50 Years Ago

In the market of Fort Lamy (Chad) one can purchase a greenish edible substance called *Dihe* which is sold as a flat cake. … It appears to be an alga collected on the bottoms of seasonally dried-up ponds and shallow waters in the north of Lake Chad and consumed by the local population.

However, on arriving in … Ounianga Kebir … more than 750 miles to the north-east of Fort Lamy, the botanist was struck by the abundance of a microscopic alga in some lakes. … Although the local population appears to be unaware that it might have a food value, the botanist … prepared some cakes according to the recipe obtained.

Both cakes … are almost exclusively composed of a Cyanophycea: *Spirulina platensis*. According to chemical analysis it appears that it is a food-plant very rich in proteins.

From *Nature* 8 January 1966

100 Years Ago

The popularisation of Science. It is scarcely surprising that scientific knowledge is so little disseminated in this country considering the difficulties which hinder its acquisition. If science is to become widespread, it seems to me essential that it should be democratic both in its higher and in its lower branches. In England, however, science may be said to be aristocratic. Scientific societies demand more or less high subscriptions. Public lectures on science are rarely free. In London an institution exists where advanced lectures are given, but the subscription to which is considerable, and to become members of which people actually have to be recommended—recommended to be allowed to learn!

From *Nature* 6 January 1916

galaxies that have low metal content, but those measurements are affected by systematic uncertainties. Even worse, the latest analyses point to a primordial ^{4}He abundance that seems to be significantly higher than the one suggested by the Planck mission's CMB study[5,6].

To resolve this problem and to reduce the uncertainties, Cooke proposes that the usually neglected primordial isotope ^{3}He should be included in the analyses. According to BBN theory, the ratio of the primordial abundance of ^{3}He to that of ^{4}He depends on both N_{eff} and the cosmic baryonic density, in a way that is opposite to the dependence of the ratio of deuterium to ^{1}H; that is, ^{3}He:^{4}He decreases with N_{eff}, whereas D:^{1}H increases. So, by combining analyses of both the hydrogen and helium isotopic ratios, the value of N_{eff} can be constrained better than by using either the abundance of ^{4}He or the D:^{1}H ratio alone (Fig. 1).

Implementing this idea is far from trivial, however, on both observational and theoretical grounds. First, uncertainties in nuclear-reaction rates will have to be further reduced to make ^{3}He a useful probe for precision cosmology. Second, unlike deuterium, which is always destroyed by stars, ^{3}He is produced by low-mass stars but destroyed by higher-mass ones, to a poorly known extent. This makes it difficult to determine its primordial abundance unambiguously, even by looking in low-metallicity environments.

Moreover, ^{3}He is 10,000 times less abundant than ^{4}He, and so its weak emission line will be hard to identify in the background of the much brighter ^{4}He line — especially if the latter is broadened by rapid thermal or turbulent motions of the emitting gas. A statistically significant detection of ^{3}He would require a high signal-to-noise ratio, of more than 500. This will be obtainable only using the next generation of telescopes, which will have mirrors 30 metres or more in diameter.

Nevertheless, Cooke's suggestion is of great interest, because the standard cosmological model should be checked as accurately as possible with every available method, in view of its prominent role in modern physics. In particular, Cooke's strategy should allow potential departures from the standard model to be probed in a complementary way to existing strategies. ■

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This article was published online on 9 December 2015.

CANCER

Oncogene brought into the loop

Analysis of the 3D structure of DNA in tumour cells reveals how mutations in the *IDH1* gene, and associated changes in methyl groups attached to DNA, elevate the expression of cancer-promoting genes. SEE LETTER P.110

MATTHEW R. GRIMMER & JOSEPH F. COSTELLO

The discovery in the late 2000s that mutations in the gene that encodes the enzyme isocitrate dehydrogenase 1 (*IDH1*) are often associated with glioma, the most common form of brain cancer, was unexpected and tantalizing[1,2]. The IDH1 protein is involved in the citric-acid cycle — a metabolic process that is used by nearly all cells to generate energy, and that in 2008 had only recently been connected to cancer[3,4]. The discovery therefore supported the long-standing theory that altered metabolism could transform normal cells into cancerous ones. On page 110 of this issue, Flavahan *et al.*[5] report that an abnormal metabolite generated by mutant IDH1 may drive cancer primarily by altering the 3D conformation of DNA.

Mutant IDH1 converts the citric-acid-cycle molecule isocitrate into an abnormal metabolite that inhibits TET enzymes[6], which remove methyl groups from DNA. The presence of methyl groups can alter gene expression by preventing some proteins from binding DNA, and an excess of methyl groups in promoter sequences (which drive gene expression) can silence tumour-suppressor genes, leading to cancer. It has been suggested[7] that inhibition of TET enzymes