

## research highlights

### EVOLVED STARS

## No C views

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The third dredge-up (TDU) is an event during the lifetime of an asymptotic giant branch (AGB; low to intermediate mass) star when the convective internal regions of the star extend down towards the core to bring freshly synthesized elements, like carbon, up to the photosphere. This process follows a thermal pulse and is responsible for turning oxygen-rich stars (as all stars are at the start of the AGB) into carbon-rich stars, provided that the mass of the star is above a certain threshold.

Devika Kamath and colleagues have observed a star in the Small Magellanic Cloud (SMC) that has recently evolved beyond the AGB (a post-AGB star), labelled J005252.87-722842.9. This star had an initial mass of 1.5–2.0  $M_{\odot}$  before it underwent mass-loss on the AGB, which means that it should have become carbon-rich in the low-metallicity environment of the SMC, where the transition to a carbon star occurs at a lower mass ( $M_{\star} \sim 1-1.25 M_{\odot}$ ) than in the Galaxy. Their high-resolution optical spectra also show no enrichment of the other heavy elements that are usually brought to the photospheric surface of the star during the TDU. Kamath *et al.* are careful to exclude other explanations for the lack of carbon (such as a process called hot bottom burning, which can turn carbon into nitrogen). The authors claim that this is the first detected object of its type, and after looking for similar stars in the Milky Way, they find two possible analogues that will need follow-up observations before they can be confirmed as members of this new class of ‘failed TDU’ star.

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