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Ants have a nose and taste for caste

Insects have a well-developed sense of smell and taste. These chemosensory inputs influence the stereotyped behaviour of insects. Eusocial insects of the order hymenoptera, are characterized by the occurrence of individuals belonging to different castes

in a colony. They perform caste-specific behaviours. Castes are found among females that develop by parthenogenesis and are haploid. Various caste-specific behaviours include kin recognition, foraging, nursing and nest building. Guided by the hypothesis that a caste-specific behaviour would require exclusive sensory input, Babu *et al.* (**page 755**) have explored the chemosensilla on the antennae and mouthparts of the three castes of the weaver ant, *Oecophylla smaragdina* (Fabricius) by light and scanning electron microscopy. *Oecophylla* exhibits triphasic allometry, wherein queen, major and minor workers develop from larvae. The choice of material therefore permits unambiguous observations, unlike in case of some social insects that exhibit temporal polyethism, wherein there is an age-related switch in caste and caste-related tasks. The sensilla of ants are also well-documented. The authors found five types of sensilla on the antennae to be present in all the three castes but their number differed. Silver-positive trichoid hairs on the mouth parts (labial and maxillary palps) of the three castes also differed in number. The observations suggest that the number of primary mother cells that are precursors of sensilla differs during development. A similar developmental mechanism is known for caste-specific visual system in honey bees also. Thus a differential development appears to produce caste-specific sensory apparatus. A haploid female exhibits plasticity to develop a suitable sensory apparatus to serve any one of the castes and the caste-specific behaviour appears to be hard-wired in the sensory apparatus of the ants.

Biomimetics for sustainable development of concrete

Biomimetics is a field of science that studies biological processes for effectively using them in the development of innovative engineering materials and systems. It is a new field of emergence in materials science and engineering in which lessons learned from biology form the basis for evolution of novel technological materials. Biomimetics can be regarded as – abstracting processes from nature, identifying the business opportunity for these processes and applying them. Biomimetics is not about copying nature, but about learning from nature. Biomimicry innovation methods can help us to create products and processes that are sustainable, perform well, save energy, reduce materials cost, and redefine and eliminate waste and subsequent environmental degradation. Ramesh Kumar *et al.* (**page 741**) present a critical review of the literature on biomimetics in civil engineering field and its application for the development of sustainable materials in the construction industry. The article includes various methodologies such as biodeposition, which has influenced material evolution, and biomineralization, which is a complex phenomenon by which organisms form minerals seen in various geothermal systems. Concrete is considered as one of the most important building materials around the world. The article deals with the initial usage of *Bacillus pasteurii* for filling up the pores for crack remediation and the research work on it by changing the nutrient source and the strain improvement of the same towards increase in strength of concrete. The article also deals with the new type of thermophilic anaerobic microorganism belonging to Shewanella species, which when added to concrete, have shown to increase the strength of the concrete. The strength improvement is due to growth of filler material within the pores of the cement–sand matrix. Thus, there is ample scope for development of biomimetics-based sustainable construction materials.

Transgenic *Bt* cotton hybrids in soils of Nagpur

Bt cotton is the first genetically modified crop to be cultivated in India. Studies on its performance have been conducted time and again. Some conclude that the use of insecticides has reduced after the introduction of *Bt* cotton and crop productivity has increased, others claim the development of resistance to *Bt* toxin in bollworms. A new finding (**page 783**) reports the effect of soil moisture and soil depth on the expression of Cry toxin in the leaves of transgenic *Bt* cotton hybrids. The study, conducted in Nagpur, Maharashtra, found concentration of the toxin to be higher in leaves of plants grown on deep black soil than on shallow soil. Both excess and deficiency of soil moisture led to a decline in the concentration of Cry toxin in the leaves. Field studies were conducted during the rainy seasons of 2006–07 and 2007–08.