Vegetables, etc. — Who Defines Food?

From the original article in 2006. Author: Ray Peat.

Since bacteria in the rumens of cows destroy unsaturated fatty acids, but don't harm vitamin E, it seems reasonable to suppose that beef and milk would have a better ratio of vitamin E to unsaturated fats than do the plants eaten by the cows.

Toxic pesticides are found in higher concentrations in the urine and fat of slaughtered animals than in their livers, since the livers are detoxifying the chemicals and causing them to be excreted. Presumably, the animals' livers will perform the same detoxification reactions with the ***phytotoxicants that occur naturally in their diet.***

Not long ago, breast feeding was socially unacceptable in the United States, and several manufacturers were teaching the world's poorest women to use their baby-food formulas even when there was no clean water for its preparation. Industrialists have campaigned to convince the public that their by-products, from cotton-seed oil to shrimp shells, are "health foods." In several parts of the world, desperately poor people sometimes eat clay, and even clay has been promoted as a health food. Almost anything becomes "food," when people are under economic and social pressure. If these things aren't acutely toxic, they can become part of our "normal" diet.

Our instincts give us a few clues about our nutritional needs, such as thirst, the hunger for salt, the pleasantness of sweet things, and the unpleasantness of certain odors or very acrid or bitter tastes. People who are constitutionally unable to taste certain bitter chemicals find certain vegetables less objectionable; their instinctive guidance has become less clear. But within the boundaries of cravings and disgust, habits and customs become the dominant forces in diet. "Professional dietitians" and other "experts" primarily function as enforcers of cultural prejudice.

The manufacturers of pureed vegetables for babies used to put large amounts of salt, sugar, and monosodium glutamate into their products, because the added chemicals served as instinctual signals that made the material somewhat acceptable to the babies. There was no scientific basis for providing these vegetables to babies in a form that they would accept, but it was a profitable practice that was compatible with the social pressure against prolonged breast feeding.

Poor people, especially in the spring when other foods were scarce, have sometimes subsisted on foliage such as collard and poke greens, usually made more palatable by cooking them with flavorings, such as a little bacon grease and lots of salt. Eventually, "famine foods" can be accepted as dietary staples. The fact that cows, sheep, goats and deer can thrive on a diet of foliage shows that leaves contain essential nutrients. Their minerals, vitamins, and amino acids are suitable for sustaining most animal life, if a sufficient quantity is eaten. But when people try to live primarily on foliage, as in famines, they soon suffer from a great variety of diseases. Various leaves contain antimetabolic substances that prevent the assimilation of the nutrients, and only very specifically adapted digestive systems (or technologies) can overcome those toxic effects.

Some plants have specific "pests," such as insects, that have adapted to be resistant to that plant's toxins, but if the plant and its predator are to survive, there has to be a balance between the plant tissue's digestibility and its toxicity. Injury of a plant stimulates it to make increased amounts of its defensive chemicals. Plant toxins are known to be specific for animal tissues; for example, a toxin will inhibit the action of an enzyme from an animal, but a plant enzyme that catalyzes the same reaction won't be affected.

Plant defensive chemicals can have beneficial uses as drugs. Plants are important sources for chemicals used in chemotherapy of cancer, with the purpose of stopping cell division. Other plant drugs can stimulate cell division. The drug from one plant will sometimes protect cells against the toxic effects of another plant. The use of any drug that isn't a natural part of animal physiology will have many biological effects, so that a beneficial drug action will usually be accompanied by unwanted side-effects. An antioxidant may turn out to disrupt the endocrine system, an antiinflammatory drug may be mutagenic or carcinogenic.

A particular plant will have a variety of defensive chemicals, with specific functions. Underground, the plant's roots and tubers are susceptible to attack by fungi and nematodes. The leaves, stems, and seeds are susceptible to attack by insects, birds, and grazing animals. Since the plant's seeds are of unique importance to the plant, and contain a high concentration of nutrients, they must have special protection. Sometimes this consists of a hard shell, and sometimes of chemicals that inhibit the animal's digestive enzymes. Many plants have evolved fruits that provide concentrated food for animals, and that serve to distribute the seeds widely, as when a bird eats a berry, and excretes the undigested seed at a great distance. If the fruit were poisonous, it wouldn't serve the plant's purpose so well. In general, the plant's most intense toxins are in its seeds, and the fruits, when mature, generally contain practically no toxins. Roots contain chemicals that inhibit microorganisms, but because they aren't easily accessible by grazing animals and insects, they don't contain the digestive inhibitors that are more concentrated in the above-ground organs of the plant.

The toxins of plants include phenols, tannins, lectins/agglutinins, and trypsin-inhibitors, besides innumerable more specific metabolic inhibitors, including "anti-vitamins." Unsaturated fats themselves are important defenses, since they inhibit trypsin and other proteolytic enzymes, preventing the assimilation of the proteins that are present in seeds and leaves, and disrupting all biological processes that depend on protein breakdown, such as the formation of thyroid hormone and the removal of blood clots.

Generally, fruits, roots, and tubers provide a high concentration of nutrients along with low concentrations of toxic antimetabolic substances.

While nutritional reference tables often show fruits and potatoes as having about 2% protein content, while nuts, grains, and

legumes are shown with a high protein content, often in the range of 15% to 40%, they neglect to point out that fruits and potatoes have a very high water content, while that of the seeds is extremely low. The protein content of milk is about 3%, which according to the charts would suggest that it is inferior to beans and grains. In fact, the protein value of grain is negligible, mainly because seeds contain their protein in a storage form, that is extremely rich in nitrogen, but poor in essential amino acids. Special preparation is needed to reduce the toxicity of seeds, and in the case of beans, these methods are never very satisfactory.

Besides their specific defensive toxins and antimetabolites, plants are major sources of allergens. The allergenicity of a food depends on the sensitivity of the individual, as well as on the growth conditions of the plant. The use of extremely toxic pesticides has affected both the crops and the sensitivity of the human population to allergens. Sensitivities induced originally by toxic pesticides used on certain crops can probably persist after the industrial chemical has been eliminated, because the immune system is susceptible to "conditioning."

Many types of phytochemicals are mutagenic, and some of those are carcinogenic. Bruce Ames, at the University of California, devised a method of screening for mutagens, using bacteria. One of his graduate students using the technique found that the flame retardants in children's pajamas and bedding were powerful mutagens, and were probably causing cancer. That event made Ames a celebrity, and in the 1980s he went on a lecture tour supported by the American Cancer Society. His lectures reflected the doctrine of the A.C.S., that industrial chemicals aren't responsible for cancer, but that individual actions, such as smoking or dietary choices, are the main causes of cancer. He used a fraudulently "age adjusted" graph of cancer mortality, that falsely showed that mortality from all types of cancer except lung cancer had leveled off after the A.C.S. came into existence. He described tests in which he had compared DDT to extracts of food herbs, and found DDT to be less mutagenic than several of the most commonly used flavoring herbs. His message, which was eagerly received by his audience of chemistry and biology professors, was that we should not worry about environmental pollution, because it's not as harmful as the things that we do to ourselves. He said that if everyone would eat more unsaturated vegetable oil, and didn't smoke, they wouldn't have anything to worry about.

For me, the significance of his experiment was that plants contain natural pesticides that should be taken more seriously, without taking industrial toxins less seriously.

Technologies have been invented to convert vegetation into digestible protein, but at our present scientific and technological level, it's better to simply minimize our use of the more toxic foods, and to direct more effort toward the elimination of the conditions that produce famine.

Animal proteins, and fruits, because they contain the lowest levels of toxins, should form the basis of the diet. Not all fruits, of course, are perfectly safe--avocados, for example, contain so much unsaturated fat that they can be carcinogenic and hepatotoxic.

Protein deficiency itself contributes to the harm done by toxins, since the liver's ability to detoxify them depends on adequate nutrition, especially good protein. In the 1940s, Biskind's experiments showed that protein deficiency leads to the accumulation of estrogen, because the liver normally inactivates all the estrogen in the blood as it passes through the liver. This applies to phytoestrogens and industrial estrogens as well as to the natural estrogens of the body. At a certain point, the increased estrogen and decreased thyroid and progesterone cause infertility, but before that point is reached, the hyperestrogenism causes a great variety of birth defects. Deformities of the male genitals, and later, testicular cancer in the sons and breast cancer in the daughters, are produced by the combination of toxins and nutritional deficiencies.

References

Onderstepoort J Vet Res 1989 Jun;56(2):145-6. **Thiaminase activities and thiamine content of Pteridium aquilinum, Equisetum ramosissimum, Malva parviflora, Pennisetum clandestinum and Medicago sativa.** Meyer P Animal and Dairy Science Research Institute, Private Bag, Irene. Thiaminase type 1 and 2 activities and thiamine content of five plants were determined. Of these Pteridium aquilinum and Equisetum ramosissimum were found to have considerably more thiaminase activity and lower thiamine content than Malva parviflora, Pennisetum clandestinum and Medicago sativa.

Nature 1994 Apr 21;368(6473):683-4. **Mystery of the poisoned expedition.** Earl JW, McCleary BV Department of Biochemistry, Royal Alexandra Hospital for Children, Camperdown, Sydney, New South Wales, Australia. The Burke and Wills expedition through the interior of Australia in the nineteenth century ended in calamity. But the cause of death was more pernicious than anyone at the time had imagined: beriberi due to thiaminase poisoning.

Comment in: Nature 1994 Aug 11; 370(6489):408. Aust Vet J 1992 Jul;69(7):165-7. **Mechanisms underlying Phalaris aquatica "sudden death" syndrome in sheep.** Bourke CA, Carrigan MJ New South Wales Agriculture, Agricultural Research and Veterinary Centre, Orange. Twenty outbreaks of Phalaris aquatica "sudden death" syndrome in sheep were investigated between 1981 and 1991. Four were confirmed and one was suspected, to be a cardiac disorder; 5 were confirmed and 3 were suspected, to be a polioencephalomalacic disorder; the aetiology of the remaining 7 outbreaks could not be determined. Potentially toxic levels of hydrocyanic acid (20 to 36 mg/100 g) were measured in the 3 toxic phalaris pastures tested. The measurement of potentially toxic levels of nitrate nitrogen (2920 micrograms/g) in toxic phalaris pastures by others, was noted. It is suggested that phalaris "sudden death" syndrome could have as many as 4 different underlying mechanisms, and **that these might reflect the presence in the plant of a cardio-respiratory toxin, a thiaminase and amine co-substate, cyanogenic compounds, and nitrate compounds.**

Indian J Med Res 1991 Oct;94:378-83. **Genotoxic effects of some foods &food components in Swiss mice.** Balachandran B, Sivaswamy SN, Sivaramakrishnan VM Isotope Division, Cancer Institute, Madras. A number of commonly consumed foods and food components in south India were **screened for their genotoxic effects on Swiss mice. Salted, sundried and oil fried vegetables and fishes induced chromosomal aberrations, sperm head abnormalities and micronuclei production, which were comparable to the effect of the positive control viz., 20-methylcholanthrene. Spices like Cissus** quadrangularis (an indigenous herb used in certain south Indian dishes) and pyrolysed cumin and aniseeds showed moderate effects. Calamus oil, widely used in pharmaceuticals was highly effective. All the three parameters of genotoxicity gave similar results.

In Vivo 1998 Nov-Dec;12(6):675-89. **Comparative anticancer effects of vaccination and dietary factors on experimentally-**

induced cancers. Zusman I Laboratory of Teratology and Experimental Oncology, Koret School of Veterinary Medicine, Faculty of Agriculture, Food and Environmental Quality Sciences, Hebrew University of Jerusalem, Rehovot, Israel. The role of two major factors were analyzed in the prevention of experimentally-induced cancers: a) vaccination of animals with polyclonal IgG generated against the soluble p53 antigen and b) feeding of animals with diets rich with dietary fibers or fat. a) In vaccination, a few attempts have been made to utilize p53 protein as a tumor suppressor. IgG generated against the cytoplasmic, soluble p53 antigen from tumor-bearing rats prevents the carcinogenic effect of 1,2-dimethylhydrazine (DMH) decreasing significantly the number of tumor-bearing rats in vaccinated group compared with non vaccinated controls and preventing benign tumors from becoming malignant. The antitumor effect of vaccination is accompanied by a significant increase in the serum-level of p53 antigen in vaccinated rats compared with non vaccinated controls. The immune response of a host to vaccination activates the lymph components of the spleen, and this activation is manifested by the multiplication of the number of lymphocytes which are generated against specific antigens. This multiplication is achieved by the higher division of the antigen-specific lymphoblasts with their subsequent transformation into plasma cells. These cells synthesize the specific protein (IgG). One such protein is the tumor-associated p53 protein, which is synthesized by rats against rabbit anti-p53 IgG. b) The role of dietary factors in the prevention of chemically induced cancer was reviewed on two models: the role of high fiber diets in prevention of colon cancer, and **the role of high fat diets in the prevention of mammary gland cancer.** Experiments in colon cancer showed that 20% cellulose decreased significantly tumor incidence caused by DMH. The tumor-preventive effect of a cellulose diet was accompanied by increased enzyme concentrations, such as ornithine decarboxylase, thymidine kinase and beta-glucuronidase. This effect was accompanied by activation of some cellular mechanisms, i.e. apoptosis, proliferating cell nuclear antigen (PCNA) and p53 protein synthesis. **Experiments in mammary glands cancer showed that a 15% olive-oil diet reduced significantly the tumor incidence caused by 9,10-dimethyl-1,2-benzanthracene. The antitumor effect of the olive-oil diet was connected to its content of monounsaturated fatty acids, such as oleic and palmitic acids. The promotive tumorigenic effects of other high-fat diets (avocado, soybeans) were associated with high content of some polyunsaturated fatty acids (linoleic and alpha-linolenic).** Different diets have different targets. The effect of the same diet depends on its anti-tumor substances content. CONCLUSIONS: Vaccination and some diets have similar mechanism in their tumor-preventive effects.

Ann Nutr Metab 1991;35(5):253-60. **Effect of dietary avocado oils on hepatic collagen metabolism**. Wermam MJ, Mokady S, Neeman I Department of Food Engineering and Biotechnology, Technion - Israel Institute of Technology, Haifa. The effect of various avocado and soybean oils on collagen metabolism in the liver was studied in growing female rats for 8 weeks and in day-old chicks for 1 week. In comparison with rats fed either refined avocado oil, refined or unrefined soybean oils, rats fed **unrefined avocado oil showed a significant decrease in total collagen solubility** in the liver, while there were no changes in total collagen, protein and moisture content. Chicks fed unrefined avocado oil as compared to those fed refined avocado oil also showed a decrease in hepatic total soluble collagen while hepatic total collagen remained unaffected. Electron micrographs and light-microscope examinations of rats' liver revealed **collagen accumulation in the periportal location. This is suggestive of the early stages of fibrosis.**

Life Sci 1997;60(19):1635-41. **L-canaline: a potent antimetabolite and anti-cancer agent from leguminous plants.** Rosenthal GA Laboratory of Biochemical Ecology, University of Kentucky, Lexington 40506, USA. garose@ukcc.uky.edu L-Canaline, the L-2-amino-4-(aminooxy)butyric acid structural analog of L-ornithine' is a powerful antimetabolite stored in many leguminous plants. This nonprotein amino acid **reacts vigorously with the pyridoxal phosphate moiety of vitamin B6-containing enzymes to form a covalently-bound oxime that inactivates, often irreversibly, the enzyme.** Canaline is not only capable of inhibiting ornithine-dependent enzymic activity, but it also can function as a lysine antagonist. Recently, this natural product was found to possess significant antineoplastic in vitro activity against human pancreatic cancer cells.

Food Chem Toxicol 1999 May;37(5):481-91. **Occurrence of emodin, chrysophanol and physcion in vegetables, herbs and liquors. Genotoxicity and anti-genotoxicity of the anthraquinones and of the whole plants.** Mueller SO, Schmitt M, Dekant W, Stopper H, Schlatter J, Schreier P, Lutz WK Department of Toxicology, University of Wurzburg, Germany. **1,8-Dihydroxyanthraquinones, present in laxatives, fungi imperfecti, Chinese herbs and possibly vegetables, are in debate as human carcinogens. We screened a variety of vegetables (cabbage lettuce, beans, peas), some herbs and herbal-flavoured liquors for their content of the 'free' anthraquinones emodin, chrysophanol and physcion. For qualitative and quantitative analysis, reversed-phase HPLC (RP-LC), gas chromatography-mass spectrometry (GC-MS) and RP-LC-MS were used. The vegetables showed a large batch-to-batch variability, from 0.04 to 3.6, 5.9 and 36 mg total anthraquinone per kg fresh weight in peas, cabbage lettuce, and beans,** respectively. Physcion predominated in all vegetables. **In the herbs grape vine leaves, couch grass root and plantain herb, anthraquinones were above the limit of detection. Contents ranged below 1 mg/kg** (dry weight). All three anthraquinones were also found in seven of 11 herbal-flavoured liquors, in a range of 0.05 mg/kg to 7.6 mg/kg. The genotoxicity of the analysed anthraquinones was investigated in the comet assay, the micronucleus test and the mutation assay in mouse lymphoma L5178Y tk+/- **cells. Emodin was genotoxic, whereas chrysophanol and physcion showed no effects. Complete vegetable extract on its own did not show any effect in the micronucleus test. A lettuce extract completely abolished the induction of micronuclei by the genotoxic anthraquinone danthron. Taking into consideration** the measured concentrations of anthraquinones, estimated daily intakes, the genotoxic potency, as well as protective effects of the food matrix, the analysed constituents do not represent a high priority genotoxic risk in a balanced human diet.

Int J Food Sci Nutr 1998 Sep;49(5):343-52. **Lipid content and fatty acid composition in foods commonly consumed by nursing Congolese women: incidences on their essential fatty acid intakes and breast milk fatty acids.** Rocquelin G, Tapsoba S, Mbemba F, Gallon G, Picq C Tropical Nutrition Unit, ORSTOM, Montpellier, France. The fat content and fatty acid (FA) composition of nearly 40 foods, currently consumed by 102 nursing Congolese mothers living in Brazzaville, were determined to assess their impact on mothers' essential fatty acid (EFA) intakes and breast milk FA. Data on mothers' milk FA and dietary habits which allowed food selection were recently published (Rocquelin et al., 1998). Most foods were locally produced. Food samples were collected at local markets, bleached if necessary to avoid microbial degradation, and stored at +4 degrees C or -20 degrees C. They were lyophilized upon their arrival in the laboratory before lipid analyses. FA composition of food lipids was determined by capillary gas chromatography. Staple diets included low-fat, high-carbohydrate foods (processed cassava roots, wheat bread) and high-polyunsaturated fatty acid (PUFA) foods: soybean oil (high in 18 : 2 n-6 and alpha-18 : 3 n-3), bushbutter **(dacryodes edulis), peanuts, avocado (high in fat and 18 : 2 n-6), freshwater** and salt-water fish (high in LC n-3 and/or n-6 PUFA), and leafy green vegetables **(low in fat but very high in alpha-18 : 3 n-3). Their frequent consumption by** nursing mothers provided enough EFA to meet requirements due to lactation. It **also explains why mothers' breast milk was rich in C8-C14 saturated FA (26% of** total FA) and in n-6, n-3 PUFA (respectively 15.0% and 2.4% of total FA) highly profitable for breastfed infants' development. From this point of view, dietary habits of Congolese mothers have to be sustained for they are more adequate than most Western-type diets.

Med Oncol Tumor Pharmacother 1990;7(2-3):69-85. **Dietary carcinogens, environmental pollution, and cancer: some misconceptions.** Ames BN, Gold LS Division of Biochemistry and Molecular Biology, University of California, Berkeley 94720. Various misconceptions about dietary carcinogens, pesticide residues, and cancer **causation are discussed. The pesticides in our diet are 99.99% natural, since plants make an enormous variety of toxins against fungi, insects, and animal predators. Although only 50 of these natural pesticides have been tested in** animal cancer tests, about half of them are carcinogens. About half of all chemicals tested in animal cancer tests are positive. The proportion of natural pesticides positive in animal tests of clastogenicity is also the same as for synthetic chemicals. It is argued that testing chemicals in animals at the maximum tolerated dose primarily measures chronic cell

proliferation, a threshold process. Cell proliferation is mutagenic in several ways, including inducing mitotic recombination, and therefore chronic induction of cell proliferation is a risk factor for cancer.

Proc Natl Acad Sci U S A 1980 Aug;77(8):4961-5. **Fecalase: a model for activation of dietary glycosides to mutagens by intestinal flora.** Tamura G, Gold C, Ferro-Luzzi A, Ames BN Many substances in the plant kingdom and in man's diet occur as glycosides. Recent studies have indicated that many glycosides that are not mutagenic in tests such as the Salmonella test become mutagenic upon hydrolysis of the glycosidic linkages. The Salmonella test utilizes a liver homogenate to approximate mammalian metabolism but does not provide a source of the enzymes present in intestinal bacterial flora that hydrolyze the wide variety of glycosides present in nature. We describe a stable cell-free extract of human feces, fecalase, which is shown to contain various glycosidases that allow the in vitro activation of many natural glycosides to mutagens in the Salmonella/liver homogenate test. Many beverages, such as red wine (but apparently not white wine) and tea, contain glycosides of the mutagne quercetin. Red wine, red grape juice, and tea were mutagenic in the test when fecalase was added, and red wine contained considerable direct mutagenic activity in the absence of fecalase. The implications of quercetin mutagenicity and carcinogenicity are discussed.

Br J Rheumatol 1994 Aug;33(8):790-1. **Even garlic.** Sweetman BJ

Nutr Cancer 1988;11(4):251-7. **Cytotoxicity of extracts of spices to cultured cells.** Unnikrishnan MC, Kuttan R Amala Cancer Research Centre, Kerala, India. The cytotoxicity of the extracts from eight different spices used in the Indian diet was determined using Dalton's lymphoma ascites tumor cells and human lymphocytes in vitro and Chinese Hamster Ovary cells and Vero cells in tissue culture. Alcoholic extracts of the spices were found to be more cytotoxic to these cells than their aqueous extracts. Alcoholic extracts of several spices inhibited cell growth at concentrations of 0.2-1 mg/ml in vitro and 0.12-0.3 mg/ml in tissue culture. **Ginger, pippali (native to India; also called dried catkins), pepper, and garlic showed the highest activity followed by asafetida, mustard, and horse-gram (native to India). These extracts also inhibited the thymidine uptake into DNA.**

J Toxicol Sci 1984 Feb;9(1):77-86. **[Mutagenicity and cytotoxicity tests of garlic].** [Article in Japanese] Yoshida S, Hirao Y, Nakagawa S Mutagenicity and cytotoxicity of fresh juice and alcohol extract from garlic were studied by Ames' test, Rec assay, Micronucleus test and the check of the influence to HEp 2 and chinese hamster embryo (CHE) primary cultured cells. No evidence of mutagenicity of these samples were observed in Ames' test and Rec assay, while there was dose dependent increase of micronucleated cells and polychromatocytes on the bone marrow cells of mice and chinese hamsters treated with garlic juice. There were severe damages, e.g. growth inhibition and morphological changes of both cultured cells due to garlic juice, but no or slightly cytotoxic signs were observed even in high concentration of garlic extract. A higher sensitivity to the cytotoxic effects of garlic was seen by the present findings with CHE primary cells than HEp 2 cell line.

Chung Hua Chung Liu Tsa Chih 1985 Mar;7(2):103-5 **[Comparison of the cytotoxic effect of fresh garlic, diallyl trisulfide, 5-fluorouracil (5-FU), mitomycin C (MMC) and Cis-DDP on two lines of gastric cancer cells].** [Article in Chinese] Pan XY Teratog Carcinog Mutagen 1998; 18(6):293-302 **In vitro and in vivo study of the clastogenicity of the flavone cirsitakaoside extracted from Scoparia dulcis L. (Scrophulariaceae).** Pereira-Martins SR, Takahashi CS, Tavares DC, Torres LM Department of Biology, Federal University of Maranhao, Sao Luis, MA. Brazil. smartins@rgm.fmrp.usp.br The mutagenic effect of the flavone cirsitakaoside extracted from the medicinal herb Scoparia dulcis was evaluated in vitro by using human peripheral blood cultures treated with doses of 5, 10, and 15 microg of the flavone/ml culture medium for 48 h. The compound proved to be mutagenic at the highest concentration tested (15 microg/ml). Furthermore, the proliferative index was significantly reduced in all cultures treated with the flavone, although the mitotic index was not reduced. However, the clastogenic activity of the flavone cirsitakaoside was not observed when Swiss mice were treated orally with doses of 10, 20, and 30 mg/animal for 24 h.

Proc Nutr Soc 1977 Sep;36(2):51A.**Attempts to overcome anti-nutritive factors in field beans (Vicia faba L) and field peas (Pisum sativum) fed in diets to laying hens.** Davidson J

Am J Clin Nutr 1995 Sep;62(3):506-11. **The influence of genetic taste markers on food acceptance.** Drewnowski A, Rock CL Human Nutrition Program, School of Public Health, University of Michigan, Ann Arbor 48109-2029, USA. Genetically mediated sensitivity to the bitter taste of phenylthiocarbamide **(PTC) and 6-n-propylthiouracil (Prop) has long been associated with enhanced sensitivity to other sweet and bitter compounds. New studies suggest that tasters and supertasters of Prop may also differ from notasters in their taste preferences and in their patterns of food rejection and food acceptance. One question is whether the acceptability of bitter-tasting vegetables is influenced by Prop taster status. Cruciferous vegetables are among the major dietary** sources of potentially chemoprotective agents in cancer control, and their consumption is reported to alter cancer risk. Strategies aimed at dietary change in individuals or groups should consider the role of genetic taste markers and their potential influences on food preferences and dietary habits.

J Environ Sci Health B 1999 Jul;34(4):681-708. **Accumulation of potentially toxic elements in plants and their transfer to human food chain.** Dudka S, Miller WP University of Georgia, Department of Crop and Soil Sciences, Athens 30602-2727, USA. Contaminated soils can be a source for crop plants of such elements like As, Cd, Cr, Cu, Ni, Pb, and Zn. The excessive transfer of As, Cu, Ni, and Zn to the food chain is controlled by a "soil-plant barrier"; **however, for some elements, including Cd, the soil-plant barrier fails.** The level of Cd ingested by average person in USA is about 12 micrograms/day, which is relatively low comparing to Risk Reference Dose (70 micrograms Cd/day) established by USEPA. **Food of plant origin is a main source of Cd intake by modern society.** Fish and shellfish may be a dominant dietary sources of Hg for some human populations. **About half of human Pb intake is through food, of which more than half originates from plants.** Dietary intake of Cd and Pb may be increased by application of sludges on cropland with already high levels of these metals. Soils amended with sludges in the USA **will be permitted (by USEPA-503 regulations) to accumulate Cr, Cd, Cu, Pb, Hg, Ni, and Se, and Zn to levels from 10 to 100 times the present baseline concentrations.** These levels are very permissive by international standards. Because of the limited supply of toxicity data obtained from metals applied in sewage sludge, predictions as to the new regulations will protect crop plants from metal toxicities, and food chain from contamination, are difficult to make.

BJU Int 2000 Jan;85(1):107-13. **A maternal vegetarian diet in pregnancy is associated with hypospadias. The ALSPAC Study Team. Avon Longitudinal Study of Pregnancy and Childhood.** North K, Golding J Unit of Paediatric and Perinatal Epidemiology, Division of Child Health, University of Bristol, UK. OBJECTIVE: To investigate the possible role of the maternal diet, particularly vegetarianism and consumption of phytoestrogens, in the origin of hypospadias, which is reported to be increasing in prevalence. SUBJECTS AND METHODS: Detailed information was obtained prospectively from mothers, including previous obstetric history, lifestyle and dietary practices, using structured self-completed questionnaires during pregnancy. Previously recognized associations with environmental and parental factors were examined, focusing particularly on the hypothesized hormonal link. Multivariate logistic regression was used to identify independent associations. RESULTS: Of 7928 boys born to mothers taking part in the Avon Longitudinal Study of Pregnancy and Childhood, 51 hypospadias cases were identified. There were no significant differences in the proportion of hypospadias cases among mothers who smoked, consumed alcohol or for any aspect of their previous reproductive history (including the number of previous pregnancies, number of miscarriages, use of the contraceptive pill, time to conception and age at menarche). **Significant differences were detected for some aspects of the maternal diet, i.e. vegetarianism and iron supplementation in the first half of pregnancy. Mothers who were vegetarian in pregnancy had an adjusted odds ratio (OR) of 4.99 (95% confidence interval, CI, 2.10-11.88) of giving birth to a boy with hypospadias, compared with omnivores who did not supplement their diet with iron. Omnivores who supplemented their**

diet with iron had an adjusted OR of 2.07 (95% CI, 1.00-4.32). The only other statistically significant association for hypospadias was with influenza in the first 3 months of pregnancy (adjusted OR 3.19, 95% CI 1.50-6.78). CONCLUSION: As vegetarians have a greater exposure to phytoestrogens than do omnivores, these results support the possibility that phytoestrogens have a deleterious effect on the developing male reproductive system.