Chemistry

Medicinal waters: Where ibuprofen goes

Last year, when Swiss chemists were looking for pesticide residues in lakes, they instead turned up the heart drug clofibric acid (SN: 3/21/98, p. 187). Several months later, they identified another pharmaceutical in Swiss rivers and lakes: diclofenac, an anti-inflammatory drug. In both cases, human urine appeared to be the source of the water-polluting drugs.

Mulling over their findings, Hans-Rudolf Buser and his colleagues at the Swiss Federal Research Station in Wädenswil became curious. Why weren't they also finding ibuprofen, a much more common anti-inflammatory drug?

In the August 1 Environmental Science & Technology, these chemists report finding a critical difference in the environmental fates of the three drugs. While clofibric acid and diclofenac pass through municipal water-treatment facilities unscathed, ibuprofen doesn't. In Switzerland, wastewater-treatment plants "seem to get rid of maybe 95 percent or so" of the ibuprofen, Buser says. That's important, he notes, because unlike diclofenac, ibuprofen appears resistant to photolysis, or breakdown upon exposure to sunlight. Clofibric acid also resists photolysis, which is why it can be found entering the ocean up to thousands of miles from its source.

Buser's group also showed that the waterborne ibuprofen is from human excretion, not direct dumping. Manufacturing produces two mirror-image versions of the ibuprofen molecule. Although only the left-handed molecule is pharmacologically active, Buser notes, the marketed drug contains a mix of both the left- and right-handed forms. His team now reports finding only the left-handed ibuprofen, together with products that form through the body's action on the drug, in water entering wastewater-treatment plants. Because the right-handed form is altered in the body, this means that the ibuprofen had passed through people. Fortunately, he says, waste-treatment plants degraded the two forms and their by-products equally well. —*J.R.*

Wild spurges make risky houseplants

Euphorbiaceae is one of botany's bigger families. Its 8,000 or so distinct species—known generically as spurges—produce a milky latex sap that oozes from cuts on leaves or stems. The fact that this latex usually contains allergy-inducing toxins hasn't stopped aficionados from cultivating scores of spurges as ornamental houseplants. Among the most popular are poinsettias, crotons, and crown-of-thorns.

Now, German biochemists offer more reason to handle spurges with care. Their latex, which easily penetrates skin, can contain ingenol—a potent tumor-promoting chemical. If someone who has been exposed to carcinogens, such as a smoker, touches this latex, "it might accelerate a tumor's development," worries Heinrich Sandermann Jr. of the GSF-National Research Center for Environment and Health in Oberschleissheim.

To gauge the risk faced by people who work with spurges, his team screened 22 houseplant cultivars using animal cells engineered to emulate precancerous cells and also to glow when they undergo a cancerlike transformation.

Twenty cultivars, including eight crotons and seven poinsettias, exhibited virtually no cancer-promoting activity, the scientists report in the September Environmental Health Perspectives. Two relatively wild spurges, however, triggered plenty of glow. The good news, Sandermann says, is that the most common spurges "appear to pose little risk." —*J.R.*