HANGOVERS

Uncongenial congeners

Whatever your tipple, too much of it and you'll suffer the next day. Yet it's commonly thought that dark-coloured alcoholic drinks such as bourbon produce worse hangovers than colourless alternatives such as vodka. Damaris Rohsenow and colleagues now provide experimental evidence of this (D. J. Rohsenow *et al. Alcoholism Clin. Exp. Res.* doi:10.1111/j.1530-0277.2009.01116.x; 2009). They also find that hangovers caused by these drinks impair performance in tasks requiring both sustained attention and speed, and that the impairment correlates with the severity of the hangover, but not the colour of the drink.

The colours of alcoholic drinks are often due to congeners — compounds other than alcohol (ethanol) that form during the fermenting process. Bourbon contains 37 times more congeners than vodka, for example. Although the main cause of hangover symptoms is ethanol, congeners are thought to make matters worse.

Rohsenow *et al.* assessed this theory in a controlled study in which subjects drank vodka or bourbon until their blood alcohol concentration reached an intoxicating level. The intensity of the subjects' hangovers was quantified the next day using a symptom-based scale, and

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the subjects were given tests to measure their performance in tasks requiring speed and/or sustained concentration. Because alcohol affects the quality and duration of sleep, the authors also monitored these effects in their subjects.

Sure enough, bourbon caused worse hangovers than vodka, and all of the subjects experienced lighter, more disturbed sleep after alcohol consumption than they did when given a placebo (decaffeinated cola). But the effects of bourbon on sleep and on next-day performance in tests were no worse than those of vodka. What's more, although the amount of alcohol-induced sleep disturbance correlated with hangover severity, it was not responsible for the effects on performance in the tests.

Older subjects, or those dependent on alcohol, might have behaved differently from the young, healthy people who took part in the research. Nevertheless, as the authors point out, these findings have implications for people working in safety-sensitive jobs — as well as providing insight into how you feel the morning after the night before.

Andrew Mitchinson

stars strike each other, they are likely to merge into a single star, in an event characterized by relatively little mass loss[5]. This violent event, which could explain how blue stragglers came to be (Fig. 1a), may stir up the contents of the newly formed star, providing large amounts of hydrogen in the centre to be used as fuel in nuclear-fusion reactions. It is almost as if the star is reborn.

But collisions are unlikely to be the entire story, because blue stragglers have been seen in isolation in the dark-matter halo of our Galaxy, where stars are so sparse that close encounters between them will not occur sufficiently often to account for the number of blue stragglers seen there[6]. An alternative way to make a blue straggler is through mass transfer within a binary star system (Fig. 1b). These systems are very common; the Sun may be rather unusual in not having a stellar companion. If one of the stars in a binary star system runs out of hydrogen fuel in its core, it evolves from the main-sequence stage and its outer envelope expands — the star becomes a red giant. Because the star is now much larger, gas may flow from its envelope on to the companion star, provided the two stars are close enough. Even though the two stars never collide, the effect of the mass flow could be the same as a collision: the companion star becomes more massive and receives a fresh supply of hydrogen fuel to its core. After a phase of stable mass flow from one star to another, the system should contain a blue straggler orbiting around the remnant core of the donor star, in a wider binary system that has an orbital period of longer than one year. This seems to be the case for at least some of the blue stragglers seen in the halo of the Milky Way.

Using Hubble Space Telescope observations of the globular cluster M 30, Ferraro and colleagues[1] suggest that the blue stragglers in M 30 have been made in these two distinct ways. They show that the blue stragglers in the cluster follow two separate sequences on the colour–magnitude diagram: one produced by collisions and the second produced by mass transfer within binaries. In both cases, a low-mass star is turned into a more-massive star that is about one-and-a-half times the mass of the Sun. If this happened relatively late in the cluster's life, then the more-massive star may not yet have had time to evolve to become a white dwarf, and so the star is seen today as a blue straggler.

Meanwhile, by analysing data obtained by the WIYN 3.5-metre telescope of the less-dense star cluster NGC 188, called an open star cluster because its stars are loosely bound by gravity, Mathieu and Geller[2] show how most of the cluster's blue stragglers are in binary systems with orbital periods of about 1,000 days. This suggests that, in this cluster, most blue stragglers have been produced by mass flow between stars within a binary.

Taken together, these results[1,2] produce a consistent story: one in which blue stragglers are formed in both ways in star clusters, with collisions becoming more common with increasing cluster density, and binaries alone producing the blue-straggler population seen in the Galactic halo. ■

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STRUCTURAL BIOLOGY

Translocation chamber's secrets

Peter J. Christie

DNA transfer across membranes is a fundamental life process. The structure of part of a protein channel that performs this task offers insight into the mechanism of DNA passage through bacterial cell envelopes.

Many bacterial species transfer DNA to neighbouring cells in a process called conjugation. Over evolutionary time, conjugation has played a dominant part in shaping bacterial genomes. On a more immediate timescale, conjugation poses an enormous public-health problem as a mechanism underlying the rapid dissemination of antibiotic-resistance genes and other virulence traits among pathogens. The question of how bacteria move DNA from one cell to the next has been investigated for more than 50 years, but only recently have structural details emerged. On page 1011 of this issue, a group led by Gabriel Waksman[1]