incompatible with an 11 TMS model, but was compatible with a model having eight TMS. Second, they investigated the *N*-glycosylation of the single endogenous and multiple artificial *N*-glycosylation sites introduced into the AtHKT1 protein in a cell-free protein synthesis system. Because *N*-glycosylation occurs only on the luminal side of the endoplasmic reticulum, which corresponds to the extracellular side of the plasma membrane, they were able to confirm the eight TMS model. Third, they expressed *AtHKT1* constructs tagged with FLAG-epitopes at either the N- or C-terminus in HEK293 cells. The FLAG-specific antibody bound only when cells were permeabilized, showing that both termini were cytoplasmic. Additional epitope tagging verified the disposition of the first (S2–S3) and third (S6–S7) cytoplasmic loops. Thus, Kato and colleagues confirmed that AtHKT1 conformed to the eight TMS topology characteristic of the protein family.

The data of Kato and colleagues support a putative 'membrane–pore–membrane' model for AtHKT1, in which four pore-forming regions ($MPM_{A–D}$) are located on the extracellular side of the plasma membrane. This hypothesis is supported by the observation that the five amino acid residues previously identified in HKT1 as being involved in Na^+ and/or K^+ binding are found in the second, third and fourth external loops of AtHKT1. These studies clarify the topology of HKT proteins and provide the basis not only for future investigations of their mechanisms of transport and cation selectivity, but also for the genetic manipulation of HKT proteins for salinity tolerance.

1 Kato, Y. *et al.* (2001) Evidence in support of a four transmembrane-pore-transmembrane topology model for the *Arabidopsis thaliana* Na^+/K^+ translocating AtHKT1 protein, a member of the superfamily of K^+ transporters. *Proc. Natl. Acad. Sci. U. S. A.* 98, 6488–6493

Philip J. White
philip-j.white@hri.ac.uk

In Brief

Waste? No such thing!

It is always comforting when a use is found for something that was previously considered just waste. Such is the case with the stalks and leaves that remain after the cones of the hop plant (*Humulus lupulus*) are harvested to be used in beer-making. A team led by Kirk Tiemann at the University of Texas (USA), mixes the leftovers with a silica-based polymer and use the mix to decontaminate metal-polluted water. This combination is as effective as using commercial ion-exchange resins to do the same job. Additionally, up to 90% of the metals can be recovered from the hop system, which permits not only their re-use, but also that of the hop-polymer. Proving that a quiet think over a pint of beer can provide liquid inspiration to inventors. [Sample, I. *New Sci.* (2001) 7 April, p. 22] *NC*

Wearable corn

A key ingredient in the manufacturing of plastics, previously only produced from petroleum, can now be made from corn. The development comes from Dupont and Tate & Lyle (Decatur, IL, USA). From a fermentation process of corn sugar, scientists can extract the chemical, 1,3,propanediol (PDO), which acts as a biocatalyst in polymer production. The polymer, commercially known as Sorona, can be spun into polyester-like textiles suitable for clothing. To date, DuPont has one manufacturing plant in the USA that is capable of using the corn-derived PDO. According to Ellen J. Kullman (DuPont), the product, 'offers solid proof that biotechnology can and will deliver benefits in a wide variety of areas.' (*PR Presswire*, 1 May 2001). *TS*

Dinosaurs cut their teeth

Teeth can reveal a lot about the owner's diet. In May, Andy Heckert, a graduate student at the University of New Mexico (USA), presented a paper to the Geological Society of America where he showed evidence of dinosaur fossilized teeth that he thinks show the transition from early meat-eating to plant eating dinosaurs. He found teeth shaped for meat eating that were blunted, indicating plant eating. The fossils are >200 million years old and might place the initial evolution of herbivory. Heckert found seven different types of the early herbivore fossil dinosaurs, suggesting that herbivory evolved rapidly. [*Associated Press* 3 May 2001] *TS*

Two new corn viruses

Scientists from the Agricultural Research Service (ARS) and Ohio State University identified two new corn viruses in the USA, one in Arizona and another in Georgia. The Arizona virus, known as maize necrotic streak, is part of a viral family that scientists previously knew only to infect broadleaf plants and not grain crops. The necrotic streak spreads through soil, decreasing its likelihood of spreading widely. However, laboratory tests indicate that corn plants harboring the virus called the Georgia Unknown cannot yield seed, making it much more serious. The virus comes from a family normally spread by common insect vectors. Tests are currently underway to establish which insects harbor Georgia Unknown. *M2 Presswire*, 20 April 2001. *TS*

The origin of leaves, no choking matter

Why do plants have leaves? Apparently, the earliest land plants had only spine-like leaf structures. Broad leaves suddenly appeared in the fossil record ~360 million years ago; why? Recognizing that the development of the more leafy habit coincided with a 90% decrease in atmospheric CO_2, David Beerling and co-workers [*Nature* (2001) 410, 352–354] suggest that stomatal density is at the root of it all. As CO_2 levels fall it becomes harder to drive photosynthesis, and the plants effectively choke to death. An increase in stomatal density facilitates better uptake of CO_2 and, hence, the ability to photosynthesize. Development of broad leaves provides the platforms to support these increases in stomata. So plausible, it surely must be right! [Hecht, J. *New Sci.* (2001) 17 March, p. 6] *NC*

