Scientific News

The phytopathogenic bacterium *Pseudomonas syringae* occurs in nature as ecotypes with varying degrees of specialization for different hosts. Previous studies revealed that ecotypes pathogenic to stone fruit, pear, and grass hosts produce syringomycin (SR), to which the hosts, particularly maize, are sensitive. C. F. Gonzalez, J. E. DeVay, and R. J. Wakeman now confirm that California isolates of *P. syringae* from blast lesions and stem cankers of various citrus trees produce a different toxin, syringotoxin (ST). Production of the toxin, a wide-spectrum biocide, is thus far unique to the citrus ecotype of *P. syringae*. When treated with ST, healthy petioles of navel orange developed typical symptoms of blast. None of the isolates of the citrus ecotype produced SR, and none of the pome fruit, stone fruit, or grass ecotypes produced ST. Preliminary evidence indicates, however, that one of four citrus isolates from Europe produces SR and three produce ST. The phytotoxicity of ST to citrus was low compared with that of SR to peach or maize. The authors conclude that ST is involved in citrus blast. (Physiol. Plant Pathol. 18:41-50)

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The numerous theories to explain cytoplasmic discharge from sporangia of *Phytophthora, Pythium, Aphanomyces*, and other aquatic fungi have included self-locomotion, contractile proteins, swelling gel matrix, differential surface tension, and osmotic pressure flow. U. Gisi and G. A. Zentmyer reviewed the evidence for each of these explanations, then concluded from their own extensive experimental evidence that the discharge from *Phytophthora* and *Pythium* spp. can be explained by the osmotic pressure flow model based on the equation of Hagen-Poiseuille. Different flow rates of cytoplasm from the sporangium correlated with the diameter of the exit pore of the sporangium and the turgor pressures at the beginning of cytoplasmic discharge. Transfer of *Phytophthora* sporangia to solutions with osmotic potentials between −2.4 and −3.6 bars stopped zoospore release completely. Turgor pressures of sporangia of three *Phytophthora* spp. produced in bean meal broth were 3–4 bars greater than for sporangia produced in chloride salt solution, and the velocity of cytoplasm discharge was greater accordingly. Transferring a sporangium to distilled water caused an influx of water with increased pressure, and the sporangium burst. Inflation of the discharge vesicle consumed about half the initial turgor pressure of the sporangium. (Exp. Mycol. 4:362-377)

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The genetic material in cauliflower mosaic virus (CaMV) is double-stranded DNA (dsDNA) that occurs in preparations as both linear and circular molecules of similar contour length. The circular form has accounted for more than 90% of DNA in fresh preparations and is the infectious entity; the linear form is believed to arise from breakage of the circular form. A. Frank and associates have now established the complete nucleotide sequence of CaMV at 8,024 nucleotides. The DNA molecule possesses two discrete discontinuities (gaps) in one (β) strand and one gap in the other (α) strand. The gap in the α strand corresponds to one or two missing nucleotides, whereas the two gaps in the β strand are sequence overlaps (19 residues for gap 2 and at least two residues for gap 3). The authors' evidence for distribution of nonsense codons on the β strand, combined with previous information, suggest that only the α strand is transcribed. The molecule is circular and consists of six long open reading frames. The authors propose that the cistron for the viral coat protein is in coding region IV, since only this region has the potential to code for richness in lysine, a characteristic of the coat protein of CaMV. (Cell 21:285-294)

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Two species of vampyrellid amoebae that cause small holes ($< 1\ \mu$m diam.) in conidia of *Cochliobolus sativas* and chlamydospores of *Thielaviopsis basicola* in soil have been identified by T. R. Anderson and Z. A. Patrick. The species resemble, respectively, *Vampyrella vorax* and *Theratromyxa weberi*, and both are members of the family Vampyrellidae. These mycophagous amoebae are distinguished from *Arachnula impatiens*, the vampyrellid amoeba shown earlier to cause perforations and annular depressions 1–7 μm in diameter in the pigmented walls of fungi in soil. *T. weberi* apparently is common in agricultural soils; *V. vorax* is found less often. The authors suggest that *T. weberi* would be more suitable than *V. vorax* for studies on biological control of soilborne plant pathogens; *T. weberi* has previously been described as nematophagous. The authors present detailed drawings of the life cycles of *T. weberi* and *V. vorax*. (Soil Biol. Biochem. 12:159-167)

Root tips of grasses have been known for some time to be coated by heavy deposits of polysaccharides, referred to as mucilage. According to N. K. Miki, K. S. Clarke, and M. E. McCully, two types of mucilage occur for young, axenically grown grasses: 1) a gelatinous material originating from the root cap and 2) a firm, uniformly thick material overlying the columnar epidermal cells. These mucilages were similar for corn, wheat, barley, oats, sorghum, and a sudangrass-sorghum hybrid. Histochemical and other tests showed the mucilages to be highly heterogeneous. The authors propose that the root cap mucilage is synthesized within peripheral and near-peripheral cap cells, moved via Golgi-derived vesicles to the plasma membrane, then released through the cell wall. Surface mucilage, they suggest, originates within the columnar epidermal cells and passes through the outer periclinal wall through the numerous dictyosomes. The authors reject earlier suggestions that mucilage is formed either by partial hydrolysis of the outer epidermal cell walls or by bacterial degradation of dead epidermal cells. They believe the term "mucigel" should be used only to describe the more general mucilaginous material ensheathing roots in nonsterile soil. (Can. J. Bot. 58:2581-2583)

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An early explanation of the mechanism by which freezing injures cells was that cells were crushed or speared by ice crystals. This theory was rejected when tissues were shown to tolerate ice and when no mechanical pressure or punctures occurred in cells. P. W. Grieve and M. J. W. Povey have produced evidence to support the current theory that on differential freezing, osmotic flow across a membrane becomes reversed, causing osmotic dehydration of the cell. The authors used a thistle-funnel apparatus to show an osmotic pressure gradient developing across a membrane after differential cooling at slow rates; the change in osmotic potential was monitored refractometrically. A sucrose solution was retained within the thistle funnel with cellulose acetate membranes, the funnel was immersed in water, and the water was slowly frozen. When the water was completely frozen, the sucrose concentration increased, reversing the steady dilution observed while the water was being frozen. The authors therefore conclude that freeze damage is a form of water stress and is functionally similar to drought damage. (J. Sci. Food Agric. 32:96-98)

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