Current Comments

Alcohol: Are the Benefits Worth the Risks?

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Old Western movies give a lot of people the idea that Americans are as addicted to alcohol as they are to ice cream. Americans do in fact drink a lot of alcohol. In 1977, Americans drank about 2.2 gallons per capita of alcohol. That figure represents the total amount of alcohol contained in all beer, wine, and spirits that were consumed per capita. But other countries have comparable approximate drinking rates: France, 4.3 gallons; Spain, 3.5; the Federal Republic of Germany, 3.3; the German Democratic Republic, 2.2; and England, 2.2. The US actually ranks about twentieth among nations in per capita consumption of alcohol.[1]

Alcoholic beverages are very big business. In 1980, US producers alone shipped to stores about $9 billion worth of beer, $2 billion worth of wine, and $3 billion of spirits.[2] (p. 382-7)

Attitudes toward drinking vary from nation to nation. In the US, our attitude is ambivalent. Alcoholic drinks are readily available in most parts of the country. A few states, such as Kentucky and Tennessee, have areas where the sale and consumption of alcohol is prohibited or limited, according to the Distilled Spirits Council of the US.[3] (p. 48) During Prohibition drinking alcohol was illegal in the US, but its consumption continued and a generation of bootleggers was spawned. I know because a member of my own family was one of them. "Bootlegging," literally, means the act of smuggling illicit goods by hiding them in the leg of one's boot.[4]

While some Americans think alcohol is inherently evil, most of us, whether we drink or not, find nothing wrong with moderate drinking. But there are no rigid definitions of heavy, light, or moderate drinking. For some people moderate drinking might be a glass of wine or a couple of beers a day. For others that may be too much. An approximation of heavy drinking would be more than four or five drinks daily. All this is relative because the response to any drug may vary with body weight or other factors.

Many people may not know that moderate drinking is possibly beneficial. Some recent studies suggest that alcohol, taken in moderation, may lower the risk of heart attack. Some experts on alcohol and alcoholism fear this news may encourage even more excess drinking. The possible benefits of drinking do need further study and clarification. Before we review the possible benefits of moderate drinking, we should keep in mind the harmful effects of alcohol.

Researchers have not agreed on criteria for diagnosing alcoholism, so nobody is sure how many alcoholics there are. Most investigators agree that symptoms include heavy drinking for a period over three months or so, inability to stop drinking once one has started, and alcohol-related job, family, or legal problems, as well as some of the health problems listed below. Nobody is sure what causes alcoholism. Theories embrace biochemical, psychological, environmental, and even genetic factors.[5]

As this essay was being prepared, the Department of Health & Human Services (HHS) was about to publish its *Fourth Special Report on Alcohol and Health*. Highlights were recently summarized in an HHS publication called *ADAMHA News* (Alcohol, Drug Abuse & Mental Health Administration).[6] It noted that alcoholics have a mortality rate two and a half times greater than that of nonalcoholics. The ill effects of alcohol overuse on the cardiovascular system include high blood pressure and a rare heart muscle disease, cardiomyopathy.

The HHS report also reiterates the well-known notion that alcoholism kills brain cells. But it notes that brain damage from alcohol abuse may not be irreversible, as had been previously thought. The report discusses what is probably the greatest cause of alcohol-related deaths: drunken driving. It says that between 35 and 64 percent of drivers in fatal traffic accidents had been drinking. It also says that 45 to 60 percent of fatal crashes involving young drivers are alcohol-related. Free copies of the HHS report are available from the National Clearinghouse on Alcohol Information, P.O. Box 2345, Rockville, Maryland 20852.

Researchers have also identified a condition called fetal alcohol syndrome (FAS). This means that a woman's drinking during pregnancy may give her child facial, cranial, or cardiac abnormalities, as well as impaired growth, mental retardation, and behavioral problems.[7] The incidence of FAS is not known. Nor is it known how much alcohol a pregnant woman can safely drink. However, since alcoholic women tend to marry alcoholic men, another factor increases the possibility that a deformed child will be born. High consumption of alcohol can affect sperm production.[8]

Heavy drinkers are also at risk for several types of cancer, including cancers of the larynx, pharynx, and esophagus. Of course, smoking complicates the role of alcohol in cancer.[9]

The liver is the most vulnerable organ when exposed to alcohol. A year or two of heavy drinking is probably enough to induce cirrhosis. High intake may also lead to pancreatitis.[10,11]

In addition to all these problems, it is not generally known that alcohol may cause a number of skin problems. Scientists Mark Rosset and G. Oki studied 355 alcoholics for over a two year period. The investigators observed over 30 different skin conditions, including acne, eczema, psoriasis, and seborrhea. Of the 307 men in that group, 44 percent had one or more skin condition. Skin problems were observed in 33.3 percent of the 48 women. But it is uncertain whether their skin problems can be correlated with alcoholism.[12]

Apparently, however, you don't need to be an alcoholic to have skin reactions to alcoholic drinks. In 1976 two scientists wrote from Helsinki about three cases of urticaria, an allergic reaction characterized by wheals or itching. Each of the victims' urticaria was attributed to drinking wine. Two cases were deemed to be caused by yeasts in the wine. The third case was attributed to the alcohol itself.[13]

Most people are well aware of most of the negative effects of alcohol abuse. Some were surprised to hear recently that alcohol may be beneficial. However, people have for centuries believed in the beneficial effects of alcohol. My grandfather drank a shot of whiskey every night at bedtime. He lived to 85. He even made his own wine in the bathtub! My close friend, the late Chauncey Leake, coauthored a book on alcohol and medicine.[14] In another work he noted that ancient Egyptian papyrus writings mention wine and beer as medicines.[15] (p. 42, 73) Chauncey wrote:

> Wines are relatively beneficial medicinal agents in a wide variety of conditions encountered in geriatric practice. In addition to fluids and alcohol, wines furnish minerals, vitamins, proteins, aldehydes, ketones, esters, organic acids, tannins, sugars, and pectins. They act as stimulants to appetite, stomachics, tonics, tranquilizers, vasodilators, astringent antiseptics, disphoretics, and diuretics.[16]

In a 1963 book called *A History of Wine as Therapy*, physician Salvatore P. Lucia notes that wine was also used as medicine in ancient India, China, Greece, and Rome.[17] (p. 216-7)

One bit of folk wisdom is that alcohol cures colds or flu. There isn't much scientific support for this belief.[18] In 1976 and 1978, Jack Konowalchuk and Joan I. Speirs of Canada's Bureau of Microbial Hazards in Ontario reported that wine, grape juice, and extract of grape skin inactivated some flu viruses in solution.[19,20] The finding for grape juice was confirmed by Cliver and Kostenbader at the University of Wisconsin.[21] However, there is no evidence that ingestion of wine, juices, or grapes will cure the flu.[19-21]

Alcohol was often an ingredient in the patent medicines of the 19th and early 20th centuries. The therapeutic value of those medicines is greatly in doubt, of course.[22] But today, as always, some physicians believe alcohol has a place in medicine. It has been used successfully in mixtures to ease the pain of cancer.[23,24]

Probably the most widely publicized benefits of alcohol concern its effects on cardiovascular disease. In 1974, Arthur L. Klatsky and co-workers at the Kaiser-Permanente Medical Center in Oakland, California, studied 464 people who had had one heart attack.[25] There were more alcohol abstainers in the group than there were drinkers. One explanation for the higher heart attack rate among abstainers may be a "protective effect" of alcohol.

(People who abstain from alcohol, by the way, are sometimes called "teetotallers." The word sprang up in the 1830s. According to the *Oxford English Dictionary*, the word descends from a slang phrase of the era, "T for total.")[26]

Other recent studies suggest that moderate alcohol drinking lessens the chance of a heart attack. In 1977, Katsuhiko Yano and colleagues studied almost 8,000 Japanese men living in Hawaii. They reported in the *New England Journal of Medicine* that moderate drinkers had fewer heart attacks than lifetime nondrinkers. Ex-drinkers had the highest rate of heart attacks. (Heavy drinkers were not studied.) Beer accounted for two-thirds of the alcohol consumed by the subjects.[27]

In November of 1979, Charles H. Hennekens and associates at Harvard and Boston Universities also demonstrated that moderate drinkers suffered less heart disease than teetotallers or heavy drinkers. They based the results on a study of 568 married men who died of heart attacks, and a comparable control group. Hennekens' team reported in the *Journal of the American Medical Association* that the risk was lowered equally whether beer, wine, or spirits were used.[28]

However, at least one study suggests that the type of beverage consumed does make a difference. In May of 1979, A.S. St. Leger and colleagues at the UK's Medical Research Council (MRC) studied death rates for heart disease in 18 industrialized countries. These countries included the US, the UK, 11 European nations, Australia, and New Zealand. The MRC investigators reported in *Lancet*, "a strong and specific negative association between ischaemic heart-disease (IHD) death and alcohol consumption." They concluded that this was wholly the result of wine consumption. The MRC scientists hypothesized that if wine protects against heart disease, the protective factor is probably not alcohol, but aromatic compounds or other trace elements in the wine. The authors quipped: "If wine is ever found to contain a constituent protective against ischaemic heart disease, then we consider it almost a sacrilege that this constituent should be isolated. The medicine is already in a highly palatable form...."[29]

(Of course, it is possible to enjoy wine without drinking much alcohol. Some California wineries, such as Villa Bianchi and San Martin Winery, both of Los Angeles, sell wines with about five percent alcohol content, as compared to the 11 to 14 percent in most California wines.[30] And the Vie-Del Company of Fresno, California, sells dealcoholized

wine flavorings for gourmet cooks.)[31]

The St. Leger study prompted several letters to the editor of *Lancet*. Two authors noted that the low IHD risk may be attributable to the consumption of garlic. Apparently in countries where a lot of wine is drunk, a lot of garlic is eaten also. Garlic may protect against atherosclerotic risk factors.[32,33] Another correspondent said the reason for the findings may be that wine drinkers consume less milk and fewer milk products.[34]

Another study reported in *Lancet*, in May 1980, tried to show the relationship between alcohol, heart attacks, and some other factors.[35] The Yugoslavian Cardiovascular Disease Study was conducted by scientists from Yugoslavia's Institute of Chronic Diseases & Gerontology and the US National Institutes of Health. The scientists examined 11,000 Yugoslav men over a period of seven years. The beverages studied were beer, wine, and *rakija*, which is a general Serbo-Croatian term for other alcoholic drinks. The researchers said they could only estimate alcohol consumption. But consumption of alcohol in any amount "seemed to be inversely related to incidence of coronary heart-disease morbidity and mortality, but not to risk of dying." Men who had less than one drink a day had a higher heart attack rate than those who had a daily drink. But men who had more than three or four drinks a day had a higher rate of stroke death. This was not the case for heavy consumers of beer, however; for them, the stroke death rate was slightly lower.

Drinking seemed to have another drawback. People who drank daily also had a higher death rate from accidents or violence.[35] In light of the Yugoslav study, it's interesting to consider the 1972 strike that closed Finnish liquor stores for six weeks. Alcohol consumption decreased by about half, cases of assault and battery went down 20 to 25 percent, and cases of drunken driving were down 10 to 15 percent. Home production of alcohol went up, though.[36]

Most studies on drinking and heart attacks consider overall consumption of alcohol. But a recent study by Harvey W. Gruchow and colleagues, Medical College of Wisconsin, considered drinking habits apart from average consumption. Gruchow's group studied 225 men whose overall consumption was moderate. Most of those men were "binge" drinkers. Gruchow defined "binge" drinkers as those who, every once in awhile, drank much more than usual. The men went on binges less often than once a week. Gruchow's study found that binge drinkers had a higher rate of heart disease than those men who drank at a moderate and steady rate.[37]

These intriguing new findings raise the question of how moderate alcohol intake seems to protect against heart attacks. One hypothesis concerns one's blood level of high-density lipoprotein (HDL), which removes cholesterol from the walls of coronary arteries. High HDL levels protect against heart disease, and are also positively associated with alcohol consumption.[38,39]

Another theory is that alcohol may affect the formation of a prostaglandin that in turn affects the aggregation of platelets.[40] Yet another possibility is that moderate drinking reduces psychological stress, and thus the risk of heart disease.[41]

Of course, these epidemiological studies aren't designed to tell individuals if moderate drinking is harmful for them in particular. While two or three drinks may be moderate for one person, they may be too much for the next. In a *Journal of the American Medical Association* editorial, W.P. Castelli, National Heart Institute, expressed a fear shared by many observers: "It may be dangerous to tell some people to take two drinks a day when, given their constitutional makeup, one could fairly predict they could not stop at two.... With [millions of] alcoholics in this country we perhaps have a message for which this country is not ready."[42]

Most doctors agree with Castelli that it is premature to recommend alcohol as

a heart attack preventive.[43] Some people have greeted the new studies as good news. It's hard to blame the public for feeling that way, since it hears so much about the dangers of this food or that drug. However, for some people, *any* alcohol may be dangerous. And even for those who can drink a certain amount, exceeding that limit is foolish.

Research on alcohol and alcoholism is funded by a variety of institutions. The National Institute of Alcohol Abuse & Alcoholism (NIAAA) had a $22 million research budget for both fiscal years 1979 and 1980. David Hamburg, president, Institute of Medicine (IOM), recently stated that alcoholism research is "grossly underfunded."[44] At least one for-profit group, Joseph E. Seagram & Sons, is supporting alcohol research. It recently granted the Harvard Medical School $5.8 million for research on the biochemistry of alcoholism.[45] This amount is peanuts compared to the multibillion dollar turnover of the alcohol industries worldwide.

Also noteworthy is the Society of Medical Friends of Wine, a private California group that encourages scientific research on wine exclusively, as well as the proper use of that beverage. Its monthly *Bulletin* offers a forum for news and opinions about wine. Copies are available free to interested physicians or scientists from Society of Medical Friends of Wine, Box 218, Sausalito, California 94965.

There may be a shortage of research funds, but there is no dearth of literature on alcohol-related research. Since I recently explained how ISI® creates co-citation clusters,[46,47] let's see how clustering works for alcohol research. The paper by Yano *et al.* mentioned earlier[27] and the paper by Castelli *et al.*[38] turn out to be the citation pair which identified the research front in 1979 called "Alcohol Intake and Cardiac Mortality." Fifty-eight papers co-cited these papers in 1979. The 16 papers in Table 1 explicitly refer to alcohol. Most of the other papers mention HDL. A sampling of them is given in Table 2. It is noteworthy that the key papers appeared in general medical journals, not in journals devoted to

Table 1: Papers, which explicitly refer to alcohol in their titles, which cite the 1979 co-citation pair on "Alcohol Intake and Cardiac Mortality."

1. Baraona E & Lieber C S. **Effects of ethanol on lipid metabolism.** *J. Lipid Res.* 20:289-315, 1979.
2. Baraona E & Lieber C S. **Metabolic actions of ethanol.** (Freinkel N, ed.) *Contemporary metabolism.* New York: Plenum, 1979. Vol. 1, p. 87-113.
3. Barboriak J J, Anderson A J, Rimm A A & Tristani F E. **Alcohol and coronary arteries.** *Alcohol. Clin. Exp. Res.* 3:29-32, 1979.
4. Barboriak J J, Anderson A J & Hoffmann R G. **Interrelationship between coronary artery occlusion, high density lipoprotein cholesterol, and alcohol intake.** *J. Lab. Clin. Med.* 94:348-53, 1979.
5. Castelli W P. **How many drinks a day?** *J. Amer. Med. Assn.* 242:2000, 1979.
6. Chafetz M E. **Alcohol and alcoholism.** *Amer. Sci.* 67:293-9, 1979.
7. Green P H R & Tall A R. **Drugs, alcohol and malabsorption.** *Amer. J. Med.* 67:1066-76, 1979.
8. Hennekens C H, Willett W, Rosner B, Cole D S & Mayrent S L. **Effects of beer, wine, and liquor in coronary deaths.** *J. Amer. Med. Assn.* 242:1973-4, 1979.
9. Klatsky A L. **Alcohol use, myocardial infarction, sudden cardiac death, and hypertension.** *Alcohol. Clin. Exp. Res.* 3:33-9, 1979.
10. Marks V. **Biochemical and metabolic basis of alcohol toxicity.** (Mendlewicz J & Van Praag H M, eds.) *Alcoholism: a multidisciplinary approach.* Basel: Karger, 1979. p. 88-96.
11. Morrison J A, Kelly K, Mellies M, Degroot I, Khoury P, Gartside P S & Glueck C J. **Cigarette smoking, alcohol intake, and oral contraceptives—relationships to lipids and lipoproteins in adolescent school children.** *Metabolism* 28:1166-70, 1979.
12. Ramsay L E. **Alcohol and myocardial infarction in hypertensive men.** *Amer. Heart J.* 98:402-3, 1979.
13. Ricci G & Angelico F. **Alcohol consumption and coronary heart disease.** *Lancet* 1:1404, 1979.
14. Robinette C D, Hrubec Z & Fraumeni J F. **Chronic alcoholism and subsequent mortality in World War II veterans.** *Amer. J. Epidemiol.* 109:687-700, 1979.
15. Rossner S, Johansson C, Walldius G & Aly A. **Intralipid clearance and lipoprotein pattern in men with advanced alcoholic liver cirrhosis.** *Amer. J. Clin. Nutr.* 32:2022-6, 1979.
16. St. Leger A S, Cochrane A L & Moore F. **Factors associated with cardiac mortality in developed countries with particular reference to the consumption of wine.** *Lancet* 1:1017-20, 1979.

alcohol research. The citing papers also appear in such multidisciplinary journals.

Of course, alcohol and heart disease is not the only important alcohol-related topic. Table 3 shows the titles of seven other research fronts identified by co-citation clustering in 1980 which can be searched through our ISI/BIOMED SEARCH™ .[48] ISI also offers two ASCA-TOPICS® on alcohol: *Alcoholism* and *Alcohol & Drug Abuse: Social Impact.*

Table 4 shows the six journals explicitly related to alcohol research. These data come from our *Journal Citation Reports®* (*JCR™*) section of the *Science Citation Index®* for 1979. The table indicates the number of citations each journal received, as well as the impact factor, the number of times the average article for each journal was cited.

Our *JCR* data adds to the known interdisciplinary pattern of alcohol research. Table 5 shows the 20 journals which most often cited the six "core" journals in 1979. And Table 6 shows the 20 journals most often cited by the core. These tables indicate that the alcohol literature draws on general medical and science journals but there is a strong representation of psychological and psychiatric journals.

I have not said much about alcoholism per se. While it is difficult to rank priorities in preventive medicine, alcoholism ranks high indeed. I've met

Table 2: A sample of the HDL-related papers that cited the cluster on "Alcohol Intake and Cardiac Mortality."

1. Agdeppa D, Macaron C, Mallik T & Schnuda N D. **Plasma high-density lipoprotein cholesterol in thyroid disease.** *J. Clin. Endocrinol. Metab.* 49:726-9, 1979.
2. Assmann G. **Tangier disease and the possible role of high-density lipoproteins in atherosclerosis.** *Atherosclerosis Rev.* 6:1-28, 1979.
3. Bateson M C & Boucher I A. **Chenodeoxycholic acid, postprandial serum-triglycerides, and HDL serum-triglycerides, and HDL cholesterol.** *Lancet* 1:930, 1979.
4. Castelli W P. **Exercise and high-density lipoproteins.** *J. Amer. Med. Assn.* 242:2217, 1979.
5. Erkelens D W, Albers J J, Hazzard W R, Frederick R C & Bierman E L. **High-density lipoprotein-cholesterol in survivors of myocardial infarction.** *J. Amer. Med. Assn.* 242:2185-9, 1979.
6. Noakes T D, Opie L H, Rose A G & Kleynhans P H. **Autopsy proved coronary atherosclerosis in marathon runners.** *N. Engl. J. Med.* 301:86-9, 1979.
7. Nupuf M S & Sutherland W H F. **High-density lipoprotein levels in children of young men with ischemic heart disease.** *Atherosclerosis* 33:365-70, 1979.
8. Taggart H & Stout R W. **Reduced high-density lipoprotein in stroke—relationship with elevated triglyceride and hypertension.** *Eur. J. Clin. Invest.* 9:219-21, 1979.
9. Williams P, Robinson D & Bailey A. **High-density lipoprotein and coronary risk-factors in normal men.** *Lancet* 1:72-5, 1979.
10. Wood P D & Haskell W L. **Effect of exercise on plasma high-density lipoproteins.** *Lipids* 14:417-27, 1979.

Table 3: Names of alcohol-related research fronts searchable through research fronts in *ISI/BIOMED SEARCH™*.

Adverse effects of alcohol consumption during pregnancy
Alcohol intake and cardiac mortality
Tetrahydroisoquinoline neurotransmitters and alcohol
Feminization of chronic alcoholic men
Genetic aspects of alcoholism
Ethanol-induced liver injury
Effects of ethanol on lipoprotein metabolism
Induction of lipid peroxidation by ethanol and halogenated hydrocarbons

Table 4: Major alcohol journals, from the "Drugs & Addiction" subject listing of the 1979 *Journal Citation Reports®*.

Title	Times cited	Impact factor
Alcoholism—Clinical and Experimental Research	93	.876
Bulletin on Narcotics	112	.204
British Journal of Addiction	323	.411
Drug and Alcohol Dependence	147	.854
International Journal of the Addictions	514	.306
Journal of Studies on Alcohol (called Quarterly Journal of Studies on Alcohol prior to 1974)	591	1.038

Table 5: Twenty journals which most cited the six alcohol journals in Table 4, according to the 1979 *Journal Citation Reports®*.

Title	Times citing core list
J. Stud. Alcohol	219
Int. J. Addict.	157
Alcohol. Clin. Exp. Res.	60
Drug Alcohol Dependence	58
Brit. J. Addict.	57
Amer. J. Drug Alcohol Abuse	53
Addict. Behav.	51
J. Drug Issues	48
Brit. J. Psychiat.	33
Drug Forum	33
Brit. J. Alc. Alcohol	28
Psychopharmacology	25
Psychol. Rep.	24
J. Clin. Psychol.	19
Pharmacol. Biochem. Behav.	19
Behav. Res. Ther.	17
Acta Psychiat. Scand.	15
Clin. Toxicol.	15
Biochem. Pharmacol.	11
Brit. Med. J.	11

Table 6: Twenty journals which were most cited by the six alcohol journals in Table 4, according to the 1979 *Journal Citation Reports®*.

Title	Times cited by core list
J. Stud. Alcohol (including Quart. J. Stud. Alcohol)[1]	694
Int. J. Addict.	152
Amer. J. Psychiat.	142
Arch. Gen. Psychiat.	113
J. Pharmacol. Exp. Ther.	111
Science	110
J. Consult. Clin. Psych.	103
J. Abnormal Psychol.	97
Brit. J. Addict.	93
J. Clin. Psychol.	75
Lancet	72
J. Amer. Med. Assn.	66
Life Sci.	66
Psychopharmacology	59
N. Engl. J. Med.	58
Psychol. Rep.	56
Brain Res.	55
Brit. J. Psychiat.	53
Drug Alcohol Dependence	45
Nature	45

many people who have been affected by the personal ramifications of this disorder. It is sometimes difficult to know who suffers most—the patient or members of the family. It is one of the most insidious diseases known to mankind. Hopefully, research will lead to more precise methods of diagnosis and prevention of alcohol abuse as well as better treatment. Clearly we want to be able to use the beneficial effects of alcohol without suffering from its ill effects. This will be possible on an individual basis only after we have learned much more about genetic and other forms of profiling.

It is obvious that the effects of alcohol can be beneficial to some people in certain circumstances. But as yet there are no generalizations that can be made. Some cultures thrived without alcohol; hard liquor was almost unknown among the Indians north of Mexico until the white man came.[49] While European cultures used alcohol with varying degrees of intensity none has ever done a nationwide cost-benefit analysis on the use of alcohol. Even in countries with the highest rate of alcoholism the overwhelming majority of people are able to consume alcohol in moderation. In spite of this, since no one knows where to draw the line, societies usually impose prohibitions of one kind or another. In Scandinavian countries it means that you shall not drive even after one drink. In some places, like certain US states, there are age prohibitions. Some religious groups, such as Moslems and Mormons, prohibit what is not prohibited elsewhere. Societies, like individuals, vary as to how much alcohol they can or will tolerate.

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We regret to announce the death of Dr. Harold C. Urey on January 5, 1981. Dr. Urey's contributions to science were immense. As a member of our Board of Directors, he also contributed greatly to ISI®. I am glad that I was able to pay tribute to him publicly while he was alive,[1] and to attend a memorial symposium in his honor at La Jolla on February 7, 1981.

Mrs. Urey has asked me to inquire whether any *Current Contents*® readers could obtain a copy of *Atoms, Molecules and Quanta*,[2] which Dr. Urey coauthored with Dr. Arthur Ruark in 1930, to add to her library. Please send responses to me at ISI, 3501 Market Street, University City Science Center, Philadelphia, PA 19104.–E.G.

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