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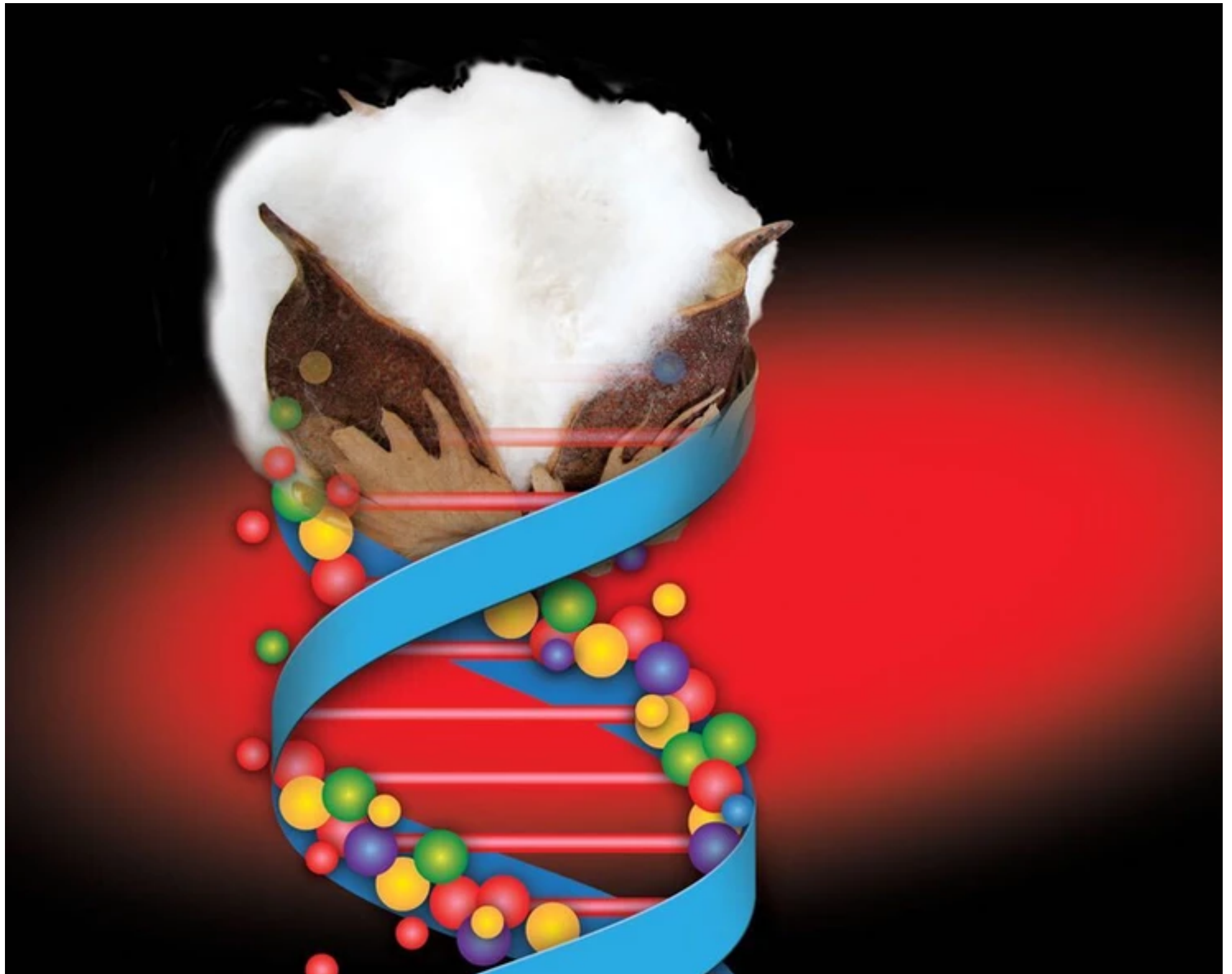
China is both the world's largest producer and importer of cotton.[1] Until 2020, China was also the largest source of garment imports into the United States.[2] Most of China's cotton is produced in the Xinjiang region of China.[3]However, human rights organizations and officials of the United States have declared that many of the cotton field factories in that region have been using forced labor from Uyghurs imprisoned in the region's internment camps.[4] On December 23, 2021, President Joe Biden signed into law the Uyghur Forced Labor Prevention Act, which barred products made from forced labor in China's Xinjiang region from being imported into the United States.[5]

However, one issue that has arisen through banning cotton from the Xinjiang region is that many companies do not know where the cotton is produced in their supply chain. Therefore, while brands like Eileen Fischer, ASOS, and Reformation have pledged to halt cotton production from Xinjiang, it can be difficult to determine if their cotton is from the Xinjiang region without extensive research.[6] For example, in 2016, there was a scandal in which Target and Walmart had to stop selling luxury bedding because it was falsely labeled as Egyptian cotton.[7]

Recently, scientists have considered using COVID-19 technology such as PCR tests to help trace where the cotton in our clothes is coming from.[8] A PCR test is a polymerase chain reaction test. This test detects genetic material from a specific organism.[9] Scientists believe that they can use PCR tests to trace the origins of the cotton. Companies such as Applied DNA Sciences and Oritan have technology that can identify the source of a cotton sample by "analyzing its genetic or chemical footprint."[10] This technology is based on polymerase chain reaction, also known as PCR which is essentially the same method used to detect COVID, only now it is desired to be used to analyze cotton's DNA.[11] If the technology is successful, the results of the cotton sample can be checked against a database of known samples from regions such as Xinjiang or Texas. As a result, they can discover where the cotton sample is from.[12] This new technology would be revolutionary and helpful to end forced labor around the world and within the cotton industry because the DNA and footprint of the cotton can be traced to a specific region and, if resources are available, labor enforcers either locally or internationally, can investigate how that cotton was produced and whether or not child labor or forced labor was used. Essentially if the idea were to come to fruition, the goal of the technology's use would be to enable a fashion brand to put a cotton sample in a machine, run a test, and tell exactly what area in the world the cotton came from.[13]

However, scientists point out that this process may be challenging to implement because fabric may be made with cotton from multiple sources or blended with synthetics.[14] It is also difficult to build a database with every known type of cotton. Another innovative method using similar technology is isotopic analysis. Isotopic analysis analyzes a fiber's chemical fingerprint, which can tell the "environment the cotton grew in based on factors such as the altitude, rainfall, and

composition of the soil."[15] However, an issue with using Isotopic analysis to trace where cotton is from is that to maintain the database, the cotton samples must be constantly replaced, which can be difficult because, in the cotton industry, there may be instances where areas that produce cotton can experience droughts for two years.[16] In addition, climate change can change the chemical makeup of the cotton material necessary to be sampled, which may be challenging to track and trace on a database.

Ultimately, these innovations may be hopeful solutions to eradicating forced labor in the cotton industry and exposing where and how exactly cotton in the cotton industry comes from. However, these innovative ideas are still in the early stages and have technological hurdles to overcome if the goal is to make this kind of technology more accessible, faster, and affordable.

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[1] Sofi Thanhauser, *How Your Favorite Jeans Might Be Fueling a Human Rights Crisis*, Vox, https://www.vox.com/the-highlight/22632448/xinjiang-cotton-ban-china-uyghurs-fast-fashion (last updated Sept. 3, 2021).

[2] *Id.* (Vietnam is now the largest exporter).

[3] *Id.*

[4] *Id.*

[5] Uyghur Forced Labor Prevention Act of 2021, Pub. L. No. 117-78, 135 Stat. 1525.

[6] *Id.*

[7] Allison Moodie, *Those Luxury Egyptian Cotton Sheets You Own May Not Be Luxurious – or Egyptian*, Guardian (Nov. 19, 2016), https://www.theguardian.com/sustainable-business/2016/nov/19/egyptian-cotton-sheets-luxury-controversy-target-walmart.

[8] Marc Bain, *After Covid, PCR Tests are Coming for Cotton*, Bus. Fashion (Feb. 9, 2022), https://www.businessoffashion.com/articles/technology/after-covid-pcr-tests-are-coming-for-cotton/.

[9] *Covid-19 and PCR Testing,* Cleveland Clinic, https://my.clevelandclinic.org/health/diagnostics/21462-covid-19-and-pcr-testing (last updated Aug. 24, 2021).

[10] Bain, *supra* note 8.

[11] *Id.*

[12] *Id.*

[13] *Id.*

[14] *Id.*

[15] *Id.*

[16] *Id.*