distinct from one another. They confirmed that the accessions could be divided into two genetically different groups (gene pools) on the basis of the numbers of seeds per pod, and found low genetic diversity in each gene pool. This is not surprising, considering the predominantly self-pollinating nature of the crop.

The researchers went on to establish possible associations between their DNA markers and agronomic data for 125 accessions. Despite the low number of accessions, the researchers' results indicate that some markers are associated with desirable agronomic traits, such as plant height. However, the markers identified will need to be validated further using larger population sizes before deployment in routine breeding.

Beyond the scientific insights gained, Njaci and colleagues' achievement is valuable because there have been few reports of African crops for which data were generated and analysed in Africa. The work highlights the possibility that a small, portable sequencing device could enable scientists from the remotest parts of the world to gain access to genomics data. As such, the study opens a new chapter for scientists based in Africa, especially those who already have all the skills needed to design, analyse and report similar results.

The publication of African research in renowned journals will help to motivate Africa's scientists. Much effort will still be needed to build infrastructure capacity and to increase staffing levels. Furthermore, major crop-genomics organizations that are working in the continent — such as the International Crops Research Institute for the Semi-Arid Tropics, BecA–ILRI and the AOCC — must take on the responsibility of mentoring scientists in national programmes to ensure that Africa's researchers receive the support they need to maintain the momentum of their work.

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The authors declare no competing interests.
This article was published online on 17 April 2023.

Astronomy

Planet swallowed after veering too close to its star

Smadar Naoz

An outburst of radiation offers direct evidence that a star has consumed a giant planet. But not every planet ends up as a stellar host's snack — the star's properties, and its interactions with the planet, have to be just right. **See p.55**

There's a long-standing theory that some stars eat their planets. However, such planetary engulfment has never been caught in action — until now. On page 55, De *et al.*[1] report a puzzling set of observations that they conclude must be the result of a star consuming its giant-planet companion.

The authors observed an optical outburst — named ZTF SLRN-2020 — that lasted roughly ten days and then slowly decayed over the course of about six months. The start of the burst coincided with infrared emission that lasted long after the optical emission had decayed. The optical radiation showed up as featureless continuous emission at red-light frequencies, as well as spectral lines corresponding to molecular absorption. Armed with this information, De *et al.* embarked on a mission to pinpoint the type of astronomical event from which their observations originated.

Our Galaxy has many short-lived, outburst-like events, collectively called transients. The authors first compared ZTF SLRN-2020 with transients known as dwarf and classical novae, which are often observed in the Galactic disk. These events occur when a white dwarf accretes hydrogen from a close companion star. Material is drawn into an accretion disk and then deposited on the white dwarf's surface as a layer of hydrogen, triggering a nuclear fusion reaction that causes a burst of radiation. However, the features of ZTF SLRN-2020 differ from those expected from a fusion reaction, and the source's spectrum contains no atomic-emission lines, suggesting that it isn't a dwarf or classical nova.

Other transients in the Milky Way's disk include outbursts of hot gas that radiate at X-ray frequencies. But the spectrum of ZTF SLRN-2020 does not exhibit X-ray emission lines — an absence that allowed De and colleagues to infer that the event did not involve hot accretion processes, which are typically associated with compact objects, such as black holes or neutron stars.

However, the authors found that the outburst resembled a red nova. Red novae are red-hued astronomical objects that emit slowly fading infrared radiation, and it has been suggested that they are associated with the merging of two stars[2,3]. ZTF SLRN-2020 first appeared as a red object that then became even

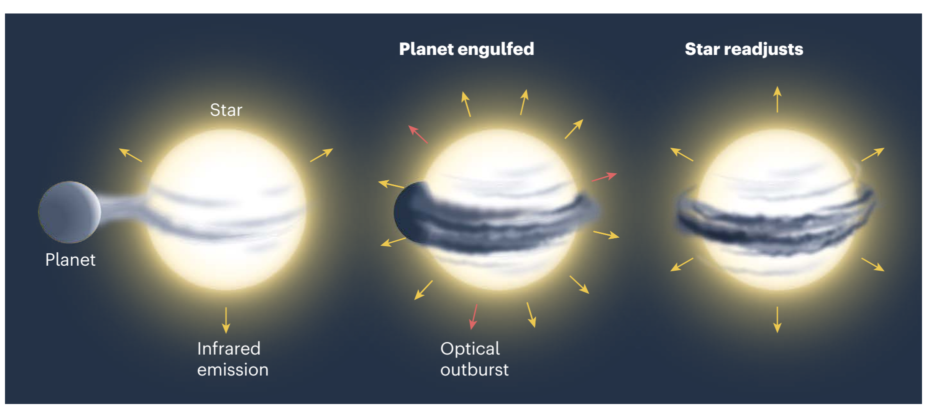

Figure 1 | A planet engulfed by its host star. De *et al.*[1] observed a short outburst of radiation at optical (red-light) frequencies, which lasted around ten days, decayed over six months and coincided with longer-lasting infrared emission. The authors deduced that the radiation came from the merger of a giant planet with its host star, following interactions between the two bodies that lasted 6–12 years before the engulfment. The outburst indicates engulfment, and the infrared emission probably came from the subsequent hydrodynamic and thermal readjustment of the star.

redder over the duration of its emission. This reddening and the molecular absorption lines in its spectrum are both reminiscent of those of a red nova, thus implying that the source originated from a merging event. However, De and colleagues noted that the luminosity of ZTF SLRN-2020 was much lower than for other red novae, suggesting that an object smaller than a star was involved in the merger event.

The authors' high-spatial-resolution imaging revealed a faint progenitor source, consistent with a Sun-like star. From the source's brightness as a function of time and from observations before the outburst, they inferred that the mass of its merging companion was roughly that of Jupiter or Neptune. The story of the event, therefore, began to unfold: a giant planet had ventured too close to its parent star, interacting with it for a while before the outburst, which probably correlated with the engulfment of the planet by the star (Fig. 1). The authors' observation of dust and gas from before the outburst suggests that the interaction lasted 6–12 years.

Compared with during a merger of two stars, the outburst and amount of material ejected from ZTF SLRN-2020 were less impressive. Moreover, the star's radius did not change substantially while it was consuming its planet. This implies that the subsequent decay of the infrared emission represents the hydrodynamic and thermal readjustment of the star post-engulfment, which is consistent with the star having consumed a planet. The low luminosity of the event indicates that the amount of hydrogen released from the star was only a tiny proportion (about one-hundredth or one-thousandth) of its mass, resulting in a relatively constant brightness and a reddening of the source as the optical emission faded. And the mid-infrared emission during this decay is a plausible signature of a warm dust shell around the star as it slowly cooled down.

A combination of theoretical modelling and indirect observations has given rise to many predictions that planetary engulfment might be detectable[4–9]. But whether a planet will ultimately be consumed by its star depends on certain conditions. Modelling suggests that gravitational interactions between a planet and other objects in the system (such as other planets or a companion star) can slowly push a planet towards its host star. These companions have certain features that make them vulnerable to such extreme gravitational interactions, for example high inclination angles or proximity to other planets.

Tidal (gravitational) interactions between a star and a planet in close orbit around it can also slowly drive the planet to its demise. As a star exhausts its core hydrogen fuel, it expands and becomes a sub-giant. At this stage, it will start to engulf its nearby planets – in a few billion years, the Sun will undergo this process. Although exoplanets have been observed around various host stars that have a range of masses and are at different stages of evolution, there seems to be a deficit of old and sub-giant stars hosting planets in close orbits.

Other indirect signatures that indicate engulfment include stars that are spinning faster than usual and those that are enriched in various chemical elements. Future observations of ZTF SLRN-2020 can therefore test for these attributes and bolster De and colleagues' claim of the first direct detection of a star consuming its planet. Such tests will no doubt open up a vast body of investigations of similar events, as well as the mechanisms that drive them.

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The author declares no competing interests.

Translation

An unexpected timer for cell division

Silke Hauf

A serendipitous observation has revealed that cells make several versions of a key protein needed for cell division. The ratio of these protein isoforms influences how long division can be delayed when errors arise. **See p.154**

Cells have a safety mechanism that delays cell division when chromosomes are not properly oriented for their correct distribution into daughter cells. When engaged, this safety mechanism inhibits the protein CDC20, whose activity is crucial for completing division, and this inhibition provides a window of opportunity for errors to be fixed. On page 154, Tsang and Cheeseman[1] report that cells produce several versions (isoforms) of CDC20 that differ in their susceptibility to inhibition. These isoforms arise when the messenger RNA encoding CDC20 undergoes translation — a process that typically produces only one version of a protein. Mutations found in cancer cells modify the isoform ratio to shorten the length of the delay, even if errors have not been fixed, which probably promotes malignancy.

> **"The authors could have discarded their observation as an oddity and moved on, but instead they dug deeper."**

This finding has an interesting backstory that exemplifies the fact that scientific discoveries are not always intentional. Tsang and Cheeseman did not set out to uncover whether CDC20 isoforms exist. Rather, they intended to inactivate CDC20 by introducing a genetic mutation. They obtained the intended mutation, but the gene surprisingly remained functional. Tsang and Cheeseman could have discarded their observation as an oddity and moved on, but instead they dug deeper. This led them to discover that CDC20 protein production can start not just at one, but at several positions in the corresponding mRNA, which results in CDC20 isoforms that have distinct characteristics.

Normally, protein production during translation of an mRNA begins at the first AUG nucleotide sequence in the mRNA (termed the start codon). The macromolecular machine that synthesizes proteins, the ribosome, scans the mRNA from one end until it encounters this start codon. Occasionally, however, in a process called leaky scanning, a ribosome ignores this first start codon and instead continues to the next AUG sequence to initiate protein synthesis[2].

Tsang and Cheeseman found that CDC20