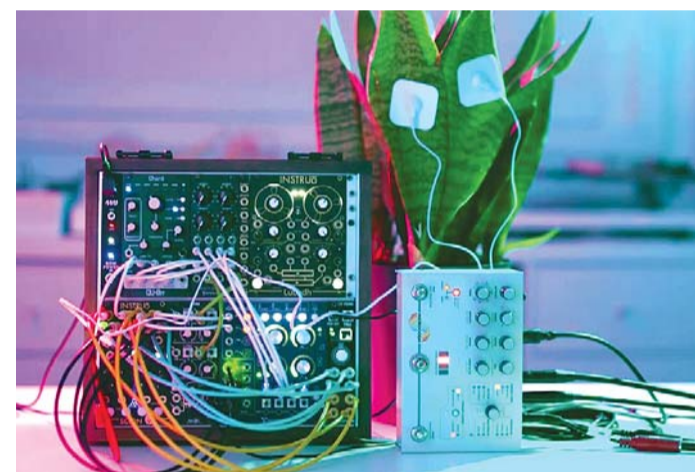


#BOTANY

## Plant Patch

The earlier growers can identify plant diseases or fungal infections, the better able they will be to limit the spread of the disease and preserve their crop.



An electronic patch, applied to the leaves of plants, can monitor crops for different pathogens, such as viral and fungal infections, and stresses such as drought or salinity. In testing, researchers found that the patch was able to detect a viral infection in tomatoes more than a week before growers would be able to detect any visible symptoms of disease.

"This is important because the earlier growers can identify plant diseases or fungal infections, the better able they will be to limit the spread of the disease and preserve their crop," says Qingshan Wei, an assistant professor of Chemical and Biomolecular Engineering at North Carolina State University and corresponding author of a paper in *Science Advances*. "In addition, the more quickly growers can identify abiotic stresses, such as irrigation water contaminated by saltwater intrusion, the better able they will be to address relevant challenges and improve crop yield."

"The technology builds on a previous prototype patch, which monitors volatile organic compounds (VOCs), emitted by plants to detect disease. Plants emit different combinations of VOCs under different circumstances. By targeting VOCs that are relevant to specific diseases or plant stress, the sensors can alert users to specific problems."

"The new patches incorporate additional sensors, allowing them to monitor temperature, environmental humidity, and the amount of moisture being 'exhaled' by the plants via their leaves," says co-corresponding author Yong Zhu, professor of Mechanical and Aerospace engineering.

The patches themselves are small, only 30 millimetres long,



and consist of a flexible material containing sensors and silver nanowire-based electrodes. The patches are placed on the underside of leaves, which have a higher density of stomata, the pores that allow the plant to 'breathe' by exchanging gases with the environment.

The researchers tested the patches on tomato plants in greenhouses, and experimented with patches that incorporated different combinations of sensors. The tomato plants were infected with three different pathogens: tomato spotted wilt virus (TSWV), early blight, which is a fungal infection, and late blight, which is a type of pathogen called an oomycete.

The plants were also exposed to a variety of abiotic stresses such as overwatering, drought conditions, lack of light, and high salt concentrations in the water.

The researchers took data from these experiments and plugged them into an artificial intelligence program to determine which combinations of sensors worked most effectively to identify both disease and abiotic stress.

"Our results for detecting all of these challenges were promising across the board," Wei says. "For example, we found that using a combination of three sensors on a patch, we were able to detect TSWV four days after the plants were first infected. This is a significant advantage, since tomatoes don't normally begin to show any physical symptoms of TSWV for 10-14 days."

The researchers say that they have two steps away from having a patch that growers can use. First, they need to make the patches wireless, a relatively simple challenge. Second, they need to test the patches in the field, outside of greenhouses, to ensure that the patches will work under real-world conditions. This could be a significant help to address food security challenges in a meaningful way.



Florence Griffith-Joyner.

Usain Bolt.

# What Makes Them Win Races!

What made Usain Bolt, an era-defining champion of immense speed and consummate ease at just 23, so fast? Bolt cited his God-given talent, while crediting a diet that ranged from ultra-processed chicken nuggets (small pieces of breaded chicken) to the Jamaican staple of yams (*shakarkand*). But he also pointed to the cruelties of man. "I think, over the years, what makes Jamaica different is because of slavery really," he said of his sprinting roots. "The genes are really strong."



Sir Roger Bannister.



Prakash Bhandari  
The writer is a senior journalist

Athletics is the foremost, rather, mother of all sports. The word 'athletics' is derived from the Ancient Greek (athletes) combatant in public contests in general, i.e. sporting competition based primarily on human physical feats. In the 19th century, the term 'athletics' acquired a narrower definition in Europe and came to describe sports involving competitive running, walking, jumping and throwing. Athletics is a group of sporting events that involves competitive running, jumping, throwing and walking.

The most common types of athletics competitions are track and field and road running that include marathon. Running is one of the simplest competitions in the history of mankind. No team is needed. No expensive equipment is required. It's one person against at least one other competitor. Running, especially sprinting, has been part of the Olympics since their inception.

Stadion (or stade) was an ancient running event that was part of the Olympic Games from 776 to 724 BC, the "stadium" was the only event at the Olympic Games, the "victor" gave his name to the entire four-year Olympiad. The winner of the

stadion at the first Olympic Games was Coroebus of Elis.

The stadion, named for the facility in which it took place, was simple, run the length of the arena, which was approximately 200 yards (180 meters). Since then, sprinting has evolved and grown immensely since the first barefoot and naked competitors ran the stadion on that exposed ground.

When the modern Olympic Games began in 1896, sprinters ran a 100-meter dash and 400-meter dash. A 200-meter dash was added in 1900, and relay races, with teams of four sprinters each, were added for the 1912 Games. Women's sprint events were included in 1928.

Not only have the events changed, but the format has evolved as well. Ropes were used to separate sprinting lanes. Sprinters first started races standing straight up before utilizing the crouched position. Synthetic tracks came into use in 1956.

Tracks have improved, apparel and shoes have gotten lighter and more streamlined, and as a result of these improvements coupled with new training techniques, sprinters have gotten faster.

Organized athletics are traced back to the Ancient Olympic Games from 776 BC. The rules and format of the modern events in athletics were defined in Western Europe and North America in the 19th and early 20th century, and were then spread to other parts of the world.

The athletics meeting forms the backbone of the summer Olympics. It's called the *poor man's sport* because it did not cost anything to play. But it requires rigorous training. There are three short distance races that are contested as part of

the track and field events during the Olympics, the 100m, 200m and 400m for both men and women.

The 100 m sprint is currently the most anticipated and the highest viewed event in the Olympics. The men's event has been a part of the games since the first 1896 and the women's event was added in 1928. Historically, the Americans have dominated the event, but of late, the Jamaicans have a strong hold on the event, winning the men's and women's races in the last three Olympics (2008-2016).

*Usain Bolt of Jamaica*, who holds the current Olympic record at 9.58 seconds and *Carl Lewis of the United States* are the two most notable athletes for the event. Bolt won the gold, three times straight (2008-2016). The current women's Olympic record is 10.62 seconds, set by glamorous Florence Griffith-Joyner of the United States in 1988 Seoul Games.

The event also has its fair share of controversies, where athletes like Ben Johnson and Marion Jones were tested positive for doping.

All important international races at 200 metres, as well as 400 metres, are run on an oval track. The starts are staggered as the lanes farther from the centre begin progressively farther forward on the track. Thus, each runner will cover an equal distance. As a result, the competitors, particularly in the 400 metres, have no exact knowledge of their respective positions until they have completed the final turn. Great stress is, therefore, placed on an athlete's ability to judge his own pace, as well as upon his speed and endurance.

Remember the famous 1960 *Rome Olympic 400 meter final*, where Milkha Singh appeared and did well when he committed the mistake to look back and see other runners. This, he became slower by split second and he lost the medal.

At the professional level, sprinters begin the race by assuming a crouching position in the starting, before driving forward and gradually moving into an upright position as the race progresses and momentum is gained. The set position differs depending on the start. The use of starting blocks allows the sprinter to perform with an enhanced isometric preloads. Body alignment is of key importance in producing the optimal amount of force. Ideally, the athlete should begin in a 4-point

## #OLYMPICS



From the Enlightenment, all the way through to the present day, there has been a science around racial typology, and the belief in meaningful difference along the lines of skin colour," explains Dr. Paul Campbell, associate professor of Sociology at the University of Leicester.

stance and drive forwards, pushing off using both legs for maximum force production. Athletes remain in the same lane on the running track throughout all sprinting events, with the sole exception of the 400 meters indoors. Races up to 100 meters are largely focused upon acceleration to an athlete's maximum speed. All sprints, beyond this distance, increasingly incorporate an element of endurance.

Technological advances have always improved sprint performances (i.e., starting blocks, synthetic track material, and shoe technology). In 1924, athletes used a small shovel to dig holes to start the race. The world record in the 100-meter dash in 1924 was 10.4 seconds, while in 1948, (the first use of starting blocks) it was 10.2 seconds, and was 10.1 seconds in 1956. The constant drive for faster athletes with better technology has brought man from 10.4 seconds to 9.58 seconds in less than 100 years.

Track events were measured with the metric system except for the United Kingdom and the United

States until 1965 and 1974, respectively. The apex athletics body decided to switch track and field in the U.S. to the metric system to finally make track and field international equivalent. What made Usain Bolt, an era-defining champion of immense speed and consummate ease at just 23, so fast?

Bolt cited his God-given talent, while crediting a diet that ranged from ultra-processed chicken nuggets (small pieces of breaded chicken) to the Jamaican staple of yams (*shakarkand*). But he also pointed to the cruelties of man.

"I think, over the years, what makes Jamaica different is because of slavery really," he said of his sprinting roots. "The genes are really strong."

It is a hypothesis that existed before Bolt's comments and has persisted since, that the barbarity of the transatlantic slave trade, which forcibly took men, women and children from Africa and exported them into forced labour in the Caribbean, Brazil, the United States and elsewhere, still echoes in modern-day

track and field.

The theory runs that the unnatural selection of black physical prowess, centuries ago, affects podium placement as well as skin colour.

Not since British sprinter, Allan Wells, triumphed at the boycotted Moscow 1980 Games, has a white man made an Olympic or world 100m podium.

In fact, it was more than four decades after Wells' triumph that China's Su Bingtian became the next man without black parentage to even compete in an Olympic 100m final, in 2021.

During that time, black sprinters from North America and the Caribbean have claimed 24 out of 30 medals in the men's 100m at the Olympics.

But was Bolt right? Does the link between modern glory and a dark past hold true? Or are appearances deceiving?

In September 1995, Sir Roger Bannister, the first man to run a mile in less than four minutes, and an eminent neurologist, stood up to speak at a conference in Newcastle.

"As a scientist, rather than a sociologist, I am prepared to risk political incorrectness by drawing attention to the seemingly obvious but under-stressed fact that black sprinters, and black athletes, in general, all seem to have certain natural anatomical advantages," he said. Bannister would concede that he was unable to identify what those precise advantages were.

But, Bannister was correct to note the apparent correlation between race and sprint medals, and seek to explain the underlying factors, that he believed, were behind it.

The response was mixed. Some disagreed with Bannister on principle suggesting that such an argument risked slipping into the territory of the eugenics movement.

Others argued that race is a social, rather than biological, construct, and to merge diverse populations from a range of continents into one homogenous group, based on skin colour, is nonsensical.

"From the Enlightenment, all the way through to the present day, there has been a science around racial typology and the belief in meaningful difference along the lines of skin colour," explains Dr. Paul Campbell, associate professor of Sociology at the University of Leicester.

"Yet, we don't look at this in any

other way. We don't look at the differences in eye colour or hair texture, despite the gap between people, in terms of basic DNA, being just as wide as skin colour."

So, why is there a fascination with continuing to try to explain meaningful racial differences?

Yet, the extrapolation some have made is startling, that *slavery turned sprinters of West African descent into world beaters*.

An estimated 10 million slaves were transported by ship from Africa across the Atlantic, between the 16th and 19th centuries, with appalling conditions onboard, meaning, many never arrived at their destination.

This was combined with a rigorous physical selection process, prior to boarding the ships, and selective breeding by slave owners at the other end.

The result, it has been argued, was to create a population of West African descendants in the United States and the Caribbean, that was predisposed to athletic performance.

It was in 2003 that a group of Australian scientists first thought that they had struck genetic gold. The gene in question was *Alpha-actinin-3 (ACTN3)*, and the academics involved identified that the more copies of the R variant a person possessed, and therefore, the less of the X variant, the more likely they would excel at sprint and power disciplines.

A number of studies showed that people of West African origin were almost guaranteed to have the right variant of the so-called 'sprint gene' to run fast.

But there was a problem. Further testing found that virtually, all Olympic sprinters of every nationality and ethnicity also possessed it. So

did billions of other people.

"All that ACTN3 can tell us, it seems, is who will not be competing in the (Olympic) 100m final," wrote David Rabinin, in his book *"The Sports Gene"*.

"And it is not even doing a very specific job of that, given that it is only ruling out about one billion of the seven billion people on earth."

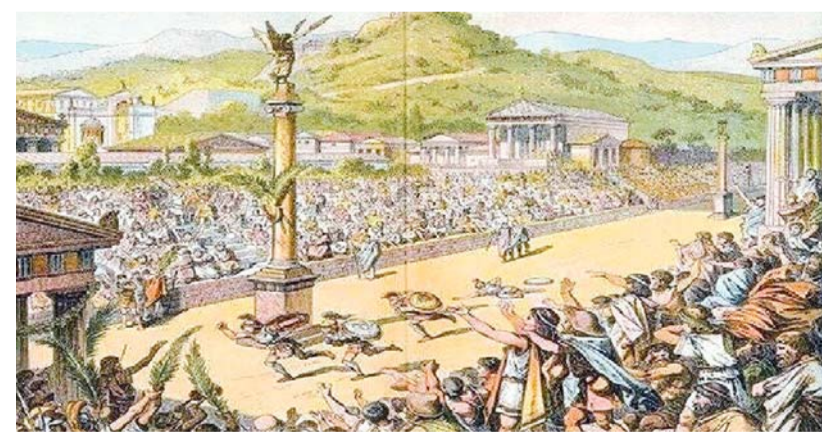
Other alternative theories for an apparent racial sprinting divide have also arisen over the years. One disputed study by scientists, Adrian Dejan and Edward Jones, suggested that people of West African origin benefited from a higher centre of gravity than white people, providing them a 1.5% advantage over the course of a 100m race, as they were able to fall to the ground more quickly between strides.

Another built on the high prevalence of sprint-aiding fast-twitch muscle fibres, which tire easily but contract quickly among black populations. Scientist Errol Morrison and author Patrick Cooper's controversial hypothesis was that the prevalence of sickle cell trait, a mutation that causes round, red, oxygen-carrying blood cells to curl up in a sickle shape, among people of West African origin, had "triggered a series of physiological adjustments, which, incidentally, had favourable athletic consequences."

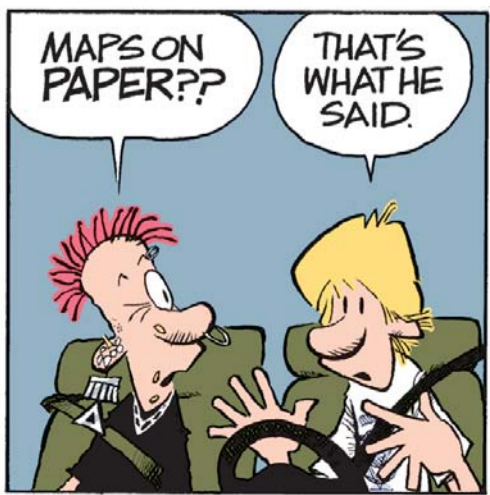
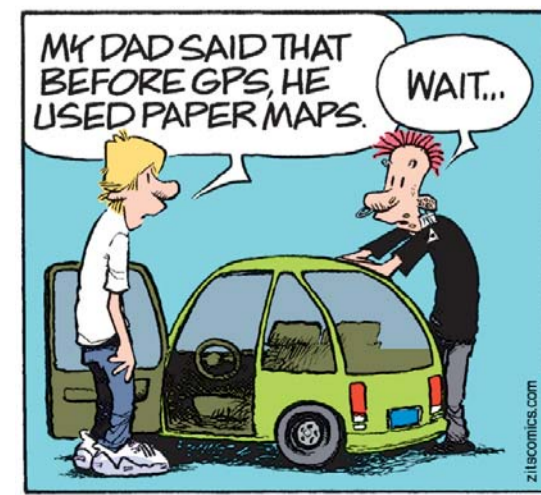
Prime among them was a higher percentage of fast-twitch muscle fibres, which are less dependent upon oxygen.

Yet, the theory was just that, a theory. No supporting data has ever been produced, and according to scientist, Yannis Pitsiladis, it is unlikely that it ever will.

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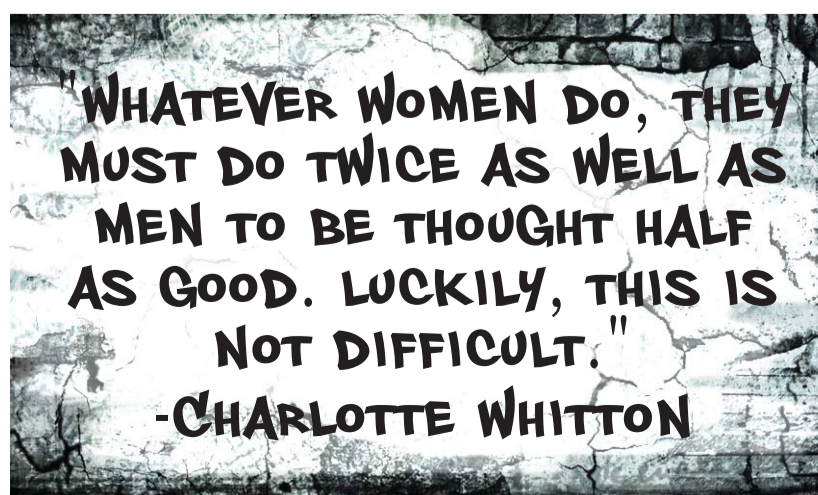


## ZITS



By Jerry Scott & Jim Borgman

## THE WALL



## BABY BLUES



By Rick Kirkman & Jerry Scott