

Fads And Fallacies



In The Name Of The Environment

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A few years ago Martin Gardner, the mathematical editor of the *Scientific American*, published a book entitled *Fads and Fallacies in the Name of Science* in which he recounted a series of anecdotes, clearly intended to be humorous, dealing with some of the crazy ideas of man, which unconfirmed by experimental evidence or practical field experience, became fads which captured the restless imagination of the people and gathered quite a following, fortunately for but a short period in each case.

Such fantasies usually arise from ignorance and fear of the unknown and establish their credence in prejudice and superstition. In the dawn of man when knowledge was very limited and danger and terror lurked at every moment and place, the only security to be found lay in amulets, charms, magic incantations and rituals and a virtual total reliance and belief in a shaman or witch doctor in whom, it was firmly believed, dwelt all knowledge necessary to cure the sick, to divine the hidden and to control all events to come for the benefit of the true disciple.

As the millenia swept past, these fakirs often

regarded by their people as holy men, recognized they had a good thing going for themselves and protected their positions in society in any way they could consonant with preservation of their public esteem and dignity. The fortuitous dice of life fell often enough their way to reassure their disciples, and when the dice fell the wrong way they invariably explained it as the work of evil spirits and would expose a scapegoat in retribution. As intellectual enlightenment followed the ascent of man, he shed these superstitious fears, for awhile rather rapidly during the glories of Greece in the golden age of Pericles, but then he retrogressed for almost 2,000 years into the nightmare of the Dark Ages, once again to emerge into the Age of Reason in the Renaissance.

It was Galileo and his contemporaries who set the feet of men once again on the road to security through intellectual enlightenment. He it was who first recognized that one experiment correctly executed was worth a million opinions, and that one man who knows the facts can withstand the censure of a million who do

not know. Upon this single concept has arisen the vast arena of science, accelerating over the intervening centuries to where it stands today. Yet as Sir Peter Medawar has pointed out, "There is a gathering reaction to science in our time, particularly among the young," who, though happily secure in the munificence with which modern technology has garnished their "brave new world" with food and raiment and pleasure, nevertheless "wring their hands over the few isolated miscarriages of technology, while they take its benefactions for granted"—"and appear to be appressed with a sense of decay and regression—by a fear of the deterioration of the world through technological innovation." Artificial chemical fertilizers and pesticides are said to be undermining their health:

the soil and sea are being irretrievably poisoned by chemical and radioactive wastes they are told; while synthetic drugs merely substitute one disease for another, and modern man oscillates continually under the influence of stimulants and sedatives."

This sense of despondency, of helpless incompetence, of suspicion and doubt prevails everywhere, preponderantly among the young people, and they are once again showing distinct signs of retrogression into the former intellectual void of superstition, fear and irrationality. As Sir Peter states "Once again there is a restless ambivalence about philosophical and scientific thinking as if the insufficiency of fact and reason has given a paradoxical validity to nonsense."

FADS THAT ARE FALLACIES

ORGANIC NATURAL FOODS

One persistent, though until recently, rather obscure fad is that foods produced naturally the "organic way" are more nutritious, better tasting, and ensure a longer, healthier life. For many years this belief has lain somewhat quiescent, kept alive by a few "nuts among the berries," but essentially ignored by the well-fed, satisfied and complacent majority. A few obscure magazines have kept the desultory flame alive and a few suppliers have provided the so-called organic foods for the true believers. Within the past few years the demand of organic naturally-grown foods has suddenly exploded, and it is estimated perhaps 1 per cent of the national food dollar or about \$500 million is currently spent for organic foods.

Actually, of course, that with the exception of table salt, *all* foods are organic in the scientific term, and all foods with a few exceptions are produced "naturally." There is therefore no scientific definition of "organic" foods. To protect their position, the advocates of organic foods are now attempting to have a standard definition written into Federal law, for as it stands, any farmer, any packer, any distributor can place the name "organic" on any foodstuff regardless of how it is produced and not break the law. In fact, it is suspected by many food faddists that this is precisely what is occurring. The essence of such a law would require that all organic foods must be produced **without** the use of chemical fertilizers or pesticides (and some extremists demand without machinery, either) and that is be processed and handled **without** the use of preservatives, emulsifiers, conditioners, color-

ings or supplemental flavorings or nutrients e.g., vitamins, unless there are also "natural" and produced "organically.") Such a law is fret with pitfalls and exceptions and will be impossible either to obey or to administer, and will develop into a briar patch of deception, swindle, and shabby fraud.

For, firstly, crop yields of produce will plummet for lack of balanced mineral nutrition and the inevitable ravages of insects, disease, weeds and vermin. Secondly, quality will decline to levels which in many cases will prevent shipment across state lines due to illegal contamination from pest detritus, examples of which include insect eggs, larvae and frass; fungal infections, some of which produce carcinogenic, teratogenic, or debilitating mycotoxins; bacterial contaminants, most of which produce toxins, or in the case of milk, eggs, and meats, frank zoonotic disease readily transmissible to man; rodent hair, urine and feces which also frequently contain infective organisms. Thirdly, the price of such foods will be at least double the present cost and could readily reach four fold.

Fourthly, were such an absurdity to be thrust upon the farmer, the nation would rapidly collapse for want of food, fiber, and shelter. Hunger, destitution and despair would preside and social-political-economic anarchy prevail.

If all the animal manures and human and industrial wastes were to be spread evenly over all the arable lands in America, at inordinate cost, it would provide somewhat less than 15 per cent of the nitrogen, phosphorus and

potash now applied, and this is regarded as not more than 30 per cent of that which should be applied merely to maintain present fertility. From the economic, land management, nutritional, public health and socio-political standpoints organic farming would be a total bust, and the claims of its adherents are not only

unscientific, they are irresponsible, ignorant and unthinkable.

There is not the slightest bit of valid experimental evidence to show organic foods are superior to those produced by scientific agriculture, and there are many valid reasons why they are inferior.

FERTILIZER CHEMICALS POISON BABIES AND CAUSE CONCERN

Recently a clamor has arisen that the drinking water of the nation, and much of the crop food, carries excessive levels of nitrate nitrogen, derived from synthetic fertilizers, which produces methemoglobinemia in infants (blue baby) and combining with digested proteins in the human bile forms nitrosamines which in turn induce cancer. Even though the evidence to support both these claims is virtually absent, nevertheless the claim is vociferously promoted by "scientists," who really know better, and eagerly publicized by the press.

In the first place the incidence of fatal methemoglobinemia in infants is so rare as to be approximately equal to fatalities from small pox vaccination, and but a fraction of those from aspirin tablets and penicillin. Further-

more, those which have occurred were traced to well water contaminated with organic manures from animal waste dumps or septic tanks. The incidence of intestinal carcinoma induced from fertilizer nitrate is pure speculation totally devoid of any unequivocal experimental evidence.

Finally, the percolation of nitrate nitrogen from fertilized cropped soils is actually less than from unfertilized cropped soils; while the levels of nitrates in our rivers, even those coursing the intensively cultivated areas of the midwest, are no higher today than they were at the turn of the century when virtually all nitrogen fertilizer was derived from animal wastes.

PHOSPHATE DETERGENTS AND EUTROPHICATION

Although it has largely subsided since the courageous and logical decision of Surgeon General Steinfeld to restore the use of phosphate detergents, the modern eco-prophets continue to intone against their use, aided and abetted by the manufacturers of proposed alternatives and the ubiquitous media.

The fact is that detergent phosphates contribute only about 15-18 per cent of the total phosphorus entering the environment and this total does *not* comprise the limiting factor in

eutrophication. Actually carbonaceous residues and nitrogen primarily from municipal and industrial effluents are the major cause of eutrophication. In any case algae are a substantial contributing factor in the demineralizing of effluents and could be so managed as to purify potable waters, produce an animal feed comparable to soybeans, or produce a crude fiber useful for paper board manufacture or newsprint or even produce useful chemicals.

MERCURY AND LEAD IN THE ENVIRONMENT

It has long been known that both mercury and lead are toxic to humans and other vertebrates. Some historians contend that lead was a major factor in the demise of the Roman Empire, because the rich Romans stored their wine in lead flasks, ate off lead-glazed crockery and used lead piping in their houses. This continuous exposure to lead-induced plumbism as it accumulated in the blood-forming centers of the skeleton elicited early sterility and early death. In 19th century America, the people were still overexposed to lead from

paint, glazed dishes and lead plumbing; but today such exposure has been substantially reduced. Analyses of human hair, where lead along with several other toxic elements—e.g., arsenic—tends to accumulate show a highly significant decline in lead, some 70-80 per cent, over the past century.

The one form of exposure over which there may be rightful concern, particularly in congested cities, is lead from auto exhausts. However, the tetra-ethyl lead in the gasoline, which is highly volatile and constitutes a hazard to

those who continually inhale it, emerges as heavy, non-volatile lead oxide particulates from the exhaust. Studies in our laboratory reveal such effluvia settle to the ground rapidly within a few yards of the highway. In center cities, however, such particulates can remain suspended for fairly long periods following issue from auto exhausts, and are inhaled by the pedestrians nearby. How serious this really is we are now trying to determine, but regardless of our findings, it is just common sense to reduce this avenue of exposure as much as is feasible.

It must be balanced against the power needs of the people, however, which will be substantially curtailed if no lead at all is to be permitted in gasoline. It now seems probable that a combination of low-leaded gas plus lead absorbers in the exhaust system can meet the tolerances that will be required. There is, of course, the possibility that some non-metallic anti-knock adjuvant will be discovered which is totally degradable and which could be added to gasoline to replace tetra-ethyl lead.

The use of mercury in industry, medicine, dentistry and agriculture has increased enormously during this century. With the development of atomic absorption, analytical equipment assay methods have sharply increased in precision. This has led to determinations of minute levels of mercury in a variety of organisms in the environment. The impetus for such surveys arose as a direct result of several clear-cut cases of mercury poisoning among humans. The most serious of these was the Minimata Bay incident in Japan, where several dozen people developed mercury toxicity from eating fish caught from the bay, into which it was discovered a chlorine manufacturing plant was dumping mercury wastes in considerable quantity. Later, several children in one family in the Southwest developed chronic mercury toxicity which was traced to pork that had been illegally fed stolen grain treated with an organic mercurial and intended for planting. A number of other similar cases have been reported in Canada, England and Sweden. In all cases the mercury contamination was derived either from industry, or treated seeds where massive exposure doses occurred.

Mercury was found at levels of 0.6-1.0 ppm

AIR POLLUTION

Air pollution in center cities and such traffic-congested areas as the Bos.-Wash., Chi.-Pitt., and San.-San. strips in the east, center and west regions of the country respectively, is a serious economic problem amounting to a cost of upwards of \$4 billion per year. Most of the

in canned tuna fish and fresh-frozen swordfish. Alarms were promptly trumpeted across the press and broadcast media, and for a while sales of both tuna and swordfish were suspended. The FDA set 0.5 ppm of mercury as the tolerance level in foods, and the tuna business nearly collapsed. When it was later determined that tuna and swordfish caught nearly a century ago and preserved as museum specimens also carried levels of mercury from 0.5 to as high as 2.0 ppm, the flurry of public consternation somewhat subsided. But not before both industry and agriculture were thoroughly castigated for polluting the environment with yet another chemical.

The facts are that apart from the isolated and reprehensible incidents such as Minimata Bay, the great bulk of environmental mercury is produced in nature. It is estimated that there are over 300 million tons of mercury in the oceans, to which man has contributed less than 100,000 tons from all sources including gold mining, the biggest source. Evidently man has been consuming mercury in his fish food for millenia, but since he was not aware of it, it did not harm him. Furthermore, Americans carry around in their teeth over a quarter million pounds of mercury amalgam in fillings, which they ingest steadily with their food. Approximately 150,000 pounds of pure mercury is installed annually into human mouths in the United States alone, which does not seem to do them any particular injury.

There is no question mercury is toxic in certain forms, and it can circulate in the environment by microbial conversion to methyl mercury to an extent not hitherto realized. As an element it is completely undestructible and has a half life of virtually infinity. It is also true that a great deal more information on the toxicology of mercury, is needed, particularly on chronic exposure to vertebrates and in combination with other toxic metals such as lead, cadmium, selenium, etc. There is, however, some evidence that selenium tends to antidote the toxicity of mercury, at least within certain limits. Nevertheless, there is no reason to panic over mercury poisoning on the basis of the very skimpy and equivocal evidence of its environmental hazard to date.

hazard, however, arises from gases which cannot be seen and therefore does not worry the public. Visible smoke on the other hand, disturbs people very much, although most of it consists of solid particles that fall out swiftly.

Some of the eco-prophets claim such will



eventually block-out the sun and induce another ice age, others conversely claim industrial and auto effluvia will create a greenhouse effect from excess carbon dioxide and cause infra-red light to be captured, raise the planet's mean temperature, cause the ice caps to melt and flood every coastal city in the world. One can, of course, subscribe to either theory, but the probability is that neither will occur.

When the Islands of Krakatau, off Indonesia,

exploded volcanically in 1883, a 6,000-foot mountain blew 50 miles (261,000 feet) up into the stratosphere carrying over 300 millions tons of ash and pumice, which lingered there for several years before it finally descended to earth. This contamination of the atmosphere was greater than the emissions of all the factories on earth for 100 years, yet it had very little effect on the earth's climate, except for creating brilliant sunsets.

PESTICIDES

There is probably no area of man-made chemicals which has received more vituperative attention from eco-activists than has that of pesticides. Although attacks on these useful implements in modern agriculture, food proces-

sing and distribution and in public health management have been made since the inception of pesticides, it was just a decade ago with the publication of Rachel Carson's *Silent Spring* that a furor arose to the level of public

hysteria.

There are few fads in modern science which have encouraged more "shamans" to creep out from obscurity to do business once again at the age-old stands than has the public fear of pesticides. Extravagant claims made in Miss Carson's book and eagerly accepted as fact, were promptly proliferated, magnified and propounded to the multitude to warn of impending doom for man and his environment. Evidence to support many of these claims when carefully investigated was found wanting, whereupon a number of "scientists" fell furiously to work to produce "experimental" data to prove de post facto that Miss Carson was, of course, quite correct in her hyperbolic assertions.

There then followed an astonishing array of so-called scientific papers, some of which were published in journals, the editors of which really must have known better, that "proved beyond a shadow of a doubt" that pesticides, particularly the organo chlorines and specifically DDT:—

- were accumulating rapidly in the environment all over the planet;
- were being magnified in concentration and intensity through the food chain to levels toxic to virtually all higher forms of animal life, including man.
- were killing off fish, mammals and birds at rates approaching extinction for some species.
- were inducing cancers in man, teratomas in the newborn and mutants in wildlife.
- were destroying the phytoplankton in the oceans, presaging the death of all ocean life and eventually of terrestrial life as well through the breakdown of the oxygen cycle.
- were inducing subtle changes in the reproduction of vertebrates, particularly birds, through disruption of essential egg shell formation.
- were creating such violent dislocations of the natural eco-systems as to result inevitably in total catastrophe.
- were, in short, hastening the inexorable doomsday of mankind and his environment.

As each of these dire predictions emerged, fortified by "scientific evidence," which upon a subsequent more rational analysis was often found to be based on artifactual techniques, invalid statistical reduction and illogical interpretation, the popular press eagerly fanned the flames of public consternation with abundant and sensational coverage.

Conference after conference has been held over the past decade—some in an atmosphere of objective inquiry, but many in an aura of

witch-hunting ritual, to assess the available evidence, sift the facts from fancy and issue virtually excathedra reports designed to assess the real hazards extant in the use of pesticides versus the real benefits attributable to their correct use. Curiously it did not seem to make any difference whether the conferees were authentic, qualified authorities in the fields of chemistry, toxicology, statistics, food technology, entomology, etc. or not. If the issued report favored the original Carson theme, it was hailed as an indubitable confirmation of her divine revelations, and its authors acclaimed as "Daniels brought to judgment"; a conference or committee that failed to hold to the Carson line, and insisted upon reviewing the experimental evidence with objectivity and scientific precision, such were condemned as non-scientists, conspirators with agribusiness, heretics and unbelievers. The general public was ardently persuaded to cast them and their report aside, if not entirely out of the public arena.

Legal hearings and court cases were promoted with much publicity and fan fare, and when the judgment fell to the side of the continued use of pesticides as it invariably did, on Long Island, in Wisconsin, in Washington State, in California and most recently at the seven-month, penetrating, EPA hearings, in Washington, D.C., then these judgments, too, were discarded and obscured by vast clouds of fulminations and generated public clamor.

Considered, objective and completely unbiased conclusions and points of law were submitted by Examiner Edward Sweeney, and DDT was found, within approved registered use, to be no hazard to man or his environment, to be no demonstrated cause of cancer or the demise of wildlife. Rather, on balance it was found to be a distinct asset to man in food, fiber and shelter production and in the maintenance of public health. These conclusions, too, were rejected unceremoniously as contrary to the public weal. Such a decision can only be regarded as made in obeisance to political expediency. It reduced the long tenuous hearings, testimonies, and cross-examinations, and the extensive lists of entered documents to a farce.

The case made against DDT, and by inference its related pesticides, is one that could be as easily fabricated against any compound, any product, any process, any individual or any organization as the principles employed and adhered to so fanatically leave nothing just, nothing secure, nothing sacred. This is Lysenkoism in its ultimate expression, for the actual evidence reveals beyond dispute that when used properly with the recommendations of the approved registered label, DDT:—



The tussock moth (and its egg mass) has caused tremendous fir forest damage in the Pacific Northwest since the EPA withheld use of DDT. The U.S. Forest Service says these forests cannot withstand another year of experimenting with new controls.

- is *not* a carcinogen, a teratogen or a mutagen.
- does *not* suppress the growth of phytoplankton in the oceans.
- has *not* reduced the bird life of any species, including raptors and brown pelicans to the verge of extinction.
- does *not* disperse universally in the environment by solution, by particulates, by evaporation or by organism magnification in concentrations which have any biological significance.
- does *not* persist in the environment indefinitely, but is actually biodegraded by many organisms both micro and macro, plant and animal and by many physico-chemical factors as well including light, alkalis, and many mineral salts. In sea water it has a half life of some 15 days.
- does *not* impair egg shell formation in birds of any species, and does *not* affect carbonic anhydrase activity.
- does *not* interfere with the reproduction of any species of plant or animal except invertebrates, and among them it is surprisingly selective at correct doses removing pests without killing many beneficials.

The really astonishing point in this whole fad is that DDT is to be banned because it constitutes a hazard to man's health, yet its use is to be permitted in the event of a serious threat to man's health, for example in the event of a serious epidemic of typhus, malaria, encephalo myelitis, etc. Who is to maintain a

substantial inventory in the face of zero sales is not of course considered.

Finally, the denouement of this extraordinary decision is to recommend a substitute for DDT, parathion, which is known to be hazardous and exceedingly dangerous both to man, livestock and wildlife, to persist in both fresh and marine waters as long or longer than does DDT, that is as toxic dermally and via inhalation as it is orally, that has a considerably less effective insecticidal spectrum and yet destroys beneficials at recommended dose levels as effectively as it does target pests. There have already been a large number of recorded deaths from parathion in contrast to DDT for which there is not one single medically annotated human death regardless of dose and despite the fact that at least one billion humans have been exposed to it for over 20 years.

It is clearly predictable that there will be, sooner or later, a tragic accident with parathion which will entail a large group of human fatalities. Who among the vituperative and tenacious opponents of DDT will answer for such a catastrophe. It is a sure bet like the shamans of old they will all look away or seek a scapegoat to protect their position.

At the present time it is hard to predict which way events with respect to pesticides will turn. Industry for one is heartily discouraged and is understandably steadily withdrawing from further investment in research and development of new pesticidal compounds. Research into biological controls though hopeful

and promising in a few isolated cases, is many years from meeting the challenge of total control of even the major pests of the 10,000 which plague man's crops, his livestock, his domiciles and his person. In the meanwhile there are now 208 million people to feed, clothe and shelter in this country alone, and many tens of millions beyond our shores who continue to turn to us for succor. Already the price of food is mounting, and as the pesticide armamentarium is reduced and their use constrained by increasing restrictions and costs, food and fiber prices will continue to rise.

CONCLUSION

Fads and fallacies in the name of ecology, conservation and environmental protection have become rampant among the general public in recent years, promoted by authorities of questionable authenticity and intent. These fads and fallacies are reaching into the Halls of Congress and various state legislatures, and are becoming translated into laws, many of which are so scientifically unsound that they are, in fact, impossible either to obey or to administer. They can lead only to socio-political-economic chaos, or to a sharply declining standard of living for all Americans.

The public **must** be informed of the facts in each case, and the self interests of the vociferous prophets of doomsday be thoroughly exposed.

To effect this, I suggest 12 basic proposals:

1—That legislative decisions on scientific matters **must** be written based upon objective experimental evidence, and not upon unqualified opinions from vociferous self-appointed custodians of the public welfare.

2—That when scientific experimental evidence demonstrates a preconceived eco-activist supposition or assertion to be wrong, it must be given equal exposure to the public.

3—That there is no such thing as a scientific decision by the democratic process—there is no Truth by Referendum.

4—That it is more important to preserve the human life of this world than that of obscure species, many of which are probably en route to extinction regardless of the works of man.

5—That rationality and science require concern over probabilities mathematically delineated, rather than over every imaginary possibility of events that in all probability will never happen.

6—That **all** chemicals are both poisonous and innocuous depending upon dose, exposure route, frequency, and species, and that there is a biological threshold value for every chemical

Perhaps a serious of massive epizootics of insects and epidemics of disease among our crops, forests and homes will so incense the public to cause the administrators to reconsider the constraints and restraints they have laid upon the American farmer and let him once again return to his fields and orchards armed with the equipment and chemicals with which agricultural science has provided him. But this will be a grievous price to pay and the impact upon man and his environment will far exceed that fallaciously claimed to be due to the correct use of pesticides by the eco-faddists.

on every species.

7—That one good scientifically executed experiment is worth a million opinions.

8—That there is not the slightest difference biologically, chemically, or physically between two pure samples of a compound, whether synthesized by man or extracted from a natural source.

9—That all foods are "organic" and with but a few exceptions "natural." To claim "organically grown" foods are more nutritious than and superior to foods produced by scientific farming and thereby to justify charging substantially higher prices is a shabby fraud on a gullible and unsuspecting public.

10—That there is no such thing as a "balance of nature" as commonly depicted as a quiet, serene, peaceful and munificent existence for all creatures; that life is a constant struggle for all species in a nature which is "red of tooth and claw," and which provides the arena for the evolution of all species by the "law of the survival of the fittest."

11—That man enters the arena armed with intelligence, a memory, vertical stance and an optic-chiasmatic vision, with which he has exercised his hegemony, for a while at least, over all other living creatures on earth.

12—That the scientific method owes no allegiance to any political party, religious credo, ethical philosophy, ethnic group or material power, that it is simply a procedure of four steps

Observation

Deduction

Experiment

Induction or Prediction

That these steps are totally objective, replicable, calculable, and reliable; what is done with the issuing data and evidence may have ethical, political, or even religious intent and motive, but this does not reflect upon the method itself.

When science is subjected to irrelevant issues, such as fads and fallacies in the name of ecology it is non-science usually abbreviated to NONSENSE.

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1—Several direct conferences with a Green Section agronomist, in this manner:

A—A scheduled half-day, on-the-course consultation, followed by a written report from the agronomist to the Course Superintendent and Green Committee Chairman or club representative. Second visits are available at reduced cost if requested.

B—Consultation with the agronomist at local group meetings and turf conferences.
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3—A subscription to the USGA *Green Section Record*, dealing with golf turf affairs, six times a year, addressed to the Golf Course Superintendent. (This is in addition to the subscription sent to the Green Committee Chairman in connection with USGA Membership.)

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(Open to USGA Members only)

Date _____, 19____

Full Name of Club or Course _____

Permanent Mail Address (street or box) _____

Post office _____, State _____ Zip _____

Application authorized by: _____ Title _____

Course Superintendent _____

We hereby apply for the Turfgrass Service of the United States Golf Association Green Section and certify that we are eligible for the class checked below.

We enclose the fee (see schedule below) for the current year ending December 31. The USGA *Green Section Record* is to be addressed to our Golf Course Superintendent (this is in addition to the subscription sent to our Green Committee Chairman in connection with USGA Membership).

This application is automatically continuous from year to year unless interrupted by advance resignation.

Check Proper Class:

_____ Less than 18 holes \$250
_____ 18 to 27 holes \$300

More than 27 holes:

_____ 36 holes \$325
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