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Salt Lake, After Sundown

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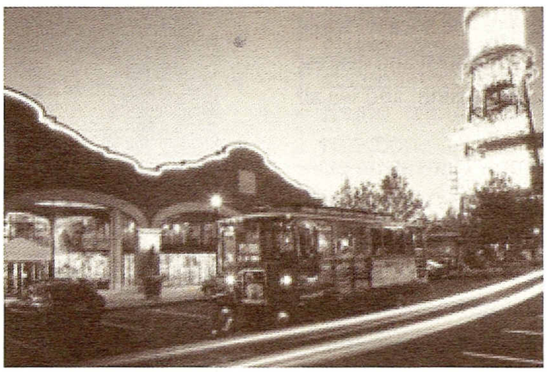
The SETAC 23rd Annual Meeting in North America is fast approaching and we wanted to make all the members aware of some unique and entertaining options provided in the Salt Lake area. Salt Lake City may be known as "Mormon Town" but that doesn't mean that she's not up for a good time. The following provides the *American Way* travel magazine's top choices for entertainment.


Trolley Square

Salt Lake City has a diverse selection of eating establishments, and a summary of the most favored is provided herein. **The Sugarhouse BBQ Company** is a noisy, bustling place that provides traditional southern cooking. The **Fresco Italian Café** may be small, but it delivers a big taste of Italy. The **New Yorker** is the place to be for steak and a long list of wine choices. Stepping through the front door of **Lambs,** which has been in business since 1919, is like walking through a time machine. Diners sit at the long diner-style counter, in cozy booths, or at linen-draped tables for hearty meals. For a quick jolt of java, the **Salt Lake Roasting Company** is the preferred spot to be. Some might consider it ironic that Salt Lake City's **Red Rock Brewing Company** was awarded "Best Brewpub in the United States" at the 2000 National Brewpub Conference. **Squatters** microbrewery, just around the corner, also has a great selection of beers and is known for its India pale ale.

For live music, head to **The Zephyr**, which hosts rising talent on an almost nightly basis. From jazz to blues to reggae to rock, The Zephyr is the most musically savvy club in the city, and the crowd varies according to the act. If the bright lights aren't your style, go underground to the **Dead Goat Saloon**. The Goat's subterranean location, coupled with its well-worn wood tables, booths, and floors, gives it a cozy feel. The food is considered some of the best in Utah. Information for each of the above listed facilities is provided as follows:

- Dead Goat Saloon: 165 South West Temple; 801-328-4628
- Fresco Italian Café: 1513 South 1500 East; 801-486-1300
- Lambs: 169 South Main Street; 801-364-7166
- The New Yorker: 60 West Market Street; 801-363-0166
- Red Rock Brewing Company: 254 South 200 West; 801-521-7446
- Squatters Pub Brewery: 147 West Broadway; 801-363-2739
- Salt Lake Roasting Company: 320 East 400 South; 801-363-7572
- The Sugarhouse BBQ Company: 2207 South 700 East; 801-463-4800
- The Zephyr: 301 South Temple; 801-355-2582

The technical program is expected to attract 1,800 abstracts for a variety of platform, poster, interactive poster, and debate sessions. The short-course program, designed to meet the continuing educational mission of SETAC, will include introductory and advanced professional-level courses on topics of current and emerging interest. Several refinements in the meeting format are being implemented to better meet the membership's needs and schedules. Perhaps the biggest change will be that the meeting will start and end a day earlier than in past years—short-courses and the opening Reception will be on Saturday and the meeting will end on Wednesday. This will hopefully reduce participants' costs by taking advantage of "Saturday night stay" airline fare reductions. Additional information on these and other changes will be announced as meeting plans are confirmed.

So, get those abstracts in, and be sure to join us in Salt Lake in November!

Learned Discourses: Timely Scientific Opinions

Assessing Effects of Plant Protection Products on the Breakdown of Organic Matter: Regulatory Requirements, Problems and Prospects

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Introduction

To minimise the environmental risk posed by the use of agricultural chemicals, European Directive 91/414/EEC and its subsequent amendments (Directive 96/12/EC) stipulate that plant protection products should be evaluated for their possible effects on the breakdown of organic matter (OM).

Current opinion, based on recommendations from a working group led by the German Biologische Bundesanstalt (BBA), is that litter-bags should be used as a higher tier test for effects of plant protection products on the mass loss of plant litter (Kula and Guske 2001).

Experience with the litter-bag test is increasing, and draft test protocols have been developed by the BBA. But questions remain. For instance, is the litter-bag test the most appropriate method for assessing effects of plant protection products on OM breakdown? If so, what are appropriate triggers for the test? To support the UK Pesticides Safety Directorate, the Department for Environment, Food and Rural Affairs (DEFRA) recently commissioned a study to determine the state of knowledge on test methods for assessing breakdown of OM and their relevance to the risk assessment of plant protection products, and on the role of soil microorganisms and soil fauna in plant litter decomposition.

Limitations of Current Tests

A test for effects of a pesticide on OM breakdown is required (Directive 96/12/EC, Annex II, Point 10) if:

- the pesticide is persistent, or
- it is harmful to soil microbial processes or earthworms (as determined from lower-tier tests), or
- there is a risk to other soil fauna (as determined from "further" single-species tests).

Earthworm tests are the only tests on soil fauna used routinely in the risk assessment scheme; other tests on Collembola, Enchytraeidae, and Acari have standard methods. However, the relevance of these single-species tests to the functional endpoint is presently unclear and for many other functionally important groups of soil fauna (e.g., Diplopoda, Isopoda, Mollusca, Nematoda, and Protozoa) standard test methods are lacking (van Straalen and van Gestel 1998).

Tests on microorganisms and microbial processes are difficult to relate to OM breakdown for four principal reasons: (1) The degree of functional redundancy among microflora is unknown; (2) Some tests are too general (e.g., soil respiration); (3) Some microbial tests are too specific (e.g., nitrification); (4) The role of individual soil enzymes in decomposition is difficult to quantify.

"Early Warning" (Middle-Tier) Predictors of Risk to Organic Matter Breakdown?

Multiple enzyme activities might have predictive value for risk to OM breakdown if studied simultaneously using the "Biolog" method (Dighton 1997).

- It is not dependent on the identification of particular microbial species.
- It can be automated as a high-throughput screening tool.
- Results can be obtained quickly (in 70 hours).
- The method could be modified for the OM breakdown endpoint.

However, this method also has drawbacks. In particular, it is suitable only for culturable microorganisms (which make up a small proportion of the soil microflora).

An alternative (or additional) approach is the catabolic response profile (CRP) (also known as in-situ catabolic potential; Degens and Harris 1997). This approach directly assesses the catabolic diversity of microbial communities by adding a range of simple organic substrates directly to soil and measuring the short-term catabolic activity as CO_2 output. It is not limited to culturable microorganisms but problems of functional redundancy might occur if substrates are utilised by a wide range of microflora, and clarification is required on which aspects of catabolic diversity are most relevant to OM breakdown.

The Biolog and CRP methods offer flexibility in the choice of substrates that can be used and hence might be developed further as predictors of OM breakdown.

Are Litter-Bags Appropriate for the Functional Endpoint Test?

Five methods that could have relevance both to the functional process of OM breakdown and to the risk assessment of pesticides are reported in the literature. These are the litter-bag (Kula and Guske 2001), minicontainer (Eisenbeis et al. 1999), cotton-strip assay (Harrison et al. 1988), stable C and N isotopes (Nagel et al. 1995) and bait-lamina assay (von Törne 1990). We compared these methods on the basis of 24 suitability criteria. Only the litter-bag test was found to be sufficiently well developed and relevant to be suitable as a technique for assessing pesticide effects on OM breakdown in the field.

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Future Directions

Although the litter-bag test is currently the most appropriate method for assessing effects of pesticides on OM breakdown, several aspects of the methodology still have to be addressed.

- The ecological relevance of the litter mass loss endpoint requires clarification.
- Exposure scenarios need to be determined for different agricultural management conditions, soils and crop types.
- A means of validating litter-bag tests is required (e.g., using appropriate toxic reference substances or chemical fate data).

The methodology has not been sufficiently well developed for application in ecotoxicology yet, but integration of stable isotope methods with the litter-bag test might in future provide enough information on C and N transformations in the field to allow risk to be determined without requiring the full time course of the litter-bag test to be completed.

Perhaps the most difficult task for optimising the risk assessment to address the OM breakdown endpoint will be finding out how relevant the single-species soil fauna tests are to the litter mass loss endpoint.

Acknowledgements

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Reactive Oxygen Species Mediated Toxicity of Environmental Contaminants

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Reactive oxygen species (ROS) are highly damaging to biological tissue and appear to be an important mode of action for a variety of environmental contaminants including polycyclic aromatic hydrocarbons (PAHs) and heavy metals. Most PAHs have increased toxicity when they are exposed to ultraviolet (UV) radiation. This photo-induced toxicity involves the formation of ROS. Heavy metals, particularly copper, cadmium and iron, are highly redox active and can exert their toxicity by generating ROS. The co-existence of PAHs and heavy metals in the environment, and the fact that they both can generate ROS, makes possible interactions between these two chemical constituents of environmental concern. In this short review, we discuss the mechanisms of formation of ROS, and how this may be a general mechanism of environmental toxicity.

Mechanism of ROS Damage

While O_2 is required for aerobic life, many biologically damaging species can be derived from O_2. Two terminologies are used in describing harmful O_2 species: oxygen free radicals and ROS. An oxygen free radical is an oxygen species that contains one or more unpaired electrons. ROS not only describe oxygen free radicals, but also some oxygen non-radicals that are reactive. Examples of oxygen free radicals are superoxide ($O_2^{\bullet-}$), hydroxyl radical ($^{\bullet}OH$), alkoxyl radical ($RO^{\bullet}$), peroxyl radical ($RO_2^{\bullet}$) and hydroperoxyl radical ($HO_2^{\bullet}$). Examples of reactive non-radicals are H_2O_2, HOCl, O_3 and singlet oxygen ($^1O_2$). Interestingly, the O_2 molecule is a radical as it contains two unpaired electrons. It is also electron poor, as reflected by its extremely positive redox potential of ~1 volt. Thus, if there is an available source of electrons, O_2 is readily reduced. Biomolecules are a good source of electrons and therefore, one can expect them to be oxidized by O_2 as shown in Equation 1.

$$\tfrac{1}{2}\,O_2 + R_2CH \rightarrow R_2COH \qquad (1)$$

The free energy of this reaction is on the order of -60 Kcal/mol. However, oxidation of biomolecules by O_2 does not readily occur because the unpaired electrons in the O_2 molecule are of parallel spin putting O_2 in a triplet state ($^3O_2$). For O_2 to act as an oxidizing agent, the molecule to be oxidized must donate elec-