).
- b 'Solution page of Wuhan Yingdi Technology Development Co. Ltd' (武汉英迪科技发展有限公司), *Yingdi* (武汉英迪科技发展有限公司), [online](#).
- c 'DNA database collection terminal' (DNA建库采集终端), Beijing Haihua Xinan Biological Information Technology Co. Ltd (北京海华鑫安生物信息技术有限公司), [online](#).
- d 'Announcement on the winning bid for the Laiwu City police DNA Y-STR database construction project' (莱芜市公安局DNAY-STR数据库建设项目中标公告; 淮南市公安局男性家族排查系统建设项目, Laiwu Government procurement website (莱芜市政府采购网站), 28 December 2018; 'Fangchang county police purchased male family tree investigation system construction, sample inspection and storage service project contract record' (繁昌县公安局购置男性家族排查系统建设样本检验入库服务项目合同备案), *Wuhu Public Resources Trading Center* (芜湖市公共资源交易中心), 9 December 2019, [online](#); 'Announcement on the winning bid for the Huaining county police male family tree data testing data entry service contract' (怀宁县公安局男性家系数据检测入库服务项目中标公告), *Huaining County Government Open Information Net* (怀宁县政府信息公开网), 20 November 2019; 'Bidding announcement on the blood sample testing service project of the Criminal Investigation Male Family Investigation System of Tongling City Public Security Bureau' (铜陵市公安局刑侦男性家族排查系统血样检测服务项目中标公告), *Tongling Public Resource Trading Center* (铜陵市公共资源交易中心), 19 September 2019, [online](#); 'Jieshou City Public Security Bureau male family screening system blood sample testing service project overview' (界首市公安局男性家族排查系统血样检测服务项目概况), Jieshou People's Government (界首市人民政府), 11 October 2019, [online](#).
- e 'Announcement on procurement results of construction project of male family investigation database in High-tech Zone' (高新区男性家族排查数据库建设项目采购结果公告), *Ningbo Public Resources Trading Network* (宁波市公共资源交易网), 29 October 2019, [online](#); 'Zhejiang Kejia Engineering Consulting Co. Ltd announcement on the winning bid (deal) result of the procurement project of the Y (STR) Reservoir Construction and Construction Service of Hangzhou Public Security Bureau Lin'an Branch' (浙江科佳工程咨询有限公司关于杭州市公安局临安分局的杭州市公安局临安分局Y(STR)建库试剂及建库务采购项目中(成交)结果公告), Hangzhou Municipal People's Government website (杭州市人民政府), 30 September 2019, at <https://archive.is/4Zs8A>; 'Jining Municipal Public Security Bureau won the bid for the second phase of the city's male family investigation system construction project' (济宁市公安局全市男性家族排查系统二期建设项目中公示), *Jining City Public Resources Trading Service Center* (济宁市公共资源交易服务中心), 28 May 2019, [online](#).
- f 'Xuancheng Public Security Bureau male family screening system construction sample test entry service contract information' (宣城市公安局男性家族排查系统建设样本检测录入服务项目合同信息), *Xuancheng Public Resources Trading Center* (宣城市公共资源交易中心网站), 22 January 2019, [online](#); 'Taihe County Public Security Bureau male family screening system sample testing service project' (太和县公安局男性家族排查系统样本检测服务项目), Taihe County People's Government procurement website (太和县人民政府采购)16 May 2019, [online](#).
- g 'Dianjiang County Public Security Bureau male family investigation blood sample collection kit purchase' (垫江县公安局男性家族排查血样采集套装采购), *China Government Procurement Network* (中国政府采购网), 27 July 2018, [online](#).

- h 'Announcement on the results of the construction project of the male family of Fuqing Public Security Bureau' (福清市公安局男性家族建设项目结果公告), *China Government Procurement Network* (中国政府采购网), 15 November 2019, [online](#); 'Announcement on the results of procurement projects for construction of reagents and analysis services for male family of Criminal Investigation Brigade, Public Security Bureau, Mawei District, Fuzhou' (福州市马尾区公安局刑侦大队男性家系建设检验试剂及分析服务采购项目结果公告), *Fuzhou Government Procurement Network* (福州市政府采购网), 27 November 2019, [online](#).
- i 'Announcement on the results of the construction of the male family investigation system' (男性家族排查系统建设结果公告), *China Government Procurement website* (中国政府采购网), 3 December 2018, [online](#).
- j 'Inspection and collection fees of samples collected by male family members and inspection fees for case evidence' (男性家系人员采集样本检验费和案件物证检验费), *Fujian Provincial Government Procurement Network* (福建省政府采购网), 1 February 2019, [online](#).
- k 'Announcement of Minhou County Public Security Bureau Criminal Investigation Brigade on Minhou male family investigation system construction service purchase project results' (闽侯县公安局刑侦大队关于闽侯男性家族排查系统建设服务类采购项目结果公告), *China Government Procurement website* (中国政府采购网), 28 November 2018, [online](#).
- l 'Announcement on the results of the procurement project for the construction of the male family screening system of the Zhangzhou Public Security Bureau' (漳州市公安局男性家族排查系统建设采购项目结果公告), *China Government Procurement website* (中国政府采购网), 12 April 2019, [online](#); 'Quanzhou Public Security Bureau DNA reagent consumables and goods procurement project results announcement' (泉州市公安局DNA试剂耗材货物类采购项目结果公告), *China Government Procurement website* (中国政府采购网), 3 April 2019, [online](#).
- m 'Announcement of the winning bid in the open call for bids for the Gansu Province Public Security Bureau 2018 DNA case and anti-trafficking work necessary reagent consumables' (甘肃省公安厅2018年度DNA办案及打拐专项工作所需试剂耗材项目公开招标公告), *Gansu Public Security Bureau Government Information Open Column* (甘肃省公安厅政府信息公开专栏), 22 October 2018.
- n 'Cangzhou City Public Security Bureau male family screening system test reagent consumables and entry terminal purchase order' (沧州市公安局男性家族排查系统检验用试剂耗材和录入终端采购项目), Cangzhou City Administrative Approval Office (沧州市行政审批局), 7 November 2019, [online](#); 'Announcement of the winning bid in the open call for bids for the Gansu Province Public Security Bureau 2018 DNA case and anti-trafficking work necessary reagent consumables' (甘肃省公安厅2018年度DNA办案及打拐专项工作所需试剂耗材项目公开招标公告), *Gansu Public Security Bureau Government Information Open Column* (甘肃省公安厅政府信息公开专栏), 22 October 2018.
- o 'Announcement on purchase transaction of family collection equipment of male family investigation system' (男性家族排查系统家系采集设备购置成交公告), *Hainan Provincial Government Administration Service Center* (海南省人民政府政务服务中心), 6 September 2019, [online](#).
- p 'YSTR database application system: (YSTR数据库应用系统), *Hisign* (北京海鑫科金高科技股份有限公司网), [online](#).
- q 'Guangxi Kewen Tendering Co. Ltd National Public Security Organ DNA Database System and Guangxi District Public Security Organ Male Family Inspection System operation and maintenance service purchase (GXZC2018-C3-20830-KWZB) transaction announcement' (广西科文招有限公司全国公安机关DNA数据库系统及广西区公安机关男性家族排查系统运维服务采购 (GXZC2018-C3-20830-KWZB) 成交公告), *China Government Procurement website* (中国政府采购网), 22 November 2018, [online](#).
- r 'Qiannan Prefecture Public Security Bureau Procurement of Qiannan Prefecture Y-STR DNA Database Construction Service Project winning bid (deal) announcement' (黔南州公安局采购黔南州Y-STR DNA数据库建设服务项目中 (成交) 公告), Guizhou Provincial Government procurement website (贵州省财政厅政府采购), 10 April 2019, [online](#); 'Y library construction plan' (Y库建设方案), *Beijing Yuwei Gene Technology Co. Ltd* (北京阅微基因技术有限公司), [online](#); 'The blood sample test service project of the male family screening system of Yingshang County Public Security Bureau was announced' (颖上县公安局男性家族排查系统血样检测服务项目中公示), *Bidcenter.com.cn* (采招网), 18 October 2019, [online](#).
- s 'Henan Lianchuang Engineering Cost Management Co. Ltd announcement on the results of the purchase of 1 batch of procurement projects by the Criminal Investigation Bureau of the City Public Security Bureau of the National Male Family Investigation System Database Server' (河南联创工程造价管理有限公司关于州市公安局犯罪侦查局购买全国男性家族排查系统数据库服务器1批采购项目的结果公告), *China Government Procurement website* (中国政府采购网), 12 February 2018, [online](#).
- t 'Zaoyang Public Security Bureau DNA blood sample collection card and 'Male Family Inspection System' supporting software procurement project inquiry transaction announcement' (枣阳市公安局DNA血样采集卡及'男性家族排查系统'配套软件采购项目 询价成交公告), *Hubei Provincial Government Procurement Network* (湖北省政府采购网), 25 February 2019, [online](#).
- u 'Zaoyang Public Security Bureau DNA blood sample collection card and 'Male Family Inspection System' supporting software procurement project inquiry transaction announcement' (枣阳市公安局DNA血样采集卡及'男性家族排查系统'配套软件采购项目 询价成交公告), *Hubei Provincial Government Procurement Network* (湖北省政府采购网), 25 February 2019, [online](#).
- v 'Announcement on the completion of the blood sample collection card and consumables procurement project for the construction of the Longhui County Public Security Bureau male family screening system' (隆回县公安局男性家族排查系统建设血样采集卡及耗材采购项目成交公告), *Longhui County Government Procurement Network* (隆回县财政局政府采购), 19 March 2020, [online](#).
- w 'Announcement of bid winning the construction project of male family investigation system (Y Bank) of public security organs of Linyi' (临沂市公安局全市公安机关男性家族排查系统 (Y库) 建设项目中公告), *Guipin VIP Bidding Network* (贵品VIP招标网), 12 June 2019, [online](#).
- x 'Announcement of public tender winning bid for the procurement of inspection reagent procurement project in pilot county of Lushan County Public Security Bureau, Sichuan' (四川省雅安市芦山县公安局男性家族排查系统建设试点县检验用试剂采购项目公开招标公告), Lushan County People's Government (芦山县人民政府), 3 January 2019, [online](#).
- y 'Construction of 'Y-STR' DNA database' ('Y-STR' DNA数据库建设), *Beijing Bosheng Siyuan Biological Technology Co. Ltd* (北京博晟思远生物科技有限公司), [online](#).
- z 'Cheng'an County Public Security Bureau Y-STR database construction service project for male family investigation' (成安县公安局男性家族排查系统 Y-STR数据库建设服务项目 中公告), *China Government Procurement website* (中国政府采购网), 24 March 2020, [online](#).
- aa 'Announcement on winning bid for the second public purchase bidding of male Family Inspection Service of Langzhong Public Security Bureau, Nanchong City, Sichuan Province' (四川省南充市阆中市公安局男性家族排查检验务第二次采购公开招标公告), *Sichuan Government Procurement Network* (四川政府采购网), 23 August 2019, [online](#); 'Announcement on the results of the male family screening system and the autosomal DNA database construction project' (男性家族排查系统及常染色体DNA数据库建设项目结果公告), *China Government Procurement Network* (中国政府采购网), 28 August 2019, [online](#); 'Sanming City Male Family Inspection System Construction Reagent Consumable Goods Procurement Project' (三明市男性家族排查系统建设试剂耗材货物类采购项目), *China Medical Tendering Network* (中国医疗招标网), 27 March 2020, [online](#); 'Announcement of the successful bidding for the second public bidding of male family inspection service of Langzhong Public Security Bureau' (阆中市公安局男性家族排查检验务第二次采购公开招标公告), *Langzhong City Government Procurement Network* (阆中市政府采购网), 23 August 2019, [online](#).
- bb Eppendorf China Limited appears to be a fully owned foreign subsidiary of German-headquartered Universitätsklinikum Hamburg-Eppendorf. Our imputations in this report are limited to Eppendorf's subsidiaries in China, and we make no claim against its Australian or other subsidiaries. 'Announcement on procurement results of X-Yi County Public Security Bureau Male Family Investigation Y-Series Blood Collection Card Project' (关于旬邑县公安局男性家族排查Y系血液采集卡项目的采购结果公告), *Bilian Network* (必联网), 1 April 2019, [online](#); 'Announcement of winning bid for Lanzhou City Public Security Bureau Male Family Inspection System construction test reagent consumables (Y database construction) purchase project' (兰州市公安局男性家族排查系统建设检验试剂耗材 (Y数据库建设) 购置项目中公告), *China Government Procurement website* (中国政府采购网), 4 December 2019, [online](#).
- cc Thermo Fisher Scientific (China) Co. Ltd is a fully owned foreign company subsidiary of US-headquartered Thermo Fisher Scientific Inc. Our imputations in this report are limited to Thermo Fisher's subsidiary in China, and we make no claim against its Australian or other subsidiaries. 'Announcement of the winning bid in the open call for bids for the Gansu Province Public Security Bureau 2018 DNA case and anti-trafficking work necessary reagent consumables' (甘肃省公安厅2018年度DNA办案及打拐专项工作所需试剂耗材项目公开招标公告), *Gansu Public Security Bureau Government Information Open Column* (甘肃省公安厅政府信息公开专栏), 22 October 2018; 'Announcement on the results of the Construction Project of the Male Family of Fuqing Public Security Bureau' (福清市公安局男性家族建设项目结果公告), *China Government Procurement website* (中国政府采购网), 15 November 2019, [online](#); 'Announcement on the results of procurement projects for construction of reagents and analysis services for male family of Criminal Investigation Brigade, Public Security Bureau, Mawei District, Fuzhou' (福州市马尾区公安局刑侦大队男性家系建设检验试剂及分析服务采购项目结果公告), *Fuzhou City Mawei District Government Procurement Network* (福州市马尾区政府采购网), 27 November 2019, [online](#); 'Fees for inspection

of samples collected by male family members and inspection fees for case evidence' (男性家系人员采集样本检验费和案件物证检验费), *Fujian Provincial Government Procurement Network* (福建省政府采购网), 1 February 2019, [online](#); 'Announcement on the results of the procurement project for the construction of the male family screening system of the Zhangzhou Public Security Bureau' (漳州市公安局男性家族排查系统建设采购项目结果公告), *China Government Procurement website* (中国政府采购网), 12 April 2019, [online](#); 'Quanzhou Public Security Bureau DNA Reagent Consumables and Goods Procurement Project results announcement' (泉州市公安局DNA试剂耗材货物类采购项目结果公告), *China Government Procurement website* (中国政府采购网), 3 April 2019, [online](#); 'Announcement of public tender winning bid for the Procurement of Inspection Reagent Procurement Project in pilot county of Lushan County Public Security Bureau, Sichuan' (四川省雅安市芦山县公安局男性家族排查系统建设试点县检验用试剂采购项目公开招中标公告), *Lushan County People's Government Network* (芦山县人民政府网), 3 January 2019, [online](#); 'VeriFiler Plus PCR amplification kit: (VeriFiler Plus PCR扩增试剂盒), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#); 'YFiler Platinum PCR amplification kit' (YFiler Platinum PCR扩增试剂盒), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#); Thermo Fisher (China), 'Huaxia Platinum PCR amplification kit: A new generation STR reagent kit that satisfies the identification needs of the Chinese people' (华夏白金PCR扩增试剂盒: 满足中国人群和亲子鉴定新一代STR试剂盒), Thermo Fisher Human Identification Division *WeChat*, 26 April 2016, [online](#); 'Huaxia™ Platinum PCR Amplification Kit' (华夏™白金PCR扩增试剂盒), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#); 'Changle District Public Security Bureau male family screening system construction personnel inspection reagent project' (长乐区公安局男性家族排查系统建设人员检验试剂项目), *Fujian Provincial Government Procurement Network* (福建省政府采购网), 6 January 2020, [online](#); 'Announcement of public tender winning bid for the Procurement of Inspection Reagent Procurement Project in Pilot County of Lushan County Public Security Bureau, Sichuan' (四川省雅安市芦山县公安局男性家族排查系统建设试点县检验用试剂采购项目公开招中标公告), *Sichuan Government Procurement Network* (四川政府采购网), 2 January 2019, [online](#); 'Luyi County Public Security Bureau "Y" database construction and purchase DNA room inspection consumables project publicity results' (鹿邑县公安局"Y"数据库建设和购买DNA室检验耗材项目中标结果公示), *China Government Procurement website* (中国政府采购网), 10 May 2019, [online](#); 'Announcement of Minquan County Public Security Bureau on Minquan County Public Security Bureau's winning the bid of Equipment Purchase Project of Political and Legal Transfer Funds in 2019' (民权县公安局关于民权县公安局2019年度政法转移支付资金采购项目中标公告), *Henan Provincial Government Procurement Network* (河南省政府采购网), 15 November 2019, [online](#); 'Announcement of public procurement of reagent consumables and technical services for construction of DNA "Y" database of Nanyang Public Security Bureau' (南阳市公安局DNA"Y"数据库建设试剂耗材及技术务公开招标政府采购中标公告), *Nanyang Government Procurement Center* (南阳市政府采购中心), 18 November 2016, [online](#); 'Jiyuan City Public Security Bureau Y database construction technology service project transaction result announcement' (济源市公安局Y数据库建设技术务项目成交结果公告), *Henan Tendering Network* (河南招标网), 6 June 2019, [online](#); 'Announcement on winning the bid of "Y" Database Construction Kit and Consumables Purchase Project of Public Security Bureau of Xinmi City, Henan Province' (河南省新密市公安局"Y"数据库建设试剂盒及耗材购置项目中标公告), *Yilian Instrument Network* (易联器械网), 16 November 2018, [online](#); 'Yichuan County Public Security Bureau 2018 Y Family Reagent Consumables Procurement Project winning results announcement' (伊川县公安局2018年Y家系试剂耗材采购项目中标结果公告), *Bidcenter.com.cn* (采招网), 30 January 2019, [online](#); 'Ningxia Hui Autonomous Region Public Security Department's 2019 DNA Reagent Procurement Project winning announcement' (宁夏回族自治区公安厅2019年DNA试剂采购项目中标公告), *China Government Procurement website* (中国政府采购网), 27 May 2019, [online](#); 'Nanchang City Level Nanchang Chenhui Tendering and Consulting Service Co. Ltd about Nanchang City Public Security Bureau Criminal Investigation Detachment—2018 Y Database Construction Procurement Project (tender number: NCCH2018-G0241) electronic public bidding winning announcement' (南昌市本级)南昌市晨晖招投标咨询有限公司关于南昌市公安局刑事侦查支队-2018年Y数据库建设采购项目(招标编号: NCCH2018-G0241)电子化公开招中标公告), *Jiangxi Government Procurement Network* (江西政府采购网), 31 May 2019, [online](#); 'Announcement on the public bidding winning of the sample inspection project for the construction of the male family inspection system of the Lu'an Public Security Bureau' (六安市公安局男性家族排查系统建设样本检验项目(第二次)公开招中标公告), *Lu'an City Government Procurement Center* (六安市政府采购中心), 31 July 2019, [online](#).

Acronyms and abbreviations

CODIS	Combined DNA Index System
DNA	Deoxyribonucleic acid
STR	Short tandem repeat
UN	United Nations

Notes

- 1 'Hubei Yunxi police helped to solved a 20-year-old man's duplicated household registration issue' (湖北郧西警方帮重户20年男子处理户籍问题), *Renmin Net* (人民网湖北频道), 18 November 2019, at [online](#).
- 2 In his February 2019 report to the 40th session of the Human Rights Council, the Special Rapporteur on the right to privacy, Professor Joseph Cannataci, stated: 'A question before the Special Rapporteur is whether it is necessary and proportionate for the entire population of a given country to have its DNA data collected. The Special Rapporteur's mandate will be engaging about these with States legislating such measures.' In comments made in 2018 concerning the 'unusually high number' of individuals whose DNA samples were in Northern Ireland's police DNA database, the Special Rapporteur noted that he 'support[ed] the recommendations made by the Northern Ireland Human Rights Commission with a view that the retention of that data is strictly done based on the principles of necessity and proportionality.' See *Report of the Special Rapporteur on the right of privacy*, Human Rights Council, UN, 27 February 2019, [online](#), and *End of mission statement of the Special Rapporteur on the right to privacy at the conclusion of his mission to the United Kingdom of Great Britain and Northern Ireland*, Office of the High Commissioner for Human Rights, UN, 29 June 2018, [online](#).
- 3 Li Sheng (李盛), 'Thoughts on building a next generation DNA database' (关于下一代DNA数据库构建的思考), *Forensic Science and Technology* (刑事技术), 2013, 38(1):49–51, [online](#).
- 4 'China: Police DNA database threatens privacy', *Human Rights Watch*, 15 May 2017, [online](#).
- 5 Tenzin Dalha, 'Beijing's export of surveillance technology', *Modern Diplomacy*, 7 January 2020, [online](#); Xinhua, 'Basic completion of free physicals for urban and rural residents in Tibet—reaches 3 million people' (西藏城乡居民免费健康体检基本完成惠及300余万人口), Embassy of the People's Republic of China in Canada, 6 December 2012, [online](#); 'Dang Xiong County, Lhasa City, organises free physicals for monks and nuns' (西藏拉萨市当雄县组织寺庙尼姑进行免费健康体检), *China Tibet Net* (中国西藏网), 23 November 2018, [online](#); Xinhua, 'Tibet continues to offer free physicals for seven years in row reaching 3 million people' (西藏连续七年开展免费体检惠及300万人), *Xinhuanet* (新华网), 7 April 2018, [online](#).
- 6 'Xinjiang National Health Checkup: Cover the last mile and benefit the furthest family' (新疆全民健康体检：覆盖最后一公里惠及最远一家人), *Xinhuanet* (新华网), 9 February 2019, [online](#); 'Free medical examination for all people in Xinjiang is gradually normalised' (新疆全民免费体检逐步实现常态化), *Xinhuanet* (新华网), 24 January 2018, [online](#); 'Xinjiang Kashi City promotes free health check-ups for all people' (新疆喀什市推进全民免费健康体检), *Renmin Net* (人民网), 12 December 2017, [online](#); 'Xinjiang has carried out 53.83 million free health examinations in three years' (新疆三年开展免费健康体检5383万人次), *Government of China Web* (中国政府网), 4 July 2019, [online](#); 'China: Minority region collects DNA from millions', *Human Rights Watch*, 13 December 2017, [online](#).
- 7 'China: Police DNA database threatens privacy: 40 million profiled includes dissidents, migrants, Muslim Uyghurs', *Human Rights Watch*, 15 May 2017, [online](#); 'China's algorithms of repression', *Human Rights Watch*, 1 May 2019, [online](#); Sui-Lee Wee, Paul Mozur, 'China uses DNA to map faces, with help from the West', *The New York Times*, 3 December 2019, [online](#).
- 8 Paul Mozur, 'How China uses high-tech surveillance to subdue minorities', *The NNew York Times*, 22 May 2019, [online](#).
- 9 Darren Byler, 'China's government has ordered a million citizens to occupy Uighur homes. Here's what they think they're doing', *ChinaFile*, 24 October 2018, [online](#); 'China: No end to Tibet surveillance program', *Human Rights Watch*, 18 January 2016, [online](#).
- 10 'Male citizens blood sample collection in Guanwen Town in full swing' (关文镇农村男性公民血样采集在行动), *Xi Chong County Government Web* (西充县人民政府网), 6 March 2020, at [online](#); 'Xinhao township convenes training meeting for the construction of male ancestry identification system', (新韶镇召开男性家族排查系统建设培训会议), Shaoguan Zhenjiang District Xinhao Township People's Government (韶关市浈江区新韶镇人民政府), 16 April 2020, [online](#).
- 11 State Council (国务院), 'PRC Regulation on the Management of Human Genetic Resources' (中华人民共和国人类遗传资源管理条例), Chinese Government website (中华人民共和国中央人民政府), 10 June 2019, [online](#).
- 12 Li Sheng (李盛), 'Thoughts on building a next generation DNA database' (关于下一代DNA数据库构建的思考), *Forensic Science and Technology* (刑事技术), 2013, 38(1):49–51, [online](#).
- 13 Tao Xiaolan, Liu Xianhai (陶晓岚, 刘贤海), 'Current situation of our Y-chromosome DNA database, and lesson and suggestions for Gansu police work' (DNA Y数据库国内发展现状及其对甘肃公安工作的借鉴意义), *Journal of the Gansu Police Vocational Academy* (甘肃警察职业学院学报), 2017, 15(4):51–53, [online](#).
- 14 'The Criminal Investigation Bureau of the Chinese Academy of Sciences made an experienced introduction at the onsite promotion meeting for the construction of the Y-STR DNA database' (厅刑侦局在全国Y-STR DNA数据库建设现场推进会上作经验介绍), Shaanxi Public Security Party Construction Youth League (陕西公安党建青联), 10 November 2017, [online](#).
- 15 These administrative regions (provinces, autonomous regions or directly administered municipalities) include Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Inner Mongolia, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan and Zhejiang.
- 16 Tao Xiaolan, Liu Xianhai (陶晓岚, 刘贤海), 'The domestic development status of Y-DNA database in China and its reference significance of Gansu public security practice' (DNA Y数据库国内发展现状及其对甘肃公安工作的借鉴意义), *Journal of Gansu Police Vocational College* (甘肃警察职业学院学报), December 2017, 15(4):51, [online](#).
- 17 Melissa Gymrek, Amy L McGuire, David Golan, Eran Halperin, Yaniv Erlich, 'Identifying personal genomes by surname inference', *Science*, 2013, 339(6117):321–324, [online](#); Cheng-Min Shi, Changzhen Li, Liang Ma, Zhendiao Zhou, Jiang-Wei Yan, Hua Chen, 'Inferring Chinese surnames with Y-STR profiles', *Forensic Science International: Genetics*, 2018, 33:66–71, [online](#).
- 18 Heather Dewey-Hagborg, 'After genetic privacy: an interview with Yaniv Erlich', *The Winnower*, 29 March 2015, [online](#).
- 19 Tao Xiaolan, Liu Xianhai (陶晓岚, 刘贤海), 'The domestic development status of Y-DNA database in China and its reference significance of Gansu public security practice' (DNA Y数据库国内发展现状及其对甘肃公安工作的借鉴意义), *Journal of Gansu Police Vocational College* (甘肃警察职业学院学报), December 2017, 15(4):51, [online](#).
- 20 Bethany Allen-Ebrahimian, *Exposed: China's operating manuals for mass internment and arrest by algorithm*, International Consortium of Investigative Journalists, 24 November 2019, [online](#).
- 21 Austin Ramzy, 'How China tracked detainees and their families', *The NNew York Times*, 17 February 2020, [online](#).
- 22 Austin Ramzy, Chris Buckley, '“Absolutely no mercy”: Leaked files expose how China organized mass detentions of Muslims', *The New York Times*, 16 November 2020, [online](#).
- 23 Lily Kuo, '“The last time I saw Granny Pu”: 85-year-old mother of Chinese dissident seized by police', *The Guardian UK*, 20 December 2018, [online](#).
- 24 Mimi Lau, '“Shackled, isolated and beaten”: how one child became a victim of China's 709 crackdown on rights lawyers', *South China Morning Post*, 9 July 2018, [online](#).

- 25 Stuart Leavenworth, 'Chinese dissident Chang Ping says brothers "abducted" over letter criticising president', *The Guardian UK*, 28 March 2016, [online](#).
- 26 Nathan Vanderklippe, 'Guilty by association: China targets relatives of dissident exiled in Canada', *The Globe and Mail*, 11 January 2017, [online](#).
- 27 Yue Qu, Dat Tran, Wanlin Ma, 'Deep learning approach to biogeographical ancestry inference', *Procedia Computer Science*, 2019, 159:552–556, [online](#).
- 28 Lisa Gannett, 'Biogeographical ancestry and race', *Studies in History and Philosophy of Biological and Biomedical Sciences*, 47 (2014):173–184, [online](#).
- 29 See, for example, Mengge Wang, Zheng Wang, Guanglin He, Zhenjun Jia, Jing Liu, Yiping Hou, 'Genetic characteristics and phylogenetic analysis of three Chinese ethnic groups using Huaxia Platinum system', *Scientific Reports*, 2018, 8(2429):1–8, [online](#); Pengyu Chen, Biao Wang, Bo Gao, Guanglin He, 'Forensic features and genetic structure of 23 autosomal STRs in Artux Turkic-speaking population residing in southwestern Xinjiang Uyghur Autonomous Region', *International Journal of Legal Medicine*, 2019, 133, [online](#).
- 30 See, for example, PM Schneider, B Prainsack, M Kayser, 'The use of forensic DNA phenotyping in predicting appearance and biogeographic ancestry', *Deutsches Ärzteblatt International*, 2019, 116, [online](#).
- 31 Yang Xin, 'Idiosyncratic inheritance of SNP locus among Tibetan groups in low oxygen environments' (藏族人群低氧诱导因子特异性SNP位点遗传多态性), Thermo Fisher (China), 2016, [online](#); Jessica Batke, "'This is not forensic genetics anymore. This is surveillance.'" A Q&A with Yves Moreau on DNA profiling in Xinjiang and corporate ethics', *ChinaFile*, 18 March 2020, [online](#); Yves Moreau, 'Crack down on genomic surveillance', *Nature*, 3 December 2019, [online](#); 'Uighurs and genetic surveillance in China', *NPR*, 7 December 2019, [online](#).
- 32 Thermo Fisher (China), 'Huaxia Platinum PCR amplification kit: A new generation STR reagent kit that satisfies the identification needs of the Chinese people' (华夏白金PCR扩增试剂盒: 满足中国人群和亲子鉴定新一代STR试剂盒), *Thermo Fisher Human Identification Division Weixin Channel*, 26 April 2016, [online](#); Peoplespot (基点认知), 'Goldeneye DNA forensic identification system' (Goldeneye®DNA身份鉴定系统 Y-ADD), Weixin, 1 May 2020, [online](#); 'Snapshot of the forensic DNA identification market' (法医DNA检测行业全景图), Ping An Securities Ltd, 6 October 2016, [online](#).
- 33 Emile Dirks, Sarah Cook, 'China's surveillance state has tens of millions of new targets', *Foreign Policy*, 21 October 2019, [online](#).
- 34 'China's Sharp Eyes surveillance system puts the security focus on public shaming', *South China Morning Post*, 30 October 2018, [online](#).
- 35 'Attention Hanjiang males, someone may be going to be called to do this soon' (湘江男性注意最近部分人可能要被叫去干这事), *Puxian Net* (莆仙网), 14 April 2019, [online](#).
- 36 'Hubei Yunxi police helped to solved a 20-year-old man's duplicated household registration issue' (湖北郧西警方帮重户20年男子处理户籍问题), *Renmin Net* (人民网湖北频道), 18 November 2019, [online](#).
- 37 Michael Kayser, 'Forensic use of Y-chromosome DNA: a general overview', *Human Genetics*, 2017, 136:621–635, [online](#).
- 38 Nicola Staitia, Fabiano Gentile, Elena Pillib, Giampietro Lagoa, 'The Yara Gambirasio case: Collection strategy and mass screening used to find the perpetrator DNA in a difficult scenario', *Forensic Science International: Genetics Supplement Series*, 2019, 7(1):444–446, [online](#).
- 39 *DNA databases and human rights*, Forensic Genetics Policy Initiative, 2014, [online](#).
- 40 *Human rights compatibility of the establishment of a DNA database*, Irish Council for Civil Liberties, October 2013, [online](#).
- 41 'ACLU slams mass DNA collection', *CBS*, 10 January 2005, [online](#).
- 42 'China: Voice biometric collection threatens privacy: police, AI giant collaboration in legal gray area', *Human Rights Watch*, 22 October 2017, [online](#); 'China's algorithms of repression: reverse engineering a Xinjiang police mass surveillance app', *Human Rights Watch*, 1 May 2019, [online](#).
- 43 'Pujiang Police went to the jurisdiction to carry out blood collection work' (浦江县公安局白马派出所到辖区开展血液采集工作), *Pujiang Police* (浦江公安), 28 September 2018.
- 44 'This elementary school in Nanzheng District has launched the collection of student DNA samples' (南郑区这个小学·开展了学生DNA样本采集), *Eastday* (东方资讯网), 12 October 2019, [online](#).
- 45 'Changtai: Blood collection notice' (长泰: 采血通告), *Soho* (搜狐网), 20 April 2019, [online](#).
- 46 'Shuangshan second public security bureau strongly promotes the construction of Y-bank' (双山二所强力推进Y库建设工作), *Meipian* (美篇网), 22 November 2018, [online](#).
- 47 'Qianjian town police collect blood samples from Yeying Village' (汉涧镇派出所到叶营村男性家族排查血样采集), *Tianchang Pioneer Network* (天长先锋网), 12 December 2018, [online](#).
- 48 'Bulletin on the progress of collection of blood samples from male families' (男性家族血样采集工作进展情况通报), *Meipian* (美篇网), 5 November 2018, [online](#).
- 49 'Bulletin of the Public Security Bureau of Leting County male family investigation system' (乐亭县公安局男性家族排查系统建设工作情况通报), *Meipian* (美篇网) 2 December 2019, [online](#).
- 50 'Tender announcement of Xian'an District Male Family Investigation System Construction (Y-DNA Bank) Project' (咸安区男性家族排查系统建设(Y库)项目招标公告), *Xian'an District Public Resources Electronic Trading Platform* (咸安区公共资源电子交易平台), 27 November 2019, [online](#).
- 51 Since the late 2000s, the Ministry of Public Security has operated a DNA database focused on missing or trafficked children. Five categories of people have their DNA data added to this database: 1) parents whose children have been trafficked; 2) parents of lost children who voluntarily request to have their own data added; 3) children who have been returned to their families after having been trafficked; 4) children whose backgrounds are unclear to authorities and who are suspected of being trafficked; and 5) children whose backgrounds are unclear and who are homeless or begging. This particular database enjoys broad popular support and extensive media coverage. However, the current mass collection of Y-STR data is targeting boys and men who don't fit into any of those categories. There is therefore little evidence that the current Y-STR data collection is specifically aimed at addressing the problem of missing or trafficked children. See 'Ministry of Public Security builds abducted DNA database wanted 50', (公安部建成打拐DNA数据库通缉50名人贩), *Sina*, 20 May 2009, [online](#).
- 52 'This elementary school in Nanzheng District has launched the collection of student DNA samples' (南郑区这个小学·开展了学生DNA样本采集), *Eastday* (东方资讯网), 12 October 2019, [online](#).
- 53 'Shigu Junior High School actively cooperates with the public security police to do a good job of collecting DNA samples from teenagers' (师古初中积极配合公安民警做好青少年DNA样本采集工作), *People's Government of Shifang City Web* (什邡市人民政府网), 12 September 2019, [online](#); Sina Weibo search result of 'student, blood collection' (新浪微博搜索: 学生 采血), *Sina Weibo*, [online](#).
- 54 'Actively cooperate with students in collecting DNA samples' (积极配合做好学生DNA样本信息采集工作), *Dongxi Primary School Web* (东溪小学王网), 14 November 2018, [online](#).
- 55 'County Experimental Primary School seriously cooperates with the development of student DNA sample information collection' (县实验小学认真配合开展学生DNA样本信息采集工作), *Zhuxi County People's Government Web* (竹溪县人民政府), 13 June 2019, [online](#); 'Baisanguan Town Police Station went to school to collect blood samples of boys' (白桑关镇派出所到学校采集男生血样), *Yunyang Net* (鄢阳网), 11 April 2019, [online](#); 'Zhuxi Shixiao earnestly cooperates with the development of information collection of student DNA samples' (竹溪实验小学

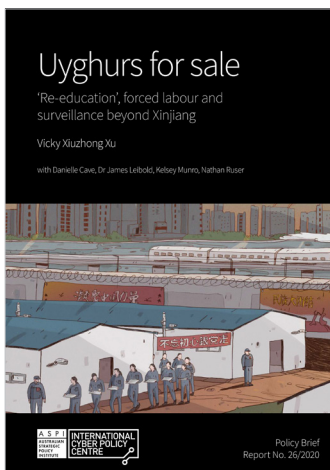
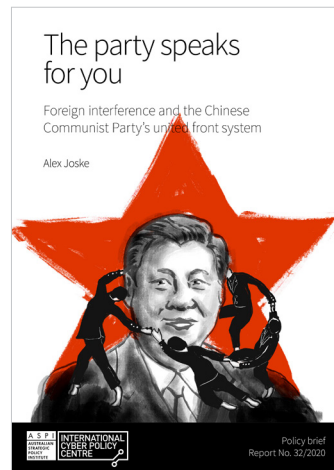
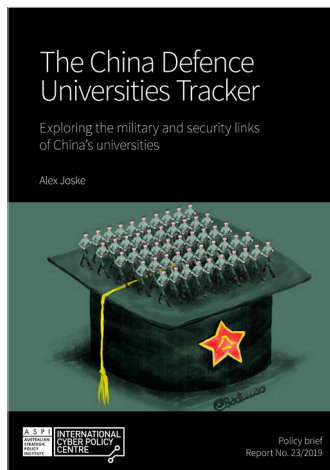
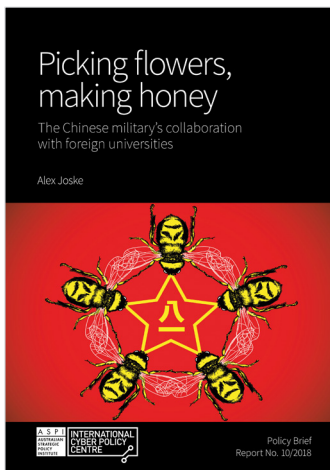
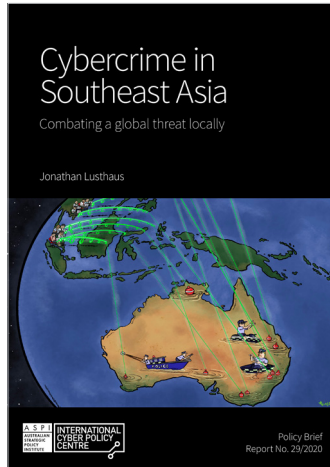
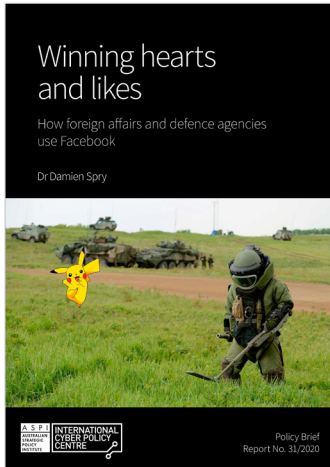
- 配合开展学生DNA样本信息采集工作), *aisy.com* (爱十堰), 12 June 2019, [online](#); 'Fang County Hongta Town Police Station launched blood DNA sample collection work' (房县红塔镇派出所开展血液DNA样本采集工作), *10yan.com* (秦楚网), [online](#); 'Safety management: Nine-year standard school in Shangjin Town actively cooperates with DNA information collection' (安全管理: 上津镇九年一贯制学校积极配合做好DNA信息采集工作), Nine-year Standard School in Shangjin Town *WeChat* account (上津镇九年一贯制学校), 22 March 2019, [online](#).
- 56 'The police from Nanyang Police Station came to our school to collect blood samples of some students to establish a human gene Y library' (南阳派出所民警到我校采集部分学生血样以建立人体基因Y库), Shouning Education Bureau (寿宁教育局), 23 December 2019, [online](#); 'Jianou City Dongyou Center Health Center collected blood from primary and secondary schools' (建瓯市东游中心卫生院进入中小学进行血样采集), *Meipian* (美篇网), 14 November 2019, [online](#).
- 57 'Chen Yaohu Police Station entered the campus to carry out anti-drug publicity activities' (陈瑶湖派出所进校园开展禁毒宣传活动), Tongling Suburban Garden Junior High School (铜陵市郊区花园初级中学), 24 June 2019, [online](#).
- 58 'Xiabaishi Police Station vigorously develops the male family investigation system' (下白石派出所大力开展男性家族排查系统建设工作), *Gugang Huangqi WeChat* (古港黄崎), 4 June 2019, [online](#).
- 59 'Notice on cooperating with the establishment of a national male family investigation system' (关于配合全国男性家族排查系统建设通知), *Mian Country Wuhou Middle School Web* (勉县武侯中学网), 22 March 2019, [online](#).
- 60 Wenxin Fan, Natasha Khan, Liza Lin, 'China snares innocent and guilty alike to build world's biggest DNA database', *Wall Street Journal*, 26 December 2017, [online](#).
- 61 Convention on the Rights of the Child, Office of the High Commissioner for Human Rights, UN, 20 November 1989, [online](#).
- 62 Hui Ting Hua, Chen Shaoheng, Wang Mingxia, 'The exploration and application of warehousing management of blood samples for violating criminals' (违法犯罪嫌疑人建库血样仓储式管理的探索及应用), *Forensic Science and Technology*, 2014, 39(4):62–63, [online](#); Ge Baichun, Peng Jianxiang, Liu Bing, 'The tactics system and capacity-building of national DNA database' (DNA数据库实战应用战法体系与能力建设研究), *Forensic Science and Technology*, 2016, 41(4):259–264, [online](#).
- 63 'Frequently asked questions on CODIS and NDIS', Federal Bureau of Investigation, Washington DC, [online](#).
- 64 Ge Jianye, Yan Jiang-Wei, Xie Qun, Sun Hong-yu, 'Development of Chinese forensic Y-STR DNA database' (中国Y-STR数据库建设相关问题探讨), *Journal of Forensic Medicine* (法医学杂志), 2013, 29:212–221, [online](#); Ge Jianye, Sun Hongyu, Li Haiyan, Liu Chao, Yan Jiangwei, Bruce Budowle, 'Future directions of forensic DNA databases', *Croatian Medical Journal*, 55 (2014): 163–166.
- 65 Greg Walton, *China's Golden Shield: corporations and the development of surveillance technology in the People's Republic of China*, International Centre for Human Rights and Democratic Development, 2001, [online](#).
- 66 'Fenyang City Public Security Bureau, "one hundred million" maintenance and control inspection and remediation activities' (汾阳市公安局"百千万"维稳管控排查整治活动), *Meipian* (美篇网) · 4 August 2018, [online](#).
- 67 'Male citizens blood sample collection in Guanwen Town in action' (关文镇农村男性公民血样采集在行动), Xi Chong County Government (西充县人民政府网), 6 March 2020, [online](#).
- 68 Charles Rollet, 'China public video surveillance guide: from Skynet to Sharp Eyes', *IPVM*, 14 June 2018, [online](#); Josh Rudolph, 'Sharper eyes: surveilling the surveillers', *China Digital Times*, 9 September 2019, [online](#).
- 69 'Anke Bio: The company's genetic forensic testing business plays a huge role in maintaining public safety' (安科生物: 公司基因法医检测业务对维护公共安全发挥巨大作用), *Sohu* (搜狐网), 30 August 2018, [online](#).
- 70 Paul Mozur, 'Inside China's dystopian dreams: AI, shame and lots of cameras', *The New York Times*, 8 June 2018, [online](#).
- 71 'Snapshot of the forensic DNA identification market' (法医DNA检测行业全景图), Ping An Securities Ltd, 6 October 2016, [online](#).
- 72 Gryphon Scientific, *China's biotechnology development: the role of US and other foreign engagement*, US–China Economic and Security Review Commission, Washington DC, 14 February 2019, [online](#).
- 73 Wuxi AGCU Biotechnology Co. Ltd (无锡中德美联生物技术有限公司), [online](#).
- 74 Anhui Anke Bioengineering (Group) Co. Ltd (安徽安科生物工程(集团)股份有限公司), [online](#).
- 75 Baidu, 'Zheng Weiguo', *Baidu Baike*, 7 May 2020, [online](#); 'Weiguo Zheng', Bloomberg Company, 6 May 2020, [online](#); 'Publication of the 2017 Wuxi "Honourable City Resident" candidate list, ("2017年无锡市"荣誉市民"候选人公示)', *Wuxi News Media* (无锡新传媒网), 25 July 2017, [online](#).
- 76 'Zheng Weiguo, Chairman of AGCU, was awarded the "Seventh China Overseas Chinese Contribution Award" and became Wuxi's only overseas Chinese award winner' (中德美联董事长郑卫国荣膺"第七届中国侨界贡献奖"·成为无锡市唯一获奖华侨), *Anke Bio* (安科生物), 29 August 2018, [online](#).
- 77 Anke Bioengineering (安科生物), 'Zheng Weiguo, Chairman of AGCU, was awarded the "Seventh China Overseas Chinese Contribution Award" and became Wuxi's only overseas Chinese award winner' (中德美联董事长郑卫国荣膺"第七届中国侨界贡献奖"·成为无锡市唯一获奖华侨), *Anke Weixin*, 29 May 2018, [online](#); 'Publication of the 2017 Wuxi "Honourable City Resident" candidate list' ("2017年无锡市"荣誉市民"候选人公示"), *Wuxi News Media* (无锡新传媒网), 25 July 2017, [online](#).
- 78 Chen Lin, Zheng Weihong, Wang Liuliu, Zhang Ke, Geng Xuelei, Shi Minghao, Zhang Lei, Mei Xinglin, Zheng Weiguo, 'Fluorescence labelling multiplex amplification kit for 35 STR loci of human Y chromosome and application thereof' (人类Y染色体35个STR基因座的荧光标记复合扩增试剂盒及其应用), *Google Patents*, 31 December 2019, [online](#); Chen Lin, Zheng Weihong, Wang Liuliu, Zhang Ke, Geng Xuelei, Liu Yong, Li Fayuan, Guo Yulin, Zheng Weiguo, 'Composite amplification kit for simultaneously detecting autosomal and Y chromosome STR loci' (一种同时检测常染色体和Y染色体STR基因座的复合扩增试剂盒), *Google Patents*, 8 November 2019, [online](#); Guo Zhuoming, Wang Lin, He Weiyong, Hong Qiang, He Xiaoyong, Mei Xinglin, Guo Yulin, Xia Zifang, Zheng Weiguo, 'Composite amplification reagent kit that is a kind of while detecting 32 Y chromosome locus', *Google Patents*, 7 June 2019, [online](#); Zhou Ruhua, Shi Yunjie, Zhang Jian, Wang Xin, Chen Weizhong, Chen Jingjing, Cui Yang, Qin Dongmei, Liu Yong, Li Fayuan, Guo Yulin, Xia Zifang, 'Composite amplification kit for simultaneously detecting autosomal and Y chromosome STR loci' (一种同时检测常染色体和Y染色体STR基因座的复合扩增试剂盒), *Google Patents*, 23 August 2019, [online](#); Yin Jianying, Zhao Yang, Chen Shuiqin, Feng Rui, Li Qiong, Zhao Lin, Fu Yong, Zheng Weiguo, Shi Minghao, Zhang Lei, Wang Gao, Chen Linli, 'Human Y chromosome STR locus and InDel site fluorescent labelling composite amplification kit and application thereof' (人类Y染色体STR基因座和InDel位点的荧光标记复合扩增试剂盒及其应用), *Google Patents*, 13 December 2019, [online](#).
- 79 Dou Shicong, 'Anke Biotech unit will act as legal medicine agent for US gene sequencing giant in China', *Yicai Global*, 8 March 2018, [online](#).
- 80 'AGCU debuts at the International Police Equipment Expo with MiSeq FGx System and portable nucleic acid detection box' (中德美联携MiSeq FGx System·便携式核酸检测箱首次亮相国际警用装备博览会), *Anke Bio* (安科生物官方网站), 23 May 2018, [online](#); 'AGCU appears at the 8th China (Beijing) International Police Equipment and Anti-Terrorism Technical Equipment Exhibition' (中德美联亮相第八届中国(北京)国际警用装备及反恐技术装备展览会), *Anke Bio* (安科生物官方网站), 3 June 2019, [online](#).
- 81 'Huada Judicial brand image optimization' (华大司法品牌形象优化), *Rologo Flag Republic WeChat* (Rologo志共和国微信), 25 July 2019, [online](#).

- 82 'Xi'an Public Security and Xi'an BGI signed a strategic cooperation agreement' (西安公安与西安华大基因签署战略合作协议), Xi'an Public Security *WeChat* (西安公安微信), 1 August 2018, [online](#).
- 83 'Announcement on winning bid for the second public purchase bidding of male family inspection service of Langzhong Public Security Bureau, Nanchong City, Sichuan Province' (四川省南充市阆中市公安局男性家族排查检验务第二次采购公开招标公告), *Sichuan Government Procurement Information* (四川政府采购信息网站), 23 August 2019, [online](#); 'Announcement on the results of the male family screening system and the autosomal DNA database construction project' (男性家族排查系统及常染色体DNA数据库建设项目结果公告), *China Government Procurement Network* (中国政府采购网), [online](#); 'Sanming City Male Family Inspection System Construction Reagent Consumable Goods Procurement Project' (三明市男性家族排查系统建设试剂耗材货物类采购项目), *China Medical Tendering Network* (中国医疗招标网), 27 March 2020, [online](#).
- 84 Shi Yinglun, 'Sino-Kazakh genetic lab opens in Nur-sultan', *Xinhua*, 5 December 2019, [online](#).
- 85 'Announcement of the blood sample test service project of the male family screening system of Yingshang County Public Security Bureau' (颍上县公安局男性家族排查系统血样检测项目公示), *Bidcenter* (采招网), 18 October 2019, [online](#).
- 86 'Qiannan Prefecture Public Security Bureau Procurement of Qiannan Prefecture Y-STR DNA Database Construction Service Project winning bid (deal) announcement' (黔南州公安局采购黔南州Y-STR DNA数据库建设服务项目中(成交)公告), *Guizhou Provincial Government Procurement Network* (贵州省政府采购网), 10 April 2019, [online](#).
- 87 'YSTR database application system' (YSTR数据库应用系统), *Hisign Technology* (北京海鑫科金高科技股份有限公司网), [online](#).
- 88 'A Ministry of Public Security contest won 10 awards. What did this 21-year-old security company do right?' (一场公安部竞赛·获十项大奖·这家21年的老牌安企做对了什么?), *AI Nuggets WeChat* (AI掘金志微信), 24 December 2019, [online](#).
- 89 'A Ministry of Public Security contest won 10 awards. What did this 21-year-old security company do right?' (一场公安部竞赛·获十项大奖·这家21年的老牌安企做对了什么?), *AI Nuggets WeChat* (AI掘金志微信), 24 December 2019, [online](#); 'Igniting the 'Chinese Fingerprint Dream'—Haixin Kejin's new generation "cloud intelligent multi-biological recognition system HABIS X" new product release and application seminar' (燃起'中国纹梦'—海鑫科金新一代「云智能多生物识别系统 HABIS X新品发布暨应用研讨会」), *Geekpark* (极客公园), 30 January 2018, [online](#); '2018 annual financial report of Beijing Hisign Hi-Tech Fingerprint Technology Co. Ltd' (北京海鑫科金高科技股份有限公司2018年度报告), [online](#); 'Haixin Kejin: Typical application of gene recognition' (海鑫科金|基因识别典型应用), Biometrics Subcommittee (生物特征识别分委会), 25 August 2019, [online](#); 'Starting from technology research and development, after 20 years of deep cultivation, Haixin Kejin is transforming into a high-tech data service company' (技术研发起家·深耕二十年·海鑫科金正在蜕变成一家高科技数据服务企业), *Zhihu* (知乎网), 5 May 2017, [online](#).
- 90 'YSTR database application system' (YSTR数据库应用系统), *Hisign Technology* (北京海鑫科金高科技股份有限公司网), [online](#).
- 91 'Brief introduction to Thermo Fisher Scientific' (赛默飞世尔科技简介), Thermo Fisher (China), 7 May 2020, [online](#); *2019 annual report*, Thermo Fisher Scientific, [online](#).
- 92 Sui-Lee Wee, 'China uses DNA to track its people, with the help of American expertise', *The New York Times*, 21 February 2019, [online](#).
- 93 Sophie Richardson, 'Thermo Fisher's necessary, but insufficient, step in China', *Human Rights Watch*, 22 February 2019, [online](#).
- 94 'Forensic Science New Technology Application Summit Forum' (法庭科学新技术应用高峰论坛), *Bioon* (生物谷), 1 November 2017, [online](#).
- 95 VeriFiler Plus PCR amplification kit (VeriFiler Plus PCR扩增试剂盒), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#).
- 96 'Yfiler Platinum PCR amplification kit' (Yfiler Platinum PCR扩增试剂盒), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#).
- 97 'Dr Zhong Chang' (钟昌博士), *Tencent Video* (腾讯视频), 8 November 2017, [online](#).
- 98 'Huaxia Platinum PCR amplification kit: a new generation STR kit for Chinese population and paternity testing' (华夏白金PCR扩增试剂盒:满足中国人群和亲子鉴定的新一代STR试剂盒), Thermo Scientific HID Forensic Science *WeChat* (赛默飞世尔科技(中国)有限公司), 26 April 2016, [online](#); 'Huaxia™ Platinum PCR amplification kit' (华夏™白金PCR扩增试剂盒), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#).
- 99 'Announcement on results of procurement project for construction of reagents and analysis services for male families of Criminal Investigation Brigade, Mawei District Public Security Bureau of Fuzhou' (福州市马尾区公安局刑侦大队男性家系建设检验试剂及分析服务采购项目结果公告), *Fuzhou City Mawei District Government Procurement website* (福州市马尾区政府采购网), 27 November 2019, [online](#); 'Construction project of personnel inspection reagents used for male family tree screening system of Changle Police Department' (长乐区公安局男性家族排查系统建设人员检验试剂项目), *Fuzhou City Changle District Government Procurement website* (福州市长乐区政府采购网) 6 January 2020, [online](#); 'Announcement of Minhou Police Department Criminal Investigation Brigade on Minhou Male Family Tree Investigation System Construction Service Purchase Project Results' (闽侯县公安局刑侦大队关于闽侯男性家族排查系统建设务类采购项目结果公告), *China Government Procurement website* (中国政府采购网), 28 November 2018, [online](#); 'Announcement of the results of the government procurement service project for the construction of the male family tree screening system of the Zhangzhou City Police' (漳州市公安局男性家族排查系统建设务采购项目结果公告), *China Government Procurement website* (中国政府采购网), 12 April 2019, [online](#); 'Sample collection fee and case evidence inspection fees of the male family tree analysis' (男性家系人员采集样本检验费和案件物证检验费), *Fujian Provincial Government Procurement website* (福建省政府采购网), 01 February 2019, [online](#); 'Results announcement of Quanzhou police DNA Reagent Consumables and Goods Procurement Project' (泉州市公安局DNA试剂耗材货物类采购项目结果公告), *China Government Procurement website* (中国政府采购网), 3 April 2020, [online](#); 'Results announcement of construction the Male Family Tree Analysis Project of Fuqing Police' (福清市公安局男性家族建设项目结果公告), *Government Procurement Information Web* (政府采购信息网), 15 November 2019, [online](#).
- 100 'Luyi County Public Security Bureau "Y" database construction and purchase DNA room inspection consumables project publicity results' (鹿邑县公安局"Y"数据库建设和购买DNA室检验耗材项目中标结果公示), *China Government Procurement Website* (中国政府采购网), 10 May 2019, [online](#); 'Announcement of Minquan County Public Security Bureau on Minquan County Public Security Bureau's winning the bid of equipment purchase project of political and legal transfer funds in 2019' (民权县公安局关于民权县公安局2019年度政法转移支付资金装采购项目中标公告), *Henan Provincial Government Procurement website* (河南省政府采购网), 15 November 2019, [online](#); 'Announcement of public procurement of reagent consumables and technical services for construction of DNA "Y" database of Nanyang Public Security Bureau' (南阳市公安局DNA"Y"数据库建设试剂耗材及技术务公开招政府采购中标公告), *Nanyang Government Procurement Center* (南阳市政府采购中心), 18 November 2016, [online](#); 'Jiyuan City Public Security Bureau Y database construction technology service project transaction result announcement' (济源市公安局Y数据库建设技术务项目成交结果公告), *Henan Tendering website* (河南招标网), 6 June 2019, [online](#); 'Announcement on winning the bid of "Y" database construction kit and consumables purchase project of Public Security Bureau of Xinmi City, Henan Province' (河南省新密市公安局"Y"数据库建设试剂盒及耗材购置项目中标公告), *Yilian Instrument website* (易联器械网), 16 November 2018, [online](#); 'Yichuan County Public Security Bureau 2018 Y Family Reagent Consumables Procurement Project winning results announcement' (伊川县公安局2018年Y家系试剂耗材采购项目中标结果公告), *Bidcenter.com.cn* (采招网), 30 January 2019, [online](#); 'Ningxia Hui Autonomous Region Public Security Department's 2019 DNA reagent procurement project winning announcement' (宁夏回族自治区公安厅2019年DNA试剂采购项目中标公告), *China Government Procurement website* (中国政府采购网), 27 May 2019, [online](#); 'Nanchang

- City Level Nanchang Chenhui Tendering and Consulting Service Co. Ltd about Nanchang City Public Security Bureau Criminal Investigation Detachment—2018 Y Database Construction Procurement Project (tender number: NCCH2018-G0241) electronic public bidding winning announcement' (南昌市本级)南昌市晨晖招投标咨询有限公司关于南昌市公安局刑事侦查支队-2018年Y数据库建设采购项目(招标编号: NCCH2018-G0241)电子化公开招中公告), *Jiangxi Government Procurement* website (江西政府采购网), 31 May 2019, [online](#); '(Second) announcement on the public bidding winning announcement of the sample inspection project for the construction of the male family inspection system of the Lu'an Public Security Bureau' (六安市公安局男性家族排查系统建设样本检验项目(第二次)公开招中公告), *Lu'an City Government Procurement Center* (六安市政府采购中心), 31 July 2019, [online](#).
- 101 'China: Minority region collects DNA from millions', *Human Rights Watch*, 13 December 2017, [online](#). Thermo Fisher has publicly noted: '[W]e recognize the importance of considering how our products and services are used—or may be used—by our customers.' See Sophie Richardson, 'Thermo Fisher's necessary, but insufficient, step in China', *Human Rights Watch*, 22 February 2019, [online](#).
- 102 'Board member biography: Gianluca Pettiti', Thermo Fisher Scientific, [online](#).
- 103 'Entering the "biological giant" in the free trade zone' (走进自贸区里的"生物巨人"), Thermo Fisher (China) (赛默飞世尔科技(中国)有限公司), [online](#).
- 104 'Take a look at Thermo Fisher's forensic science product line with Lisa Calandro' (和Lisa Calandro一起纵览赛默飞法庭科学产品线), Thermo Scientific HID Forensic Science *WeChat* (赛默飞HID法庭科学微信), 26 June 2018, [online](#).
- 105 State Council (国务院), 'PRC Regulation on the Management of Human Genetic Resources' (中华人民共和国人类遗传资源管理条例), Chinese Government (中华人民共和国中央人民政府), 10 June 2019, [online](#).
- 106 HM Wallace, AR Jackson, J Gruber, AD Thibedeau, 'Forensic DNA databases: ethical and legal standards: a global review', *Egyptian Journal of Forensic Sciences*, 2014, 4:57–63. See also the Forensic Genetics Policy Initiative's website, [online](#).
- 107 Universal Declaration on the Human Genome and Human Rights, UNESCO, 11 November 1997, [online](#).
- 108 International Declaration on Human Genetic Data, UNESCO, 16 October 2003, [online](#).
- 109 International Covenant on Civil and Political Rights, Office of the High Commissioner for Human Rights, UN, 16 December 1966, [online](#).
- 110 Convention on the Rights of the Child, Office of the High Commissioner for Human Rights, UN, 20 November 1989, [online](#).
- 111 'Criminal Procedure Law of the People's Republic of China' (中华人民共和国刑事诉讼法), *People's Daily* (人民日报), 24 January 2019, [online](#).
- 112 Qiu Gepin (邱格屏) 'An analysis of gene privacy of criminal DNA database' (刑事DNA数据库的基因隐私权分析), *China Law Forum* (法学论坛), 2008, 23(1):37–43, [online](#); Chen Yumei (陈玉梅), 'Legal protection of the DNA databases gene privacy rights in China' (论我国DNA数据库基因隐私权的法律保护), *Social Sciences in Hunan* (湖南社会科学), 2015, 84–88, [online](#).
- 113 Liu Bing (刘冰), 'Several key issues for China national DNA database development' (现阶段我国DNA数据库发展的几个关键问题), *Forensic Science and Technology* (刑事技术), 2015, 40(4):318–323, [online](#).
- 114 'Expert believes the compulsory collection of DNA samples from thousands of male students following a theft at a Shandong University has no legal basis' (山东学校失窃数千男学生验DNA 专家指警方强采无法律依据), *Beijing Youth Daily* (北京青年报), 14 October 2013, [online](#).
- 115 Pei Yu (裴煜), 'Reflection on the application of Y-STR family investigation method in investigation' (Y-STR 家系排查法在侦查中应用的思考), *Journal of Hunan Police Academy* (湖南警察学院学报), 2018, 30(1):22–30, [online](#).
- 116 'Huanglu Town carried out the construction of a male family investigation system' (黄麓镇开展男性家族排查系统建设 家系调查和图谱绘制工作), Huang Lu *WeChat* (黄麓发布), 5 April 2018, [online](#); 'Xiabaishi police energetically launch male ancestry inspection system development work' (下白石派出所大力开展男性家族排查系统建设工作), Gugang Huangqi *WeChat* (古港黄崎威信), 4 June 2019, [online](#); 'This elementary school in Nanzheng District has launched the collection of student DNA samples' (南郑区这个小学·开展了学生DNA样本采集), *Eastday* (东方咨询), 12 October 2019, [online](#).
- 117 'Is it legal for a police station to collect male blood in the village?' (派出所到村里采集男性血液·这样合法吗), *BooLaw.com* (法律部落网), 17 February 2019, [online](#); 'The police station came to the village to collect blood from each villager and said it was a genetic test. What's wrong with this?' (派出所来村里对每个村民采集血液·说是基因检测·这有什么问题?), *Zhihu* (知乎网), [online](#); 'Is it legal to collect blood at will?' (随意采集血液合法吗?), *Zhihu* (知乎网), [online](#).
- 118 Universal Declaration on the Human Genome and Human Rights, UNESCO, 11 November 1997, [online](#); International Declaration on Human Genetic Data, UNESCO, 16 October 2003, [online](#).
- 119 'What are the blood samples collected by men in Minhou County used for?' (闽侯县男性采集的血样是用来做什么的), *Sohu* (搜狐网), 15 April 2019, [online](#).
- 120 'Blood samples collected by male family members at the police station' (派出所采集男性家族成员血液样本?), *Zhihu* (知乎网), 22 July 2018, [online](#); see also 'Is it legal for police to collect fingerprints and DNA samples when registering for a residency permit? (办居住证·派出所采集公民十指指纹和DNA血是否合法?)', *Tianya Shequ* (天涯社区), 11 February 2019, [online](#).
- 121 Stanley Lubman, 'Arrested, detained: a guide to navigating China's police powers', *Wall Street Journal*, 12 August 2014, [online](#).
- 122 '142 fugitives have been reported by this place listed by the Ministry of Public Security' (公安部挂牌整治的这个地方已有142网逃人员归案), *Guangxi News* (广西新闻网), 11 April 2019, [online](#).
- 123 Sui-Lee Wee, 'China uses DNA to track its people, with the help of American expertise', *The New York Times*, 21 February 2019, [online](#).
- 124 'Does the Y-STR gene database violate privacy?' (Y-STR基因数据库是否涉嫌侵犯隐私?), *Zhihu* (知乎), no date, [online](#); Qiu Geping (邱格屏), 'An analysis of gene privacy of criminal DNA database' (刑事DNA数据库的基因隐私权分析), *China Law Forum* (法学论坛), March 2008, 23(1):37–43, [online](#); Chen Yumei (陈玉梅), 'Legal protection of the DNA databases gene privacy rights in China' (论我国DNA数据库基因隐私权的法律保护), *Social Sciences in Hunan* (湖南社会科学), April 2015, 84–88, [online](#).
- 125 'Are blood samples private? Does anyone here collecting blood samples infringe personal privacy rights, and must public security organs have the right to collect them?: (血样属于个人隐私吗? 我们这里有人进行血样采集·是否侵犯个人隐私权·而公安机关一定有权采集吗?)', *Baidu Zhidao* (百度知道), 20 April 2019, [online](#); 'The police station came to the village to collect blood from each villager and said it was a genetic test. What's wrong with this?' (派出所来村里对每个村民采集血液·说是基因检测·这有什么问题?), *Zhihu* (知乎网), [online](#); 'What is the use of public security personnel to collect blood samples in the village?' (公安人员来村里做血样采集有什么用), *China Foods* (中国食品信息网), 29 September 2017, [online](#).
- 126 'Does the Y-STR gene database violate privacy?' (Y-STR基因数据库是否涉嫌侵犯隐私?), *Zhihu* (知乎), no date, [online](#).
- 127 The recently passed Civil Code of the People's Republic of China, which is scheduled to come into effect on 1 January 2021, codifies new privacy protections—including personal information such as names, birth-dates, ID numbers, and bio-metric information—which would appear to blatantly conflict with the compulsory collection of DNA and genealogical profiles in China's forensic database. See Xinhua, "China adopts world's first modern-day civil code," Xinhua Net, 28 May 2020, [online](#). Article 1034 of the Civil Code passed at the 2020 National People's Congress states: "The personal information of natural persons is protected by law. Personal information is a variety of information recorded electronically or in other ways that can identify specific natural persons either by itself or when combined with other information;

- including personal names, birth-dates, ID numbers, bio-metric information, addresses, phone numbers, email addresses, health information, tracking information, and so forth.” See “Civil Code of the People’s Republic of China” (中华人民共和国民法典), 28 May 2020, [online](#).
- 128 ‘Case of S and MARPER v. the United Kingdom’, European Court of Human Rights, 4 December 2008, [online](#).
- 129 ‘Concluding observations on the third periodic report of Kuwait’, Office of the High Commissioner for Human Rights, UN, 11 August 2016, [online](#).
- 130 Protection of Freedoms Act 2012, Chapter 9, *Legislation of the UK*, [online](#).
- 131 *Protection of Freedoms Act*, GeneWatch UK, 1 May 2012, [online](#).
- 132 ‘Kuwait: Court strikes down draconian DNA law’, *Human Rights Watch*, 17 October 2017, [online](#).
- 133 Jerome A Cohen, ‘Law’s relation to political power in China: a backward transition’, *Social Research: An International Quarterly*, 2019, 86(1), [online](#); Sarah Biddulph, Joshua Rosenzweig (eds), *Handbook on human rights in China*, Edward Elgar Publishing, London, 2019.
- 134 See, for example, Li Ruohan, ‘China slams HRW’s report on alleged Xinjiang human rights violations’, *Global Times*, 13 December 2017, [online](#).
- 135 Biddulph & Rosenzweig, *Handbook on human rights in China*; Sarah Biddulph, *The stability imperative: human rights and law in China*, University of British Columbia Press, Vancouver, 2015.
- 136 Jan Ransom, Ashley Southall, ‘NYPD detectives gave a boy, 12, a soda. He landed in a DNA database’, *The New York Times*, 15 August 2019, [online](#).
- 137 Sarah Zhang, ‘The messy consequences of the Golden State Killer case’, *The Atlantic*, 1 October 2019, [online](#).
- 138 These administrative regions (provinces, autonomous regions or directly administered municipalities) include Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Inner Mongolia, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan and Zhejiang.
- 139 Li Jiawei (李佳蔚), Yuan Duanduan, ‘Why is family DNA testing the key to the Bai Yin case?’ (为什么家族DNA检测是白银案落网的关键?), *Yunnan Zhongdun Web* (云南中盾网), 17 April 2018, [online](#).
- 140 ‘The Dehong police mobilised the deployment of “male family tree investigation system”’ (德宏州公安局动员部署全州公安机关“男性家族排查系统”建设工作), Dehong Public Security (德宏州公安局), 18 June 2018, [online](#); ‘Chendian Township held a training seminar on mobilisation of male family tree investigation system’ (陈店乡举办男性家族排查系统建设工作动员业务培训会), Anlu Government (安陆政府网), 3 September 2019, [online](#).
- 141 ‘Qishui Town: Actively carry out the male family system investigation’ (企水镇:积极开展男性家族系统排查工作), *Leishi Net* (雷视网), 6 November 2018, [online](#).
- 142 ‘Huailin town carried out male family tree survey and mapping’ (槐林镇开展男性家族家系调查和图谱绘制工作), Chaohu Government (巢湖政府网), 10 April 2018, [online](#).
- 143 ‘Huailin town carried out male family tree survey and mapping’ (槐林镇开展男性家族家系调查和图谱绘制工作), Chaohu Government (巢湖政府网), 10 April 2018, [online](#).
- 144 ‘Chengguan Police Station completed the construction of male Y DNA bank’ (城关派出所全面完成男性Y库建设工作), Nanyuan Police (南苑警务网), 8 August 2018, [online](#).
- 145 ‘Notice of the County Government Office on printing and distributing the work plan for the construction of the ‘Y-STR’ DNA database in Sui County’ (县人民政府办公室关于印发随县‘Y-STR’DNA数据库建设工作方案的通知), Sui County Government (随县政府网), 4 September 2018, [online](#).
- 146 ‘Blood sample collection’ (血样采集), *Meipian* (美篇网), 23 November 2018, [online](#).
- 147 ‘Dongsheng District Government Affairs Information (Issue 44)’ (东胜区政务信息第44期), Dongsheng Government (东胜政府网), 29 May 2019, [online](#).
- 148 ‘The construction of the male family tree investigation system of the Yijun County Police was praised by local government’ (宜君县公安局男性家族排查系统建设工作获市局红字通报表扬), *Meipian* (美篇网), 28 August 2018, [online](#).
- 149 ‘Bulletin on the progress of collection of blood samples from male families’ (男性家族血样采集工作进展情况通报), *Meipian* (美篇网), 5 November 2018, [online](#).
- 150 ‘Baojia Town Police Station carried out the construction of male family tree investigation system’ (包家镇派出所开展男性家族排查系统建设工作), *Dianjiang Mobile Station* (垫江手机台), 11 September 2019, [online](#).
- 151 ‘The pros and cons of storing DNA on cards’, *Bitesizebio*, 17 September 2012, [online](#).
- 152 ‘Construction of “Y-STR” DNA database’ (‘Y-STR’DNA数据库建设), *Bosun Life* (北京博晟思远生物), [online](#).
- 153 ‘Liulang police fully sprinted blood collection work of male families’ (六郎派出所全面冲刺男性家族血样采集工作), Wuhu County Police (芜湖县公安局网站), 28 June 2019, [online](#).
- 154 See for example, ‘Qiannan Prefecture Public Security Bureau procurement of Qiannan Prefecture Y-STR DNA database construction service project winning bid (deal) announcement’ (黔南州公安局采购黔南州Y-STR DNA数据库建设服务项目中(成交)公告), *Guizhou Provincial Government Procurement Network* (贵州省政府采购网), 10 April 2019, [online](#).
- 155 ‘Tongren City Public Security Bureau male family investigation system database construction service purchase project’ (铜仁市公安局男性家族排查系统数据库建设采购项目), *Tongren Public Resources Trading Center* (铜仁市公共资源交易中心), 3 March 2020, [online](#).
- 156 Tao Xiaolan, Liu Xianhai (陶晓岚, 刘贤海), ‘The domestic development status of Y-DNA database in China and its reference significance of Gansu public security practice’ (DNA Y数据库国内发展现状及其对甘肃公安工作的借鉴意义), *Journal of Gansu Police Vocational College* (甘肃警察职业学院学报), December 2017, 15(4):51, [online](#).
- 157 Tao Xiaolan, Liu Xianhai (陶晓岚, 刘贤海), ‘Current situation of our Y-chromosome DNA database, and lesson and suggestions for Gansu police work’ (DNA Y数据库国内发展现状及其对甘肃公安工作的借鉴意义), *Journal of the Gansu Police Vocational Academy* (甘肃警察职业学院学报), 2017, 15(4):51–53, [online](#).
- 158 ‘Cheating citizens in the name of Erligang Police Station in Zhengzhou City’ (以郑州市二里岗派出所之名欺诈公民), *People’s Net* (人民网), 31 January 2018, [online](#); ‘Construction of “Y-STR” DNA database’ (‘Y-STR’DNA数据库建设), *Bosun Life* (北京博晟思远生物), [online](#).
- 159 ‘Snapshot of the forensic DNA identification market’ (法医DNA检测行业全景图), Ping An Securities Ltd, 6 October 2016, [online](#).
- 160 ‘Li Haiyan: Let the “body code” speak’ (李海燕:让“身体密码”开口说话), *China Southern Magazine* (中国南方杂志), 1 July 2019, [online](#).
- 161 ‘Public Security Organ DNA Database Application System’ (公安机关DNA数据库应用系统), Beijing Haixin Kejin High-Tech Co. Ltd (北京海鑫科金科技股份有限公司), [online](#).
- 162 ‘Li Haiyan: Let the “body code” speak’ (李海燕:让“身体密码”开口说话), *China Southern Magazine* (中国南方杂志), 1 July 2019, [online](#).
- 163 ‘Snapshot of the forensic DNA identification market’ (法医DNA检测行业全景图), Ping An Securities Ltd, 6 October 2016, [online](#).

Some previous ICPC publications



WHAT'S YOUR STRATEGY?

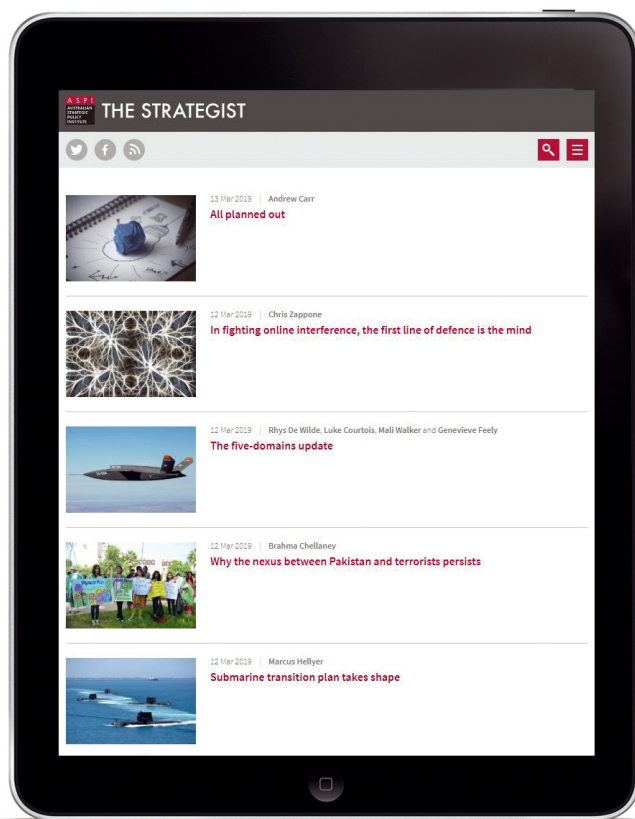


Stay informed via the field's leading think tank, the Australian Strategic Policy Institute.

The Strategist, ASPI's commentary and analysis website, delivers fresh ideas on Australia's defence and strategic policy choices as well as encouraging discussion and debate among interested stakeholders in the online strategy community. Visit and subscribe to an email digest at www.aspistrategist.org.au.

 facebook.com/ASPI.org

 [@ASPI_org](https://twitter.com/ASPI_org)



Supported by



To find out more about ASPI go to www.aspi.org.au or contact us on 02 6270 5100 and enquiries@aspi.org.au.

