The biophysical limitations in physiological transport and exchange in plants grown in microgravity
D. M. Porterfield
J. Plant Growth Regul., 2002, **21**, 177–190.

The indirect effects of microgravity are described in this paper that reports the calculated changes in the physiological transport and gaseous exchange in higher plants. The mathematical modelling simulates the gravity conditions on earth and during space flight. This model shapes a theoretical foundation for explaining physiological processes in plant growth during a space flight experiment.

Tissue localization of the endosymbiotic bacterium *Candidatus Blochmannia floridanus* in adults and larvae of the carpenter ant *Camponotus floridanus*
C. Sauer *et al.*
Appl. Environ. Microbiol., 2002, **68**, 4187–4193.

The carpenter ant *Camponotus floridanus* shelters endosymbiont bacteria *Candidatus Blochmannia floridanus* in their specialized cells called the bacteriocytes present in the midgut. The mutualism in this association is not clear but the bacteria inside the bacteriocytes are likely to be transmitted vertically. Light microscopy, electron microscopy and *in situ* hybridization techniques are used to localize the bacteria in various preparations of histological specimens of the ant. The experimental data demonstrate the presence of endosymbionts in the bacteriocytes, that could be eliminated upon feeding the ants with tetracycline and rifampin enriched diet.

The biomechanics of *Pachycereus pringlei* root systems
K. J. Niklas *et al.*
Am. J. Bot. 2002, **89**, 12–21.

Biomechanics of the root systems in plants is related to the nature and extent of the mechanical forces transmitted by the shoot system, much like the considerations employed in the foundation design of a tall building or a tall distillation column. The authors study the root system of a large columnar cactus, *Pachycereus pringlei*, to arrive at an understanding of the primary function of the root system with increasing body size. The study was conducted on the coast of the state of Sonora, Mexico. The root anatomical features were described on the examination of sections observed under stereomicroscopes photographed by reflected light. Mechanical testing of the root and stem wood samples was done to determine Young's elastic modulus and the tensile breaking stress. Computational analysis indicates that a size-dependent shift occurs in the root function, from support of the stem against windload to nutrient absorption/storage as body size increases.

Substrate-facilitated assembly of elastin-like peptides: studies by variable-temperature *in situ* atomic force microscopy
G. Yang *et al.*
J. Am. Chem. Soc., 2002, **124**, 10648–10649.

Human elastin peptides, derived from exons 20, 21, 23 and 24 can form fibrillar aggregates with a high degree of β-structure. *In situ* variable temperature atomic microscopy is used to investigate the initial stages of transitions into the peptide coacervates. Nucleation and growth were accumulated at higher temperatures. The observations are consistent with a hydrophobic coacervation mechanism and could be used to understand protein nanostructure fabrication.

Left hemisphere cerebral specialization for babies while babbling

S. Holowka and L. A. Petitto
Science, 2002, **297**, 1515.

Baby babbling, defined as vocalizations that contained a reduced subset of possible sounds found in spoken language with reduplicated syllabic organization, is related to origins of human languages and the programmed development of neural foundation of higher human cognition. The authors studied 5 English-speaking and 5 French-speaking babies in the age group 5 to 12 months and videotaped their oral activities. An analysis of the videotapes was grouped into three types, babbles, non-babbles and smiles. Based on the observations of right asymmetry of the mouth opening, it is concluded that babbling represents the onset of the productive language capacity in humans; not just a motoric development but a left hemisphere specialization. No significant variations were found in the general pattern of mouth asymmetry in the French and English groups.

Prion protein specific aptamer reduces PrPsc formation
D. Proske, S. Gilch, *et al.*
Chem. Bio. Chem., 2002, **3**, 717–725.

Prion proteins are associated with transmittable spongiform encephalopathies (TSE). The cellular prion protein (PrP^c) is converted to the pathogenic isoform (PrP^{sc}) along with a post-translational structural change from an α-helix/random coil to a predominantly β-sheet conformation. The authors developed 2′-amino-2′-deoxypyrimidine-modified RNA aptamers (DP7) that can interfere with the conversion from PrP^c to PrP^{sc}, by binding to a specific region on human prion protein. This inhibition could be demonstrated in prion-infected neuroblastoma cell lines. DP7 appears to be the first of a class of RNA therapeutics or prophylactics against TSEs.

Nanometer sized products of uranium bioreduction
Y. Suzuki *et al.*
Nature, 2002, **419**, 134.

Stimulation of growth of native bacterial populations in uranium-contaminated sediments can reduce aqueous uranium concentration from 20 to 0.3 ppm. This bioremediation can be achieved by pure cultures of *Desulphosporosinus* spp. X-ray absorption near edge spectroscopy (XANES) identifies the transition from U(VI) to the bacterially reduced U(IV) that can form uranite particles, that are typically 2 nm or less in diameter. These results point to the possibility of making *in situ* bioremediation of radionucleotide contaminated ground water a reality.