



Laetrile: the cult of cyanide Promoting poison for profit¹

Victor Herbert,² M.D., J.D.

On June 8, 1977, 11-month-old Elizabeth Hankin of Attica, New York, ate five tablets (2.5 g) of laetrile. She rapidly went into a coma from cyanide poisoning, and 3 days later she was dead.³ Her Certificate of Death read, "Immediate cause of death: Extensive anoxic (lack of oxygen) brain damage, due to subacute cyanide poisoning, due to ingestion of amygdalin. Ingested laetrile tablets in her home." The Certificate was signed by the Erie County Chief Medical Examiner, Dr. Judith Lehotay, who performed the autopsy (1). Faster death has been reported (160, 161).

In July 1977, three Los Angeles physicians sent to the *Journal of the American Medical Association* the case report of a 17½ year-old Los Angeles girl who drank 3½ ampoules (10.5 g) of laetrile. Within 10 min she was in a coma from cyanide poisoning and in 24 hr she was dead (2).

Chemistry

Laetrile is amygdalin, a cyanogenetic glycoside (3) naturally present as a toxicant (poison) in the kernels of apricot pits, a number of other stone fruits and nuts (almonds, macadamia nuts, etc.) (4). Nature may have put it there to protect the plant against being eaten (5). Cyanogenetic glycosides (tradenamed "laetriles," "nitrilosides," and "vitamin B₁₇" by laetrile proponents) (5) are chemical substances made up of cyanide, aldehyde or ketone, and sugar. Laetrile consists of two parts glucose, one part benzaldehyde (itself mildly poisonous (4)), one part cyanide, and no parts vitamin (3, 6) (Fig. 1). The cyanide they contain is released ("generated") as hydrogen cyanide (prussic acid) by

hydrolysis in the presence of the enzyme β -glucosidase, or heat, or mineral acids (3, 4) or megadoses of ascorbic acid, especially in the presence of blood (6a).

The released hydrogen cyanide (hydrocyanic acid, HCN) is a colorless, weak acid that boils at 25.5 C (well below body temperature) to become a gas (7). The almond oil odor ("bitter almond odor," "odor of fresh macaroons") of crushed apricot kernels is associated with the release of the gas. The gas is so penetrating a poison that victims have died within 2 min after ingestion of 300 mg hydrocyanic acid in aqueous solution (7), an amount obtainable from 2½ ounces of some varieties of bitter apricot kernels mixed with saliva or from a sixth of an ounce of laetrile mixed with saliva and vegetables containing β -glucosidase, a plant enzyme.

The false claim by laetrile promoters (cited in Reference 5) that any dose of cyanide from food or laetrile is immediately detoxified to thiocyanate by rhodanese (mitochondrial sulfur transferase) is disproved by the fact of undetoxified cyanide measurable in the blood of persons poisoned by laetrile or apricot kernels (1, 8–10a) and the further fact that thiocyanate is itself toxic (7) to a lesser degree. While the liver and kidneys contain enough rhodanese to convert several kilograms of

¹ Supported in part by the Medical Research Service of the Veterans Administration and in part by United States Public Health Service Grant AM 20526.

² Chief of the Hematology and Nutrition Laboratory at the Veterans Administration Medical Center, Bronx, and Professor and Vice-Chairman of Medicine at SUNY Downstate Medical Center, New York, New York. Author retains license to republish.

³ Her father, who was taking the laetrile for his cancer, died in the ensuing year.

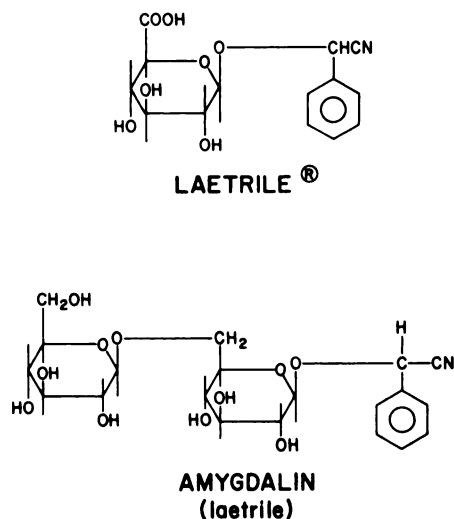


FIG. 1. Laetrile with a capital "L" is a synthetic substance that has never been marketed, and the claimed method of synthesis of it by Krebs was never reproduced. The "natural" substance closest to it is prunasin, which differs only in having a "-CH₂OH" replacing the "-COOH". Laetrile with a lower case "l" is amygdalin, the product marketed by laetrile promoters. The popular term "laetriles" is a synonym for "cyanogenetic glycosides" (3, 4, 25).

cyanide to thiocyanate in 15 min, very little of the enzyme is present in blood, and the limiting factor in detoxification is not enzyme, but available intracellular cystine, cysteine, and other reducing sulfur as substrate (7). Thiocyanate can reconvert to cyanide (7).

Laetrile with a capital "L" is the trademark for the product Krebs claims to have synthesized once upon a time (11) and which has just one instead of two parts glucose in addition to one part benzaldehyde and one part cyanide (4). In his 1977 "Laetrile Fact Sheet," laetrile promoter Dean Burk⁴ states "laetrile is on the H.E.W.-F.D.A. GRAS (generally recognized as safe) list . . . under the heading of natural extractive from bitter almond, apricot or peach kernels . . ." The statement is false, since the "almond bitter (free from prussic acid)" on the GRAS list is an oil extract that is essentially benzaldehyde, with residual traces of cyanide removed (10).

Laetrile is 6% cyanide by weight (4). Its promoters allege that cyanide in minute quantities and in the "proper food forms," instead of being a deadly poison, actually is an essential component (the mythical "vitamin B₁₇") of normal body chemistry. It is poison, is not a component of normal body

chemistry, and its only effect on body chemistry is to harm it (6, 10). There is no vitamin B₁₇ (6); B₁₇ is a *trade-name* created for laetrile by a laetrile proponent (5). A vitamin is an organic nutrient functioning to facilitate an essential biochemical reaction, necessary in small amounts from food to sustain life, and lack of which produces a specific deficiency disease which is corrected by supplying the vitamin (6, 12). Cyanide has no value in sustaining human life. In small amounts it injures, in larger amounts it maims, and in still larger amounts, it kills. No law prevents promoters from trade-naming nutritionally worthless pangamate as "B₁₅" (13), or poisonous laetrile as "B₁₇". They practice the snake oil medicine of the 19th century. To paraphrase Abraham Flexner and Harvard biochemist L. J. Henderson (14), "It was not until after World War I that a random patient

⁴ A Ph.D. biochemist, who, before his retirement at age 70 in 1974, was head of the then small four-person Cytochemistry Section of the Laboratory of Biochemistry of the National Cancer Institute. Since 1974, as head of the Dean Burk Foundation, despite his lack of credentials as a clinical nutritionist or in cancer treatment, he has promoted various questionable remedies, such as laetrile, "vitamin B₁₅" and "vitamin B₁₈" (15), alleging on specious grounds that they are vitamins. (See "A brief on foods and vitamins," by Dean Burk, published on 12 June 1975 by the McNaughton Foundation, and sold by various promoters of laetrile.) (Address of McNaughton Foundation: Box B17, San Ysidro, California; just across the border from Tijuana.) McNaughton, who has a criminal conviction for stock fraud, established the Cytopharma laetrile manufacturing plant in Tijuana (5, 30-34), of which Contreras became co-owner (See opinion upholding criminal convictions and sentences, including fines and 3 years probation of defrocked physician John Richardson, Ralph Bowman, Frank Salaman, and Committee for Freedom of Choice President Robert Bradford for conspiracy to smuggle laetrile, U.S.A. v. Richardson, Bowman, Salaman and Bradford, #77-2203, -2204, -2262, -2268. United States Court of Appeals for the Ninth Circuit, filed October 20, 1978). McNaughton also has a criminal conviction for conspiracy to facilitate transportation of smuggled merchandise and was placed on 2 years probation (U.S.A. v. Andrew McNaughton, #76-0488, United States District Court of California (119-122). As an expert witness, Dr. Burk indicated his definition of a vitamin included many food substances and minerals,⁵ when the word "vitamin" was created, the substances specifically excluded from the definition were carbohydrates, fats, proteins, minerals, and water (12). It is a perfect example of the abuse of words by laetrile promoters in deceptive and misleading ways, and violates the Federal Rule of Evidence which says that words shall have their ordinary (dictionary or encyclopedia) meaning.

⁵ Closing brief for the People (199) by Asst. D.A.

with a random illness seeing a random doctor had a random chance of profiting from the encounter."

Typical of the scientifically bizarre reasoning of laetrile promoters is their claim that laetrile must be a vitamin because vitamin B₁₂ also contains cyanide. There is no cyanide in functional vitamin B₁₂ (15). Cyanide is *added* to one of the pharmaceutical forms of vitamin B₁₂ to stabilize it as cyanocobalamin (15). A daily 1- μ g dose of cyanocobalamin not only contains well below one millionth the amount of cyanide in a daily 1-g dose of laetrile, but also the cyanide, which is metabolically worthless, must be removed before vitamin B₁₂ can function in human nutrition (15).

An ironic fact is that vitamin B₁₂, in hydroxocobalamin form, can be used in large doses as a continuous intravenous infusion to prevent cyanide poisoning from concomitantly administered nitroprusside (16). It acts by "soaking up" the cyanide before the cyanide binds to cytochrome oxidase. It may also be good treatment (with oxygen and diuretics, for the pulmonary edema) for acute cyanide poisoning; in truly massive doses of 1.8 g vitamin B₁₂ per 100 mg of cyanide (17, 18). About 25 mg hydroxocobalamin (1347 daltons) should neutralize about 1 mg sodium nitroprusside (269 daltons; 5 cyanide radicals per molecule). (See "Epilog" below.)

The laetrile cult and the billion dollar laetrile industry

Cults relating to health have existed throughout history. For centuries there was the Cult of the Unicorn Horn, claiming mysterious health powers of the powdered horn, which brought huge sums to those who purveyed it (19). A century ago, when scientific medicine was still in its infancy, there was the Cult of Arsenic. This purported remedy was so widely used by physicians that it became the basis for the Cult of Homeopathy. Homeopathy sprang up using only trace doses of arsenic to reduce the side-effects from this remedy. Since patients who got trace doses of arsenic did better than those who got larger doses, homeopathy globalized the concept to a general belief that one should always use doses of treatment so small that they were worthless, because that brought out the true worth of the drug. What was actually going

on, of course, was that large doses of arsenic did harm, and using smaller doses did less harm.

Down through the centuries, quacks and

Carol Hehmeyer noted: Testimony of State Department of Health Investigator J.R. Jackson that "Most of the correspondence for purchase of laetrile was addressed to E.T. Krebs, Jr., Malvina Cassese, or to the Krebs Foundation. The mail order business was conducted out of 1348 South Van Ness . . . during that search, money was found hidden in a can . . . Mr. Krebs had initially refused to open the can but the investigator insisted and discovered the large stack of money . . . there were quarters in the Krebs mansion for R.L. McNaughton, for Wynn Westover, and for Dean Burk (See "Chemistry" section footnote).^{*} He identified each one of these people as leading figures in the laetrile conspiracy . . . The literature propounded laetrile as a cure or treatment for cancer . . . Testimony of Tamara Zema that her husband contracted a 95% surgically curable cancer but she was "persuaded by Dr. Krebs that she should use laetrile for her husband instead of surgery . . . He told her that it is normal for the spots of cancer or the lumps to get larger before they get smaller during laetrile treatment . . . she accompanied her husband to Dr. Richardson's office when he went there for treatment. He received vitamin B₁₅ with the laetrile. She brought one of the vitamin B₁₅ bottles into court . . . That bottle bears the label Krebs Laboratories . . . the bottle of B₁₅ cost \$15.00. She stated that she paid over \$3000 to Dr. Richardson for her husband's treatment. In September, 1974, the bill for her husband's treatment was in an amount over \$200, and the money was all for pills . . . Inspector Jim Eddington testified about . . . Krebs . . . \$12,705 in cash . . . hidden in a cache in the ceiling. It was in 12 bundles which were dated February and June of 1975 . . . sales records . . . indicate that between February 5, 1975 through December 1, 1975, \$10,310 passed from Mr. Bradford to Mr. Krebs for the B₁₅ . . . there were three probationary searches . . . on each occasion there were empty barrels of calcium gluconate . . . These were all 200 pound drums . . . Undercover agent Don Cooper testified that . . . "it was a hush when Mr. Krebs would enter the room, and he was treated by his guests as a sort of 'sage' " . . . there was another meeting at 1348 South Van Ness which was attended by Mr. Cooper. Mr. Malone, Dr. Parker, Mr. Bradford, Mr. Newkirk, Frank Salaman's wife, Dr. Dean Burk, Malvina Cassese and Mr. McNaughton were all present . . . During that visit to the mansion, Mr. Cooper noted that Dr. Dean Burk had a room in the mansion, apparently permanently. He heard a great deal of discussion about laetrile. The people also discussed McNaughton's laetrile factories in various countries . . . A local "B₁₅ laboratory" was discussed . . . Mr. Krebs . . . talked about a new clinic in Mexico. He also talked about smuggling arrests and discussed his theories as to who the informant was that made those arrests possible . . . In the testimony of Dean Burk . . . "testified that his definition of a vitamin would include many food substances and minerals . . . He admitted that he does have a permanent "bed" at the 1348 South Van Ness mansion owned by E.T. Krebs, Jr . . . He stated that he testifies "a lot" for his friends . . . Andrew McNaughton "admitted that his laetrile foundation up in Canada had been

faith-healers have created cults of followers, who accept with religious fervor the bizarre teachings of their mentors, who usually became rich in the process. These cults spring in part from "magical thinking," which Piaget studied in children, which is still present in many adults, and which can be reactivated by fear of cancer or other dread diseases (20).

The Laetrile Cult is perhaps the most bizarre, ruthless, deceptive misleading and dangerous health cult to come along in this century. Laetrile is not supported as of value by a single scientist recognized in the scientific community as a currently reliable source of information about cancer or about nutrition (5, 8, 10, 21–29). Its support comes from self-styled cancer and nutrition experts rewarded by backers who profit from such promotions, such as the Committee for Freedom of Choice in Cancer Therapy (some of whose leading figures have had criminal convictions)^{4,5} and the National Health Federation (seven of whose leading figures have had criminal convictions in relation to health fraud) (30). Individual proponents have allegedly taken in millions of dollars from it (5, 30–34), it is a billion dollar a year industry (5, 30–34), an estimated hundred thousand cancer patients (at least 50,000 in the United States) are fanatically supporting it even as it shortens their lives (5, 36), and state legislatures are supporting it because they are counting votes instead of lives (34). More than half of cult supporters, the "cancer underground," are characterized by a unique ideological tetralogy: belief in vitamins as a panacea, hostility to scientific medicine, right wing politics, and religious fundamentalism (35). Many laetrile profiteers and their victims are John Birch Society members (31, 37, 38). Attorneys fighting the cult should avoid judges and jurors with such characteristics, the first two of which suggest inability to separate anecdote from science; and the last two often indicating a proclivity to accept without evaluation or question conclusory pronouncements of simple solutions to complex problems. Such judges in several states have rendered pro-cult decisions, by giving fabrication, anecdote, and deceptive and misleading testimony by laetrile promoters the same weight as scientific evidence. The totalitarian mentality, be it right- or left-wing, appears to favor the promulgation of nutrition quackery, as wit-

ness the support by the Russian political apparatus of the fraudulent "vitamin B₁₅." (13).

The laetrile empire is a highly organized and lucrative industry using sophisticated computerized technology, levels of funding undreamed of by the "snake oil salesmen" of old, with enormous impact on federal, state and local levels of government. It has the ability by push-button to generate avalanches of mail, massive funding for candidates supporting laetrile. It has an interlocking network of direct mail, an interlocking network with other organizations promoting health quackery (30), exerts unrelenting pressures on elected officials, and is not above smearing and threatening responsible scientists who dare to challenge it. For example, the Coalition for Alternative Therapies and the Na-

started with the assistance of some Mafia-related money sixteen years ago. He also admitted that he frequently stays with Mr. Krebs when he comes to San Francisco ... Mr. Krebs testified that he has never ever made any money from laetrile ... he at no time mentioned any source of income which would explain his ... mansion ... car ... elaborate meals ... secretary ... trips ... thousands and thousands and thousands of dollars in cash which were located on two separate occasions during probationary searches. In each instance, the large sums of money were hidden on the premises ... With respect to his doctorate from the American Christian College, Mr. Krebs admitted that this particular college has no science department. The doctorate was, of course, in science. He stated that he gave a speech at this particular college, and that this was the reason that he received the honorary degree ... Mr. Krebs is listed as a Doctor in the 1975 phone book ... and the 1976 ... He has allowed and encouraged himself to be touted and proclaimed as a person of knowledge and wisdom, whose authority can be relied upon. He is not that ... his educational history, the record of his criminal activities, his own testimony ... show him to be an irresponsible and greedy man—motivated by a love of acclaim, as well as by a love of money ... Where does the money which supports this unemployed man come from? B₁₅?!!!! Laetrile!!!!!! Judge O'Gara stated Krebs, "wants us to believe he has a messianic belief in the value of laetrile as a retardant in the cancer area. It's one thing if a man wants to be a prophet of a far-out cause, but Krebs profited at the expense of a very vulnerable group—cancer victims and their relatives." The judge stated "there is overwhelming evidence produced during the probation hearing that shows laetrile at best is useless ... " (118). The original conviction, fine, suspended 6 month jail sentence, and three years probation in connection with their selling laetrile of Krebs and Cassese (No. G 14656 et seq. on April 16, 1973) was with Ernst's brother Byron, an osteopathic physician whose license to practice medicine was revoked in 1974 by the California Board of Medical Examiners for "mental incompetence," after years of promoting laetrile (117).

tional Health Federation publish a monthly newspaper called "Public Scrutiny" which, in its November 1, 1978 issue, smeared this reviewer, falsely claiming he makes "attacks on nutrition," "lies a lot," "distorts the truth," and (frightening exhortation) "needs to be exorcized." Suing for defamation is costly and unworkable, since it results in heavy legal expense, years in court, and a final judgment which usually merely slaps the defendant's wrist. In the case of *Scott v. McDonald* (38), in which this reviewer was "of counsel" to the lawyers for the Scott family, he was told by an anonymous telephone caller, "If you show up in court Monday morning, you're a dead man."

"Freedom of Choice in Cancer Therapy" is the laetrile industry's slogan, as clever and deceptive a slogan as ever mounted on a multimillion dollar budget by a Madison Avenue advertising agency, with sophisticated experts in mass psychology preparing the literature. A major voice for the laetrile industry is the Committee for Freedom of Choice in Cancer Therapy (5, 21, 30, 31, 39) whose Scientific Director, Ernst Krebs, Jr. (119), flunked out of medical school, is a convicted criminal, and called himself "Doctor" in the San Francisco telephone book by dint of an honorary doctorate from American Christian College in Tulsa, Oklahoma, which was not empowered by the State of Oklahoma to grant the degree (5, 31, 33). The masthead page of the Freedom of Choice monthly magazine, "The Choice," lists a number of promoters who appear to have become multimillionaires in that industry (5, 31, 33) among its officers, consultants, and contributors. A number of them have had criminal convictions variously for fraud, conspiracy, smuggling, and probation violation in connection with their lucrative activities (5, 31, 33); documentation of the brushes with the law of Krebs, Bradford, Richardson, McNaughton and others are available from the Food and Drug Administration. Thousands of dollars were found concealed in various parts of Krebs' castle in San Francisco during raids by the authorities (5, 31, 33, 119-122).

The December 1976 issue of "The Choice" notes that "McDonald . . . legislative consultant to the Committee for Freedom of Choice in Cancer Therapy . . ." was rewarded by reelection to a second term in the United States

Congress with the help of "a radio-television blitz in the Atlanta area by . . . committee spokesmen." The laetrile industry backs its promoters with apparently unlimited funds. It sells not only products but also services, publications, meetings, and conventions.

Laetrile-promoter and Congressman (Georgia) McDonald and the multibillion dollar health quackery industry (30) are so financially and politically powerful that their "open season on the consumer" Symms bill (H.R. 54) to repeal the hard-won "proof of efficacy" requirement of the Kefauver amendments of 1962 (which arose out of the Kefauver hearings into horrendous consumer frauds) is supported by over 100 congressmen. The bill, under the euphemism "Medical Freedom of Choice," eliminates rationality from therapeutics and legitimizes every snake oil salesman who ever double-talked a widow out of her life savings. To quote *Consumer Reports* (34): "the 'Medical Freedom of Choice' bill has no place among the laws of the land. It would turn the clock back to a time when purveyors of worthless nostrums could prey freely on an unprotected public, exploiting the fears of the sick and the desperation of the dying."

The interlocking nature of the laetrile empire of lucrative books, filmstrips, meetings, services, tests, and goods was illustrated in the McDonald malpractice trial (38, 40). According to uncontroverted testimony, McDonald required his patients to have read the Kittler book, to see the Griffin filmstrip (at a meeting), Scott paid \$1,000 cash (laetrile is usually sold only for cash, which can't be traced) for a money order to Heinsohn's Tennessee outfit (5) for 3 weeks of Tijuana laetrile to be mailed to Scott c/o McDonald, McDonald required Scott to make out a check to Richardson in California for a test to be done by Navarro in Manila, and Scott ran up thousands of dollars in hospital bills in the defendant hospital while getting intravenous laetrile there.

No doctor treating cancer with legitimate therapy can take in the more than \$100,000/month taken in by some laetrile promoters (5, 31-33) with their emotionally charged word-salad doubletalk (evasive and ambiguous language) of "cancer control," "nutritional therapy," "alternative therapy," "metabolic therapy," "holistic therapy," "uncon-

ventional therapy," "nontoxic therapy," "terminally ill," "food supplement," and "freedom of choice". These euphemisms may be characterized as the "code phrases of quackery," since in no case is the phrase as used by quackery promoters an honest description; they have stripped it of its dictionary meaning. The millionaire promoters behind laetrile (5, 31-33) claim they oppose the evil demon of "orthodox medicine" (by which they mean scientific medicine) and support the good fairy of "unorthodox medicine" (by which they mean unscientific medicine) (5, 39). Interestingly, the word "orthodox" comes from the Greek word for "straight," "upright," "correct," and means "sound or correct in opinion or doctrine" (41). "Un" means "not" (41). What they oppose is scientific medicine; the term "orthodox medicine" is used by them so they may characterize themselves as "unorthodox" rather than "unscientific". While taking in millions of dollars from their gullible victims, they can afford to joke. Page 2 of the December 1976 issue of "The Choice" carried a cartoon captioned: "Orthodox medicine has no known cure for your condition. I could recommend a good quack."

Cyanide poisoning from laetrile and apricot kernels

Laetriles have been known to be poisonous since antiquity. Professor J. Ross (5) drew attention to the 1895 book by Blyth (42) which contains the lines: "The Egyptians knew prussic acid as extracted in a dilute state from certain plants, among the chief of which was certainly the peach; on a papyrus preserved at the Louvre, M. Duteil read, 'Pronounce Not the Name of I.A.O. under the Penalty of the Peach,' in which dark threat, without doubt, lurks the meaning that those who revealed the religious mysteries of the priests were put to death by waters distilled from the peach." Laetriles were used as a suicide poison in ancient Rome, according to Blyth (42): "From the Egyptians the knowledge of the deadly drink appears to have passed to the Romans. At the trial of Antipater, Verus brought a potion derived from Egypt, which has been intended to destroy Herod; this was essayed on a criminal; he died at once. In the reign of Tiberius, a Roman knight, accused of high treason, swallowed a poison, and fell dead at the feet of

the senators; in both cases the rapidity of action appears to point to prussic acid."

Contrary to the popular belief that all foods are safe no matter how much of them we eat, many foods contain poisons in small quantities. In fact, the National Academy of Sciences in Washington, D.C. publishes a large book entitled "Toxicants Occurring Naturally in Foods," which describes the various poisons found in small quantities in different foods. Chapter 14, on the cyanogenetic glycosides (3), describes the many compounds that yield hydrogen cyanide on treatment with acid or appropriate enzymes. It notes that more than a thousand species of plants release varying quantities of cyanide when tissues of the plant are crushed or otherwise disrupted. The first substance listed in the table of cyanogenetic glycosides in that book is amygdalin, which is the scientific name, since 1830 (25), for the substance Krebs more than a century later (5) trade-named laetrile, and which sold even better after he also trade-named it "vitamin B₁₇" (5) despite its not being a vitamin and being nutritionally worthless (6). It is found in significant quantities in the pits not only of apricots, but also of apples, cherries, peaches, pears, and plums, and in almonds (3).

Bitter apricot kernels are little "cyanide pellets" because of their millions of subcellular organelles containing amygdalin and millions of other organelles (lysosomes) containing β -glucosidase. The cyanide is "safe" as long as the apricot kernel is uncrushed, because it is tightly bound to the benzaldehyde of amygdalin. When an apricot kernel is crushed (by a blender, or the teeth, or anything else) the amygdalin and β -glucosidase make contact and cyanide is generated. The amount of cyanide generated is directly proportional to thoroughness of chewing the kernel. The process of cyanide release from an apricot kernel is analogous to dropping a sodium or potassium cyanide pellet (these salts of cyanide are highly water soluble solids) into water or acid, the means of "gas chamber" executions in California and genocidal mass killings by the Hitler regime during World War II. Ironically, various leaders of the Third Reich, including Himmler and Goering, ultimately committed suicide by biting into, and thereby crushing, cyanide pellets.

Cyanide is rapidly absorbed from the intestine and diffuses throughout the body, knocking out respiration in normal cells and to a lesser extent in cancer cells (6, 8, 43), combining with and completely inhibiting the enzyme cytochrome oxidase at a concentration of only 10^{-8} M cyanide (7). Because the lethal dose of cyanide taken orally for humans is between a half and $3\frac{1}{2}$ millionths of a pound per pound of body weight (8), and because cyanide is rapidly breathed out of the body or detoxified within the body, up to about 10 of some varieties of bitter apricot kernels can be eaten without acute toxicity by adults, but 25 kernels of other varieties could be lethal eaten at once (43a). Twenty-five to 35 average variety bitter apricot kernels eaten over 1 or 2 hr would be likely to produce nonfatal symptoms of cyanide toxicity: headache, dizziness, nausea, drowsiness, sharp fall in blood pressure, difficulty breathing, damage to heart action, and possible convulsions or coma (8). The Merck Index lists 50 to 60 mg as the average fatal dose of cyanide (4); if the entire 60 mg cyanide content of 1 g laetrile was released before giving it to a patient, it could be lethal. Human autopsy studies showed the minimum lethal absorbed dose of cyanide to be 0.5 mg HCN/kg of body weight (44), the *average* absorbed dose in people killed by cyanide was 1.4 mg/kg of body weight at the time of death (44).

Sollman (45) notes the lethal dose of absolute HCN (a liquid) is about 0.05 g; that of KCN (a solid) is 0.2 to 0.3 g; that of dilute hydrocyanic acid would be about 2.5 g; 50 to 60 average bitter almond seeds would be fatal. For some cultivars (varieties), one gm of cherry kernels yields 1.7 mg hydrocyanic acid; 1 g bitter almond pulp yields 2.5 mg hydrocyanic acid (45). One apricot kernel weighs about 0.5 g and contains about 0.5 to 2 mg cyanide. In one study, kernels of five cultivars (varieties) of apricots showed cyanide contents of 11.7 ± 0.5 to 177.1 ± 11.1 mg/100 g (46), but only one cultivar had less than 132.5 ± 9 mg/100 g and it was the only one tasting sweet rather than bitter. (Bitterness can be measured in the laboratory by measuring cyanide or benzaldehyde content.) The kernels that poisoned a Connecticut lady in 1978 contained 409 mg cyanide/100 g moist weight (10a). Her blood cyanide on hospitalization was 3.2 mg/liter. Testimony

on September 13, 1978, in State of New York Department of Agriculture and Markets Food Seizure S-19091 was that the seized health food store apricot kernels contained 391 mg cyanide/100 g. The kernels each weighed about 0.5 g, so a lethal dose (50 mg cyanide) for an adult was about 25 kernels weighing less than $\frac{1}{2}$ ounce! Respondent's attorney offered to eat one to "prove" they were harmless, but refused to eat 10 crushed with a mortar and pestle. (It is a ploy of laetrile promoters to gulp apricot kernels to "prove" their safety, knowing that unchewed kernels, like pebbles, pass out in the stool without releasing their cyanide.) Respondent's attorney alleged apricot kernels were "safe" because macadamia nuts were "safe" and also contained amygdalin, but failed to point out that the amygdalin (and cyanide) content of the nuts was less than 5% that of respondent's kernels. Testimony in the hearing was that the "ordinary use" of health food store apricot kernels was as recommended by "Prevention" magazine, the "bible" of health food faddists, whose apricot kernel recipe produced cyanide poisoning (47). The alleged strength of many preparations may be weakened by decomposition or slow absorption due to various factors, accounting in part for the variability of symptoms. Sollman gives a thorough account of the symptoms of acute and chronic cyanide poisoning as known in 1957, including chronic cachexia and visceral and nervous degenerations (45), and Drill's Pharmacology, an excellent account through 1970 (7).

The cult of cyanide has its own cookbooks (48, 49). According to the May 10, 1977 issue of the Thousand Oaks (California) News Chronicle, "Little Cyanide Cookbook" authoress DeSpain, "a Thousand Oaks nutritionist (and health food store owner) who advocates the banned drug laetrile in cancer treatment, fell victim to her own enthusiasm" and was hospitalized with acute cyanide poisoning from 25 apricot kernels she had ground to a powder, toasted, mixed with honey, and eaten. The May 11, 1977 State of California Food and Drug Fraud Unit report stated "June DeSpain in comatose condition on arrival . . . immediate treatment of subject on 5-2-77 . . . intensive care one night . . . almost died . . . hospital stay two days . . . more concerned about her business than her

health . . . doesn't want people to know how sick she really was." The vast majority of hospitalizations from cyanide poisoning from apricot kernels are not reported in the medical literature. Hospitals rarely report them. Some of them can be found in the Food and Drug Administration files as "consumer complaint/injury" reports (Examples: cyanide poisoning reports X 098-450 and X 059-818, involving "health food" sellers in Minnesota, Washington, and Oregon in 1976 and 1977). Some others may be found in the files of local Poison Control Centers and Medical Examiners.

Because of the dangers of cyanide, foods containing it are generally processed to reduce or remove the cyanide prior to their being eaten, and/or heated to destroy the enzyme that could release the cyanide. For example, almonds and macadamia nuts are often roasted or smoked to reduce their cyanide content and destroy their β -glucosidase before their being eaten. The almond paste used to make marzipan and other almond-flavored candies is processed to remove all of its cyanide before it is used. The air of work areas where benzaldehyde (almond flavor) is prepared from apricot pits may contain toxic levels of cyanide (7). Laetrile promoters put on "demonstrations" of the "safety" of apricot kernels by either gulping them whole so as not to crush them and release the enzyme, or secretly preroasting them to destroy the enzyme. In the 1978 Atlanta laetrile malpractice case, defendant McDonald refused to eat apricot kernels offered to him with a mortar and pestle to crush them (38, 50); respondent's attorney Rothblatt similarly refused such an offer in the 1978 New York apricot seizure case described above.

Laetrile is unique because, unlike all foods containing cyanide, which are processed to remove cyanide before their being eaten, laetrile is processed *from* food to *concentrate* the cyanide.

Jerry Lewis, of the University of California, Davis, School of Medicine, published in July 1977 a review of a number of cases of amygdalin and apricot kernel poisoning (8). His review included four cases of cyanide poisoning reported from France following eating amygdalin; two fatal cases and seven nonfatal cases of cyanide poisoning at the

Children's Hospital in Ankara, Turkey, after eating apricot kernels; and a fatal case from Germany of cyanide poisoning after eating amygdalin. Professor Joseph Ross observed in November 1977 the death from apparent cyanide poisoning of a Hollywood figure who came to the University of California at Los Angeles Center for the Health Sciences emergency room shortly after having been given intravenous laetrile (personal communication).

The California Bureau of Communicable Disease Control has reported cyanide poisoning in Los Angeles from following a recipe for apricot kernel milkshakes (51): "A man and his wife purchased a two-pound bag of apricot kernels at a local health food store. They soaked some 30 kernels with dried apricots in distilled water overnight, and the following day pureed the ingredients in a blender. The resulting concoction was bitter and took some effort to swallow. About an hour after drinking the mixture the wife complained of abdominal discomfort, rapid heartbeat, and feeling strange. She drank some water and vomited. Within minutes of his wife's onset, the husband became symptomatic also and complained of headache, lightheadedness, tachycardia, a generally strange sensation, and impaired vision, 'as if looking through frosted glass.' He felt impending doom. They were rushed to the emergency room of a nearby hospital. Vomiting was successfully induced and after several hours of observation, they were released. For the next three days, the husband complained of insomnia and tinnitus. The wife had diarrhea which abated in one day."

The California Bureau of Communicable Disease Control also reported cyanide poisoning in a San Diego County man who had eaten 48 apricot kernels (47). He used 48 kernels roasted for 10 min and milk and honey in the preparation of milkshakes, following a recipe in the magazine, "Prevention". An hour later, he developed forceful vomiting, headache, flushing, heavy perspiration, dizziness, and faintness. The local emergency room induced forceful vomiting with ipecac, bringing up kernel fragments. The Bureau also reported the case of a 56-year-old woman in Redwood City (52) who ate a "handful" of apricot kernels purchased

at a "Nutrition Center" and within 30 min developed headache, tachycardia, lightheadedness, flushing, and generalized weakness. She was seen at the emergency room of a local hospital where ipecac was used to induce vomiting; the vomitus had a cyanide content of 1.7 $\mu\text{g}/\text{ml}$.

Even the proponents of laetrile admitted a variety of toxic effects of the drug, including low blood pressure, itching, bleeding into the urine and intestine, fever, inflammation of the nerves, vomiting, dizziness, blue skin, and headache (8).

One of Dr. Lewis' patients, who had been to the Contreras Clinic in Tijuana, reported that several patients at the Clinic had serious reactions to laetrile injections, including diarrhea, vomiting, and high fevers. Another of Dr. Lewis' patients, who had also been to the Contreras Clinic, told him that she too experienced nausea when taking oral laetrile (8). In December 1977, Dr. V. Herbert and photographer M. Herbert visited and photographed the Soto Clinic (Clinica Cydel) in Tijuana and tape recorded a conversation with a patient and her husband, who stated that it was only after her first injection of laetrile that she was told, "it makes you sick for a week," and indeed she was unable to keep any food down for a week after the first injection. She also stated it was an "all cash business; they take no checks" and that her family pooled their life savings for her 3 weeks at the clinic. The Committee for Freedom of Choice in Cancer Therapy had its laetrile literature in the lobby of the Clinica Cydel, and the Clinic brochure lists the Committee as its official American agent. (These documents and others were turned over by Dr. Herbert to United States Attorney Herbert Hoffman in San Diego in December, 1977).

There is evidence that, although it may not be as bad as thalidomide, laetrile may have bad effects on a developing fetus, since it appeared to produce kidney defects in some rat fetuses and hydrocephalus in others (8). Yet it is promoted to everyone, including pregnant women, as a "cancer preventative."

There is also evidence that laetriles in the diet can produce goiters, from the inhibition of iodine uptake by the thyroid due to the thiocyanate produced by the body in detoxi-

fying the cyanide (43, 53, 54) and 1 to 10% of a million Zaire nationals are affected with cretinism and mental retardation from it (43, 55). (See Epilog below).

Laboratory diagnosis of poisoning

The 11-month-old girl, Elizabeth Hankin, who was killed by laetrile, ate approximately five tablets of it (labeled as 500 mg each) on June 8, 1977. Within 30 min, she began to vomit, became listless, had difficulty breathing, and later went into a coma from cyanide brain damage, and died 3 days later from that brain damage (1, 9). As was to be expected because of the rapid absorption of cyanide from the intestinal tract, the blood cyanide level was very high when it was measured shortly after she took the laetrile. Also, as was to be expected because of the rapidity with which cyanide exhaled from the body, there was almost no cyanide left in her body tissues when she died 3 days later. It is characteristic of cyanide poisoning that the blood levels are high immediately after taking the poison, but, after the poison and the invariable lactic acidosis of major cyanide poisoning (7, 17) has done its damage to the brain and other tissues, the cyanide is rapidly detoxified and some of it is exhaled (56).

Every patient who takes laetrile should have a plasma and blood cyanide (for acute cyanide poisoning) and plasma thiocyanate and 24-hr urine thiocyanate (for chronic cyanide and thiocyanate poisoning) determination at least every 2 weeks, because of the erratic degree of chronic and acute poisoning due to the various factors each day which result in different degrees of release of cyanide each day from identical oral and/or intravenous doses of laetrile (3, 6a, 8, 10, 22, 53), and different rapidity of conversion of cyanide to thiocyanate. The daily industry excretion in the urine is 0.5–3 mg thiocyanate (57). Any blood cyanide level in excess of 0.2 $\mu\text{g}/\text{ml}$ of blood suggests a toxic reaction, but because of tight binding to cytochrome oxidase, serious poisoning may occur with only modest blood levels, especially several hours after poisoning (58). Normal values are less than 0.2 $\mu\text{g}/\text{ml}$ (59). Levels of 0.1 to 0.15 $\mu\text{g}/\text{ml}$ may occur in normal persons from cigarette smoking, pollution by industrial cyanide

wastes, and food sources. Fatal cyanide poisoning has been reported with blood levels greater than 3 $\mu\text{g/ml}$ (17). About $\frac{3}{4}$ of the cyanide in a blood sample is in the red cells, to the hemoglobin of which cyanide tightly binds (7, 60). Highest cyanide concentrations are found in the spleen (61). Blood levels dissipate rapidly in vivo and in vitro (19). Normal Nigerians (53) have plasma thiocyanate levels in the range of $2.9 \pm 0.02 \mu\text{mole}/100 \text{ ml}$; and urine thiocyanate levels in the range of $0.6 \pm 0.04 \mu\text{mole/kg}$ body weight per 24 hr. Patients with ataxic neuropathy have plasma levels in the range of 11.3 ± 0.2 and urine levels in the range of 2.4 ± 0.1 (53). Since the molecular weight of HSCN is 59, $2.9 \mu\text{mole}/100 \text{ ml} = 0.17 \text{ mg}/100 \text{ ml}$ and $11.3 \mu\text{mole}/100 \text{ ml} = 0.67 \text{ mg}/100 \text{ ml}$.

Additionally, a plasma and blood cyanide and plasma thiocyanate determination should be made immediately upon appearance of hypotension, an obvious indicator of poisoning from hydrogen cyanide (prussic acid) released from nitroprusside (62) or laetrile (63) given intravenously, or on appearance of any other sign of cyanide poisoning. Cyanide levels must be drawn immediately because this evidence dissipates rapidly (56); thiocyanate persists longer.

When the 10th Circuit in 1978 in *Rutherford v. U.S.A.* authorized intravenous laetrile for terminal cancer patients, it should have required that each intravenous injection of laetrile running into a patient's vein should be sampled for free cyanide. It would appear to be negligence not to make such samplings and to immediately determine blood cyanide on the appearance of hypotension or any other symptom of cyanide poisoning from intravenous laetrile, as well as 24-hr urine thiocyanate determinations for chronic poisoning at intervals of at least once every 2 weeks for all patients on such a regimen. There was testimony that John Scott (38) had hypotension on three mornings after a slow drip of intravenous laetrile given at about 2 AM. This suggests there was either release of cyanide in the blood or free cyanide in the intravenous laetrile given, possibly due to deterioration of laetrile in its ampoules or mixing it in the iv with glucose and water and megadoses of vitamin C (6a). All 10 patients of a New Jersey surgeon given intravenous

laetrile got hypotension (63), presumably from free cyanide (see "Epilog").

Clinical signs of poisoning

The 17½-year-old girl killed by laetrile in Los Angeles drank 3½ ampoules of it (10½ g) in her home (2, 56). Within 10 min, she developed headache, dizziness, collapse, convulsions, and coma. The paramedics were called to her home and put her on a respirator at the nearest hospital, but she died 24 hr later. Ironically, autopsy showed that the conventional surgery she previously had at Kaiser-Permanente, Los Angeles had removed all parts of her brain tumor. Her subsequent trip to Mexico gave her laetrile and laetrile gave her an untimely death.

Hypotension occurred in all ten patients given laetrile intravenously by a New Jersey surgeon, now deceased, who provided no data on whether the laetrile shortened the lives of his patients (63). Other symptoms suggesting poisoning from intravenous cyanide, and calling for immediate determination of plasma and blood cyanide and plasma thiocyanate, are nausea, vomiting, diarrhea, headache, palpitations, muscular twitching, restlessness, and sweating (64). Thiocyanate may accumulate; particularly during prolonged laetrile infusion in patients with renal insufficiency. Blood thiocyanate levels should be determined after 48 hr in such patients, and more frequently in patients with renal failure (64). Three weeks of cyanide could produce hypothyroidism from excessive thiocyanate accumulation (64). In some patients who have recovered from cyanide poisoning, complaints of weakness, fatigue, insomnia, and cardiac distress occasionally continue for months (65). Repeated episodes of acute poisoning may be followed by polymorphous chronic illness, which may appear as encephalopathy, extrapyramidal signs mimicking Parkinsonism, may resemble poliomyelitis, or there may be periodic excitement and violence (66).

Chronic cyanide intoxication from laetriles in the diet has produced in Africa thousands of cases of slowly progressing neurologic damage with blindness (bilateral optic atrophy), nerve deafness, and myelopathy, with muscle weakness in a demyelinating syndrome of toxic ataxic neuropathy and var-

plants of it (3, 45, 53). In these patients, whose staple diet includes bitter cassava (manioc), a plant root food containing a laetrile, plasma levels of thiocyanate, plasma cyanide, and urine thiocyanate are high, and an increased frequency of goiter is observed (53). Small amounts of cyanide may be oxidized to CO₂ via cyanate (7), and cyanate is neurotoxic (67, 68). This may help explain the neurotoxicity of cyanide. Cyanate toxicity in man includes not only hypoxia-like damage to the nervous system (drowsiness, diminished vision, severe debilitating peripheral neuropathy with muscle weakness, gait disturbance with foot drop, electroencephalogram changes with possible diffuse encephalopathy, demyelination, paresthesias), but also marked weight loss, cataracts (which may appear months or years after exposure), and greater susceptibility to bacterial infection (with reduced titer of the third component of complement (C3), and impaired humoral antibody production (69).

Hard on the heels of the two most recent deaths from laetrile was further evidence in the United States that doses not large enough to kill may still be toxic. Dr. Frederick Smith and his colleagues at Georgetown University School of Medicine in Washington, D.C., had the opportunity to study two patients who had been given laetrile by others (70). Both had serious reactions to the laetrile. One of them was a woman who developed generalized discomfort, with nausea, backache, headache, abdominal cramps, and a fever to 102 F with diffuse rash most prominent on her abdomen. (Dermatitis occurs frequently in industrial workers chronically exposed to cyanide solutions (57).) She had been taking 6 g laetrile weekly intravenously and oral laetrile as one 500 mg tablet three times a day. When her laetrile was stopped, her temperature became normal, and her rash and abdominal cramps went away within 2 days. When she resumed taking laetrile, she was readmitted to the hospital with the exact same symptoms that laetrile had previously given her: headache, nausea, abdominal cramps, rash, and fever to 102 F. When laetrile was discontinued, the fever, rash, and abdominal discomfort again went away within 48 hr (70).

The other Washington patient was a 46-year-old man who had been taking one 500-mg laetrile tablet daily since September 1976,

and came into Georgetown University Hospital in March of 1977 with a 1-week history of progressive neuromuscular symptoms, including severe drooping of the eyelids and muscle weakness in the arms and legs. Within 48 hr after stopping laetrile, his drooping eyelids and muscle weakness improved dramatically and went away completely in 6 days (70). The cases reported by Dr. Smith and his associates suggest laetrile tablets or injections produce a similar type of poisoning to that produced by the laetrile in cassava.

The Merck Index (4) lists the human toxicity of cyanide from laetrile (or any other source) as: from high doses, tachypnea, dyspnea, paralysis, unconsciousness, convulsions, and respiratory arrest; from lesser doses, headache, vertigo, nausea, and vomiting, and from chronic exposure over long periods, fatigue, and weakness. Lassitude, insomnia, cardiac discomfort, anemia, skin eruption, and ocular and auditory disturbances may also occur (65). In the McDonald case (38), there was expert testimony from Professor Jerry Lewis (who wrote Reference 8), that the hospital record gave evidence of seven separate episodes of acute cyanide poisoning of deceased John Scott by laetrile given orally (nausea, vomiting, diarrhea) or intravenously (hypotension) by defendant laetrile doctor McDonald, plus testimony of progressive fatigue and weakness, consistent with chronic cyanide poisoning.

The vegetarian diet given by laetrile proponents assures the patients of greater cyanide poisoning because plants are the main sources of the enzyme which releases cyanide from laetrile (3, 8, 22, 71, 72).

For every person dramatically killed by cyanide poisoning, there may be thousands chronically poisoned by low concentrations of it, and suffering insidious loss of appetite, weight loss, cachexia, and mental deterioration. Rhodanese and sulfur in the body "detoxify" cyanide to thiocyanate, which itself is toxic and can produce weakness, nausea, vomiting, diarrhea, skin eruptions, arthralgia, palpitations, precordial pain, muscle cramps, facial edema, nephrosis, hepatic necrosis, anemia, depressed thyroid function, irritability, blurred vision, tinnitus, motor aphasia, hallucinations, and delirium (66, 73). The public conception of cyanide poisoning as

always acutely lethal arises from the use of cyanide in homicides and suicides.

Cyanide poisoning in a child may produce bizarre behavior which parents may describe as "acting like an animal." A 3½-year-old girl poisoned by apricot kernels exhibited "disorientation and confusion, vertigo and restlessness. She reportedly tried to drive her tricycle into a wall and to chew on a red flower, which she assumed was a lollipop" (43a). She was thought to have ingested about 15 apricot kernels, and passed kernel fragments in her stool (43a).

The odor of cyanide is widely believed to be easily detected. However, there are gross genetically determined differences in the olfactory perception of cyanide by different persons (17, 74). In one study, only six of 19 physicians recognized cyanide when they smelled it, and five of 30 detected no smell at all when confronted by a sample of sodium sulfate containing essence of almond (17).

In patients taking laetrile "some deaths ascribed to cancer, particularly in debilitated patients, may have been due or accelerated by cyanide from the drug" (9). Laetrile may cause neurological signs and symptoms erroneously attributed to a suspected or actual brain metastasis but in fact due to the laetrile. These signs are curable by stopping the laetrile (9, 70) rather than increasing it and producing neuromuscular weakness and ptosis (70). The case against "nontoxic" laetrile grows daily (56).

Factors affecting toxicity

As a poison, laetrile is much more toxic when taken by mouth than when injected. Gastric juice may release some cyanide from laetrile. The enzymes which split off the 6% cyanide from the rest of the laetrile molecule are found in many plant foods, and to a small extent in intestinal bacteria and possibly intestine epithelial cells (6, 8, 22). Human feces were reported to hydrolyze 45.2% of amygdalin as compared to only 0.47% for mouse feces and none for monkey feces (75). These enzymes are not absorbed from the intestine into the blood stream, and thus the releasing of cyanide from laetrile occurs largely in the intestine (6, 8, 22), including the colon (75).

The toxicity of the cyanogenic glycosides (laetriles) is influenced by actual cyanide con-

centration, which varies widely (76). Cyanide concentration depends on the size of the bolus of cyanide; thus 25 apricot kernels chewed and eaten as one mouthful could be lethal, but the same 25 kernels chewed one every ½ hr may produce no visible symptoms. As Olson (77) noted, if 50 ppm of cyanide in air are inhaled by human subjects, the rate of detoxification to thiocyanate is equivalent to the rate of intake, and the subject shows no obvious acute ill effects. Under these conditions, 720 mg can be metabolized in 24 hr (77). Chronic poisoning from thiocyanate would still have to be reckoned with from long-term such conditions.

Laetrile tablets and injections may contain as little as 0 (78) to 55% (10, 79, 79a) of the amount claimed on the label, with 10 to 80% being the usual range (10). Ampoule solutions contain the D and L epimers in 1:1 ratio and often contain 2.7 to 6.8% isopropanol (79, 79a). Tablets have only the D epimer (79, 79a). Other factors affecting toxicity are amount and type of plant products and other foods ingested, size of patient, how long and well the food is Waring-blended, chopped, or chewed before swallowing, factors in the stomach and intestine affecting the stability of the cyanide-releasing enzymes in eaten plant food, and the ability of the patient to detoxify the cyanide. Conn (76) and Lewis (8, 9) have pointed out that among the plant foods that can assure cyanide poisoning from ingesting them with oral laetrile are sweet almonds, mushrooms, lettuce, carrots, green peppers, celery, bean sprouts, peaches, and plums.

Worthlessness of anecdotal and testimonial claims

Anecdotal evidence is a narrative account lacking necessary scientific evidence to establish the facts alleged. Testimonials are emotional statements citing personal experience by persons unqualified by scientific training and expertise to separate cause and effect from coincidence. On investigation, every case of cancer "cure" from laetrile falls into one of the following four categories: never had cancer; cancer in remission unrelated to laetrile; cancer progressing; patient dead.

In July of 1977, United States District Court Judge John Reynolds (former Gover-

nor of Wisconsin) put a laetrile factory out of business in the case of the United States of America v. Mosinee Research Corporation and United States Pharmaceuticals, Inc. (23). His decision was upheld, as was his injunction against U.S. Pharmaceuticals of Manitowoc, Wisconsin, on August 18, 1978, by the United States 7th Circuit Court of Appeals in Chicago (80). Three of his important Findings of Fact were: "Due to the presence therein of cyanide, a poisonous and deleterious substance, amygdalin is potentially harmful and ordinarily injurious to health," and "Due to the presence of cyanide, amygdalin is unfit for consumption as a food by human beings," and "The promotion or sale of amygdalin for any food or drug use constitutes a fraud on the consuming public." Among his Conclusions of Law was, "amygdalin in any form contains cyanide, a poisonous and deleterious substance which is ordinarily injurious to health and otherwise unfit for food" (21).

Perhaps his most important judicial decision was to reaffirm that the uncontrolled studies of laetrile by its proponents are worthless (81). Specifically, he held as a Finding of Fact that, "anecdotal and testimonial evidence as to cures or effects of treatments on cancer victims as described by lay persons, or persons possessing either an M.D. or Ph.D., but who are not qualified by scientific training and experience as experts in the field of cancer therapy, is not probative or substantial evidence of the safety and efficacy of cancer treatments." Judge Reynolds held as a Conclusion of Law, "The testimony of lay witnesses as to the existence of cancer and the safety and efficacy of an alleged cancer treatment based on their personal experience with the treatment is entitled to no weight and is therefore inadmissible as irrelevant and non-probative evidence." As precedents for this Conclusion of Law, Judge Reynolds cited a number of legal sources (82).

At several 1977 and 1978 National Health Federation conventions promoting nutrition quackery (30), and in several court cases involving laetrile, stunning results against cancer with laetrile were purported to have been obtained by Harold Manner of Loyola University and David Rubin of Israel. As is typical of laetrile claims, these were not submitted to scientific scrutiny by publication in the scientific literature, and laetrile promoters

falsely claimed legitimate scientists were ignoring "the facts" because of a conspiracy against any possible cure. The reality was that investigation of the Manner claims by this reviewer and others revealed that he was digesting mammary tumors in mice by injecting digestive enzymes (a German quack cancer remedy called Wobe Mugos) (155) directly into the tumors, and then irrelevantly claiming in these mice "complete regression of cancer by laetrile, enzymes, and vitamin A." Further information regarding Manner's claims appears in the "Epilog". Many laetrile quacks inject Wobe Mugos into their patient's tumors, which is equivalent in barbarism to injecting Adolph's meat tenderizer. Both have the plant enzyme papain as an active ingredient. Fatal anaphylaxis is a risk of such injections.

The information on Rubin as of late 1978 was that the "Israel Medical Research Foundation" of which he was Medical Director had never done clinical research and was out of business, all 45 patients to whom he gave laetrile in 1976 and 1977 were dead in 1978, and he was working in a Tijuana laetrile operation for which the Committee for Freedom of Choice in Cancer Therapy was the official American agent (83).

Because of the public's inability to separate anecdote from fact, scientists do not come off very well against quacks on radio and television talk shows. The scientist is limited to speaking the truth, the quack is not, and most moderators are solely interested in entertaining the audience, which spectacular scientifically unsound claims do better than cold facts. Some talk shows will only give air time to personalities known to make such spectacular claims (30). Responsible nutritionists often refuse to appear in the same forum with quacks, because it lends prestige to the quack, who is falsely presented as a scientist of equal stature engaged in legitimate scientific controversy (83a).

A typical example of a worthless testimonial is the affidavit laetrile promoters attempt to obtain from the next of kin of patients who die from cyanide poisoning from laetrile, attesting laetrile did not kill the patient. Loved ones, feeling involved in the death, attempt to expiate their feelings of guilt by willingly signing such affidavits, which are worthless as evidence since they are self-serving docu-

ments which not only fly in the face of the medical facts (the clinical and laboratory evidence of cyanide poisoning), but the persons signing lack the clinical and laboratory knowledge to evaluate the medical facts.

As psychiatrist Hilde Bruch has pointed out (20), patients turn to quacks because they offer hope and, often by "nutrition" gimmicks in which the patient can participate, make the patient feel involved in, and in control of, his own therapy. Those who feel hapless, helpless, and hopeless are easy marks for the quack. To avoid driving patients into the arms of such persons, physicians should never give up hope, never tell the patient his case is hopeless, and should involve the patient in his therapy so he has some sense of mastery of the situation (20).

The placebo effect

Frequently, on beginning any treatment, a patient will have a sense of improved well-being, improved appetite, and reduced pain. This phenomenon is so well-recognized by physicians that it has an established name—the "placebo effect" (the name descends from the Latin "shall be pleasing") (84–86). Competent physicians recognize this effect as having nothing to do with the medication given *per se*; quacks and less competent physicians take credit for it as the effect of the drug rather than what it is—psychological effect, or the effect of suggestion (which can generate neuroendocrine changes) (86). For this reason, there has been no testimony in favor of giving people laetrile by any medical scientists recognized by the scientific community as a source of reliable information about cancer or nutrition, and all such testimonials have been from anecdotalists.

Scientific failure does not prevent political success (34). Quack remedies will survive as long as they are lucrative and laymen and legislators ignore the scientific dictum that every chemical is harmful until proved safe, and fail to realize that the placebo effect is a powerful therapeutic tool "on the average about one-half to two-thirds as powerful as morphine in the usual dose in relieving severe pain" (87). Placebos may induce endorphin release (166).

Since cyanide and thiocyanate are neurotoxic, it is possible that as the patient is

progressively debilitated, blinded, and deafened by laetrile, his sensory nerves may also be damaged so that he feels less pain. However, many analgesics and narcotics offer surer pain relief without slowly destroying the patient.

Since the "placebo effect" occurs with a harmless "sugar pill," giving a poisonous "food supplement" like laetrile to achieve it is irresponsible, and can be the legitimate basis for a malpractice claim by a victimized patient, or for a charge of murder by the state.

Laetrile is a fake "cancer cure"

The claim that cyanide from laetrile concentrates in cancer tissue because such tissue has more β -glucosidase and/or less rhodanese than normal tissue flies in the face of the fact that neither of these claims is true (6, 29) and, furthermore, cyanide is freely diffusible (7, 45, 57).

Dr. Lewis has pointed out that the acute toxicity of laetrile in tumor-bearing animals is much greater than in animals without tumors (8). This would suggest that the worse the patient's cancer the more toxic laetrile will be for the patient. Cyanide poisoning has been demonstrated in normal dogs when fed laetrile (22).

Laetrile is a fraud as a cancer cure. So held United States District Court Judge John Reynolds in July 1977. Judge Reynolds held as a Finding of Fact that the promotion or sale of laetrile for any food or drug use constitutes a fraud on the consuming public (21, 80). Irving Lerner, Past President of the Minnesota Division of the American Cancer Society, testified that he had examined reports of 23 studies of laetrile conducted at such institutions as Yale University, the University of California, and Sloan-Kettering Memorial Institute in New York. In each of these institutions, laetrile was found to have no effect on tumors. He further testified that the theories of laetrile action on cancer cited by proponents of laetrile were pure scientific carelessness and error. He pointed out that when laetrile was injected *iv* it was absolutely useless and excreted in the urine, and that when it is swallowed either nothing happens or something bad happens, depending on how much cyanide is released from the dose. He testified to having seen patients who stopped conven-

tional cancer treatment, which was effective, and went on to die of cancer after switching to laetrile. He testified the use of laetrile was cruel because it involved proposing a treatment with no hope of effectiveness to replace treatment which has hope.

Dr. Lewis testified that the claims of value of laetrile against cancer made by the lucrative laetrile-promoting "fringe" clinics such as those of Contreras and Soto in Mexico, Nieper and the Janker clinic in Germany, Navarro in the Philippines, and Ransberger and the Fairfield Clinic in Montego Bay, were worthless. Laetrile promoters and their attorneys are generally armed with reams of deceptive and misleading writings, provided by the laetrile industry's most active lucrative promotional literature sources, including the McNaughton Foundation (5, 31) (See footnote in "Chemistry" section, also footnote to Reference 119; see also References 121 and 122) and American Media (48), as well as letters touting laetrile from the lucrative laetrile mills in Tijuana, Manila, Germany and Vienna, and the island of Jamaica. This material ranges from anecdotal and worthless to blatantly false, and, because of its hearsay nature, was not allowed into evidence by Judge Reynolds. Documents on these various laetrile mills are available from the Food and Drug Administration and make fascinating reading, since many of them also promote a wide variety of other quack remedies, from cell injections to coffee and enzyme enemas.

The laetrile industry has a crew of "laetrile doctors," many of them previously lauded in, or listed on the masthead page of, "The Choice." Some are outright quacks and others are licensed physicians on the lucrative fringe of organized medicine, all selling hope—for a price. This crew flies around the country passing themselves off on gullible audiences, judges, and juries as legitimate scientific experts on nutrition and cancer. Most of them are charismatic masters of the art of deceptive and misleading exposition and are snake oil salesmen of classic stripe. Their credibility is usually easily impeachable by an attorney with the foresight to secure their documents from the Food and Drug Administration, since their background often includes brushes with the law in relation to health quackery, often with more indictments than convictions. For this reason, a frequent

legal tactic of the laetrile industry is to spring one of their crew as a "surprise witness" so there will be no time to learn his background to discredit him. Attorneys fighting laetrile quackery who do not secure pretrial agreement that there will be no surprise "expert" witness risk fighting a flying circus.

The promoters of laetrile falsely claim that the drug is legal and freely prescribed in many countries (for example, in the exploitation book *World Without Cancer—the Story of Vitamin B₁₇*). However, Dr. Sherwood Lawrence, Executive Secretary for the Cancer Advisory Council of the Department of Health of the State of California contacted the Secretary of Health, or equivalent, of Israel, Australia, Greece, Belgium, the United Kingdom, and India, and learned that laetrile was not only illegal, but that no applications had been made to legalize it (21, 23). Even in Mexico, the direct selling of laetrile to the general public was prohibited, and both of the Tijuana sellers of laetrile were under federal injunction by the Mexican Government.

Laetrile mill operators fake credibility by using letters from responsible medical scientists asking for their data as "proof" that they too are respected cancer scientists, and by submitting abstracts (summaries) to reputable scientific meetings. However, their abstracts present irresponsible conclusions unjustifiable by the data, and therefore are scientifically worthless.

Despite a letter from Guy Newell (88) of the National Cancer Institute to 385,000 physicians and 70,000 allied health professionals, and additional letters to many persons who were self-proclaimed laetrile prescribers or users in the United States, asking for report of beneficial effects on tumors in any case at all by laetrile, only two cases of alleged remission and 4 of alleged partial remission passed initial screening, and progression of cancer was reported in over 1000 cases (89). The "partial remissions" in the laetrile group (four of 68) were statistically not significantly greater than in the "no treatment" group (one of 24), and the two complete remissions could have been incorrect or falsified data or spontaneous remission (89). No effort was made to visit the alleged two completely remitted patients to determine if they even existed, much less to determine if the data was valid.

Failure of laetrile in this study in which

only positive results were solicited and no information on adverse effects of laetrile was sought is damning (two alleged complete remissions out of over 50,000 Americans taking laetrile), as is the recent report of studies in which the life span of cancer patients has been halved by taking laetrile, due to the combined effects of lack of proper medical care and chronic cyanide poisoning (36).

In 1976, a crusading new book about unscrupulous medical con men who steal money and sometimes kill people was published. It is *The Health Robbers: How to Protect Your Money and Your Life*, edited by Stephen Barrett, M.D., of the Lehigh Valley Committee Against Health Fraud and the Committee on Quackery of the Pennsylvania Medical Society, and Gilda Knight of the American Institute of Nutrition (30). Its first chapter, by Sidney Arje, deals with "The cruellest killers: exploiting cancer victims." It points out that through the years, hundreds of worthless drugs have been promoted for cancer prevention or cure, but laetrile heads the list of all forms of cancer quackery. It notes that in the 25 years laetrile has been promoted, not a single case has been published in the scientific literature in which it was proved useful against cancer, but "cancer quackery is big business, with an estimated yearly income in the billions. It is also a cruel business for its customers come in deadly fear" (30). Barrett, an editor of the book, subsequently collected \$500 and an apology from a promoter of questionable therapy who slandered him.

Laetrile doctor John Richardson (5, 31, 72) had his license to practice medicine in California revoked in 1976, after a hearing before the California Board of Medical Quality Assurance, partly because he "personally and his agents, advised and discouraged Helen B. Schneck, Kapitan P. Zema, Paul Olsen, and Margaret Baldock from seeking conventional cancer therapy" (5, 31). Four of the seven patients whose records were reviewed by the California Board either paid or were asked to pay \$2000 each for a course of laetrile treatments (5, 31). In May 1977, Dr. Richardson was convicted of conspiracy to smuggle laetrile into the United States and fined \$20,000 (5, 31, 120). This would appear trivial to him, because, according to Herbert Hoffman, the Assistant United States Attorney who prose-

cuted the case, Richardson took in \$2.8 million from January 1973 to March of 1976 (5, 31). Less trivial may be the lawsuits filed against him by the spouse of deceased laetrile patient Zema, and by another laetrile patient. As noted below, a 42-year-old patient of his clinic subsequently died from cyanide poisoning from laetrile and apricot kernels, a mixture his book warns against, but does not say produces cyanide poisoning (72).

Richardson will probably take in more money with his 1977 lay press book, "Laetrile Case Histories," written with Mrs. Griffin, a nurse who is the wife of the author of another laetrile exploitation book, "World Without Cancer." (An interesting statement on page xxii of the Bantam edition of *Laetrile Case Histories* was that reputed Mafia figure "Bayonne Joe" Zicarelli of New Jersey provided \$130,000 to the McNaughton Foundation to promote laetrile. Subsequent to that financial transaction, and presumably unrelated to it, laetrile was legalized by New Jersey). Both books were published by American Media, the lucrative laetrile exploitation literature house (48), of which Mr. Griffin is President. Case histories are worthless unless they can successfully survive the cross-examination by experts which they can get from outside reviewers when submitted to responsible scientific journals. This is why literature promoting health quackery is published only in the lay press and in fringe journals, which do not have submitted articles pass through outside expert nonpartisan reviewers before acceptance. The Richardson book case reports are too scanty and case follow-ups too brief to be of any scientific worth. The "metabolic therapy" and "corrective diet for patients with neoplastic disease" which the Richardson book describes is not only nutrition nonsense, but also nutritionally dangerous (71, 72). The unsophisticated layman may believe it, because he has not the scientific basis to separate science from anecdote and fact from fiction (13, 21). "Nontoxic therapy" and "metabolic therapy" for cancer are double-talk phrases used by self-styled "nutritionists" and outright quacks to "con" the gullible. Cyanide is neither "nontoxic" nor "metabolic" therapy and to so describe it is so obscene and without redeeming value as to be nutrition pornography, as witness the

death from cyanide poisoning of the lady who got her laetrile from the Richardson clinic and ate it with apricot kernels (160, 161).

The antidote to the deceptive and misleading Richardson book is *You Can Fight Cancer and Win*, by New York Times writer Jane Brody and American Cancer Society Vice-President Arthur Holleb (24). This excellent book dispels the irrational fears and ignorant mystification about cancer and shows that in many cases it can be prevented, modified, or cured by the genuine medical advances of recent years. It records that one and a half million cancer patients are alive today from surgery, radiation, and chemotherapy who would be dead if on laetrile.

Laetrile promoter McDonald had indicated in an article in American Opinion magazine in January 1974 (37) that his patient John Scott's cancer was "controlled" by laetrile, yet Scott died with untreated cancer two months later (38). In 1978, as a defendant on trial for malpractice in connection with Scott's death, McDonald admitted in the witness box that laetrile could be poisonous (90) and, although he admitted he gave Scott laetrile, he denied he was treating Scott's cancer and said he had no intention of doing so (38, 40). His hometown Atlanta jury's verdict was against him for \$15,000 (38). Yet, the John Birch Society "American Opinion" bookstores in 1978 were still selling offprints of the article at 20¢ each (12¢ each for 1000 or more), with no notification to the buyer that the implication Scott was cured by laetrile was false, no indication that laetrile could be poisonous, and no indication it was worthless against cancer. As noted earlier, many laetrile profiteers and their victims are John Birch Society members. Most "metabolic doctors" have their patients sign forms consenting that they understand laetrile is not a cancer cure but "nutritional and metabolic support". These deceptive and misleading "consent forms" by the laetrile industry appear meant to exculpate the "metabolic doctor" when his patient dies of untreated cancer.

In the 1978 trial, McDonald did not contest the testimony of the widow Scott and her son Dan that he wanted "a \$200 suit if I cure him and a \$2 tie if I don't," and that he then indicated he had cured Scott by having the

Scotts (who lived in Birmingham) open a charge account at Muse's men shop in Atlanta and picked out a \$300 suit for himself. McDonald's legal team contented themselves with pointing out to the jury that the Scotts had paid Muse's only the majority of the \$300 due for the suit by the time John Scott died, but declined to pay the balance due for the cure after the patient died (38).

Those who promote laetrile claim that it is "nontoxic therapy" which "corrects the body chemistry" and "supplies vitamin B₁₇, the cancer preventing vitamin." They are either misguided or unscrupulous, according to testimony in Federal Court in July 1977 (21). The claims are contrary to fact (5, 6, 10, 21). As United States Senator Edward Kennedy stated at the end of the laetrile hearings he chaired (5), in which he heard extensive testimony from laetrile promoters Krebs, Bradford, Richardson, and Halstead, "There isn't a scintilla of evidence that it provides any sense of hope in terms of curing or preventing cancer . . . there's been wholesale profiteering in terms of this substance . . . gross malpractice and a number of individuals who . . . appeared here today, in terms of the distribution of it." Representative Terrence McCarthy (Edgartown) of the Massachusetts legislature was quoted as stating: "The people selling laetrile are crooks, liars, and thieves . . . Anyone who votes for laetrile is helping to organize mass murder." (91)

The specious "freedom of choice" and "terminal cancer" arguments

Senator Edward Kennedy has noted that, "The elimination of useless treatment is a valid federal role. It is a humanitarian role. It reduces the burden on cancer patients and their families and allows them to exercise their freedom of choice on the basis of informed judgments among viable alternatives" (5).

The "freedom of choice" argument of the proponents of laetrile (37) ignores the fact that, for freedom, choice must be informed. There is no freedom of choice when the chooser is not informed that a worthless poison like laetrile is worthless and poisonous (22). Under our Constitution, freedom of choice does not run to freedom to use fear of cancer and of effective therapy to poison

people with a drug that has no redeeming features in order to get rich. There is no "right to shout 'fire!' in a crowded theater."

In July 1978, The United States Court of Appeals for the 10th Circuit, in the case of *Rutherford v. U.S.A.* (92), ruled that "safety" and "effectiveness" have no meaning when considered in the context of a patient "terminally ill". Ironically, the phrase "terminally ill" had no meaning in the case of plaintiff Rutherford, a healthy propagandist for laetrile legalization, not known to have cancer at the time of the lower or upper court decision, apparently having years earlier been cured of a polypoid adenocarcinoma of the colon by cauterization after the edema subsided (92a). Such tumors rarely metastasize, and local removal of the polyp is virtually always curative (92a). The court upheld administration of laetrile (intravenously only) to persons certified by a licensed medical practitioner to be "terminally ill" of cancer. The phrase "terminally ill" was not adequately defined, and it was left to any unscrupulous or misguided physician to declare by affidavit that anyone to whom he chose to give laetrile, including patients previously cured by conventional therapy, such as Rutherford, was "terminally ill". Presumably the Court rejected oral laetrile (effectively outlawing laetrile tablets and capsules) because, while it approved worthless and possibly harmful therapy in such cases, it would not go so far as to authorize gross cyanide poisoning. The disturbing 10th Circuit decision depriving "terminal" cancer patients of the right to safe and effective drugs is being appealed by the United States of America to the Supreme Court (92, 94) and is counter to the 7th Circuit 1978 decision in *U.S.A. v. Mosinee* (U.S. Pharmaceuticals of Manitowoc, Wisc.) (21, 80), as well as other court decisions (93). Death from so-called "terminal" blood cancers is often due to a bleeding tendency associated with thrombocytopenia. Recent evidence suggests cyanide may precipitate worse thrombocytopenia (94a).

Expert testimony in July 1977 in Judge Reynolds' court (21) confirmed that all the claims of relief of pain and other cancer symptoms, and of slowing or "curing" cancer by laetrile were based on the gullibility of the victims, and, in some cases, ignorance by their doctors that the natural history of cancer

is that it frequently progresses by halts and starts rather than relentlessly, and that many people with "terminal cancer" live many years. It is unjust to use the phrase "terminal cancer," which distorts the truth about cancer in an era when so much can be offered to treat successfully or even cure these patients (95). "Terminal cancer" is a poor synonym for "incurable cancer" (95), also often a wrongly used phrase. Anything a patient takes when his cancer, in the course of its natural history, goes into a "halt" phase will erroneously get the credit for the "halt". (21) Additionally, spontaneous regression of cancer has been reported in nearly 200 patients (96).

Laetriles may cause cancer

The final irony in the laetrile story is that laetriles may actually *cause* cancer. Five lines of evidence suggest this possibility: laetriles are goitrogenic (54, 55), and such goiters are precancerous lesions (43), mutagenic (8, 97), give a positive Ames test (11), a patient with cancer developed a second cancer while being "treated" with laetrile (98), and cyanate, an oxidation product of cyanide reduces the ability of mice to reject tumor inocula (69). The happy fiction by laetrile proponents that Hunzas (Hunzakuts) "do not get cancer because they eat apricot kernels" was shattered two decades ago by the unhappy fact that autopsy reports showed that Hunzas got cancer (5, 99).

H. L. Mencken noted that, "For every complex problem, there is a simple solution—and it is wrong."

Nutrition quackery as murder

There is precedent in appropriate cases for a murder charge against laetrile purveyors (30, 81, 100). A California chiropractor, Marvin Phillips, was convicted of second degree murder and imprisoned for shortening the life of a cancer victim by making money via false promises. It is a situation the law calls felony murder. He maliciously induced the prevention of surgery necessary to save the life of 8-year-old cancer victim Linda Epping, by representing that surgery would not cure her cancer but his treatment could, by "chemical balancing" with food supplements. The promoters of laetrile call it a food supple-

ment. When Linda died, assistant D.A. John Miner of Los Angeles got a murder conviction despite the defendant's employment of Melvin Belli as one of his attorneys (100). Dr. Phillips was sentenced to state prison for the term prescribed by law, and the United States Supreme Court refused to hear his appeal (81).

In his article on "The Phillips Case—A New Dimension in Murder" (100), John Miner concludes that, "Medical quackery is a peculiarly vicious social evil. It preys on those who, because of ignorance or wishful thinking, are left defenseless against the glib promises of cures of everything from pimples to terminal cancer. Inevitably, the quack takes the lives of these unfortunates who . . . are talked out of getting the proper medical treatment needed to cure or alleviate their illness. Until the Phillips case, the most the quack had to fear was a theft conviction, and if they were unlucky, as much as a year in prison." The affirmation of Phillips' conviction for murder by the highest court of California, and the refusal of the Supreme Court to review the case (81), means the law has forged its strongest weapon to strike down the quack. Justice needs that weapon. The doctor-patient relationship is based on the moral principles of truth, fairness and keeping of promises. Using ineffective drugs in life-threatening diseases gives up realistic hope and betrays the patient. The patient does not want laetrile—he wants to live.

A frightening fact is that anyone wishing to murder a devotee of the laetrile cult need only feed him all at once a half-dozen freshly crushed sweet almonds, macadamia nuts, or apricot kernels (to supply β -glucosidase) plus about a gram of pure laetrile (not the usual adulterated stuff, which is 0 to 80% of what it says on the label) (78, 79). A gram of pure laetrile contains 60 mg of cyanide, and the Merck Index (4) lists 50 to 60 mg as the average fatal dose of cyanide.

The allure of quackery: specious logic versus the logic of science; the overlap of cultism and quackery

Patients are most susceptible to quack remedies when they feel helpless, not in control of their therapy, or without hope (19, 20). Nutrition quackery feeds on specious slogans

and beliefs which appeal to needs for control of one's own destiny and of the environment (20, 101, 102), such as the sophistic concept that natural is good and synthetic is bad (30). This need for control is accompanied by lack of respect for knowledge, repudiation of knowledge, and perception of established experts as hated paternal authority figures, whereas promoters of quackery are seen as courageous, independent persons with the foresight to penetrate the fakery of the establishment. Those most vulnerable to nutrition quackery are unable to perceive the difference between a genuine authority and expert, i.e., someone who has earned, by disciplined controlled study, scientific training, and experience, the right to make a judgment, and persons who do not follow the basic scientific canons (13, 103) for evaluating medical information, and thus are not authorities and have not earned the right to be classified as experts. Many lay persons are blind to the difference between creative originality and intemperate rebelliousness, and unable to recognize the many characteristics which, taken together, define nutrition quackery (83a, 104, 105, 105a).

Specious logic is typical of the hypothetical questions posed by health quacks. For example:

1) How can you say my remedy doesn't work if you don't personally use it? (Answer: those who do not profit from history are condemned to repeat it.) Attorneys for laetrile interests ask opposing experts: Do you use laetrile, doctor? If not, how can you say it doesn't work?

2) Since useful drugs can be toxic, why isn't my drug justifiable? (Answer: possible efficacy is the only justification for possible toxicity.)

3) Big doses of anything are harmful, so isn't my drug as good as anything else? (Answer: Comparison of possible harms without comparing efficacy is specious. The only valid comparison is of both efficacy and harm.)

Bills promoting nutrition quackery frequently pass legislatures because the promoters are better organized than "organized medicine" (105). They control magazines and organizations nationwide in scope. They hold "revival" type meetings exhorting their followers to be at the legislature during the debate and vote. At the legislature, they set

up a command post, fill every seat, button-hole every legislator, and place their propaganda on each legislator's desk. Thus, legislators are buried under an avalanche of proponents and the bill often prevails.

Promoters of quackery frequently pounce on a legitimate scientific word or phrase, empty it of its dictionary meaning while retaining its emotional impact, and then use it as a deceptive and misleading "code phrase" in pseudoscientific jargon which impresses the gullible. Examples of such often-abused phrases are "nutritional therapy," "metabolic therapy," "holistic therapy," "alternative therapy," and "nontoxic therapy" (71, 72). The modern quack represents himself as a scientist.

The Harvard Medical School Health Letter notes four basic scientific canons for evaluating medical information (103):

1) Does it go beyond "personal observation" to stand the test of scrutiny and criticism by other scientists, i.e., is it a study or a story? Is it science or anecdote?

2) Was it compared for effectiveness in controlled studies to other treatments and to suggestibility or to the "doing of nothing," i.e., to a placebo? What is the natural history of the disorder in the absence of therapy? Was the observed result cause and effect, or coincidence due to the natural history of the disorder?

3) Has it been proved safe? Safe compared to what? Is the risk justified? What is the risk: benefit ratio? (Note that if there is no benefit, the risk:benefit ratio is infinity, which is not tolerable.)

4) The burden of proof is on those who propose doing or giving something, especially if it involves a remedy or procedure not well established in medical practice.

Valid weapons against disease are forged in the crucible of these canons, and products which fail to meet these canons either disappear or become quack remedies.

To protect patients from worthless and possibly harmful remedies for which the unscrupulous make miraculous claims, physicians should never lose patience or give up hope, never tell a patient his condition has no legitimate basis or is hopeless, and always involve the patient in his own therapy.

Vickery and Fries (106) suggest 4 questions

the consumer should ask himself to avoid medical fraud:

1) *What is the motive of the marketer?* (If his hourly gross exceeds \$100 per professional, watch out.)

2) *What are the claims made?* (Vague? Misleading? Testimonials? The question is not has it *ever* allegedly helped *anyone*. The question is: Is it *likely* to help *you*?) It is characteristic of health quackery to make "shifting claims." That is, as the facts slowly catch up with claim "A", quacks shift to claim "B". This is now occurring with laetrile. As the facts are now overwhelming that laetrile is worthless against cancer, the promoters say, "Sure. It's worthless *alone*. You have to use our whole program of nutritional and metabolic therapy (72) to cure cancer." Of course, the new claim, like the old, is unsupported by valid evaluation such as double blind control studies. As usual, the quack's position is not, "Here is proof I'm right," but rather "Prove I'm wrong." No matter which "nutritional and metabolic program" of quackery is added to laetrile, when it proves useless against cancer, the quack will simply shift to claim "C"—"You used the wrong quantity of one or more of the "nutritional and metabolic agents," or "You didn't give the enzyme enemas the right way." The claims are infinitely shifting, based in quicksand rather than data, and thus the quack stays in business.

3) *Do experts in the field use it?* (Do cancer doctors use laetrile when their mother, spouse, or child has cancer? What organizations endorse it?)

4) *Does it make sense?* (False cures have false rationales.) Specious or sound?

History professor John Duffy noted that, "A fact frequently overlooked is that in any day and age a good part of medical practice falls into the categories of folk medicine, self-medication, and quackery. For the vast majority of people, sickness represents a serious economic threat, and their first impulse is to try a folk or proprietary medicine or some practical home technique . . ." "One can only wonder which is most amazing—the greed and callousness of the quacks or the gullibility of their clientele." (107). The long and continuing story of health quackery in the United States has been well told by history professor James Harvey Young (108).

The Consumers Union book, *The Medicine Show* (109) points out that "The AMA, whose Bureau of Investigation has been a clearing-house for information about quacks and quackery for fifty years, has suggested certain guidelines for spotting a quack. Beware, it warns, if self-styled medical experts use a special or secret machine or formula they claim can cure disease; if they guarantee a quick cure; if they advertise or use case histories or testimonials to promote their cures; if they clamor constantly for medical investigation and recognition; if they claim representatives of organized medicine are persecuting them or are afraid of their competition; or if they tell you that surgery, X rays, or drugs will cause more harm than good."

"If, after applying these rules, you still have doubts about a treatment or cure suggested to you by an advertisement, a book, a friend, or a relative, you can obtain helpful answers to questions from a variety of public service organizations. (Most of these organizations appreciate being notified of questionable activity in their areas of special interest.) Some of the reliable places to try are:

The Food and Drug Administration District Offices, as listed under Health, Education, and Welfare Department in telephone directories of the cities where they are located, or its national office, Rockville, Md. 20852.

The Federal Trade Commission, Bureau of Consumer Protection, Washington, D.C. 20580.

The United States Postal Service, 1200 Pennsylvania Avenue, N.W., Washington, D.C. 20260—for information and complaints about mail-order products.

The Consumer Product Safety Commission, Bethesda, Md. 20016.

The American Medical Association, Bureau of Investigation, 535 North Dearborn Street, Chicago, Ill. 60610.

The American Cancer Society, Committee on New or Unproved Methods of Treatment, 219 East 42 Street, New York, N.Y. 10017.

Your state or local health department, medical society, or food and drug enforcement agency."

The *Medicine Show* goes on to state (109): "The vigor shown by the AMA in pursuing outright quacks has not been matched by equal energy and diligence in unmasking

questionable practitioners who operate under the cloak of official licensure. In this area the AMA has been virtually derelict. Although machinery exists for depriving physicians who are incompetents or charlatans of their right to practice medicine, the procedures are so cumbersome that they are seldom invoked. The authority to hear charges and, theoretically, to revoke licenses is delegated to state and county medical societies. These bodies are usually content merely to reprimand a physician brought up on charges. The physician, duly reprimanded, is then permitted to resume normal practice."

"This kind of wrist slapping does little to upgrade the quality of medical care. The traditional image of the doctor as an inviolate guardian of health care has changed in recent years more because of the misconduct of a few physicians than because of any pervasive flaw in the medical profession as a whole. Consumers Union believes that more stringent penalties for abuses of medical privileges are needed, as well as more responsibility on the part of state and county medical societies."

Some of the "questionable practitioners who operate under the cloak of official licensure" are part of the "flying circus" of laetrile promoters who travel around the country speaking to gullible audiences and appearing in various court cases involving laetrile, using their M.D. degree to impress the gullible into believing that laetrile is "nutritional and metabolic therapy."

The allure of quackery was recently garishly illustrated by People's Temple cult leader Jim Jones, who reportedly was a faith healer who "cured" parishioners by the "Filipino psychic surgeon" (110) trick of appearing to remove tumors while actually "removing" a palmed chicken innard. According to the New York Times for November 21, 1978, he killed about 900 of his parishioners in Guyana, South America by a suicide method in which "cyanide was dumped into a large soup kettle, and the liquid was fed first to the babies, then to the children old enough to drink it themselves, and finally swallowed by the adults, many of whom were older people who had turned their Social Security checks and their lives over to the custody of Mr. Jones." About Jim Jones, former cult Plan-

ning Commission member Wanda Johnson was quoted in the November 21, 1978 New York Times as saying, "I was struck with his charisma, his power; he spoke beautifully; he seemed so benevolent . . . Once I became a member of the inner circle, I realized he was a madman, completely insane."

Like other quacks, Jones used letters of reply from responsible public figures, thanking him for his letter, as a means to vouch for his own integrity. According to the Times, "A physician, Lawrence Schacht, prepared the cyanide punch" taken by about 900 People's Temple cult members who "took their drinks, put their arms around each other, had convulsions, and died within five minutes." Cult leader Jim Jones "died of a bullet wound in the head." The poison punch was purple Flavour-aide laced with potassium cyanide.

When quackery and cultism overlap, as in the case of laetrile, the allure of quackery takes on grotesque proportions. Boston psychiatrist and student of cultism, John Clark noted in the November 21, 1978 Associated Press story on why the People's Temple cultists committed suicide, that "People who go into cults are in a state of mind that does not allow outside information to enter. They feel safe, cozy. They can talk their own language to each other. It is reinforced by their opposition to all outside reality—an 'us and they' mentality. There is no room for ambiguity in groups like these."

Boyce Rensenberger of the New York Times, in its November 22, 1978 issue, discussed the fanatical devotion to their leaders and fears of the outside world fundamental to many cults. He quoted Yale psychiatrist and authority on brain washing, Robert Jay Lifton, as noting that when the present looks frightening, there is often a cry for a return to absolute simplicity in the rules of living. People seek to return to a past of perfect harmony that never was. When they find their fundamentalist principles threatened by the outside world, believers have many times chosen suicide as a way of immortalizing their purpose. Dr. Lifton indicated the increasing rootlessness of American society was spawning new cults, most fundamentalist in nature, at a striking rate.

Laetrile, the cult of cyanide, is just such a cult, with alarming similarities to the People's Temple. Both cults are headquartered in Cal-

ifornia, which, with its many rootless transplanted people from other areas, is fertile soil. Both breed on fear and fanaticism. Paranoia pervades the atmosphere of both. The followers of both are impervious to outside reality and information. They are intolerant of outsiders and submissive to their leaders.

Followers of both cults run the risk of their loved ones dying of cyanide poisoning. Operating out of San Francisco, Ernst Krebs is the "guru" of the laetrile cult, as Jim Jones, operating out of San Francisco, was of the People's Temple cult. Unlike Jones, Krebs is a convicted criminal (119). Followers of both cults pour their money and their lives into the coffers of the cult. Both appeal particularly to the elderly, are fundamentalist, anti-establishment, and politically extreme (one to the left, the other to the right). Cults and quackery go hand-in-hand (20, 83a).

Professor Harold Morowitz of Yale (105a) suggests that young people are vulnerable to irrational food cults because we do not teach students how to evaluate the validity of statements, i.e., epistemology and logic. We need to teach them to ask, "How do we know the things that we know?" They should know the methodology for evaluating the validity of statements such as, "Laetrile cures cancer. Laetrile is harmless." We need to teach them how belief can be rationally established. This section indicates the type of evaluatory questions students should be taught to ask regarding health and nutrition, so that they become capable of separating the specious from the sound. Self-righteous certainty about the validity of nutrition fads is the province of the smugly ignorant (105a).

Conclusion

Figure 2 is the warning notice which in November, 1977 was mailed to every doctor (111) and a total of nearly one million health professionals in the United States (26, 111) placing them on notice that laetrile is worthless, poisonous, and often contaminated with fungus and insect parts (79). It may also contain free cyanide released by deterioration of laetrile. Thus, no American doctor using laetrile can invoke the defense of ignorance or confuse anecdote with science. Legalization of laetrile will not protect physicians against charges of malpractice or homicide. Many narcotics are legal, but physicians re-

LAETRILE WARNING

LAETRILE IS WORTHLESS

LAETRILE IS DANGEROUS

LAETRILE MAY BE CONTAMINATED

GET THE FACTS

Cancer patients and their families are warned that:

Whether sold as a drug (amygdalin) or as a "vitamin" (B-17), Laetrile is worthless in the prevention, treatment or cure of cancer. The substance has no therapeutic or nutritional value.

Laetrile can be fatal for cancer patients who delay or give up regular medical treatment and take Laetrile instead.

Laetrile contains cyanide and can cause poisoning and death when taken by mouth. One infant is known dead of cyanide poisoning after swallowing fewer than five Laetrile tablets. At least 16 other deaths have been documented from ingestion of Laetrile ingredients (apricot and similar fruit pits).

Laetrile is especially hazardous if the injection form is taken by mouth. This can cause sudden death.

Laetrile is not routinely subject to FDA inspection for quality and purity as are all other drugs.

Analysis has shown some Laetrile to contain toxic contaminants. Ampules of Laetrile for injection have been found with mold and other adulterants which can be dangerous when injected.

Those who persist in the use of Laetrile or its ingredients should:

- Be prepared to deal promptly with acute cyanide poisoning if the oral product is used. Vigorous medical treatment must be started immediately or death can result.
- Watch for early symptoms of chronic cyanide poisoning, including weakness in the arms and legs and disorders of the nervous system.
- Keep the drug out of reach of children.

For full details about the hazards of Laetrile, see your family physician or a cancer specialist, or write the Food and Drug Administration, HFG-20, 5600 Fishers Lane, Rockville, Maryland 20857.



Donald Kennedy
Commissioner of Food and Drugs

FIG. 2

main liable for malpractice or homicide in relation to their use.

The alleged value of laetrile is clearly a myth (112) and a fraud (23, 27). It is not for scientists to beg for the data of every new snake-oil promoter of laetrile who claims that the century-old quack cancer remedy now "works;" it is for the promoters to submit their data for publication in the crucible of the peer-reviewed scientific literature, where it can be subjected to validity testing. It is in this crucible that the steel of truth is separated from the dross of error. Since the time of the pharaohs, when laetriles were first used for execution by cyanide poisoning, they have failed every test of validity (113) except as agents of debility and death.

The legal position of the United States and Canada is that laetrile is quackery (27, 114).

The cyanide in it is deadly (7, 8, 18, 22, 42, 44, 45, 57, 59, 65, 115). The quack says "anything I do is safe and effective until you can prove otherwise." The basic rule of medical science is that it is for the proponent to prove safety and efficacy, and any therapy is unsafe and ineffective until proved otherwise. To have any other rule is to risk the health and lives of millions. Laetrile violates the primary ethical rule of medicine—"above all, do no harm." (81, 116)

A number of leaders of the laetrile cult, including Ernst Krebs, Jr., Andrew McNaughton, John Richardson, and Robert Bradford are convicted criminals (117-122). However, their charisma still sustains the laetrile industry, a role facilitated by their being on probation rather than in jail. Each has a foundation named for him. Such foundations

provide a layer of protection from the law and from aggrieved victims, who must "pierce the corporate veil," and lend prestige in the eyes of the gullible.

Scientific medicine uses many medicinal agents derived from plants (123-125). Unsafe and ineffective remedies like laetrile are not among them (3). Scientific medicine does not reject the "natural;" it rejects quackery.

Epilog

Recent data suggest the partial detoxification of cyanide to thiocyanate may not be as rapid as previously believed (126). Thiocyanate may partially convert back to cyanide (127). While the total daily excretion in urine of adults in industry is 0.5 to 3 mg thiocyanate (57), for nonsmoking adults generally, it averages 0.65 mg KSCN/24 hr (128, 129), or 0.5 mg -SCN, although smokers may urinate a mean of 10 mg KSCN/24 hr (128,129). Nonsmoking adults may average 0.54 mg/100 ml KSCN in their serum and smokers 1.52 mg/100 ml (128, 129). "If a proven nonsmoker has serum values of 1.5 to 2 mg% or above, which is the normal range of the smoker, then he should be regarded as over-exposed . . . (as should be regarded a smoker with a) . . . serum thiocyanate of 3 mg% or above" (129). "Any increase of urinary thiocyanate output above 2 mg/24 hours should be regarded as indicating too great an absorption . . ." (129). In adult smokers, "only increases of urinary thiocyanate above 16 mg/24 hours should be regarded as dangerous" (129). In one laboratory, 10 adult nonsmokers had mean levels of $3.6 \pm 0.9 \mu\text{mole}$ thiocyanate/100 ml of plasma ($2.2 \pm 0.5 \mu\text{g}/\text{ml}$), and 20 smokers had mean levels of $6.5 \pm 1.7 \mu\text{mol}/100 \text{ ml}$ ($4 \pm 1 \mu\text{g}/\text{ml}$) (130). Each laboratory should run its own control values, since values vary from one laboratory to another; perhaps the most important diagnostic information is that either plasma or urine levels approximately four times normal for the laboratory may mean serious toxicity if sustained (53).

It has been suggested that Leber's hereditary optic atrophy and tobacco amblyopia are both due to defects in the partial detoxification of cyanide to thiocyanate (130). Smokers with such defects should have high plasma cyanide levels, but they have the same plasma

thiocyanate levels as nonsmokers (130, 167).

A level in excess of $0.2 \mu\text{g}$ cyanide per milliliter of blood suggests acute cyanide poisoning (58, 59, 126). Since about three-fourths of blood cyanide is in the cells (7, 60, 131), a value greater than $0.1 \mu\text{g}$ cyanide per milliliter of plasma would suggest acute cyanide poisoning (assuming a hematocrit of 50). In acute fatal cyanide poisoning, levels of 0.26 to 3.1 mg cyanide per 100 ml of blood occur (131a). Fatal subacute poisoning was associated with a level of $0.29 \mu\text{g}$ cyanide per ml of serum 3 hr after ingestion (1). Vesey et al (131) suggest the amount of cyanide in plasma rather than in red cells is the critical factor in cyanide intoxication, and that the fatal concentration is between 10 and 20 μmole HCN per liter plasma (0.27 to $0.54 \mu\text{g}$ HCN per ml plasma).

The finding that human feces hydrolyze amygdalin (75a) raises the possibility of insidious cyanide poisoning one or two days after ingestion of amygdalin, when ingested material reaches the colon and the released cyanide is absorbed by diffusion. A similar phenomenon may occur if injected laetrile is excreted in the bile. Human tumor cells do not release cyanide from laetrile (29, 132), but human liver can, to a very small degree release cyanide from prunasin (6, 29, 132). A number of studies in the first half of this century tested cyanide as a cancer chemotherapy agent, but it always proved to have too narrow a therapeutic ratio (i.e., toxicity to tumor:toxicity to host) to be of clinical value (133).

In the body, cyanide ($\text{—C} \equiv \text{N}$) is converted to not only the lesser poison, thiocyanate (—SCN), but also the lesser poison, cyanate (—OCN), so it may also be desirable to measure blood cyanate (134) when assessing cyanide poisoning.

This reviewer was a medical-legal consultant to the Commonwealth of Massachusetts in the Chad Green case (135). Chad was a 3-year-old acute lymphocytic leukemia victim who had been placed in the legal custody of the State after his parents had allowed relapse by stopping the chemotherapy that put him in remission without significant side effects. Under court order, a second remission without significant side effects was brought about with chemotherapy. After September, 1978, when the physician giving Chad chemother-

apy learned that he was getting the so-called "metabolic therapy" of the laetrile cult at home, Chad had plasma thiocyanate levels of 2.7 and 1.1 mg/100 ml measured at Massachusetts General Hospital, as compared to levels of 0 in each of four children on chemotherapy not taking laetrile. His parents stated his laetrile dose was 250 mg twice daily, but only 80 mg amygdalin was found in the 24-hr urine collected by Court order in January, 1979, suggesting that the drug had either been stopped prior to the start of the urine collection or was so adulterated (79, 136) as to be about 22% of label content, since about 70% of an oral dose of amygdalin appears in the urine in 24 hr (79, 136). However, residual cyanide from prior doses was still so great that Chad had 0.22 μ g cyanide per milliliter of plasma, a plasma thiocyanate of 1.8 mg/100 ml and a total urine thiocyanate of 24.3 mg (1.43 mg —SCN/kg body weight/24 hr) (compared to two other children on chemotherapy not taking laetrile, who had 8.5 mg (0.25 mg/kg per 24 hr) and 9.2 mg (0.51 mg/kg per 24 hr), respectively. These two children were in hospital, exposed to frequent tobacco smoke and possibly various low cyanide sources in their diets. It should be noted that Chad's plasma cyanide was only 0.07 μ g lower than that of a fatally poisoned (1) infant.

These laboratory evidences of chronic cyanide poisoning suggested that his intermittent symptomatology of irritability, insomnia, and abdominal distress (and possibly other symptoms) on the "laetrile metabolic diet" were due to episodic cyanide poisoning associated with the variable blood levels of cyanide and thiocyanate of persons taking laetrile, due to the variable release and absorption of cyanide from laetrile, and the varying actual amygdalin content of the tablets labeled "500 mg" (79, 136). His blood and urine data were in the range of Nigerians with ataxic neuropathy associated with laetriles in their diets (53), supporting the possibility that he would also gradually deteriorate over the years from cyanide poisoning if he continued taking laetrile. Headaches, nausea, perspiration, and flushing are frequent in children with low grade cyanide poisoning (136a). Typical symptoms of chronic exposure to cyanide are hoarseness, conjunctivitis, anorexia, weight loss, weakness, and an al-

tered mental status (136a). A 3-year-old poisoned by apricot kernels repeatedly rammed her tricycle into a wall and sucked on a red flower thinking it was a lollipop (43a). Cyanide can make a child act like a "wild animal."

He was getting at home 15,000 IU of "emulsified vitamin A" thrice daily. "Emulsified vitamin A" is considered a prohibited (154) new drug by the Food and Drug Administration, because of lack of adequate evidence of safety or efficacy, but it is the preferred product of the laetrile cult. Dr. John Truman testified that, over a 3-month period, the "emulsified vitamin A" produced serial rises in Chad's plasma vitamin A levels from the 0.67 μ g/ml normal mean (137) to 6.8, which is in the toxicity range of tenfold normal, along with parallel serial rises in SGOT, suggesting probable liver damage from deposition of toxic quantities of vitamin A in his liver. Laetrile cult folk hero Harold Maner (32) recommends that cancer patients receive "metabolic therapy" including 300,000 I.U. of "emulsified vitamin A" daily, on page 165 of his 1978 cult book "The Death of Cancer."

On January 23, 1979, Judge Guy Volterra ordered that the health-threatening (71, 72) "nutritional and metabolic therapy" with laetrile, vitamin A, and enemas of digestive enzymes be stopped, and that Massachusetts General Hospital be allowed to do periodic tests on Chad to check for cyanide and vitamin A poisoning. There had been testimony that the enzyme enemas could digest the colon's protective coat, allowing toxic substances to enter the blood, and, additionally, daily enemas in a 3-year-old boy could produce emotional problems that could be severe in his later life. Mrs. Green stated, "We have the constitutional right to believe whom we wish to believe," and the parents then fled the State with Chad, as have other disciples of the laetrile cult when states challenge laetrile therapy, and took him to Contreras' laetrile clinic in Tijuana, which contains the retail outlet in Mexico for the Kem laetrile factory founded by Contreras (33).

In "The Origins of Totalitarianism," Hannah Arendt noted that the feelings of rootlessness, loneliness, and despair in modern society cause people feeling adrift in anarchy to seek connectedness via a disciplined set of

rules, consistent even to the point of absurdity. Psychoanalyst Erich Fromm, in his book, "Escape from Freedom," described the desire to replace the complexity of real life and the uncertainties of democratic choices by a nearly childish existence in totalitarianism, in which the cult and its leaders supply all rules and all answers, and the disciple meets his psychobiological need for relatedness by absorbing himself to the cult without true connectedness. The cultist abandons his own personality and adopts that of the cult, becoming an automaton, reciting what he has been taught (Fromm's "automaton conformity"). This lack of reality orientation at the heart of the cult makes its members dangerous to themselves and others. "Heavenly lying" (i.e., lying to further cult goals) is a feature of many extreme cults.

This fanaticism of cultists is illustrated in the Green case, in which the parents, disciples in the cult, and Contreras (33) and Halstead, leaders in both the cult and the laetrile industry, all indicated in court that they favored continuing the chemotherapy (which might get the judge to lift the protective order), but, as soon as the judge ordered cessation of the laetrile due to the evidence of cyanide poisoning, the Greens fled to Contreras' laetrile clinic in Mexico. The judge issued warrants for their arrest on contempt charges, but they indicated they would stay in Mexico, where they were getting financial support from the National Health Federation, they stated.

Funding for the Greens' legal battles appears to have come from the laetrile industry, as appears to be the case for legal battles of other disciples of the cult of cyanide. The laetrile industry magazine, "Choice," in full page ads, secured funding for the Greens' "life and death battle with the courts and medical orthodoxy," and their lawyer, John Graham, was an officer in the laetrile industry-promoting National Health Federation (30) whose General Counsel, Kirkpatrick Dilling, frequently represents both the laetrile industry (21) and disciples of the laetrile cult in their respective battles. Mr. Dilling is listed in the monthly Bulletin of the National Health Federation as one of the seven "paid Federation staff." The respectable (i.e., orthodox) pharmaceutical industry has no machinery comparable to that which the laetrile industry mobilizes for the legal battles of

nutrition cultism. "The Health Robbers" (30) notes that then Chairman Kurt W. Donsbach and Vice-Chairman V. Earl Irons of the Board of Governors of the National Health Federation have criminal convictions for nutrition fraud, with the latter having once received a one-year prison sentence. Several other NHF Governors have been involved with the law in relation to nutrition frauds, and Emory Thurston received a criminal conviction and two years probation for selling laetrile and advising against surgery for cancer of the uterus (30): luckily the lady was an agent of the California Bureau of Food and Drug (30). Donsbach has a "Ph.D. in Nutrition" from Union University of Los Angeles, which is neither approved nor accredited by the State of California (but is "authorized", as, apparently, is almost any "diploma mill" in California), according to the State Office of Private, Post-Secondary Education.

A similar case was "reported" by Alan Stang (37) in the January, 1978, issue of "American Opinion," the John Birch Society magazine. He recited the battle of the parents of 7-year-old leukemia victim Kimberly Cox against the "establishment" which was forcing chemotherapy on her, and how they had to flee Wisconsin to get her to a doctor who "is one of the most beautiful human beings" Stang ever met. Typical of laetrile industry articles asserting the need for "freedom of choice in cancer therapy," there was no mention of the outcome: in December, 1977, Kimberly had been rushed by ambulance on the threshold of death from bleeding due to relapsed leukemia wiping out the ability of her blood to clot, from the Contreras laetrile clinic in Tijuana to University Hospital in San Diego, for proper treatment including chemotherapy (Milwaukee Sentinel, December 7, 1977, and Milwaukee Journal, December 8, 1977). Once out of the hands of "metabolic" doctors, she was brought back into remission and continued on proper chemotherapy at the Marshfield Clinic in Wisconsin (Milwaukee Journal, June 4, 1978).

In January, 1979, the United States Supreme Court agreed to hear the government's appeal from the Rutherford v. U.S.A. decision (92) in which the 10th Circuit held that terminal cancer patients had no right to safe or efficacious drugs, and therefore could be given intravenous laetrile if a physician

signed a "Bohannon affidavit" that the patient was terminally ill with cancer.

The Greens had presented to the court (135), as their choice of physician for Chad, two "metabolic physicians," Ernesto Contreras of Tijuana and marine plant toxicologist and "chelation therapy" (138) promoter Bruce Halstead (72) of California. Contreras is reputedly a multimillionaire in connection with laetrile sales (33), and he and his laetrile factory were indicted by United States attorney Herbert Hoffman in San Diego, but only the factory was convicted on smuggling conspiracy charges (92a, 120). Under cross-examination, both Contreras and Halstead stated that Chad was not terminally ill and that the chemotherapy being given at Massachusetts General Hospital was the proper therapy for his cancer and could cure him. However, each stated that if Chad became his patient, he would sign "Bohannon affidavits" swearing that Chad had terminal cancer so that Chad could continue to get laetrile (135). The Green's attorney, John Graham, a Governor of the laetrile-promoting National Health Federation (30), indicated to the court that, in his opinion, the Rutherford decision included any cancer patient (135). Accepting this position would mean that anyone with a small skin cancer completely curable by local removal would be considered a "terminal cancer patient" and could get "Bohannon affidavits" and cyanide poisoning from laetrile.

When Attorney Brant (135) split therapy effects into objective and subjective, Contreras admitted that only proper chemotherapy would objectively benefit Chad, and that placebo therapy could produce the same subjective "improvement in the quality of life" as he claimed could be produced by chemotherapy with laetrile and the destructive "nutritional and metabolic diet" of laetrile proponents (71, 72).

Under cross-examination (135), Harold Manner of Loyola University, a folk hero of the laetrile cult (32), admitted that his laetrile industry-financed study claiming regression of mouse mammary tumors by laetrile, digestive enzymes and vitamin A did not include autopsies of his mice to determine if his enzyme injections were spreading cancer and that he claimed "remission" simply because "he digestive enzymes digested the tissue into

which they were injected. He failed to do two other crucial controls: studies to ascertain if the digestive enzymes he used would digest normal as well as tumorous mouse mammary tissue, and studies to determine if laetrile, enzymes, and vitamin A shortened the lives of the mice so treated as compared to untreated mice.

Manner also admitted (135) that his daughter was president of Mid West Nutrition, whose price list included laetrile and digestive enzymes, and that he was a consultant to two profitable laetrile-promoting enterprises in Illinois, and travelled widely to promote laetrile at profitable symposia organized by the laetrile industry (139). Like many laetrile promoters and cult leaders, Manner is an ingratiating and charming person whose misleading presentations are not easily seen through by the scientifically unsophisticated. His use of the word "remission" instead of "digestion" to describe what digestive enzymes do to mouse mammary cancer tissue is typical. Any tissue should be digested when injected with the Wobe-Mugos (155) (German; prohibited for human use in the United States, according to the Food and Drug Administration) enzyme mixture used by Manner. It contains not only pancreatin, which digests carbohydrates, fats, and proteins (140) but also many other digestive enzymes. Viokase (Viobin Corporation, Monticello, IL), the 4 N.F. (National Formulary) pancreatin used in our own gastroenterology research, will digest 100 times its own weight in protein, 150 times its own weight in starch, and 450 times its own weight in fat. From studies of patients with chronic pancreatitis, it has been known for decades that pancreatic enzymes digest human tissue. Wobe-Mugos and similar digestive enzyme preparations could produce lethal anaphylactic shock if repeatedly injected into humans, but Manner recommended such injections on page 165 of his 1978 cult book, "The Death of Cancer," in a section entitled "Physician's Protocol."

Ernst Krebs,⁵ the layman who is the guru of the cult of cyanide and the creator of the billion-dollar laetrile industry, is currently appealing the revocation of his parole, which followed his criminal conviction (119). In the Green case, the Greens and their attorney kept reciting the central dogma of the laetrile cult, which is the "Krebs theory". The theory

holds that cancer is a nutritional deficiency disease due to lack of cyanide, for which the cure and prevention is cyanide provided by cyanogenetic glycosides ("laetriles"). The theory states that cyanide from laetriles is not released in the stomach or intestine but rather only when it gets into cells in the body, where it selectively destroys cancer cells but not normal cells, because only normal cells immediately detoxify cyanide to "harmless" thiocyanate. The theory further holds that the cure and prevention of cancer require a "nutritional" and "metabolic" therapy different from nutritional and metabolic therapy as understood by persons with scientific training and experience in human nutrition and human metabolism, but rather a bizarre array of dangerously large doses of digestive enzymes, vitamin A, vitamin C, and other cult "nutrition" measures (71, 72). The cyanide cult ordains as "metabolic physicians" and "nutritional physicians" individuals who accept as fact the speculations of the Krebs theory. As oncologist Takao Ohnuma, M.D., Ph.D., of Mount Sinai School of Medicine in New York noted, the laetrile industry creates "metabolic physicians" in 2 day "workshops on metabolic therapy," which have "no good science; no patient histories or case data; no histology; not even chest x-rays or bone scans to illustrate the response to treatment." Most of the program deals "with the legal status of laetrile, its alleged non-toxicity, and its Keystone role in a 'holistic metabolic' regimen for treating cancer patients" (139). Such would be expected of a cult whose guru is a layman (Krebs) who variously styles himself "physician", "biochemist", "Dr.", and "Ph.D." (119),⁵ after failing medical school (31).

A theory is a speculation, and, as reviewed in the preceding pages and elsewhere (6, 10, 29), every facet of the Krebs theory has proven to be wrong when subjected to reality testing, as well as dangerous to health if followed. Even the minor concept of the Krebs hypothesis that laetrile is an active agent after parenteral administration by virtue of metabolism to HCN *in vivo* is wrong, because essentially 100% of injected laetrile is excreted unchanged (136), unless deteriorated so that it produced cyanide poisoning (*vide supra*).

Because of the doubtful insights of "clinical

experience," it is only the systematic testing of hypotheses concerning the causes and treatments of disease, using the means provided by science and technology, which makes possible the validation of proposed cures. Science is the knowledge gained by such systematic study, i.e., by the scientific method (138).

That the laetrile cult and its priests, the "nutritional and metabolic physicians" continue to thrive and wax rich is a tribute to their skills in politics, propaganda, and proselytizing, funded by the several million dollars they collect daily from disciples who, like members of other extreme cults, have escaped from reality to recite like automatons the litany of their cult as the highest truth (34).

Lack of safety of alleged nutrients has always had difficulty overcoming fictional allegations of efficacy couched in nutrition cult terms. It took from the French Revolution to World War I for the fact that wormwood in absinthe slowly and inexorably destroyed the brain to overcome the fiction that absinthe was an aphrodisiac. When absinthe was finally outlawed in the United States in 1912, thousands had been destroyed by it, and New Orleans had been "the absinthe capital of the World."

Several other pertinent articles relating to laetrile were recently published (141-145).

One of the shifting claims of the quackery industry is that benzaldehyde "may be" the active antineoplastic principle of laetrile. Some Japanese work claimed reduction in weight of tumors in mice injected with benzaldehyde extracted from figs, an anecdotal cancer remedy (146). The studies were worthless because they presented no data on whether the benzaldehyde produced weight loss in all (not just cancer) tissues, or shortened the lives of the mice. Various aldehydes extracted from plants have been claimed to be carcinostatic since at least 1938, including citral and citronellal from lemon grass (146), but none has been shown to have a sufficient difference between the dose toxic to the tumor and the dose toxic to the patient to be of value in treating human cancer.

Thousands of chemicals kill cancer cells, but also unacceptably risk the life of the patient, because of the low therapeutic ratio of the drug (i.e., the dose which kills the tumor is too close to the dose which kills the

patient). Therapeutic ratio is determined in various ways, including "therapeutic trial in the test tube," in which the ability of the chemical at a given dose to kill tumor cells versus its ability to kill normal cells is tested (147-149). Only chemicals with therapeutic ratios high enough that they constitute acceptable risks can rationally be used to kill cancers in humans. Benzaldehyde (4) and cyanide (4) are both poisons with therapeutic ratios too low to be used in humans. As Duker states (150), "No evidence appears to have become available that neoplastic tissue is more sensitive to cyanide than is healthy tissue, or possesses preferential mechanisms for enzymatic break down of amygdalin. A selective effect thus seems unlikely, and one would therefore expect that if Laetrile is given for long periods (as is recommended) and in sufficient doses to exert any effect at all, cyanide poisoning will result."

The effectiveness of laetrile propaganda on a gullible judge is illustrated in the New York "Custody of a Minor" case of 8-year-old Hodgkin's disease victim Joseph Hofbauer (151), whose parents were disciples of the laetrile cult and whose doctor was "metabolic physician" Michael Schachter.

The following is documented in the pages of the Appendix on Appeal (151), referred to below as pages A-1 to A-363: Schachter, a psychiatrist (A-34) with little or no experience in proper treatment of cancer (A-142) and no specialty credentials in the science of nutrition (A-34), "teaches" both these subjects at laetrile industry "metabolic workshops" (139), and represents nutritionally and metabolically destructive therapy (71, 72) as "supportive" (A-34, A-157).

Dr. Schachter was apparently conducting human experimentation on Joseph using various dangerous and questionable remedies noted in the oncology text chapter on "Drugs, Cancer and Charlatans" (144), and in the American Cancer Society literature on cancer quackery (152, 153). In addition to laetrile, these questionable remedies include Staphylococcus phage lysate (A-150), once to twice daily digestive enzyme retention enemas (A-299), Progenitor cryptocides vaccine (A-310, A-317) and several other dangerous products promoted by the laetrile industry, including "B₁₅" (A-162) (13, 72), a product the FDA considers a prohibited food additive, and

"emulsified vitamin A" (A-mulsin) (A-162, A-198) (154) and Wobe-Mugos enzymes (A-162) (155) which the FDA consider to be prohibited new drugs in the United States because acceptable proof of either safety or efficacy has not been submitted to the FDA (154, 155). All of these appear to be in violation of New York State Law regarding human experimentation (156). Dr. Schachter was also giving Joseph dangerously large doses (6a, 71, 72) (often intravenously; A-150, A-307) of 10 to 30 g of vitamin C (A-317), a largely vegetarian diet (A-161, A-164-A-171) which increases cyanide poisoning from laetrile (71, 72), and daily coffee retention enemas (A-168). He performed the bizarre and dangerous act of injecting digestive enzymes (possibly Wobe-Mugos) on two occasions into one of the nodes in Joseph's neck (A-45, A-46, A-293). His human experimentation on Joey in part mimicked the uncontrolled and therefore worthless mouse experiments of laetrile promotor Harold Manner (32), who flew in to testify in the case. Schachter also carried out (and presumably charged for) extensive "food allergy testing" of Joey (A-215, A-290, A-291), using the "cytotoxicity" methodology (A-222-A-247) considered questionable to worthless by responsible authorities (157).

Joseph developed liver damage, found by liver function tests requested by the State (A-18, A-19), probably due to the megavitamin therapy with up to 225,000 IU emulsified vitamin A. Dr. Schachter was giving Joseph intravenously (A-161) daily. There were no plasma vitamin A levels to document the suspected poisoning (A-191, A-198), as competent medical practice would dictate. Megadoses of 225,000 IU of emulsified vitamin A were actually resumed without measuring plasma vitamin A level, because Schachter stated he believed (against the logic of the situation) that Hodgkin's disease caused the liver damage and vitamin A was treating it (A-283, A-292). Dr. Schachter sought advice regarding treatment of Joseph from laetrile industry leaders, including Dr. Hoefler-Janker (153), who Schachter referred to as a "world's expert on Hodgkin's disease" (A-283), and layman and convicted criminal Ernst Krebs (119) (who Schachter referred to as an "expert on nutritionally and metabolically supportive therapy") (A-199), Dr. Marco Brown (Fairfield laetrile Medical Cen-

ter, island of Jamaica) (A-199, A-201–A-203), and Dr. Donald Cole (A-161, A-216), a promoter of questionable cancer therapy. However, Dr. Schachter rejected advice from two radiotherapists and a hematologist, alleging that “None of the three consultants have had any experience with laetrile or the nutritional management of cancer patients. All of them admitted ignorance in this area. . .” (A-308). (The laetrile industry frequently uses the specious logic that only those who subject their own patients to laetrile are competent to judge it, and that no doctor can claim cyanide from laetrile poisons people unless he personally has poisoned people with it.)

Dr. Schachter had the Hofbauers sign a deceptive, misleading, and uninformative “informed consent” (A-141 to A-143, A-151, A-157–A-159), giving them almost no information on the dangers (71, 72) of his treatment program, which he elsewhere represented as “nontoxic” (A-137, A-160), not telling them he was engaging in human experimentation on Joey, and representing his treatment as “nutritional and metabolic support”, where in fact it was otherwise (71, 72). He appeared ignorant of the possibility that Joseph’s “occasional nausea and abdominal cramps” (A-197) could be intermittent cyanide poisoning. He obtained no serum cyanide, blood cyanide, plasma thiocyanate or 24-hr urine thiocyanate tests for cyanide poisoning when these symptoms appeared, as competent medical practice would dictate in a patient receiving laetrile (A-44, A-45). The single tests the State of New York managed to obtain via legal process showed that Joseph had a serum cyanide of 0.14 $\mu\text{g}/\text{ml}$, but no detectable thiocyanate in his plasma, and a urine cyanide of 1.15 $\mu\text{g}/\text{ml}$ and urine thiocyanate of 15 $\mu\text{g}/\text{ml}$. There was no amygdalin in his urine, suggesting the laetrile may have been stopped after the parents and Dr. Schachter were notified to make Joseph available for testing but before the blood and urine collection started (136), possibly in the hope that all laboratory evidence of cyanide poisoning would dissipate before the plasma and urine were collected.

Dr. Schachter gave Joseph daily 3 to 6 g intravenous injections of laetrile (A-150). There seems to be no sense and only danger in this procedure, because 100% of uncontam-

inated injected laetrile pours out unchanged in the urine (136), and the intravenous vitamin C he gave Joey could have increased cyanide release from laetrile (6a). No laetrile for human use is subjected to FDA standards for purity and safety. All laetrile for parenteral use appears to be adulterated and/or contaminated with fungus, insect parts, and/or other noxious and dangerous foreign matter (79, 79a), as well as sometimes possibly deteriorated with free cyanide present in it (6a). There is no evidence in the Appendix on Appeal that Dr. Schachter had the laetrile he injected intravenously into Joey checked for content, deterioration, or foreign matter before injecting it.

Unlike Judge Volterra in Green (135), Judge Brown did not wait in the Hofbauer case (151) for laboratory evidence that Joseph was being poisoned with cyanide from laetrile. He refused the State’s demand that Joseph’s Hodgkin’s disease be properly treated. He had numerous ex parte telephone conversations (A-369) with Dr. Schachter prior to his June, 1978 hearing of the Hofbauer case, and ex parte discussions with an unnamed “oncologist” confidante (A-369), but refused to have ex parte telephone conversations with experts with specialty credentials in hematology, oncology, or nutrition (A-368, A-369). The Judge received into the record (A-172–182, A-248–A-253, A-324–A-350, A-365) extensive literature promoting cancer quackery which Dr. Schachter appended to his “progress reports” on Joseph (A-365), and, despite his disclaimer (A-365), the judge was so thoroughly indoctrinated that he recited laetrile cult dogma as part of his June 28, 1978 Findings of Fact and Conclusions of Law. He accepted Dr. Schachter and the laetrile industry’s “flying circus” as experts, despite their lack of specialty credentials in the sciences of hematology, nutrition, and cancer treatment, rejected the evidence of all the scientific experts with such specialty credentials, and held that, “. . . respondents’ experts strongly indicated that the scientific development of metabolic therapy, including the use of vitamin A, vitamin C, proteolytic enzymes, Amygdalin (Laetrile), coffee retention enemas and enzyme retention enemas, is being suppressed by governmental and peer pressures. . . This court also finds that meta-

bolic therapy has a place in our society, and, hopefully, its proponents are on the first rung of a ladder that will rid us of all forms of cancer."

Judge Brown's approval of Dr. Schachter's experimentation on Joey may not have legalized that experimentation, since there is no evidence that Schachter met the precedent condition of compliance with the requirements of New York State law with respect to human experimentation (156). New York law implies that there be an IND (investigational new drug) application (none existed in 1978 for laetrile, B₁₅, "emulsified vitamin A," or Wobe-Mugos), and other compliance with Article 24-A of the New York Public Health Law (156) before any experimentation on a human. The law makes no exception from compliance with Article 24-A for court-approved human experimentation.

The cult of cyanide rejects proper treatment for curable cancer in favor of quack remedies, and thereby kills those who can be cured. Eighty percent of children with acute lymphocytic leukemia brought into remission are cured (158); the stopping of Chad Green's chemotherapy caused his relapse. Stage I Hodgkin's disease is curable with proper therapy in 95% of cases (159); Joseph Hofbauer's Hodgkins's disease is progressing unchecked. Both these children were exposed to acute and chronic cyanide poisoning from laetrile, vitamin A poisoning from "emulsified vitamin A," and Joey also to possible anaphylactic shock from injections of digestive enzymes, and the dangers of a panoply of other questionable remedies.

The religious overtones of the cult of cyanide appear clear in the case of 5-year-old leukemia victim Nikki Decker, who, according to the White Plains Reporter-Dispatch of February 18, 1979, "has been taken by her parents to West Germany from her home in Gainesville, Florida, for treatment more consistent with their religious convictions," even though "the girl's doctor says the move will deprive the child of basic medical care," and even though "unlike the Chad Green case in Massachusetts, Nikki's parents won their case in court." Parents of children with cancer feel particularly helpless and are particularly easy marks for the high-pressure laetrile cult recruiters, who have been alleged to pay hos-

pital clerks per head for providing name, address, and telephone number of anyone diagnosed as having cancer, and then go after them hammer-and-tongs to "take laetrile or be cut, burned, and poisoned to death by the doctors." A good mutual-support organization for parents of cancer victims is Candlelighters, affiliated with the American Cancer Society, and founded by attorney Grace Powers Monaco, herself the mother of a cancer victim.

On December 3, 1978, 42-year-old Jo Anne Pye died in the emergency room of Vesper Memorial Hospital, San Leandro, California, of cyanide poisoning from her daily oral dose of 1 g of laetrile, taken with capsules of crushed apricot kernels (Apricaps) (160, 161). She was taking these products to avoid surgery for ductal breast cancer. The cause of her death might have been attributed to cancer, which is usually blamed (perhaps often erroneously) for the deaths of patients taking laetrile, except that the law required an autopsy in her case because no physician, "metabolic" or otherwise, was seeing her at the time she died. According to Alameda County Chief Deputy Coroner Roland Prah and the autopsy report, the cyanide poisoning was first suspected when Dr. P. Herrmann made the first autopsy abdominal incision, because the aroma of cyanide rose from her stomach (161). Her whole blood cyanide was 3.8 µg/ml, her gastric content contained 175 µg cyanide, and her vitreous fluid contained 0.8 µg -CN/ml (161). Alameda County Coroner C. Simmons certified "cyanide intoxication" as immediate cause of death (161). Her death was apparently due to the β-glucosidase in the crushed apricot kernels (health food store Apricaps) found in her alimentary tract releasing cyanide from both her routine laetrile dose and the crushed kernels. She was not only a victim of the cult of cyanide but also of the Bohannon decision in Rutherford, now under appeal to the Supreme Court (92), since the Coroner's Investigator's report indicated she obtained laetrile with a "Bohannon affidavit." One wonders whether her next of kin could win civil and punitive damages against the laetrile industry and its vendors, for representing laetrile and apricot kernels as "nontoxic therapy," (and as useful against cancer) for breach of warranty, and

strict liability. It has been noted with respect to laetrile, that, "Patients, physicians, and promoters are potential parties for actions in fraud and deceit, negligence and malpractice, products liability and wrongful death and for homicide prosecutions as well" (162). One also wonders whether the authors and publishers of nutrition cult and laetrile industry books and monthlies alleging laetrile is non-toxic and helpful against cancer are vulnerable to similar suits, in view of recent litigation instituted against the publisher of Adelle Davis' misleading book "Let's Have Healthy Children," because of the injuries and death resulting from Davis' advice to use large doses of potassium (which was then purchased at a health food store) as a remedy for colic. That suit, brought by the law firm of Portley and Sullivan in Pompano Beach, Florida, will be watched with interest. It is usually true that a person who knowingly participates in harm to another or negligently allows that harm to come about generally is liable if the act of negligence has causation to the ultimate injury.

On page 113 of the book, "Laetrile Case Histories," Richardson warns against eating apricot kernels and laetrile at the same time, but does not provide a reason for the warning (72). One wonders if the Richardson clinic people who Coroner Prahll stated provided Joanne Pye with laetrile gave her that warning, or gave her the reason for the warning, and if she would be alive today had they done so.

The word "cult" is used in this review in the dictionary meaning of "any system for treating human sickness that originated by one usually claiming to have sole insight into the nature of disease, and that employs methods generally regarded as being unorthodox and unscientific" (41). Nutrition cultists are recognized by their statement, "I believe in. . ." rather than, "The scientific nutrition evidence is. . ." They are recognized at public meetings regarding nutrition when they ask speakers, "Do you believe in. . ." rather than, "What is the scientific nutrition evidence that. . ." To "believe in" something regarding nutrition is to engage in cult talk. Either there is scientific evidence or there is not.

Of all the nutrition cults, the cult of cyanide is most dangerous. Its disciples are slowly and insidiously destroyed by almost imperceptible

progressive deterioration from chronic cyanide ($-\text{CN}$), thiocyanate ($-\text{SCN}$), and cyanate ($-\text{OCN}$) poisoning, and intermittent bouts of acute cyanide poisoning, and some are killed outright by more severe acute poisoning, chanting the dogma of the cult as if it were scientific gospel all the way to the grave. The leaders constitute a billion dollar a year industry selling not only laetrile and its promotional materials, but other nutritionally and metabolically destructive products represented as "nutritional and metabolic therapy," through doctors usually lacking scientific specialty credentials in nutrition, metabolism, or oncology, who label themselves "orthomolecular," "preventive," "ecological," "unorthodox," "holistic," "nutritional," or "metabolic" physicians. In addition to laetrile, they promote other nostrums the FDA prohibits from interstate transport for human use, such as "emulsified vitamin A" (154) and Wobe-Mugos digestive enzymes (155), the former producing vitamin A poisoning (135), and the latter capable of producing death from anaphylaxis on repeated injection.

The ultimate irony that laetrile, promoted as a cancer preventive, may actually cause cancer (see section above on "Laetrile may cause cancer"), is compounded by the fact that a frequent ingredient of the other fake vitamin created by Krebs (" B_{15} ") (13) turns out to be a mutagen (163, 164) and a highly dangerous nerve, eye, and gonad poison (165). Our only protection from these poisons has been the FDA enforcement of the "safety and efficacy" requirements of federal law, and the FDA has been under constant attack by the nutrition cultism industry to narrow its application of these requirements so that anything the industry calls a "food supplement" (including laetrile, " B_{15} ", and dangerously high doses of "emulsified vitamin A") can be freely sold to a gullible public. Interestingly, attacks on food additives and preservatives in the nutrition cult literature ignore laetrile and pangamate, both of which may be much more potent carcinogens than any food additive or preservative. This makes clear that the nutrition cult literature is more interested in undermining confidence in food scientists and government protection agencies, to build confidence in what the cult sells (see discussion of "Prevention" magazine on pages 183-187 of "The Health Robbers")

(30)), than it is in providing responsible information on real dangers from nutrition cult practices.



References

- HUMBERT, J. R., J. H. TRESS AND K. T. BRAICO. Fatal cyanide poisoning: Accidental ingestion of laetrile. *J. Am. Med. Assoc.* 238: 482, 1977; BRAICO, K. T., J. R. HUMBERT, K. L. TERPLAN AND J. M. LEHOTAY. Laetrile intoxication: report of a fatal case. *New Engl. J. Med.* 300: 238, 1979.
- SADOFF, L., K. FUCHS AND J. HOLLANDER. Rapid death associated with laetrile ingestion. *J. Am. Med. Assoc.* 239: 1532, 1978.
- CONN, E. E. Cyanogenetic glycosides. In: *Toxicants Occurring Naturally in Foods* (2nd ed.), edited by the Committee on Food Protection, Food and Nutrition Board, National Research Council. Washington, D.C.: National Academy of Science, 1973, pp. 299-308.
- WINDHOLZ, M. The Merck Index (9th ed.). Rahway, N.J.: Merck and Co., Inc. Entries No. 630 (Amygdalin); 1057 (Benzaldehyde); 4688 (Hydrogen Cyanide); 5197 (Laetrile[®]), 1976.
- Subcommittee on Health and Scientific Resources, United States Senate. Proceedings of the July 12, 1977 Hearings on Banning of the Drug Laetrile from Interstate Commerce by F.D.A. Available free from any member of the United States Congress. Washington, D.C.: United States Government Printing Office, 1977.
- GREENBERG, D. M. The vitamin fraud in cancer quackery. *West. J. Med.* 122: 345, 1975.
- BACKER, R. C., AND V. HERBERT. Cyanide production from laetrile (amygdalin) in the presence of megadoses of vitamin C (ascorbic acid). *J. Am. Med. Assoc.*, in press.
- RIEDERF, F. Noxious gases and vapors I: Cyanide. In: *Drill's Textbook of Pharmacology*, edited by J. DiPalma. 1971, pp. 1189-1194.
- LEWIS, J. P. Laetrile. *West. J. Med.* 127: 55, 1977.
- Anonymous. Laetrile: not so harmless. *Emergency Med.* 10: 155, 1978.
- Food and Drug Administration Commissioner's Decision on Status: Laetrile: *Fed. Register* 42: 39768, 1977.
- BASELT, R., C. FLETTERICK AND F. DAVIDOFF. Cyanide poisoning in an adult following ingestion of apricot seeds. *Proc. Ann. Meet., Am. Acad. Clin. Toxicol.*, New Orleans, March, 1979; *J. Am. Med. Assoc.*, in press; *Holt v. Village Health Food Center, Inc.*, Superior Ct., Judicial District of Hartford, New Britain at Hartford, Conn., 1978.
- FENSELAU, C., S. PALLANTE, R. P. BATZINER, W. R. BENSON, R. P. BARRON, E. B. SHEININ AND M. MAIENTHAL. Mandelonitrile beta-glucuronide: Synthesis and characterization, *Science* 198: 625, 1977.
- HERBERT, V. Vitamin. In: *The World Book Encyclopedia* (1979 ed.). Chicago: Field Enterprises, 1979.
- HERBERT, V. Pangamic acid ("Vitamin B₁₅"). *Am. J. Clin. Nutr.*, in press.
- INGELFINGER, F. J. Medicine: meritorious or meretricious. *Science* 200: 942, 1978.
- HERBERT, V. Drugs effective in megaloblastic anemias: vitamin B₁₂ and folic acid. In: *The Pharmacological Basis of Therapeutics* (5th ed.), edited by L. S. Goodman, and A. Gilman. New York: Macmillan, 1975, pp. 1324-1349.
- COTTRELL, J. E., P. CASTHELY, J. D. BRODIE, K. PATEL, A. KLEIN AND H. TURNDORF. Prevention of nitroprusside-induced cyanide toxicity with hydroxocobalamin. *New Engl. J. Med.* 298: 809, 1978.
- GRAHAM, D. L., D. LAMAN, J. THEODORE AND E. D. ROBIN. Acute cyanide poisoning complicated by lactic acidosis and pulmonary edema. *Arch. Internal Med.* 137: 1051, 1977.
- Commentary. Cyanide, sometimes not so sudden. *Emergency Med.* 10: 229, 1978.
- DARBY, W. J. Allure of quackery: the unicorn and other lessons from history. *Nutr. Rev.* 32(Suppl. 1): 57, 1974.
- BRUCH, H. The allure of food cults and nutrition quackery. *J. Am. Dietet. Assoc.* 57: 316, 1970.
- United States of American v. Mosinee Research Corporation and U.S. Pharmaceuticals, Inc., No. 77-C-285, U.S. Dist. Ct., E. Dist. of Wisconsin, decided 29 July 1977; Appeal 77-1982, decided 18 August 1978, United States Court of Appeals for the 7th Circuit.
- SCHMIDT, E. S., G. W. NEWTON, S. J. SANDERS, J. LEWIS AND E. E. CONN. Laetrile toxicity studies in dogs. *J. Am. Med. Assoc.* 239: 943, 1978.
- LEHMANN, P. Laetrile: the fatal "cure." *F.D.A. Consumer* 11: 10, 1977.
- BRODY, J., AND A. HOLLEB. *You Can Fight Cancer and Win*. New York: Quadrangle Press, 1977.
- DORR, R. T., AND J. PAXINOS. The current status of laetrile. *Ann. Internal Med.* 89: 389, 1978.
- Anonymous. Poster warns public on laetrile. *F.D.A. Consumer* 11: 26, 41, 1977.
- JANSSEN, W. F. Cancer quackery: Past and present. *F.D.A. Consumer* 11(6): 27, 1977; The cancer "cures": A challenge to rational therapeutics. *Analyt. Chem.* 50: 197A, 1978.
- Laetrile background information. August 1977. (Available free from the American Cancer Society, 777 Third Avenue, New York, New York 10017.)
- GREENBERG, D. M. The case against laetrile: the fraudulent cancer remedy. *Cancer*, in press.
- BARRETT, S., AND G. KNIGHT. *The Health Robbers*. Philadelphia: George Stickley, 1976.
- LYONS, R. D. Inquiry casts doubt on credentials of laetrile figures. *N.Y. Times*, June 26, 1977, pp. 1, 38.
- PARACHINI, A., AND Z. N. SMITH. The laetrile underground: a laetrile pusher cashes in on cancer; Tijuana: start of laetrile circuit; Shades of Krebiozen: Why a laetrile folk hero is under scientific cloud. *Chicago Sun-Times*, March 5-8, 1978.
- ALBIN, L. The millionaire promoters behind laetrile. *Free Enterprise*, Sept.-Oct., 1977, pp. 106-111. (Published at 1212 Avenue of the Americas, New York, N.Y. 10036.)
- Anonymous. Laetrile: the political success of a scientific failure. *Consumer Reports*. August 1977, pp. 444-447.
- MARKLE, G. E., J. C. PETERSON AND M. D. WAGENFELD. Notes from the cancer underground: participation in the laetrile movement. *Soc. Sci. Med.*

- 12: 31, 1978.
36. YOUNG, R. S. K. On the harmful effects of laetrile. IV. Clinical experience with laetrile. Joint Hearing, Florida State Board of Medical Examiners and Osteopathic Board of Medical Examiners. Orlando, Florida, Feb. 25, 1978. (Copies available from Dr. R. S. K. Young, Division of Oncologic and Radiopharmaceutical Drug Products, F.D.A., 5600 Fishers Lane, Rockville, Md. 20857.)
37. STANG, A. Laetrile. Freedom of choice in cancer therapy? *Am. Opinion*, January 1974. (Monthly magazine of the John Birch Society.)
38. SCOTT v. McDONALD: Civil Action No. C-75-1613A, United States District Court, Northern District of Georgia, Atlanta Division, decided February 22, 1978. (News Briefs, Congressman cleared in laetrile death. *Legal Aspects Med. Pract.* 6(3): 18, 1978.) (Follow-up: McDonald loses, sort of, in laetrile malpractice suit.) *Med. World News* 19(6): 83, 1978.
39. Anonymous. Laetrile: Anti-orthodox-medicine clans rally round its banner. *Med. World News*, May 1, 1978, pp. 43-45, 49-51.
40. RUSSAKOFF, D. Scott cancer possibly treatable, testifies doctor from Emory. *Atlanta Journal*, Feb. 17, 1978, pp. 1-C, 6-C.
41. STEIN, J., L. URDANG. *The Random House Dictionary of the English Language* (Unabridged ed.). New York: Random House, 1967, pp. 1017, 1536.
42. BLYTH, A. W. *Poisons: Their Effects and Detection*. London: Charles Griffin & Co., Ltd., 1895, p. 2.
43. JUKES, T. H. Laetrile for cancer. *J. Am. Med. Assoc.* 236: 1284, 1976.
- 43a. GUNDERS, A. E., A. ABRAHAMOV, E. WEISENBERG, S. GERTNER AND S. SHAFRAN. Cyanide poisoning following ingestion of apricot (*prunus armeniaca*) kernels. *Harefuah, J. Israel Med. Assoc.* 76: 535, 1969.
44. GETTLER, A. O., AND J. O. BAINE. The toxicology of cyanide. *Am. J. Med. Sci.* 195: 182, 1938.
45. SOLLMAN, T. H. Hydrocyanic acid and cyanides. In: *Manual of Pharmacology*. (8th ed.). Philadelphia: W. B. Saunders, 1957, pp. 982-990.
46. STOEWSAND, G. S., J. L. ANDERSON AND R. C. LAMB. Cyanide content of apricot kernels. *J. Food Sci.* 40: 1107, 1975.
47. TOWNSEND, W. A. Cyanide poisoning from ingestion of apricot kernels. *Calif. Morbidity*, Nov. 14, 1975. (Weekly report from Infectious Disease Section, State Department of Health.)
48. DESPAIN, J. *The Little Cyanide Cook Book: Delicious Recipes Rich in Vitamin B₁₇*. California: American Media, 1975.
49. TIMMS, S., AND Z. ZAR. *Natural sources: Vitamin B₁₇/laetrile*. Millbrae, Calif.: Celestial Arts, 1978.
50. STEWART, J., AND P. LIEBERMAN. McDonald "dared" to eat apricot pits; he declines. *Atlanta Constitution*, Feb. 8, 1978, p. 1-A, 8-A.
51. Cyanide poisoning from the ingestion of apricot kernels. *Calif. Morbidity*, Sept. 1, 1972. (Published by the Bureau of Communicable Disease Control, State Department of Public Health, Calif.)
52. JOHNSON, H., AND G. RICH. Cyanide poisoning from apricot kernels. *Calif. Morbidity*, Dec. 26, 1975. (Published by the Bureau of Communicable Disease Control, State Department of Public Health, Calif.)
53. OSUNTOKUN, B. O. Nutritional problems in the African region. *Bull. Schweiz. Akad. Med. Wiss.* 31: 353, 1975.
54. ERMANS, A. M. Disorders of iodine deficiency: endemic goiter. In: *The Thyroid* (4th ed.), edited by S. C. Werner and S. H. Ingbar. Hagerstown, Md.: Harper & Row, 1978, pp. 537-553.
55. DOROZYNSKI, A. Cassava may lead to mental retardation. *Nature* 272: 121, 1978.
56. Anonymous. Case against "nontoxic" laetrile grows. *Med. World News*, Jan. 9, 1978, pp. 16, 21.
57. HAMILTON, A., AND M. L. HARDY. *Industrial Toxicology* (3rd ed.). Acton, Mass.: Publishing Sciences Group, Inc., 1974, pp. 221-228.
58. BERLIN, C. Cyanide poisoning—a challenge. *Arch. Internal Med.* 137: 993, 1977.
59. HALSTROM, F., AND K. O. MOLLER. The content of cyanide in human organs from cases of cyanide taken by mouth. *Acta Pharmacol.* 1: 18, 1945.
60. BARR, S. The microdetermination of cyanide: its application to the analysis of whole blood. *Analyst* 91: 268, 1966.
61. BACKER R. C. Volatile group: cyanide. In: *Introduction to Analytical Toxicology*, edited by Y. H. Caplan and H. C. Freimuth. New York: Marcel Dekker, Inc., 1979.
62. RODKEY, F. L., AND H. A. COLLISON. Determination of cyanide and nitroprusside in blood and plasma. *Clin. Chem.* 23: 1969, 1977.
63. MORRONE, J. A. Chemotherapy of inoperable cancer. Preliminary report of 10 cases treated with laetrile. *Exptl. Med. Surg.* 20: 299, 1962.
64. AMA Department of Drugs. *Sodium nitroprusside*. AMA Drug Evaluations, 3rd edition. Littleton, Mass.: Publishing Science Group, Inc., 1977, pp. 74-75.
65. GETTLER, A. O., AND A. V. ST. GEORGE. Cyanide poisoning. *Am. J. Clin. Pathol.* 4: 429, 1934.
66. DREISBACH, R. H. Cyanides, sulfides and carbon monoxide. In: *Handbook of Poisoning: Diagnosis and Treatment*. Los Altos, Calif.: Lange Medical Publishers, 1977, pp. 241-245.
67. SHAW, C. M., T. PAPHYANNOPOULOU AND G. STAMATOYANNOPOULOUS. Neuropathology of cyanate toxicity in rhesus monkeys. *Pharmacology* 12: 166, 1974.
68. PETERSON, C. M., P. TSAIRIS, A. ONISHI, Y. S. LU, R. GRADY, A. CERAMI AND P. J. DYCK. Sodium cyanate induced polyneuropathy in patients with sickle cell diseases. *Ann. Internal Med.* 81: 152, 1974.
69. HARKNESS, D. R., AND S. ROTH. Clinical evaluation of cyanate in sickle cell anemia. *Prog. Hematol.* 9: 157, 1975.
70. SMITH, F. P., T. P. BUTLER, S. COHAN AND P. S. SCHEIN. Laetrile toxicity: A report of two cases. *J. Am. Med. Assoc.* 238: 1351, 1977; *Cancer Treatment Rept.* 62: 169, 1978.
71. HERBERT, V. The nutritionally unsound "nutritional and metabolic anti-neoplastic diet" of laetrile proponents. *J. Am. Med. Assoc.* 240: 1139, 1978.
72. HERBERT, V. The nutritionally and metabolically destructive "nutritional and metabolic antineoplastic diet" of laetrile proponents. *Am. J. Clin. Nutr.* 32: 96, 1979.

73. NICKERSON, M., AND J. L. REUDY. Antihypertensive agents and drug therapy of hypertension. In: *The Pharmacologic Basis of Therapeutics*, edited by L. S. Goodman and A. Gilman. New York: Macmillan, 1975, p. 717.
74. GWILT, J. R. The odour of (potassium) cyanide. *Medico-Legal J.* 24: 98, 1961.
75. KLASSEN, R. D., AND B. STAVRIC. Hydrolysis of amygdalin: Potency of intestinal/fecal flora of various species. 91st Ann. Meet., AOAC, 1977, p. 18.
76. CONN, E. E. Cyanogenesis, the production of hydrogen cyanide, by plants. In: *Effects of Poisonous Plants on Livestock*, edited by R. E. Keefer, K. R. V. Kampen, and L. F. James. New York: Academic Press, 1978, pp. 301-310.
77. OLSON, R. Testimony before United States Department of Labor, O.S.H.A., Washington, D.C., proposed regulation for identification, classification and regulation of toxic substances posing a potential carcinogenic risk. O.S.H.A. docket #H-090, 1978. (Olson's cyanide toxicity data was from Salter's *Textbook of Pharmacology*. Philadelphia: W. B. Saunders Co., 1952).
78. Anonymous: Warning issued on misbranded "laetrile." *F.D.A. Consumer* 12: 22, 1978.
79. DAVIGNON, J. P. Contaminated laetrile: a health hazard. *New Engl. J. Med.* 297: 1355, 1977.
- 79a. CAIRNS, T., J. E. FROBERG, S. GONZALES, W. S. LANGHAM AND J. J. STAMP. Analytical chemistry of amygdalin. *Anal. Chem.* 50: 317, 1978.
80. News Highlights. Appeals court backs laetrile injunction. *F.D.A. Consumer* 12: 25, 1978.
81. HERBERT, V. Acquiring new information while retaining old ethics. *Science*, 198: 690-693, 1977. (Reprinted in *Jurimetrics Journal* 18(3): 215-224, 1978 (published by the American Bar Association.))
82. *United States v. Hoxsey Cancer Clinic*, 198 Fed. Rep., 2nd ser. 273 (5th Cir. Ct., 1952); *United States v. Wier*, 281 Fed. Rep., 2nd ser. 850 (5th Cir. Ct., 1960), and Federal Rules of Evidence 401, 402, 403 and 701.
83. Claims of clinical success with laetrile in Israel found baseless. *Med. World News* 19 (Sept. 18): 11, 12, 16, 1978.
- 83a. BLIX, G. *Food Cultism and Nutrition Quackery*. Uppsala, Sweden: Almqvist & Wiksells, 1970.
84. BYERLY, H. Explaining and exploiting placebo effects. *Perspect. Biol. Med.* 19: 423, 1976.
85. WOLF, S. The pharmacology of placebos. *Pharmacol. Rev.* 11: 689, 1959.
86. MILLER, T. R. Psychophysiologic aspects of cancer. *Cancer* 39: 413, 1977.
87. BEECHER, H. K. *Research and the Individual*. Human Studies. Boston: Little Brown & Co., 1970, p. 12.
88. NEWELL, G. R. Why the National Cancer Institute chooses a case record review of laetrile. *New Engl. J. Med.* 298: 216, 1978.
89. ELLISON, N. M., D. P. BYAR AND G. R. NEWELL. Special report on laetrile; the NCI laetrile review. *New Engl. J. Med.* 299: 549, 1978.
90. EDELSON, E. Laetrile case doc—drug can be poisonous. *NY Daily News*, Feb. 8, 1978, p. 8.
91. Anonymous: Lopsided 161-58 vote defeats legalizing laetrile. *Boston Herald American*, May 19, 1978, p. 8.
92. *United States of America, et al., petitioners, v. Glen L. Rutherford, et al., respondents*. No. 78-605, Supreme Court of the United States, October term, 1978; Laetrile's day in court. *Science* 203: 528, 1979.
- 92a. Anonymous: "Cured" cancer patient proselytizes for laetrile. *Med. World News* 14(June 28): 18, 1976.
93. GADLER V. U.S.A., 425 Fed. Suppl. 244 (1977); *Hanson v. U.S.A.*, 417 Fed. Suppl. 30 (1976); *U.S.A. v. General Research Laboratories*, 397 Fed. Suppl. 197 (1975); *Morgan v. Matthews*, Civil No. 76-1637, U.S. Dist. Ct., S. Carolina, Spartanburg (1976); *U.S.A. v. Spectro*, Civil No. 76-101, U.S. District Court, NJ (1976).
94. News Highlights. Court restricts use of laetrile. *F.D.A. Consumer* 12: 26, 1978.
- 94a. MEHTA, P., J. MEHTA, T. D. MIALE. Nitroprusside lowers platelet count. *New Engl. J. Med.* 299: 1134, 1978.
95. KENNEDY, B. J. Who says it is terminal? *J. Am. Med. Assoc.* 239: 138, 1978.
96. Conference on Spontaneous Regression of Cancer. *Nat'l. Cancer Inst. Mongr.* no. 44, 1976; Everson, T. C., and W. H. Cole. *Spontaneous Regression of Cancer*. Philadelphia: W. B. Saunders, 1966.
97. SELBY, L. A., R. W. MENGES, E. C. HOUSER, R. E. FLATT AND A. CASE. Outbreak of swine malformations associated with wild black cherry, *Prunus serotina*. *Arch. Environ. Health* 22: 496, 1971.
98. DAINER, P. M., AND H. J. LONG. Reactions of "laetrilomania". *New Engl. J. Med.* 297: 220, 1977.
99. HARADA, N., AND A. MYOSHI. Is the healthy Hunza true? Results of the Kyoto University Scientific Expedition to the Karakoram and Hindukush, 1955, vol. V, pp. 1-14, 1963.
100. MINER, J. W. The Phillips case: a new dimension in murder. *J. Forensic Sci.* 9: 1, 1964.
101. McBEAN, L., AND E. W. SPECKMAN. Food faddism: a challenge to nutritionists and dietitians. *Am. J. Clin. Nutr.* 27: 1071, 1974.
102. SCHAEFER, R., AND E. A. YETLEY. Social psychology of food faddism. *J. Am. Dietet. Assoc.* 66: 129, 1975.
103. How to evaluate medical information. *The Harvard Medical School Health Letter* 3: 6, 1978.
104. HERBERT, V. The health hustlers: how to spot a food quack. In: *The Health Robbers*, edited by S. Barrett and G. Knight. Philadelphia: Stickley, 1976, pp. 99-123.
105. YOUNG, J. H. The agile role of food: some historical reflections. In: *Nutrition and Drug Interrelations*, edited by J. H. Hathcock and J. Coon. New York: Academic Press, 1978, pp. 1-18.
- 105a. MOROWITZ, H. J. Drinking hemlock and other nutritional matters. *Hosp. Practice* 13: 155, 1978.
106. VICKERY, D. M., AND J. F. FRIES. *Take Care of Yourself: A Consumer's Guide to Medical Care*. Reading, Mass.: Addison-Wesley Publishing Co., 1976, pp. 67-71.
107. DUFFY, J. *The Healers: The Rise of the Medical Establishment*. McGraw-Hill, New York 1976.
108. YOUNG, J. H. *The Medical Messiahs: A Social History of Health Quackery in Twentieth-Century America*. Princeton, N.J.: Princeton University Press, 1967. (Consumers Union has a \$2.50 ed.)
109. The Editors of *Consumers Reports*. *The Medicine*

- Show (rev. ed.). Mt. Vernon, N.Y.: Consumers Union, 1976.
110. NOLEN, W. A. *Healing: A doctor in search of a miracle*. Random House, N.Y.: 1974.
 - 110a. Anonymous. Cult massacre. *Time Magazine*, Nov. 27, 1978, p. 33.
 111. Anonymous. Toxicity of laetrile. *F.D.A. Drug Bulletin* 7: 25, 1977, (Nov-Dec.)
 112. Anonymous. Laetrile: the making of a myth. *F.D.A. Consumer* 10: 5, Dec. 1976-Jan. 1977.
 113. LASTER, W. R., JR., AND F. M., SCHABEL, JR. Experimental studies of the Antitumor Activity of Amygdalin MF (NSC-15780) Alone and in Combination with β -glucosidase (NSC-128056). *Cancer Chemother. Rept.* 59: 951, 1975.
 114. GRAY, C. Laetrile. Canada's legal position firm but pressure in the South grows. *Canad. Med. Assoc. J.* 117: 1068, 1977.
 115. BAUMEISTER, R. G. H., H. SCHIEVELBEIN AND G. ZICKGRAF-RUDEL. Toxicological and clinical aspects of cyanide metabolism. *Arzneim. Forsch.* 25: 1056, 1975.
 116. HERBERT, V. Medical, legal and ethical considerations in the use of drugs having undesirable side effects. *Am. J. Clin. Nutr.* 28: 555, 1975.
 117. Anonymous: People. *Am. Med. News*. July 29, 1974, p. 2.
 118. HOWZE, K. Probation revoked for laetrile figures. *San Francisco Chronicle*, May 5, 1977, p. 24.
 119. The People of the State of California v. Ernst Krebs, Jr., and Malvina Cassese. No. G 14673, G 14670 (1977). Municipal Court of the State of California in and for the City and County of San Francisco, Dept. No. 5, before the Honorable Gerald J. O'Gara, Judge. (Motion to Revoke Probation resulting from 1971 case involving arrest and conviction of Krebs and Cassese).⁵
 120. U.S.A. v. John Anton Richardson, Ralph S. Bowman, Frank Salaman, Robert William Bradford, U.S. Ct. of Appeals for the Ninth Circuit, Nos. 77-2202, -2204, -2262, -2268. Criminal convictions upheld October 20, 1978. All convicted of conspiracy to smuggle (Bradford also convicted of smuggling) and given suspended sentences, 3 years probation, and fines. (Criminal convictions 76-0448, U.S. District Ct. for the Southern District of California, filed May 16, 1977). Richardson's license to practice medicine in California was suspended in 1976 for "gross negligence" among other reasons. An agent of the California Food and Drug Bureau "estimated that Mr. Bradford takes in \$150,000 to \$200,000 a month in laetrile sales" (5, 31). Richardson reported in 1974 a net income of \$172,981 on a gross income of \$783,000 (5, 31) according to Lyons (31), and, according to the San Francisco Examiner, has a vast country estate.
 121. U.S.A. v. Andrew R. L. McNaughton. No. 76-0448. Criminal conviction for conspiracy to facilitate the transportation of smuggled merchandise, filed December 12, 1977. (Given suspended sentence and 2 years probation.)
 122. Her Majesty the Queen vs. Andrew R. L. McNaughton. Court of Sessions of the Peace, Province of Quebec, District of Montreal, no. 499-72. Criminal conviction for stock fraud, judgment rendered April 22, 1974.
 123. THOMPSON, W. A. R. *Medicines from the Earth: a Guide to Healing Plants*. New York: McGraw-Hill, 1978.
 124. AIKMAN, L. *Nature's Healing Arts: from Folk Medicine to Modern Drugs*. Washington, D.C.: Special Publications Division, National Geographic Society, 1977.
 125. LEWIS, W. H., AND M. P. F. ELVIN-LEWIS. *Medical Botany: Plants Affecting Man's Health*. New York: John Wiley & Sons, Inc., 1977.
 126. BOGUSZ, M., J. MOROZ, J. KARSKI, J. GIERZ, A. REGIELLI, R. WITKOWSKA AND A. GOLABEK. Blood cyanide and thiocyanate concentrations after administration of sodium nitroprusside as hypotensive agent in neurosurgery. *Clin. Chem.* 25: 60, 1979.
 127. SWINYARD, E. A. Noxious gases and vapors: Hydrocyanic acid. In: *The Pharmacological Basis of Therapeutics* (5th ed.), edited by L. S. Goodman and A. Gilman. New York: Macmillan, 1975, pp. 904-905.
 128. STEWART, C. P., AND A. STOLMAN. *Toxicology: Mechanisms and Analytical Methods*. New York: Academic Press, 1960, vol. 1, pp. 43-44.
 129. LAWTON, A. H., T. R. SWEENEY AND H. C. DUDLEY. Toxicology of acrylonitrile (vinyl cyanide). III. Determination of thiocyanates in blood and urine. *J. Indust. Hyg. Toxicol.* 25: 13, 1943.
 130. PETTIGREW, A. R., AND G. S. FELL. Simplified colorimetric determination of thiocyanate in biological fluids, and its application to investigation of the toxic amblyopias. *Clin. Chem.* 18: 996, 1972.
 131. VESEY, C. J., P. V. COLE AND P. J. SIMPSON. Cyanide and thiocyanate concentrations following sodium nitroprusside infusion in man. *Brit. J. Anaesthesiol.* 48: 651, 1976; *J. Pharm. Pharmacol.* 30: 20, 1978.
 - 131a. BERLIN, C. The treatment of cyanide poisoning in children. *Pediatrics* 46: 793, 1970.
 132. NISSELBAUM, J. S., M. K. SCHWARTZ AND L. OLD. Cyanonitriles. Sloan-Kettering Institute 1974 Annual Report, pp. 60-61. Sloan-Kettering Institute, New York.
 133. BROWN, W. E., C. D. WOOD AND A. N. SMITH. Sodium cyanide as a cancer chemotherapeutic agent. *Am. J. Obstet. Gynecol.* 80: 907, 1960.
 134. CHARACHE, S., T. P. DUFFY, N. JANDER, J. C. SCOTT, R. BEDINE AND R. MORRELL. Toxic-therapeutic ratio of sodium cyanate. *Arch. Internal Med.* 135: 1043, 1975.
 135. CHAD GREEN. Custody of a Minor, Plymouth Superior Court No. 78-6816, Hearing held (and transcribed) January 8-19, 1979, Plymouth, Massachusetts. Judge: Guy Volterra. For the Commonwealth of Massachusetts: Assistant Attorney General Jonathan Brant; BRUZELIUS, N. J. Tests find Chad is poisoned. *Boston Globe*, Jan. 18, 1979.
 136. AMES, M. M., J. S. KOVACH AND K. P. FLORA. Initial pharmacologic studies of amygdalin (laetrile) in man. *Res. Comm. Chem. Pathol. Pharmacol.* 22: 175, 1978.
 - 136a. GOLDFRANK, L., AND R. KIRSTEIN. The tea party. *Hosp. Phys.* 13(4): 30, 1977.
 137. VAN SICKLE, G. J., AND G. K. POWELL. Is vitamin

- A a good screening test for fat malabsorption in children? Clin. Res. 26: 812A, 1978.
138. SOFFER, A. Chihuahuas and laetrile, chelation therapy and honey from Boulder, Colo. Arch. Internal Med. 136: 865, 1976.
 139. Anonymous. How to become a holistic metabolic physician in two days. Med. World News 19(9): 44, 45, 49, 1978.
 140. National Formulary Board: National Formulary XIV, official from July 1, 1975. Washington, D.C.: American Pharmaceutical Association, 1975, pp. 519-526.
 141. McMEEKIN, R. R. Laetrile: unsafe and ineffective—and illegal? Legal Aspects Med. Pract. 6(12): 15, 1978.
 142. RUSHING, D. G. Picking your poison: the drug efficacy requirement and the right of privacy. UCLA Law Rev. 25: 577, 1978.
 143. MARTIN, D. S. Laetrile—a dangerous drug. Ca-A Cancer Journal for Clinicians 27: 301-304, 1977 (published by the American Cancer Society).
 144. HORTON, J., AND G. J. HILL, II. Clinical Oncology. Philadelphia: W. B. Saunders Co., 1977, pp. 23-24, pp. 182-191.
 145. United States Congress: Unofficial Hearing on Cults (presiding: Sen. Robert Dole). February 5, 1979. Proceedings available from United States Government Printing Office and from Congresspersons. See particularly testimony of: Harvard Psychiatry Prof. John Clark, Univ. of Washington Law School Prof. Richard Delgado, and White Plains Jewish Community Center Rabbi Maurice Davis.
 146. TAKEUCHI, S., M. KOCHI, K. SAKAGUCHI, K. NAKAGAWA AND T. MIZUTANI. Benzaldehyde as a carcinostatic principle in figs. Agric. Biol. Chem. 42: 1449, 1978.
 147. TISMAN, G., V. HERBERT AND H. EDLIS. Determination of therapeutic index of drugs by *in vitro* sensitivity tests using human host and tumor cell suspensions. Cancer Chemother. Rept. 57: 11, 1973.
 148. SALMON, S. E., A. W. HAMBURGER, B. SOEHNLEN, B. G. M. DURIE, D. S. ALBERTS AND T. E. MOON. Quantitation of differential sensitivity of human tumor cells to anticancer drugs. New Engl. J. Med. 298: 1321, 1978.
 149. Prediction of Response in Cancer Therapy. National Cancer Institute Monograph 34 (Thomas C. Hall, Chairman). U.S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health, National Cancer Institute, Bethesda, Md. December, 1971.
 150. DUKES, M. N. G. Side Effects of Drugs. Annual 2. Chapter 46: Remedies used in non-orthodox medicine. Amsterdam: Excerpta Medica, 1978, pp. 384-385.
 151. LEFKOWITZ, L. J., Attorney General, State of New York, by D. K. McGivney, Esq. Appendix on Appeal "In the matter of Joseph Hofbauer," State of New York Supreme Court, Appellate Division, Third Judicial Department, Index No. N-46-1164-77, May 17, 1978. pages A-1 to A-363.
 152. American Cancer Society. Unproven Methods of Cancer Treatment. American Cancer Society, 1966. (Various alleged "cancer cures:" enzymes, laetrile, Staphylococcus phage lysates.)
 153. Medical Affairs Department, American Cancer Society. Informal Summary as of 3/73 on Wobe Enzymes and Vitamin A emulsion (proposed for the treatment of cancer by Max Wolf, M.D., (President, Medical Enzyme Research Company, Grunwald, Germany), Karl Ransberger (President of Mucos Pharmaceuticals, Grunwald, Germany), and the laetrile-promoting Hoefer-Janker Strahlen Klinik of Bonn, Germany).
 154. HALPERIN, J. A. Sworn affidavit of Deputy Director, Bureau of Drugs, United States Food and Drug Administration, dated 5 January 1979. "... A-mulsin (emulsified vitamin A) is a 'new drug' ... (with no) new drug application permitting the distribution in interstate commerce ... for administration into the human body ... (and no) acceptable IND (Investigational New Drug) application which permits the investigational use of A-mulsin (emulsified vitamin A) in humans."
 155. HALPERIN, J. A. Sworn affidavit of Deputy Director, Bureau of Drugs, United States Food and Drug Administration, dated 5 January 1979. "... Wobe Mugsos or Wobenzyme is a 'new drug' ... (with no) new drug application permitting the distribution in interstate commerce ... for administration into the human body ... (and no) acceptable IND (Investigational New Drug) application which permits the investigational use of Wobe Mugsos or Wobenzyme in humans." The FDA has seized shipments of Wobe Mugsos (U.S.A. v. ... Wobe Mugsos ... No. CV 78-3736, Complaint for Forfeiture, U.S. District Court, Central District of California).
 156. Public Health Law, State of New York, Article 24-A, effective September 1, 1975: Protection of Human Subjects, Section 2440-2446. Section 2441 reads in part that the article covers "... any research, development, or related activity which departs from the application of those established and accepted methods necessary to meet his needs or which increases the ordinary risk of daily life. ..." Section 244-3 reads "Each person engaged in the conduct of human research or proposing to conduct human research shall affiliate himself with an institution or agency having a human research review committee, and such human research as he conducts or proposes to conduct shall be subject to review by such committee in the manner set forth in this section." The provisions of this law preclude physicians in private practice from engaging in research except pursuant to the provisions of the article (according to Department of Health Council).
 157. LIEBERMAN, P., L. CRAWFORD, J. BJELLAND, B. CONNELL AND M. RICE. Controlled study of the cytotoxic food test. J. Am. Med. Assoc. 231: 728, 1975; BENSON, T. E., AND J. A. ARKINS. Cytotoxic testing for food allergy: Evaluation of reproducibility and correlation. J. Allerg. Clin. Immunol. 58: 471, 1976.
 158. GEORGE, S. L., R. J. A. AUR, A. M. MAUER AND J. V. SIMONE. A reappraisal of the results of stopping therapy in childhood leukemia. New Engl. J. Med. 300: 269, 1979.
 159. CANELLOS, G. P., A. T. SKARIN AND R. L. GOOD-

- MAN. Recent Advances in the Treatment of Malignant Lymphomas: Hodgkin's Disease. In: *The Year in Hematology*, 1978, edited by R. Silber, J. LoBue and A. S. Gordon. New York: Plenum Publishing Company, 1978, pp. 481-499.
160. Anonymous. Death blamed on cyanide-laetrile link. *San Francisco Chronicle*, February 6, 1979.
Anonymous. Laetrile poisoning takes third life, threatens fourth. *Med. World News* 20: 32, 1979.
 161. Verdict of Coroner in the Matter of the Death of Jo Anne Etta Pye, 1 February, 1979; Pathologist's report, 1-26-79; Investigator's report, 12-3-78. Alameda County Coroner's Department, County of Alameda, Oakland, CA 94607.
 162. LERNER, G. The laetrile challenge to drug regulation. *Hamline Law Rev.* 1977.
 163. HERBERT, V., A. GARDNER AND N. COLMAN. Mutagenicity of dichloroacetate (DCA), an ingredient of the "cancer cure" pangamic acid ("vitamin B₁₅"). *Blood* 52 (Suppl. 1): 252, 1978.
 164. HERBERT, V., A. GARDNER AND N. COLMAN. Evidence for possible lack of safety for human consumption of dichloroacetate, a "sister compound" and frequent ingredient of the non-vitamin "B₁₅" (pangamate). *Clin. Res.*, in press; *Am. J. Clin. Nutr.*, in press.
 165. STACPOOLE, P. W., G. W. MOORE AND D. M. KORNHAUSER. Toxicity of chronic dichloroacetate. *New Engl. J. Med.* 300: 372, 1979.
 166. HERBERT, V. Facts and fictions about megavitamin therapy. *Res. Staff Phys.* 24: 43, 1978; *J. Fla. Med. Assoc.*, April, 1979.
 167. JACOB, E., AND V. HERBERT. Vitamin B₁₂ and the nervous system. In: *Biochemistry of Brain*, edited by S. Kumar. Oxford, England: Pergamon Press, 1979.
 168. RUSSAKOFF, D. Witness says fungus found in laetrile vial. *Atlanta J.* Feb. 15, 1978.
 169. MANDELL, A. J. The powerful forces of Jonestown unleashed. *Int. Med. News* 12: 3, 32, 33, 1979 (March 15).

Addendum

Although benzaldehyde is a poison in large doses (4), and has not yet been evaluated for possible carcinogenicity by the Selection Subgroup of the Clearinghouse for Environmental Carcinogens, for flavoring uses in low doses it is GRAS (generally recognized as safe) (*Food Chemical News*, Dec. 11, 1978).

There was testimony in *Scott v. McDonald* (38) of living fungus cultured from an ampoule of laetrile found

in defendant hospital (168), and question was raised about possible pulmonary fungus infection being misdiagnosed as metastatic cancer (38).

Mr. Krebs calls himself "doctor" by dint of a 1973 honorary doctorate from American Christian College,⁵ a small Bible college in Tulsa, Oklahoma. According to the Academic Affairs Office of the Oklahoma Regents, it was not accredited to award any doctoral degree, and was defunct as of the 1977 to 1978 academic year. An organization at American Christian College was reported in early 1978 by the Minneapolis District FDA Supervisory Investigator to have been established by Carey Reams, who "tells every patient 'I am a biophysicist and an ordained minister. I am not a medical doctor . . . All I am doing is giving you a diet for your specific body chemistry and teaching you the health message contained in the Bible.'" (quote from *Healthview Newsletter*, which, via his parents, got into the Massachusetts General Hospital medical record of Chad Green (135), whose laetrile was from Krebs' operation). The FDA has information on Reams' brushes with the law in various states in relation to lucrative nutrition quackery.

Mandell (169) considers Harvey Cleckley's book "The Mask of Sanity" a classical psychiatric explanation of certain cult gurus. He notes they are "... apparently sane, often dynamic ... almost always seductive ... impress others with their sincere motives and positive intentions and wind up causing great institutional and personal harm. With an unexplainable capacity to engender trust, even in experienced and cynical observers, these people create chaos ... the single most powerful diagnostic test was his own willingness to cash their checks ... Charm, a quick sensitivity to the unspoken needs of others, and a certain flexibility with the facts are woven into a personal charisma that entrances." They are confidence men par excellence. "Cleckley speaks of the psychopath's immunity from anxiety, extraordinary poise, sense of well-being, and remorselessness. The people around usually think, 'He's found it.' 'The ambivalence of living, the good and bad of everything there is, is painful internal dialogue until the shaman and his magic encourage metaphysical surrender and the induction of unity (169).

"The two sides of the brain, especially the neural circuits that are our emotions, are specialized in their functions ..." The survival side with speech capacity analyzes incoming data for potential dangers (Freud's force for life, Eros); the pleasure side is intuitive and insatiable for stimulation (Freud's force for death, Thanatos). When the conscious discipline of the survival side fails to brake the natural impulses of the pleasure side, we have Jim Jones and His People's Temple of Jonestown (169), or the gurus of laetrile, the cult of cyanide.