

Genetics/Toxics STOPWATCH

The Journal of the Center for Ethics and Toxics (CETOS)

Where Does Cancer Start?

By Marc Lappé

As one of its first studies, the new Genetic Integrity/Cancer Protection Project at CETOS is focusing on the phenomenon known as “perinatal carcinogenesis,” or the ability of chemical exposure during the time a developing child is in the uterus or nursing to produce cancer. Our work will focus on the special time window between conception and birth as a potential period of exquisite vulnerability to the later development of cancer.

The idea that cancer is a disease of old age hides the fact that many cancers may have their origin decades earlier. Some chemicals, especially those that have hormonal activity, can begin the cancer process in the womb. The experience of the “DES-daughters” is a case in point. DES is the abbreviation for diethylstilbestrol, an estrogen-like synthetic hormone prescribed to over 1 million women between 1950 and 1962 in the mistaken belief that this extra estrogen would overcome their tendency towards miscarriage. In the late 1950s, physicians learned that DES was useless (it actually caused more miscarriages than it prevented) but continued to prescribe it anyway.

Only a decade later did anyone suggest that DES created a cancer risk to those who took it, especially to their offspring. Mothers who took this potent hormone—even as little as 2 mg of it—unknowingly were courting the risk of perinatal carcinogenesis. In 1962 University of Chicago physician Arthur Herbst reported that about 1 in every thousand daughters of women who had taken DES would develop a rare cancer of the junction between the cervix and the uterus when they reached early adulthood. This astonishing finding set the stage for a revolution in drug and chemical safety testing. The lesson of DES appeared to be straightforward—even tiny amounts of extra hormones during pregnancy could produce a delayed effect in exposed offspring. But it was a lesson that few researchers took to heart.

A Brief History of Perinatal Carcinogenesis

In the 1970s, Russian researchers like Sergei Vesselinovitch who is now at the University of Chicago alerted their colleagues to the ability of a wide spectrum of chemical carcinogens to produce cancer following exposure in the uterus. More urgently, these researchers argued that the fetus was especially vulnerable to the

CETOS' Critical Habitat Project Focuses on the Effects of Chemicals To California Salmon Populations

By Britt Bailey

One of the primary goals of the newly formed Critical Habitat Project of the Center for Ethics and Toxics is to assess the risks to endangered species, specifically salmon, from the impacts of pesticide applications in intensive farming areas. The project momentum is the result of prior consulting assignments where we established that a significant amount of pesticides exceeded the protective levels accepted for vulnerable aquatic species, such as endangered salmon.



Coho Salmon - Photo courtesy of NOAA

One of CETOS' consulting assignments involved a partnership assignment with Smith River Project (www.smithriverproject.org). The Smith River, including its sloughs and estuaries, are home to perhaps the healthiest populations of salmon in the State of California. In fact, the Smith River is considered a State Reference Stream for salmonid populations due to these relatively healthy fish stocks. It is home to Central Coast Coho, northern California Steelhead, and the California Coastal Chinook. The Upper and Middle Smith River subwatersheds have been targeted as high priorities for watershed restoration. These areas (the Upper and Middle Smith River) comprise a “key watershed,” meaning it is an area important for maintaining and recovering habitat for at risk fish stocks, specifically salmonid populations and other resident species.

The Smith River estuary is especially important to the recovery efforts of salmon. Estuaries generally afford rearing, refuge, and feeding grounds for salmon. Juvenile salmon experience the highest growth rates of their lives while in estuaries and near-shore waters. Juvenile salmon move to estuaries for weeks or months to grow and adapt to salt water before moving out to sea. The estuary is the location where salmon transform from a freshwater to a saltwa-

In this Issue...

It has been an exciting summer at CETOS. In the past few months we have focused our work into three distinct though overlapping program areas. We have introduced the “**Safe Pregnancy Initiative**” being directed by Noah Chalfin. The Safe Pregnancy Initiative is focusing on identification of reproductive hazards, with the intent to educate families as to where they may be encountered so as to avoid exposure and potential harm to the developing child. “The Safe Pregnancy” initiative is an extension of our earlier work with the March of Dimes. We are also commencing the “**Genetic Integrity Cancer Protection Project**” directed by Marc Lappé. This program area follows our interest in the advances of biotechnology and toxics present in the environment that can alter the genetic integrity of a person, plant, or animal. Britt Bailey will direct the “**Critical Habitat Project**” assessing the risks to endangered species from pesticides and

chemicals. By identifying the intensive agricultural areas that present a risk to endangered species, the project can educate and support alternatives to synthetic pesticide use.

Not only has CETOS internally re-organized, but it is putting a new face forward as well. We have refreshed our website and are working with the Public Media Center to re-design an identifying logo that best represents our areas of interest and strengths.

In this issue you will read about the roots of our new program areas, important genetics and toxics news, and non-toxic tips such as ways to avoid volatile organic compounds present in some paints and stains.

Enjoy this issue of StopWatch, and feel free to give us the ever important feedback on our recent modifications.

– Britt Bailey, Editor

Where Does Cancer Start? Cont. from Pg. 1

gene-damaging effect of cancer causing chemicals, and would be expected to develop many more cancers on a dose-by-dose basis than would others who had not been exposed in utero. For some chemicals, this risk extended into the newborn period when certain enzyme systems that break down chemicals into active carcinogens reach maturity. As a post-doctoral student in 1969, I worked with one of these chemicals, known as urethane. I found that newborn exposure was a potent means of inducing lung cancers later in adulthood.

By 1979, American researchers were sufficiently concerned about the period before birth being a potent time of cancer-initiating events. Many argued for including pre-natal testing of chemicals to find others that behaved like DES as perinatal chemical carcinogens. Almost twenty years elapsed before such testing was introduced. Now, it is commonplace for the National Toxicology Program to include a test for perinatal carcinogenesis in its assays of chemicals for cancer. This testing regime includes giving the chemical before mating and then throughout the pregnancy period, continuing on to nursing. Tests are typically done either uniquely through the perinatal period or in conjunction with later adult exposure. When a perinatal test is included as part of lifetime, adult testing, some carcinogens that are only weakly cancer-causing (or non-cancerous) in adults were found to be potent carcinogens when given to fetuses. An example is

the group of chemicals known as polybrominated biphenyls (PBBs) which inadvertently contaminated the feed of dairy cattle in the Midwest in the 1980s and led to the contamination of tens of thousands of Americans who later drank the milk. Of greater interest was the finding (in female rats) that intrauterine exposure to PBBs during pregnancy, followed by adult exposure dramatically enhanced the ability of the chemicals to produce cancer compared to adult exposure alone. This same effect was seen with other chemicals, such as ethylene thiourea which causes an abundance of thyroid cancers if the adult-treated test animals had been exposed during their prenatal life.

The message of these studies, while probably specific for only certain chemicals, is clear. Exposure to carcinogens or radiation before and just after birth can set in motion a series of largely irreversible steps that put the child, and later the adult, at enhanced risk of cancer. For instance, exposure of babies to high amounts of an insulin-like growth hormone (IGF) stimulating substance during their fetal development is directly correlated with birth weight—which in turn is correlated with a later increase in breast cancer risk. Because many products or circumstances can increase (or decrease) the amount of IGF in an infant’s life, most notably the alleged increase in IGF in bovine-somatotropin stimulated dairy cows’ milk, this issue is of prime importance.

What Happens to Our DNA?

A common denominator for radiation and chemical-induced perinatal cancer is the ability of the offending substance to damage DNA, especially in the rapidly dividing cells of the fetus. Certain exposures, such as to chemical carcinogens like those found in cigarette smoke, will produce cancer (such as lung cancer) in adulthood from fetal exposure during during the period of rapid lung development. Other exposures, such as to chemicals in smoked foods or other so-called “N-nitroso” compounds, have been hypothesized to be responsible for some of the increasing numbers of brain cancer in children.

Why Children Are More Susceptible than Adults

Sometimes “young cells” appear to be more susceptible to can-

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Where Does Cancer Start? Cont. from Pg. 2

cer causing effects, say from radiation, than are older cells. This phenomenon is vividly demonstrated in dogs exposed to radiation while in the womb to small amounts of Cobalt 60. Over a lifetime, dogs irradiated before birth were dramatically more likely to get fatal cancer than were newborn dogs exposed to approximately the same dosage. Other chemicals, such as anti-oxidants or common drug-enzyme inducing chemicals like Phenobarbital can protect against radiation or chemically induced perinatal carcinogenesis.

The Genetic Integrity Project

Our project is concerned with identifying ways of reducing the DNA-damage from early exposures to hazardous chemicals and thereby protecting children and living organisms. Often protective agents, such as anti-oxidants found in the diet, may prove to be beneficial. Elsewhere, certain chemicals with potent gene-altering ability when exposure occurs before birth may have to be curtailed.

Finally, certain chemicals generally increase the risk of genetic damage through an indirect effect: by depleting a protective enzyme, substrate or environmental chemical that otherwise protects us from genetic damage. A case in point is the present explosive increase in ultraviolet radiation striking the earth and ocean surface as a result of the pollution-driven depletion of the ozone layer. In Argentina and Chile, a dramatic increase in gene damaged plants and animals have been found. In Australia, the current epidemic of skin cancer can probably also be partially attributed to a flux of UV light from ozone depletion. If we are interested in protecting the genetic integrity of species, we of necessity are interested in limiting the chemicals which reduce ozone and thereby increase the amount of DNA-damaging UV light.

We at CETOS hope to forge effective alliances to promote our ideas and program in this new project to preserve genetic integrity and reduce cancer risks accordingly.

References to the above article are included at the article link on our CETOS website: <http://www.cetos.org/geneinteg.html>



CETOS Staff: Noah Chalfin, Britt Bailey, Marc Lappé

Critical Habitat Project. Cont. from Pg. 1

ter fish. This adaptation, called smoltification, is especially sensitive to chemical disruption. Smoltification involves alterations and developmental changes to body chemistry, appearance, and behavior that are easily disrupted by toxic chemicals.

Degradation to the quality of water within the estuary is a significant barrier for the continued survival and recovery of salmon. Studies involving the effects of pesticides on salmon show that juvenile salmon may suffer adverse effects from passing through polluted estuaries and near-shore areas. Human-produced pollutants can cause immune dysfunction, increased susceptibility to disease and impaired growth and development in fish. Ecological impacts of some pesticides to non-target organisms, such as the effect of the carbamate pesticide carbofuron in male salmon, can lead to a significantly reduced ability to respond to priming pheromones, a scent released when a female is ovulating. Low level concentrations of fungicides have also been shown to cause death in juvenile salmon.

Although, the Smith River is recognized for its rich biological diversity, nearly 200,000 pounds of pesticides are used near the banks of the river's estuary. As with estuaries generally, the Smith estuary acts as a nursery where salmon complete their maturation and ready themselves for life in the ocean. We assessed 5 chemicals used within the surrounding land intensively cultivated for lily bulbs—90% of the lily bulbs grown in the United States come from this small 11 square mile area. We discovered that of the five pesticides examined, 4 exceeded the levels of protection set by the EPA for endangered aquatic organisms.

More recently, CETOS in partnership with Californians for Alternatives to Toxics (www.alternatives2toxics.org) examined the levels of three pesticides (active ingredients only) used for 10 crops surrounding endangered and threatened salmon populations. The four California salmon populations include Southern Oregon/Northern California Coho, Central Valley California Steelhead, South Central California Coast Steelhead, California Coast Chinook, and Southern CA Steelhead. Of the three chemicals (chlorpyrifos, carbaryl, and diazinon) used in 10 crops, nine of the ten crop areas exceeded the threshold of protection for salmon.

What does It all Mean?

Our "findings" coupled with research on the policy and scientific data available from government agencies, point to shortfalls in the level of protection provided to the recovery efforts of salmon populations in California. In our view, the EPA has failed to consider key factors such as the effects small doses of pesticides can have on an organism's behavior. Research on pesticides has shown low doses of pesticides can affect an animal's ability to smell. For salmon, this sense is integrally linked to homing and alarm responses. Pesticides can also impact an animal's reproductive capacity. For example, some pesticides can disrupt the swimming behavior of salmon, which in turn affects their ability to reach spawning areas.

The indirect effects of pesticides are also less than adequately understood. Pesticides can wipe out food sources creating alterations and indirect effects to habitat. An additional concern in addressing the effects of pesticides to endangered species is the

Continued on page 5

Genetics & Toxics News

• **CALIFORNIA: New report entitled *Secondhand Pesticides: Airborne Pesticide Drift in California*, released by Pesticide Action Network North America (PANNA)**, California Legal Rural Assistance Foundation (CRLAF) and Pesticide Education Center (PEC), reveals that several widely used pesticides are regularly found in air far from where they are applied at concentrations that significantly exceed levels deemed "safe" by regulatory agencies. The report shows that current regulations ignore 80-95% of airborne movement of hazardous drift-prone pesticides, putting the health of many hundreds of thousands of Californians at risk. New analysis presented in *Secondhand Pesticides* shows that pesticides are not only an immediate poisoning hazard for farmworkers and others directly exposed, but can adversely affect the health of people far from fields through the air they breathe. Ongoing, background exposure to pesticides in air in high pesticide use areas also poses considerable long-term health risks, the report reveals. For a copy of the full report, go to www.panna.org or phone Susan Kegley, PANNA, 415-981-1771, ext. 316.

• **Institute of Medicine Report Recommends Steps to Reduce Dietary Dioxin Exposure:** According to a new report from the Institute of Medicine of the National Academies of Sciences, a federal agency should develop and implement an action plan to reduce human exposure to dioxins in foods.

Dioxins are long-lasting compounds that accumulate in the body fat of animals and people. Although dioxins are ubiquitous in the environment, the fats in meat, poultry, fatty fish, whole milk, and full-fat dairy products are the principal source of most people's exposure. However, fetal and infant exposure depends on the amount in the mother's body because these compounds can cross the placenta and also collect in the fat in breast milk. Minimizing girls' and young women's intake of dioxins during the years before pregnancy is the only practical way to reduce dioxin exposure in fetuses and breast-feeding infants, the report says. Given the health and social benefits of breast-feeding, the committee recommends strategies to reduce accumulated body levels of dioxin, rather than discouraging breast-feeding. By promoting compliance with current dietary recommendations to consume less animal fat -- where dioxins primarily collect -- the government could help all Americans reduce their exposure to these compounds.

Copies of *Dioxins and Dioxin-like Compounds in the Food Supply: Strategies to Decrease Exposure* will be available later this year from the National Academies Press; tel. (202) 334-3313 or 1-800-624-6242 or on the Internet at <http://www.nap.edu>.

• **WHO Names Top 10 Health Risks:** According to the World Health Report 2002, *Reducing Risks, Promoting Healthy Life*, government action, in concert with individual action, can increase healthy life expectancy by 5-10 years worldwide. The report summarizes one of the largest research projects ever undertaken by the World Health Organization (WHO), and identifies the 10 greatest risks to human health worldwide.

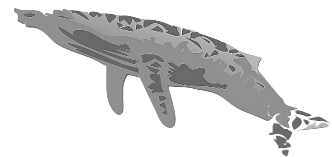
10 Greatest Global Health Risks	
	• being underweight
	• unsafe sex
	• iron deficiency
	• indoor smoke from solid fuels
	• unsafe water, sanitation, and hygiene
	• high blood pressure
	• tobacco consumption
	• alcohol consumption
	• high cholesterol
	• obesity

Source: World Health Organization. 2002. The World Health Report 2002: Reducing Risks, Promoting Healthy Life. Geneva, Switzerland: World Health Organization.

See <http://www.who.int/whr/en/> for further details.

• **Three pesticides, Alachlor, Atrazine, and Diazinon found linked to reduced sperm counts in Missouri men.** Researchers from the University of Missouri-Columbia found a correlation between high levels of certain pesticides and lower sperm count or sperm quality. Men with high levels of alachlor metabolites were found to be 30 times more likely to have poor semen quality. For more information contact the principal author, Shanna Swan, Department of Family and Community Medicine, MA306 Medical Sciences Building, University of Missouri-Columbia, Columbia, MO 65212 USA. Telephone: (573) 884-4534. Fax: (573) 884-6172. E-mail: swans@health.missouri.edu

• **California's Central Valley Regional Water Board votes to adopt the waiver proposal failing to include a fee provision or adequate monitoring of non-point source pollution.** This decision transpired after 3300 letters flooded into the Water Board's staff offices to oppose waivers and urge the Board to protect the public interest, 150 environmental and public health advocates gathered with signs and banners and costumes to protest the Board's failure to protect the public from agricultural toxins, 8 environmental leaders presented the public interest issues clearly and convincingly during the hearing in front of a Board that looked ready to run, and over 100 public comment cards were read into the record on Friday July 11th on behalf of concerned Californians who were not able to provide testimony on Thursday July 10th due to the Board's failure to enforce time limits. Contact Sejal Choksi at <http://www.cleanfarmscleanwater.org/> for more information.



extent to which a chemical can be assessed in a site-specific manner and in isolation of other activities.

CETOS' Critical Habitat Project is prepared to take a refined look at these and related pesticide endpoints. We have developed a way to estimate environmental risk concentrations of pesticides using site-specific data within actual established boundaries of the species population. The resulting assessments take into account the actual rate of use within a habitat. The so-called risk quotients provide an accurate way to estimate the potential risk to endangered populations from the active pesticide ingredient. Once an estimation of risk is established, we are determined to develop educational and policy programs that can assist in the recovery efforts of endangered and threatened species.

Chemicals and Fish

Diazinon

Diazinon is an organophosphate insecticide used throughout four major California salmon populations containing endangered and threatened Steelhead, Coho, and Chinook salmon. Upon consideration of diazinon's physicochemical properties, its primary concern is the potential effects to an organisms' brain acetylcholinesterase (AChE) activity which can alter optomotor behavior.

Sublethal Effects

Detecting sublethal effects of diazinon to salmonids requires careful consideration. At least one research team, Scholz et al, have found that low doses have been shown to effect homing and olfactory related behaviors necessary for species recovery. The Scholz data not only demonstrates potential effects on Chinook salmon behavior at very low levels, but also show effects below the proposed "margin of safety".

Carbaryl

Carbaryl is a carbamate insecticide with little acute toxicity for fish at values lower than 1 mg/liter. Cold water fish (Salmonidae), such as Coho Salmon and trout, seem to be susceptible to carbaryl. Irritability, sluggishness, and loss of equilibrium are classical signs of acute intoxication. Rainbow trout (*Oncorhynchus mykiss*), exposed to 1 mg carbaryl/L for 96 h, exhibited decreased swimming capacity and swimming activity and diminished capacity to capture and consume prey.

Aquatic Invertebrates

Most of the studies on the toxicity of carbaryl for aquatic invertebrates have been conducted under laboratory conditions and, consequently, the results only yield data on the relative toxicity of the substance. They do not reflect realistic exposure in the environment. Most of the laboratory studies evaluate constant, short-term (less than 1 week) exposure to carbaryl under static or flow-through conditions. There are few long-term studies on the effects of carbaryl on aquatic invertebrates. Aquatic insects in the orders Plecoptera (stoneflies) and Ephemeroptera (mayflies) are generally highly sensitive to low levels of carbaryl. The effects of 0.6-50.0 mg carbaryl/L were studied on selected aquatic organisms, including: *Scenedesmus quadricauda*, *Lemna minor*, *Lebistes reticulatus* and *Daphnia magna*. Carbaryl depressed reproduction, biomass, and chlorophyll content in *Lemna minor* (vascular plant) after 24 hours of exposure at a concentration of 6.6 mg/L. An almost 100% decrease occurred at a concentration of 50 mg/L. Inhibition of photosynthesis intensity in the alga

Scenedesmus quadricauda was about 50% at a concentration of carbaryl in the water of 32 mg/L, and 65% at a concentration of 56 mg/L, after 24 h exposure. Less than 10% inhibition occurred at a concentration of 1.8 mg/L. A decrease in the production of chlorophyll was demonstrated at 4.4 mg/L.

Breakdown Products

The primary breakdown product of carbaryl (1-naphthol) is believed to be nontoxic in the terrestrial environment. But in the few cases where its toxicity to the aquatic organisms/mollusks and three species of marine fish/ has been tested, 1-naphthol was found to be more toxic than the parent compound. For example, on a dose-to-dose comparison, the growth of juvenile cockle clams (*Clinocardium nuttalli*) was reduced more by 1-naphthol than by carbaryl, and 1-naphthol was more toxic to juvenile clams. For 6 species of fish, 1-naphthol was about twice as toxic as carbaryl, but in the case of *Mystus cavasius*, the degradation product was 14 times as toxic as the parent compound (96 hr LC50s being, respectively, 0.33 and 4.6 mg/L). In its analysis of carbaryl, EPA states that the primary breakdown product 1-naphthol is moderately to highly toxic to fish and aquatic invertebrates. Though in the case of 1-naphthol, environmental fate data and structural toxicity data are not available making it impossible to establish estimated environmental concentrations and resulting risk quotients.

Chlorpyrifos

Chlorpyrifos is an organophosphate insecticide that is extremely toxic to fish. The chemical has an unacceptable LC50 as well as an unacceptable octanol-partition coefficient and half-life making it likely that the chemical will persist in the environment and bioaccumulate within the food chain. Chlorpyrifos is also a suspected endocrine disruptor.

¹ Scholz NT, Truelove NK, French BL, Berejikian BA, Quinn TP, Casillas E, Collier TK. 2000. Diazinon disrupts antipredator and homing behaviors in chinook salmon (*Oncorhynchus tshawytscha*). *Can. J. Fish. Aquat. Sci.*, 57:1911-1918.

² Macek KJ & McAllister WA (1970) Insecticide susceptibility of some common fish family representatives. *Trans Am Fish Soc*, 99(1): 20-27.

³ Little EE, Archeski RD, Flerov BA, & Kozlovskaya VI (1990) Behavioral indicators of sublethal toxicity in rainbow trout. *Arch Environ Contam Toxicol*, 19(3): 380-385.

⁴ Bogacka T & Groba J (1980) Toxicity and biodegradation of chlorfenvinphos, carbaryl, and propoxur in water environment. *Bromatol Chem Toksykol*, 13(2): 151-158 (in Polish with English summary).

⁵ Murty, A.S. Toxicity of Pesticides to Fish. Volumes I, II. Boca Raton, FL: CRC Press Inc., 1986, p. V2 31

CETOS Non-Toxic Tips

Paints and stains can contain Volatile Organic Compounds which are a large family of carbon containing compounds that contribute to indoor air pollution as well as outside ozone depletion. Many Volatile Organic Compounds (VOCs) create unnecessary dangers in the home.

Exposures to certain volatile organic compounds (VOCs) can cause eye, nose, and throat irritation; headaches, loss of coordination, nausea; damage to liver, kidney, and central nervous system. Some volatile organics can cause cancer in animals; some, like benzene, are suspected or known to cause cancer in humans.

While the Environmental Protection Agency is mandated to regulate toxic ingredients within products, no regulatory standards have been set for VOCs in non industrial settings, such as in your home. In occupational settings specific VOCs, such as the cancer causing agent formaldehyde, have permissible exposure levels of less than 1 part per million (.75 ppm). While this is a step in the right direction, there is still a long road to go to truly protect the environment and the consumer from the wide variety of toxins that are used by the coatings industry.

Many members of the paint and coatings industry commonly use inexpensive and hazardous ingredients in their products. Many paints and stains that are petroleum-based, contain toxic additives designed for a narrow benefit, such as killing mildew. To be on the safe side, it is a good idea to reduce exposure to VOCs, particularly in the home. There are many types of "non toxic" paints and finishes.

Types of non toxic paints:

Low VOC

Low VOC paints, stains and varnishes use water as a carrier instead of petroleum-based solvents. As such, the levels of harmful emissions from water-borne surface coatings are significantly lower than solvent-borne surface coatings.

These certified coatings also contain no, or very low levels, of heavy metals and formaldehyde. The amount of VOC's varies among different "low-VOC" products, and is listed on the paint can. Paints and stains must not contain VOCs in excess of 200 grams per liter. Varnishes must not contain VOCs in excess of 300 grams per liter.

Low VOC paints will still emit an odor until dry. If you are particularly sensitive, make sure the paint you buy contains fewer than 25 grams/liter of VOC's. Benjamin

Moore, AFM Safecoat, Glidden, and Carver Tripp Safe & Simple are a few of the companies offering a line of water-based products that are low in VOCs.

Zero VOCs

These paints are the safest for your health and for the environment. Any paint with VOC's in the range of .5 grams/liter or less can be called "Zero VOC", according to an EPA standard. Some manufacturers may claim "Zero-VOC's", but these paints may still use colorants, biocides and fungicides with some VOC's. Adding a color tint usually brings the VOC level up to 10 grams/liter, which is still quite low. Alistagen CALIWEL (www.caliwel.com or 866 280-0001), AFM Safecoat (303 465-1537), and Kelly Moore (916 921-0165), are a few of the companies providing zero VOC paints.

Natural Paints and Finishes

These are paints made from natural raw ingredients such as water, plant oils and resins, plant dyes and essential oils; natural minerals such as clay, chalk and talcum; milk casein, natural latex, bees' wax, earth and mineral dyes. Water-based natural paints give off almost no smell. The oil-based natural paints usually have a pleasant fragrance of citrus or essential oils. Allergies and sensitivities to these paints is uncommon. Auro (www.aurosa.com) provides a full line of solvent-free, water-based natural paints and primers, finishes, stains and adhesives. Tried & True Wood Finishes (www.calistawood.com) provides a line of zero-VOC, all natural, food-safe, biodegradable wood finishes. The companies, Old Fashioned Milk Paint Company (www.milkpaint.com) and Sawyer Finn Natural Milk Paint (www.sawyerfinn.com) provide a non-toxic paint made with milk protein, lime, clay, earth pigments and colors.

Toxic materials such as VOCs found in paints and stains can not only impact the human body either by affecting the respiratory system, the eyes and/or the skin, but also can impact the environment in significant ways. If you are considering some home painting projects, we encourage you to consider choosing a paint or stain that is low if not completely free of VOCs. For further questions contact cetos@cetos.org or 707-884 -1700. No specific endorsement of product is intended.

Tree Sitters in Fortuna

They hang from the highest branches, faces smeared with resin, cheeks shadowed with burnt cork and burdock. They hang from the highest places chained or roped in, held by their own devices, carbiners ring clips, chocks. Three-eighths nylon ropes, they are sworn to the Tree. They sit alone, together rock climbers in the redwoods.

In the redwood trees, this merry band hangs from the highest branches, tied in, holding their young lives not so dear as the Tree's. Each tree with a name, Luna, Clearbark, Stand Alone and Pomo, primal redwoods all. They have stood the test, swaddling the climbers with feather-neededled limbs and branches.

"Aieoooooo" comes the cry through the branches. A logger is climbing, not nearly so nimbly as they, snapping limbs, breaking branches, gouging trunks and cutting bark to ribbons. But this company climber is safe—every step protected by an overhanging rope, holding his life secure even as he seeks to end the life of another—Tree.

These Peter Pans hang from the highest branches content to Spend their lives suspended between green life and chain-saw death. The Tree holds them, not bending, not willing to let them down. Some have not touched earth for six months. They hold fast to their swaying perches, high in their aeries in the branches, secure as were their ancestors—chimps, bonobos, mountain gorillas.

The new guerrillas hang from the highest branches, no less fearless than the apes they ape, holding to the smallest branches, dancing from limb to limb. The youngest chortle and hoot, shaking branches of the redwoods, scaring their parent, the Tree. They throw things at each other, feces on the climbing logger—pissing on their enemy.

They grab each others' food, chastened by the Tree even as they dance from branch to branch along squirrel pathways, moving through the redwoods. They laugh at the folly of the lumberjacks, chain-sawing the trees that are their livelihood. They hang from the highest branches, way above where the climbing logger is willing to go.

They wait in their cunning branches, listening for the tell-tale whine of the saw against the Tree, suspended in the redwoods, clinging to life and life.

ANNOUNCEMENTS

• CETOS' staff has been working on a new look! We have been busy this summer refreshing our website and, with the help of the Public Media Center, developing a new logo. Please check our newly refreshed website to find out about latest program areas, latest research, and our new look.; www.cetos.org

• Announcing the arrival of *Engineering the Farm: The Social and Ethical Aspects of Agricultural Biotechnology*, Edited by Britt Bailey and Marc Lappé (Island Press, June 2002).

Engineering the Farm offers a wide-ranging examination of the social and ethical issues surrounding the production and consumption of genetically modified foods. Contributors include; Dr. Paul Thompson, Lori Andrews, Dr. Peter Rosset, Frances Moore Lappé, and other critical thinkers in the field. Call 1-800-828-1302 to order or visit www.islandpress.org.

• KZYX 90.7 and 91.5 FM Ecology Hour has moved to Tuesday nights! Join host Britt Bailey September 30, 2003 at 7:00 PM. Always bringing you exciting and relevant topics and expert guests. Mark your calendars!

• CETOS is looking for NEW MEMBERS!! Your membership supports our outreach efforts and provides educational materials for the general public. We are an independent non-profit, 501(C)(3), dedicated to protecting public health and the environment. Please make checks payable to TIDES/CETOS, PO Box 673, Gualala, CA 95445. Basic membership is \$30.00 though additional donations are welcome. All contributions are tax-deductible to the full extent permitted by law.

• Come on out to the Solar Living Festival (www.solfest.org) August 23 & 24th in Hopland, CA. The Solar Living Festival (SolFest) 2003 highlights will include a special focus on alternative fuels, expanded workshops and a designated Food and Farming series. CETOS' Britt Bailey will present a workshop on the social and ethical aspects of genetically engineered foods at 2:00 PM Saturday the 23rd. SolFest is a family affair featuring a fun zone where kids can cool off in the bubbling stream while learning about solar energy and the characteristics of life-giving water. You will not want to miss this exciting and informative weekend.

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