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Consumer reports
FEBRUARY 1955

cigarettes

laboratory tests of 37 brands:
for tar and nicotine
on effects of filters

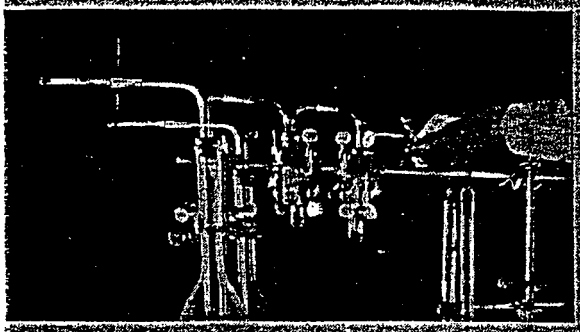
medical report:
the case against smoking
how good is the evidence?

2 cars for 1955

road tests of the new
chevrolet and pontiac V-8s

also: reports on household products

cigarettes



Laboratory Tests

37 brands of cigarettes, regular and king size, with both plain and filter tips, were analyzed for the tar and nicotine content of their smoke.

The Industry

Under the impetus of the "cancer scare," the tobacco business is going through its second revolution.

Medical Aspects

Smoking is often a health hazard, but evidence that it is a major cause of lung cancer is still inconclusive.

Here are the results of CU's recent laboratory tests

Will filter-tip cigarettes give you less nicotine and tar than plain cigarettes? What about the king-size cigarette which "travels the smoke further," or king size *plus* a filter? What about the cigarettes which use a low-nicotine tobacco, or a denicotinized tobacco—is there really less nicotine in their smoke? And the "popular" brands—how do they compare with the other brands on the market with regard to their nicotine and tar content?

These are some of the questions to which smokers would like to have answers. But no answers, at least no reliable ones, are to be found in the hazy, happy, healthy world of cigarette advertising. The purpose of this report is to provide some of the answers. In February 1953, CU reported on laboratory tests of 27 widely sold brands of cigarettes, and readers were informed of brand-to-brand, and type-to-type differences in terms of nicotine and tar content. Since that time, however, many new king-size and filter-tip cigarettes have appeared on the market, and some of the older brands have changed their lengths and their filters. CU's tests for nicotine and tar embrace the newcomers as well as the old standbys.

The following report covers tests of 37 brands of cigarettes, purchased in 28 cities throughout the country. They are of four broad types: regular size, filtered; regular size, unfiltered; king-size, filtered, and king-size, unfiltered. Within these types are cigarettes made of American blends, and Turkish cigarettes; low nicotine, denicotinized, and mentholated smokes; regular-price, low-price, and premium-price; plain, and filter-tipped.

Sixteen cigarettes of each brand (each from a different pack) were mechanically "smoked" in a laboratory apparatus in tests for nicotine and tar. The test results are summarized in the table on page 59. Apart from the obvious determinations of how the brands rank in nicotine and tar content, there are a number of interesting conclusions which can be drawn from the figures.

First of all, the test results indicate that the use of tobacco which is low in nicotine results in lower nicotine content in the smoke than regular tobacco even with a filter. *John Alden*, a regular-size cigarette without a filter, had far less nicotine in its smoke than any other cigarette; this brand is made from a special low-nicotine tobacco. Additional information was provided by some check tests: for the five largest selling brands, not only the smoke but the tobacco itself was analyzed for nicotine content. There was a direct correlation between the nicotine content of the smoke and of the tobacco in each case. Because crops of any given variety of tobacco vary in nicotine content from year to year, and from region to region, depending on such things as climatic and soil conditions, the nicotine in the smoke of the cigarettes made from these tobaccos can also be expected to vary. And in most cases it does.

Of the 20 brands included in both CU's previous tests and the current tests, only *John Alden* and *Sano* regular were found to be unchanged in the nicotine content of their smoke. *John Alden* was lowest in nicotine content in both series of tests; it averaged only 0.4 milligram of nicotine per cigarette in the 16 test samples "smoked" by the laboratory apparatus. *Sano* regular also remained at its previously found low nicotine level, although it was not quite as low as the recently introduced *Sano* king size with filter tip. *Sanos* are made of a denicotinized tobacco: that is, tobacco from which a large part of the nicotine has been extracted.

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cigarettes LABORATORY TESTS

Nearly all the other cigarettes tested for both this and the 1953 report were higher in nicotine this time. The nicotine content in the smoke from *Camels* increased from 1.9 milligrams to 3.3 milligrams per cigarette; the regular-size *Old Golds, Lucky Strikes, Philip Morris,* and *Chesterfields* also rose in nicotine content, although not as sharply as *Camels*. The range in nicotine content, except for *John Alden* and *Sano*, was from about 1.5 milligrams (for *L&M* regulars) to 4 milligrams (for *Old Gold* king size), and the range among the five most popular regular-size brands was even less, running from 2.3 milligrams to 3.3 milligrams.

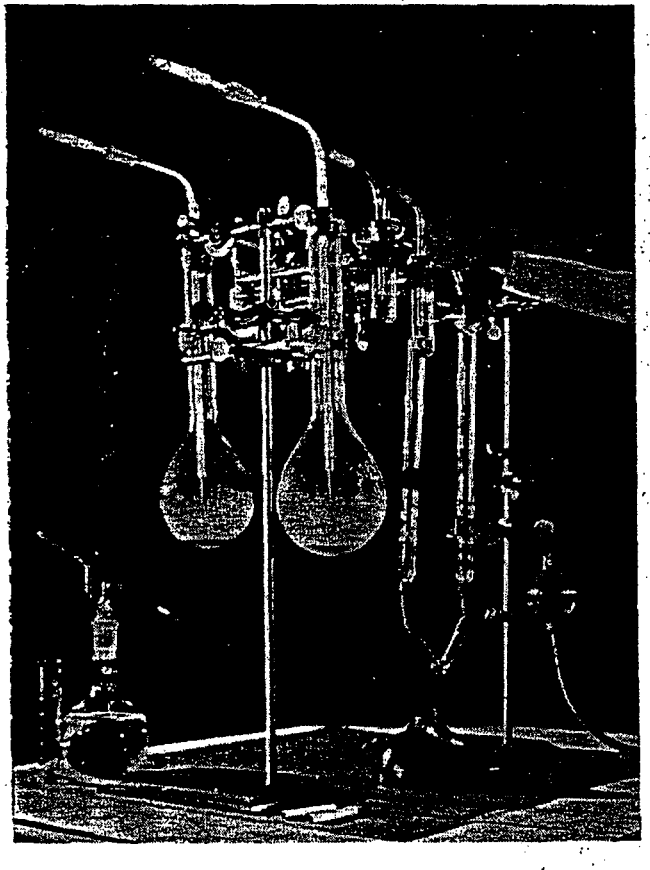
There is no generally accepted definition of the "tars" so much talked about in connection with smoking, and consequently no generally accepted method for their measurement. In its new tests, CU utilized a modification of its previous test method to obtain what is believed to be a more precise determination of the tar content of the smoke; the results, therefore, are not strictly comparable with those obtained in the previous tests. The range in tar content among the 37 brands tested was not as great as the range in nicotine content. By smoking *John Alden*, you can cut your nicotine intake down to 10% of that of the brand highest in nicotine. But the cigarette lowest in tar content (*L&M* regular) will still give you 40% of the tar content of the smoke of the cigarettes highest in tar content.

THE FILTER-TIP BRANDS

Open up the filter tip of different cigarettes and you will find a variety of things—absorbent cotton, paper containing activated carbon, cellulose acetate fibers, creped and uncreped paper, asbestos fibers, or combinations of several of these materials. No laboratory tests were run to determine whether it was the filters, or other factors, that were responsible for high or low nicotine content in each case. The main concern was with the final product—the amount of nicotine and tar in the smoke.

The test results indicate, however, that for a cigarette of given size there was in most cases less tar in the smoke of the filter-tip brands—on the average, about a third less. Within a given size too, the filter-tip cigarettes were also generally lower in nicotine content, although there were several exceptions. The brands whose smoke yielded the

HOW CU TESTS CIGARETTES



The testing of a cigarette begins with the collection of its smoke. The cigarette is first fitted into a glass holder and then "smoked" in the laboratory apparatus (left). The smoke drawn from the cigarette is collected in acidified alcohol in the flask (any smoke carried into the glass "train" is trapped in the two vials). Lowering the level of the water in the vertical glass tube at the end of the train by means of the bulb at the extreme right of this picture draws air through the cigarette. Each puff is made to last for two seconds and one puff is taken each minute. Slightly more than two cubic inches (35 cubic centimeters) is taken in with each puff, and each cigarette is smoked down to a butt of just under an inch (23 mm.). In CU's

least tar were all filter-tipped. Three of them—*L&M* regular, *Sano* king size, and the premium-priced *du Maurier* regular—were also below the 2 to 4 milligram range of nicotine content into which 80% of all brands tested fell.

Kent, while relatively low in tar, did not fare so well in holding down the nicotine in its smoke. In the 1953 survey, *Kent* was noted as having less nicotine than any other brand with the single exception of *John Alden*. The *Kents* which CU tested for this project had little edge in this respect over most of the other brands tested.

Regardless of the effectiveness of filter tips in keeping nicotine and tars out of your lungs, they have some value in keeping bits of tobacco from getting into your mouth and they do afford a firmer butt.

KING-SIZE CIGARETTES

The smoke of king-size cigarettes contained, on the average, more nicotine and tar than the smoke of regular-size brands when both were smoked down to a butt of 23 millimeters (just under an inch), though here also there were several exceptions. King-size brands with filter

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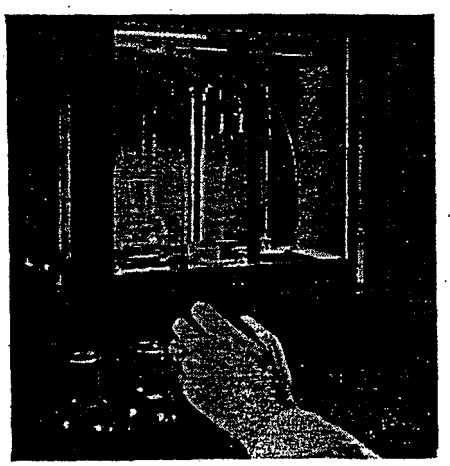


tests, 16 samples of each brand were "smoked" in two runs of eight cigarettes each; the results of each run were determined separately and then averaged. After each run, the washings from the apparatus are added to the smoke solution in the collecting flask. One portion is steam distilled to isolate the nicotine; amounts are measured with an ultraviolet spectrophotometer (center). Chloroform is added to another portion of the smoke solution, which is then diluted with water. The tar is then extracted by vigorous shaking, first from acid solution, then from alkaline solution, and the chloroform is then drained from separatory funnels. After this, the chloroform is boiled off and the tar residue weighed on a chemical balance (above).

RESULTS OF TESTS FOR NICOTINE AND TAR IN THE SMOKE FROM 37 BRANDS OF CIGARETTES

Brands are listed in order of increasing nicotine content of their smoke. A difference of a few milligrams in tar content is of no significance.

BRAND AND TYPE	AVERAGE NICOTINE IN SMOKE PER CIGARETTE (MILLIGRAMS)	AVERAGE TAR IN SMOKE PER CIGARETTE (MILLIGRAMS)
JOHN ALDEN Low nicotine tobacco John Alden Tobacco	0.4	16
SANO Denicotinized (KF) United States Tobacco	1.0	12
SANO Denicotinized	1.2	15
L&M (F) Liggett & Myers	1.5	11
DU MAURIER (F) Columbia Tobacco	1.7	12
YORKSHIRE Larus & Bro.	1.7	15
MURAD P. Lorillard	1.8	21
KENT (F) P. Lorillard	2.0	12
YORKSHIRE (K)	2.0	18
CHESTERFIELD Liggett & Myers	2.3	17
DU MAURIER (KF)	2.3	16
REGENT (KF) Riggio Tobacco	2.4	19
PARLIAMENT (F) Philip Morris	2.4	14
L&M (KF)	2.5	18
HERBERT TAREYTON (KF) American Tobacco	2.5	19
PARLIAMENT (KF)	2.6	15
CHESTERFIELD (K)	2.7	22
PHILIP MORRIS Philip Morris	2.7	21
LUCKY STRIKE American Tobacco	2.7	21
KENT (KF)	2.8	15
OLD GOLD (KF) P. Lorillard	2.9	14
WINGS (K) Brown & Williamson	2.9	20
OLD GOLD	2.9	18
FATIMA (K) Liggett & Myers	2.9	24
VICEROY (KF) Brown & Williamson	3.0	18
DUNHILL (K) Philip Morris	3.0	23
WINSTON (KF) R. J. Reynolds	3.1	20
HERBERT TAREYTON (K)	3.1	22
CAMEL R. J. Reynolds	3.3	20
KOOL Brown & Williamson	3.4	20
PHILIP MORRIS (K)	3.4	26
PALL MALL (K) American Tobacco	3.5	26
EMBASSY (K) P. Lorillard	3.7	24
KOOL (K)	3.7	23
RALEIGH (K) Brown & Williamson	3.7	25
CAVALIER (K) R. J. Reynolds	3.8	26
OLD GOLD (K)	4.0	25

K = king size; F = filter tip; KF = king size with filter tip. Where no letter follows name, brand is regular size.

tips were also higher in nicotine and tar than the regular-size filtered brands. King-size cigarettes measure about 85 millimeters compared with about 70 millimeters for regular-length cigarettes. However, if you smoke the same length of a king-size cigarette as you do of a cigarette of regular size (that is, you leave a longer butt), the extra tobacco serves as an effective filter, and the total nicotine from the king-size cigarette will, under such conditions, generally be lower than from a regular-size cigarette.

Not all king-size cigarettes tested were high in nicotine and tar when smoked to usual butt size, however. The relatively low-priced *Yorkshire* king size (available only at Sears-Roebuck retail stores in larger cities) yielded only about as much nicotine as *Kent* regular, and less than any of the regular-size "popular" brands.

Also lower in nicotine than the popular brands was *Murad*, a premium-priced, regular-size Turkish cigarette. *Murad*, however, had an above-average tar content.

A NOTE ON FLAVOR

CU made no attempt to evaluate flavor in any of the cigarettes tested, but a note on this hotly disputed subject may be of some interest. It is now pretty generally agreed —and CU has in the past verified this with mass tests— that in blindfold tests most smokers can't tell the difference between one "popular" brand and another. The situation is a little different when it comes to Turkish blends, special tobaccos, or specially treated or flavored tobaccos. It is widely conceded that a reasonably sensitive smoker can tell one from the other, and can distinguish all of them from the "popular" brands. The preference for one or another of the flavor types seems to be a mixture of personal taste and habit. A number of smokers who tried the low-nicotine *John Alden* commented adversely on its flavor; however, those bent on reducing their nicotine intake without reducing their cigarette consumption might be willing to bear with *John Alden's* initially less-pleasing flavor in the hope that they would get to like it.

CIGARETTE PRICES

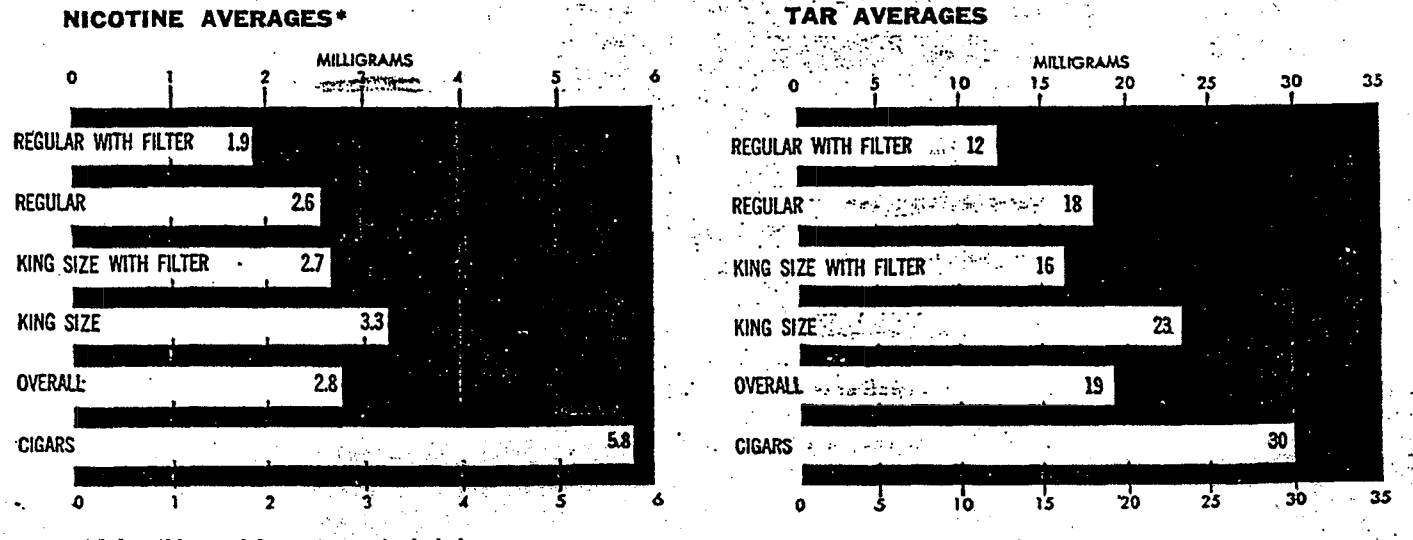
Cigarette prices often vary from store to store. The following prices are representative of those paid by CU's shoppers in New York City. *Murad*, at 37¢ was the most expensive brand tested, with *Parliament* and *du Maurier* (both regular- and king-sizes) close behind at 33¢. Other premium-priced brands included *Kent*, in both sizes, at 31¢, and *Sano* king-size, 30¢. At the low end of the scale were *Yorkshires* (they averaged 17¢ for the regular and 18¢ for the king-size in Sears retail stores throughout the country), and *Wings* at 21¢. Nearly all other brands were priced at 24¢ or 25¢, with some filter-tip and king-size cigarettes at a penny or two more. *John Alden*, the brand lowest in nicotine, was 26¢ a pack.

WHAT ABOUT CIGARS?

Recent medical literature has dealt largely with the hazards of cigarette smoking, but little has been said about cigars. CU ran limited tests, to give readers some information on nicotine and tar in cigar smoke. A random selection of 24 cigars—thin ones, fat ones, long ones, short ones—were "smoked" in the same laboratory apparatus used in the cigarette tests, and the collected smoke of each cigar was analyzed in the same manner.

On the average these cigars, which gave about six times as many puffs as cigarettes, had in their smoke only about twice as much nicotine and one and a half times as much tar. On a weight-for-weight basis, the cigars had on the average only one-third as much nicotine and one-fourth as much tar in their smoke as cigarettes. The relationship of cigars to cigarettes in this respect is shown below.

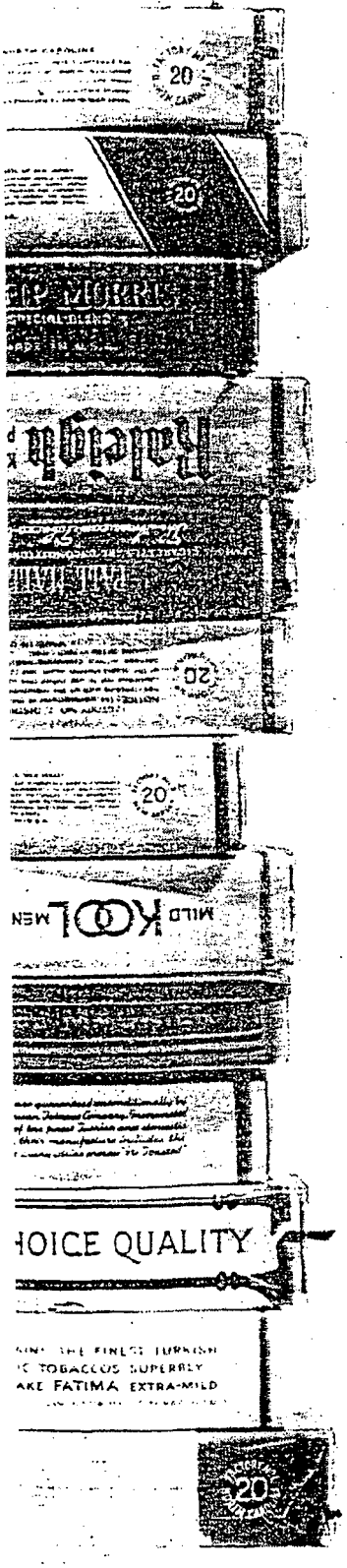
NICOTINE AND TAR CONTENT OF SMOKE PER CIGARETTE



John Alden and Sano are not included.

The Industry

Medical reports have upset the cigarette business; regular brands decline as 19 new versions enter the retail arena



The tobacco industry today is undergoing one of the greatest periods of change and upheaval since Americans first started smoking cigarettes before the Civil War." This was the sweeping judgment, as the year 1954 ended, of Lewis Gruber, vice-president in charge of sales for P. Lorillard, one of the "Big Six" tobacco companies which together manufacture more than 98% of the cigarettes sold in America. "Upheaval" is a startling word in the tobacco industry; two years ago it would have been almost unthinkable.

The tobacco industry had its revolution 40 years ago, the revolution which turned it into the *cigarette* industry. The revolution consisted of two fundamental changes in American habits, which began around the time of the first World War: first, a great increase in smoking, especially among women, as the social pressures against it were relaxed; and second, a switch to cigarettes from the older forms of tobacco—pipes, cigars, snuff, and chewing tobacco. This expanding consumer demand, shaped and standardized by a few companies, hoisted cigarettes to a retail position which was simple, secure and gigantic.

Even by the massive standards of the American economy, cigarettes are big business. In 1952—to date, the year of greatest total sales—some 395 billion cigarettes were bought in the United States, an average of 187 packs a year for every American over the age of 15. (Almost 43 billion more cigarettes were sold tax-free, largely to the armed forces.) In this one year, American consumers spent $4,300,000,000 for cigarettes alone.

THE BIG SIX AND THE BIG THREE

Since the 1920s, the cigarette market has been increasingly dominated by a few big companies. In the order of their total sales, the "Big Five" have been: the American Tobacco Company (makers of *Lucky Strike, Pall Mall, Herbert Tareyton*), R. J. Reynolds (*Camel, Cavalier, Winston*), Liggett & Myers (*Chesterfield, L&M, Fatima*), Philip Morris (which, besides its namesake, also makes *Dunhill* and *Parliament*), and P. Lorillard (*Old Gold, Kent, Embassy*). In 1954, Brown & Williamson (*Viceroy, Kool, Raleigh, Wings*) rose to fourth position to make the Big Five the Big Six. The first three—American, Reynolds, and Liggett & Myers—are much the biggest; they account for a whopping 75% of all cigarettes sold in 1954, and are usually grouped in a super-king-size class as the "Big Three."

Each of the big companies won its commanding share of the market with one leader—*Camels, Lucky Strikes, Chesterfields, Philip Morris,* or *Old Golds*. Each of these brands was picked as a "leader" by its manufacturer and the leader got top priority, especially in the company's advertising budget. Each company made a relentless effort to imprint one brand name on the consumer's mind, to make *"Luckies"* or *"Camels"* his sole, automatic response to the idea of "cigarettes." These insistent, "Johnny One-Note" advertising campaigns have been going on for 40 years, and on a very large scale. The cigarette industry spends upwards of 65 million dollars a year on advertising. Among the 20 largest American advertisers have been four tobacco companies, along with such giants as Procter & Gamble, General Motors, General Foods, and Ford. And their advertising paid off; by 1947, the five leading cigarettes held more than 92% of the market. In this "win-or-lose-with one" race, the Big Three entries—*Luckies, Camel,* and *Chesterfields*—came in first, with a combined total of 80% of the market.

In effect, each of the five big companies was selling the American smoker one

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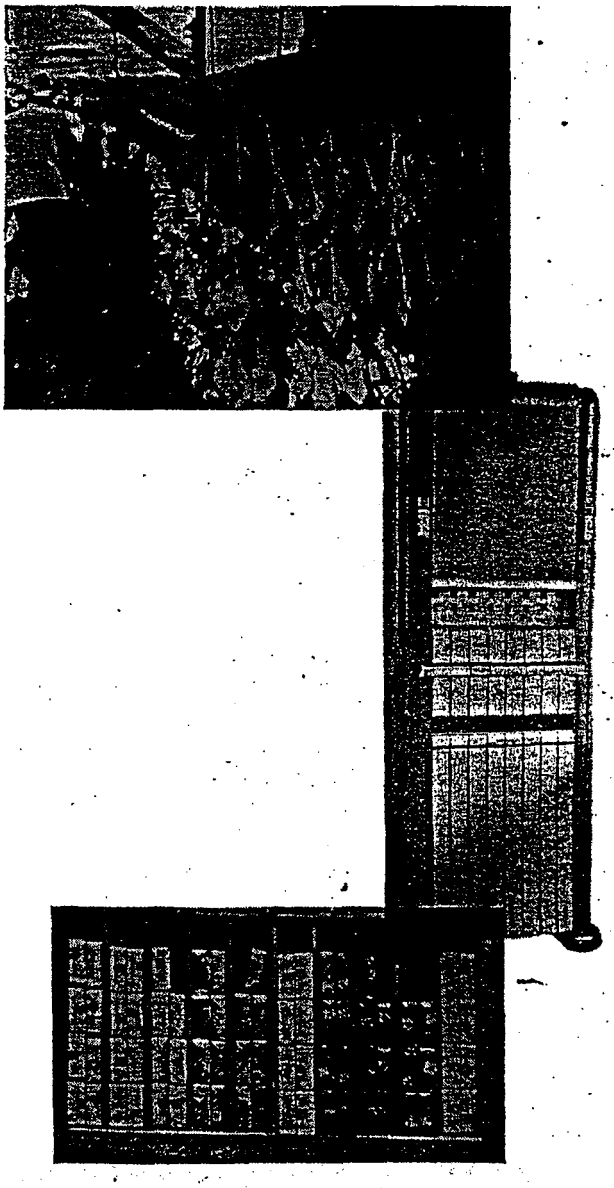
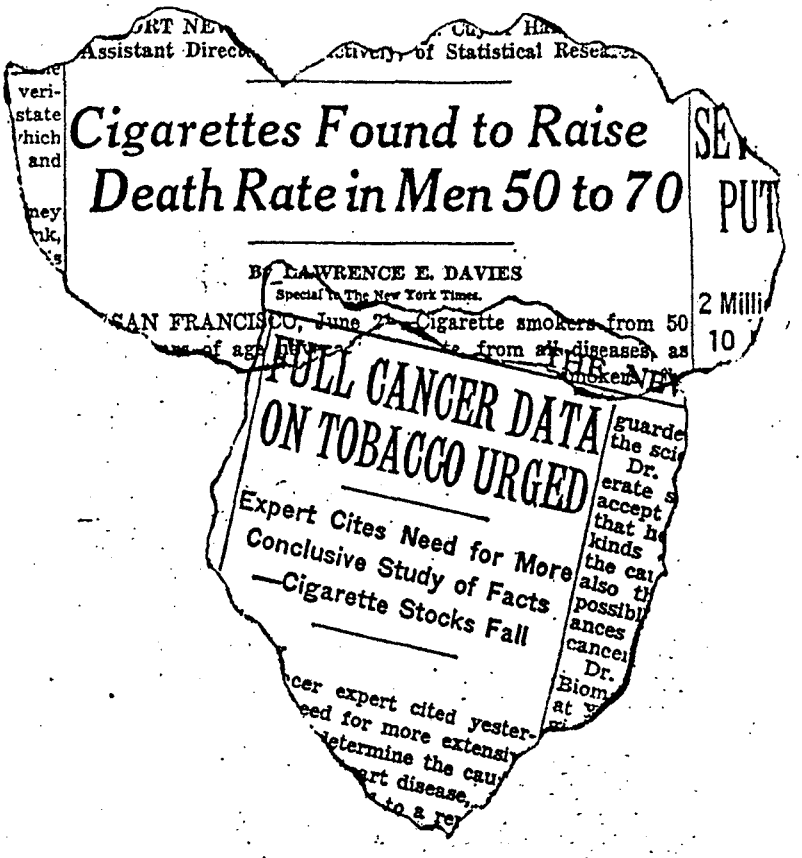


product—and, basically, their five products were the same. In simplifying the cigarette market, the big companies had also standardized it: whatever its name, the "American cigarette" was a plain cylinder of thin paper, 70 millimeters long, filled with a mixture of burley and flue-cured tobacco. Among the five brands there were, of course, differences in the proportion of burley to flue-cured, in the small amounts of Turkish tobacco mixed with this basic filler, in added flavorings, and in "processing." The resulting differences in taste and quality of smoke were supposed to be the basis for the consumer's brand loyalty. It is true that many smokers believe in these "differences," and can describe them, usually in vague terms, though they may frequently contradict each other as to which brand is "mild," which is "strong," which "hurts my throat," etc. Blindfold tests indicate, however, that most smokers cannot tell, by taste alone, whether they are smoking their favorite big-name brand, or another. Nevertheless, the "differences" have been stressed vociferously in big-brand advertising. So simple and standardized a product did not permit any other kind of competition—except, perhaps, in price.

NO PRICE COMPETITION

Despite their almost frantic appeals for public acceptance, however, the big brands have never tried to compete in price. When one of the Big Three has moved its price up or down, the other companies have promptly done the same. In the depths of the depression, smaller tobacco companies launched cut-rate brands (such as *Wings, Avalons* and *Marvels*) which sold at 10¢ a pack—3¢ under the regular brands—and for a brief time in 1932 captured 22% of the market. The big companies, which had raised their prices in 1931, answered this challenge by a uniform price drop. (According to testimony in a successful federal antitrust suit against them, they also bought up the kind of tobacco used in the cut-rate cigarettes and hoarded it.) This solidarity in pricing among the dominant Big Three was condemned by the courts in 1946 as collusion. But prices remained identical. Competition in price was left to the retailers. By reducing their own margin of profit, the small retailers can reduce the price of cigarettes a cent or two per pack. Thus, they can compete—but only against each other. When supermarkets or drugstores cut the prevailing local price, it is almost always by the same amount on all regular brands.

What reason was there, after all, for the big companies to lower their price? There was certainly no resistance by the consumer. The market for cigarettes kept on expanding, despite a series of price hikes, which, in the last 20 years, have raised the price per pack of the big selling brands from 13¢ to 25¢. In fact, it was during this same period of inflation and higher federal cigarette taxes that the industry scored its most spectacular gains. Between 1932 and 1952, the number of cigarettes sold almost quadrupled, and industry spokesmen were confidently predicting sales rises of 4% to 6% a year.



Cigarettes Found to Raise Death Rate in Men 50 to 70

BY LAWRENCE E. DAVIES

SAN FRANCISCO, June 7—Cigarette smokers from 50

FULL CANCER DATA ON TOBACCO URGED

Expert Cites Need for More Conclusive Study of Facts —Cigarette Stocks Fall

At the beginning of 1953, then, the industry seemed to be safe against any upset: 1952 had been the peak year for sales; cigarettes were an "essential" to a vast, and apparently growing, sector of American life; the market was dominated by a few prosperous companies, selling their product at a standard price, and with half-a-dozen brands which bore a comforting resemblance to one another.

What has happened, in only two years, to cause so much concern in the industry? Briefly, three developments of major importance to the consumer:

1 A series of reports which, according to the scientists and statisticians who prepared them, imply that there is a significant association between the rising incidence of lung cancer and the smoking of cigarettes.

2 For two years running, a significant drop in the number of cigarettes sold—the first since 1932; in 1953, cigarette consumption fell by 2.9%, and another drop of about 4.6% is expected to be shown for 1954.

3 A big change-over by smokers from "regular" brands to king-size cigarettes (85 millimeters long), and a marked shift to those with some kind of filter tip.

Since these three developments all took place during roughly the same period of time, the big question is: are they related? The recent "health" attacks on cigarette smoking are evaluated in a special report on pages 67 to 73. The point here is: what effect have they had on the industry —and the consumer?

THE CANCER SCARE

The industry's first reaction came after the publication in December 1953 of the report by Dr. Ernest L. Wynder and Dr. Evarts A. Graham, "Experimental Production of Carcinoma [cancer] with Cigarette Tars." This medical report was quickly "translated" for the public by an outburst of stories in newspapers and such mass-circulation magazines as *Life* and *Time*. On January 4, 1954, a full-page advertisement in 448 newspapers announced the formation of the Tobacco Industry Research Committee to investigate the relation of tobacco to health. The Committee's members were 14 tobacco companies and associations—growers, warehousers, and manufacturers—and included all the Big Six, with the exception of Liggett & Myers. The Committee followed up the ad by naming a scientific advisory council headed by Dr. Clarence Cook Little, founder and director of the Roscoe B. Jackson Memorial Laboratory at Bar Harbor, Maine.

Since then, the TIRC has not been publicly active. Dr. Little's occasional statements have followed the "wait-and-see" line taken in the first ad, namely, that no single cause of lung cancer has been established, and that there is no proof of a cause-and-effect relationship between smoking and lung cancer. In November of last year, the TIRC made its first six grants (totaling $82,000) for research projects involving the composition of tobacco, the physiology of smokers, and other pertinent subjects.

Industry spokesmen have followed the "not proven" line. They imply that the current medical controversy is only the latest in a long series of "health scares" which have blown over in the past. But business and trade journals generally agree that during the last year and a half the cigarette business has received the most damaging publicity in its history. And last November, this was virtually confirmed by one of the Big Three, when E. A. Darr, president of Reynolds, accused the American Cancer Society of attempting "to destroy the tobacco industry."

INDUSTRY HEALTH CLAIMS

The industry does not admit in public that "health" publicity may have caused the unprecedented drop in cigarette sales. But critics close to the industry—for example, in the advertising trade journals—have said flatly that it is fear which is causing Americans to turn away from cigarettes. They also say that the companies themselves are largely to blame. Long before the current medical attacks, the companies were building up suspicion in the consumer by the discredited "health claims" in their ads. For a generation, the companies have been insisting, in big red letters, that their particular brand had "less nicotine," was "less irritating," "guarded against throat scratch," was "safe in your T-zone," and so on, to the outer limits of the copywriter's imagination and the Federal Trade Commission's patience. Such medicine-show claims may have given the smoker temporary confidence in one brand, but they also implied that cigarettes in general were distasteful, probably harmful, and certainly a "problem." When the

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scientists came along with their charges against cigarettes, the smoker was ready to accept them.

SALES TUMBLE

There is no way to determine what lasting effect the recent "health" attacks have had on the consumer. But there is pretty convincing evidence that the Graham-Wynder report made a strong first impression. In January and February, 1954, the first two months after the report was published, cigarette sales went down 9% and 17% below the figures for the same months in 1953. In May and June, however, sales moved up 2% and 8% respectively over 1953. After the American Cancer Society's life-expectancy survey reported by Drs. Hammond and Horn in late June, sales again turned down. All in all, sales were off nearly 4% for the first nine months. That there is uneasiness among American smokers is confirmed by the heavy sale of Herbert Brean's book, "How to Stop Smoking," published by Vanguard Press in 1951. By the end of last year, about 500,000 copies had been sold, 425,000 of them in the paper-backed edition put out by Pocket Books. This sale does not prove, of course, that Americans in large numbers are actually giving up smoking, but it does show that a lot of them are interested in doing so.

THE NEW LOOK IN CIGARETTES

The industry may appear sluggish, or just cautious, in its reaction to the medical attacks, but it has a lot of merchandising fight left, as shown by its quick response to the new consumer demand for king sizes and filter tips. Last year, at least 19 new brands, or new versions of old brands, came on the market. All of these new cigarettes were either king size or filter tip, and 11 of them were both. This is "fast service" indeed for the restless or discontented smoker. It is also good business for the tobacco companies, since the "new look" cigarettes are the growing sector of an otherwise shrinking market.

For the last seven years, the tobacco industry has watched the demand for the Big Three brands—*Camels*, *Luckies*, and *Chesterfields*—steadily contract. In 1947, over 80% of all the cigarettes sold bore these familiar names. By 1953, the Big Three regulars' share of the market had gone down to 58%. This 22% decline meant a loss in retail sales of about a billion dollars.

The decline also made more striking the rise of *Pall Mall*, a king-size cigarette which American Tobacco brought out in 1939 at a "popular" price, and promoted heavily. By 1947, *Pall Malls* had attracted a modest 3.4% of the market. By 1953, the *Pall Mall* share had quadrupled to 12.4%, and this king-size entry had passed both *Old Golds* and *Philip Morris* to become the nation's fourth largest seller. In 1954, *Pall Mall* passed regular-size *Chesterfields* to become the third largest seller.

Although American Tobacco was losing business with its old leader, *Lucky Strike*, it was more than regaining it on *Pall Mall* and another king size, the cork-tipped *Herbert Tareyton*. This new way to balance sales did not escape the notice of rival companies, all of whom put out longer smokes of their own—*Cavalier* (Reynolds), *Fatima* (Liggett & Myers), *Dunhill* (Philip Morris), and *Embassy* (Lorillard).

MORE KINGS APPEAR

Three years ago, Liggett & Myers made another concession to the king-size demand. It offered *Chesterfield* smokers a choice between king size and regular size, under the same brand name. The king-size *Chesterfields* were marketed as merely a longer version of the old cigarette, in the familiar white and gold package. In 1953, three other old favorites also appeared in the "new look"— *Philip Morris*, *Old Gold* and *Raleigh*. *Raleigh* smokers were given no choice about going king size; the regular-length *Raleigh* was taken off the market.

Clearly, the number of smokers who want king size is growing—whether it is because they feel they are getting more health protection, a more "distinguished" look, or just a longer smoke for their money. In 1953, the year when total cigarette sales first fell, extra-length brands had grown to almost 26% of the market, as against 18.5% in 1952. Last year, the figure jumped again, to an estimated 30%.

The king-size conversion has been gathering momentum for some time, but with the impact of cancer fears, the change to filter tips was abrupt, a real "rush." In 1952, only 1.4% of the cigarettes sold were filter-tipped; in 1953, the number more than doubled, to 3.4%; when the returns for 1954 are in, experts estimate that the filter brands will have 10%, and possibly 12%, of the total market. Lorillard's Lewis Gruber flatly predicts that within two more years, 40 of every 100 smokers will be smoking filtered cigarettes, most of them king size.

WHAT IS A FILTER TIP?

What is this "revolutionary" product? It is simply a cigarette in which about one-half inch of the butt has been filled with a filtering substance instead of tobacco. Most of the filters are made of finely creped (crinkled) paper, absorbent cotton, and cellulose-acetate fibers, either alone or in combination. Some have added "purifying agents," such as *Herbert Tareyton's* activated charcoal, and *Kent's* patented Micronite, an asbestos-like substance.

Filter cigarettes are not new; they have been on the American market for some time in *Parliament* and *Du Maurier*, which sold at a premium price (32¢ or more

Continued on next page

CHANGES IN THE CIGARETTE MARKET

The tables on the facing page show how the cigarette market has changed in two years. The halftone areas backing the tables show the trend, not exact percentages: the figures for 1954 include estimates for the last months of the year and do not distinguish between regular- and king-size filter-tip brands

SALES OF CIGARETTES

1952

REGULAR SIZE: 81.56% OF THE MARKET

	BILLIONS OF CIGARETTES	% OF MARKET
CAMEL (R. J. Reynolds)	113.7	26.0
LUCKY STRIKE (American Tobacco)	82.2	18.8
CHESTERFIELD (Liggett & Myers)	65.8	15.1
PHILIP MORRIS (Philip Morris)	40.4	9.2
OLD GOLD (P. Lorillard)	23.6	5.4
KOOL (Brown & Williamson)	11.5	2.6
RALEIGH (Brown & Williamson)	8.3	1.9
DOMINO, YORKSHIRE (Larus & Bro.)	2.6	0.6
MARLBORO (Philip Morris)	0.5	0.1
PIEDMONT, SPUR (Liggett & Myers)	0.2	0.05
VIRGINIA ROUNDS (Benson & Hedges)	0.06	0.01
EXPORT BRANDS (Brown & Williamson)	5.3	1.2
ALL OTHERS	0.9	0.2

KING SIZE: 17% OF THE MARKET

PALL MALL (American Tobacco)	45.5	10.4
HERBERT TAREYTON (American Tobacco)	12.8	2.9
CHESTERFIELD (Liggett & Myers)	8.5	1.9
FATIMA (Liggett & Myers)	3.0	0.7
CAVALIER (R. J. Reynolds)	1.3	0.3
DUNHILL (Philip Morris)	1.0	0.2
EMBASSY (P. Lorillard)	0.8	0.2
WINGS (Brown & Williamson)	0.7	0.2
REGENT (Riggio Tobacco)	0.55	0.1
HOLIDAY, LORDS (Larus & Bro.)	0.5	0.1

FILTER TIP: 1.3% OF THE MARKET

VICEROY (Brown & Williamson)	2.7	0.6
PARLIAMENT (Benson & Hedges)	1.66	0.4
ENCORE (United States Tobacco)	0.7	0.2
KENT (P. Lorillard)	0.5	0.1

1954

REGULAR SIZE: 63.22% OF THE MARKET

	BILLIONS OF CIGARETTES	% OF MARKET
CAMEL (R. J. Reynolds)	89.8	22.3
LUCKY STRIKE (American Tobacco)	65.2	16.2
CHESTERFIELD (Liggett & Myers)	42.0	10.4
PHILIP MORRIS (Philip Morris)	24.8	6.1
OLD GOLD (P. Lorillard)	15.6	3.9
KOOL (Brown & Williamson)	12.1	3.0
SANO (United State Tobacco)	0.4	0.1
MARLBORO (Philip Morris)	0.3	0.07
EXPORT BRANDS (Brown & Williamson)	4.5	1.1
ALL OTHERS	0.2	0.05

KING SIZE: 27.06% OF THE MARKET

PALL MALL (American Tobacco)	54.5	13.5
CHESTERFIELD (Liggett & Myers)	15.5	3.8
HERBERT TAREYTON (American Tobacco)	11.3	2.8
PHILIP MORRIS (Philip Morris)	8.2	2.0
RALEIGH (Brown & Williamson)	6.5	1.6
OLD GOLD (P. Lorillard)	5.0	1.2
CAVALIER (R. J. Reynolds)	4.1	1.0
DOMINO, YORKSHIRE (Larus & Bro.)	2.3	0.6
FATIMA (Liggett & Myers)	1.0	0.25
DUNHILL (Philip Morris)	0.4	0.1
EMBASSY (P. Lorillard)	0.3	0.07
REGENT (Riggio Tobacco)	0.3	0.07
HOLIDAY, LORDS (Larus & Bro.)	0.2	0.05
WINGS (Brown & Williamson)	0.1	0.02

FILTER TIP: 9.64% OF THE MARKET

VICEROY (Brown & Williamson)	14.9	3.7
L&M (Liggett & Myers)	7.7	1.9
WINSTON (R. J. Reynolds)	7.5	1.9
KENT (P. Lorillard)	2.5	0.6
PARLIAMENT (Philip Morris)	2.3	0.6
HERBERT TAREYTON (American Tobacco)	1.5	0.4
MARVEL (Stephano Bros.)	1.5	0.4
OLD GOLD (P. Lorillard)	0.5	0.1
REGENT (Riggio Tobacco)	0.1	0.02
ENCORE (United States Tobacco)	0.1	0.02

Statistics reprinted from Printers' Ink, *December 31, 1954.*

a pack in New York City, where regular brands have been selling at 24¢ to 25¢), and which took a distinctly ritzy tone in their ads. As long ago as 1936, Brown & Williamson introduced the regular-size filter-tip *Viceroys*, at only a cent or two above the price of regular brands. *Viceroys* and *Parliaments* divided most of the insignificant filter-tip market until 1952. Then Lorillard offered *Kents*, a premium-priced filter-tip which was promoted and distributed with big-brand energy. The Big Three made its first entry into the filter market in 1953, when Liggett & Myers launched *L&Ms*, also at a premium price.

THE FILTER BAND WAGON

The other big companies, which had stood aloof from this "small-time" market, suddenly joined in the scramble last year. In March, Philip Morris bought out Benson & Hedges—and its successful filter-tip brand, *Parliaments*. A month later, Reynolds started off with an exclusive king-size filter-tip *Winston*, which was described in ads as "made by the makers of *Camels*," an appeal to old brand loyalties. Finally, in August, American Tobacco took the field with a filter version of its king-size *Tareyton*, in the same white package, but distinguished by thin red and blue stripes across the lower left corner. Both these new filter tips sold at 26¢, the "popular" price for filter-tips.

Filters have restored price-competition to the industry, if only temporarily. In March, the price of *L&M* was cut by 4¢, dropping both the regular and new king-size style out of the premium class and into the popular arena. *Kent*, which Lorillard says can never compete on the lower price level because of the high cost of its Micronite filter, went to king size. Some observers thought this was indirect price competition, as well as an invitation to smokers of king-size brands. *Parliaments*, another premium product, showed its sensitivity to the price factor in September by cutting the price on its king size by 2¢.

THE PRICE OF FILTERS

Price competition thus far has not brought filter-tips down to the price level of regulars and some king sizes. "Popular price" for filter-tip brands still means around 26¢, a cent or two more than the "popular price" for plain cigarettes. Leaf tobacco accounts for about half the cost of a cigarette, and it is doubtful that the material in the average filter costs any more than the tobacco it replaces. Putting the two elements—filter and tobacco—together in one cigarette, however, is a more complicated process. (The trade magazine *Sales Management* reports that Lorillard had to import machinery from Europe to produce the first *Kents*.) Also, the industry claims the production machinery for filter cigarettes is slower and more subject to mishaps. One big-company executive says that a regular machine can turn out around 1200 cigarettes a minute, but that he has yet to hear of a filter-tip machine doing better than 750.

Though the cigarette companies have subdued the scare-head health advertising of the regular brands (the ads no longer proclaim that "more doctors smoke *Camels*" but rather that "*Camels* agree with more people than any other cigarette"), in their filter-tip advertising, they seem to be working both sides of the street lest the smoker feel that in protecting his health, he will not enjoy smoking. Thus *Tareyton's* filter "holds back elements that can detract from the pleasure of smoking," and *Old Gold Filter Kings* proffer "a treat you can trust." *Winston* "the filter cigarette with flavor . . . tastes good—like a cigarette should."

The Federal Trade Commission has been trying for years to temper the more blatant assertions of the cigarette advertisers, but if there has been any recent amelioration, it has been the result of the industry "upheaval" rather than of legislative or judicial action. In late 1952 and early 1953, the courts rejected FTC's claim that cigarettes should come under the Federal Trade Commission Act. In September 1954, the FTC tried a different tack and submitted to the cigarette companies a draft code of advertising standards. This code would be entirely voluntary and without the force of law. But though meetings have been held to discuss it, no cigarette manufacturer has yet indicated his willingness to accept even this dilute regulation.

HOW TO SELL CIGARETTES

Such, then, is the "upheaval"; where does it leave the huge cigarette industry at the beginning of 1955?

Cigarettes are still the major product of the industry. Some of the medical reports which condemn cigarettes also tend to exonerate pipes and cigars, but thus far there has been only a minor rise in the sale of these two forms of tobacco. In the near future, the companies must make up their losses on regular brands with increased sales of filter-tipped and king-size brands.

The manufacturers must get their new products in front of as many consumers as possible, as quickly as possible. Distribution of a number of brands can be costly, and difficult. Retailers complain at the extra space for new brands which must be found on their crowded shelves and counters, at the extra bookkeeping, at the extra dollars tied up in their inventories of slow-selling items. Space is also a major problem for the estimated 500,000 cigarette vending machines in the United States. Heretofore, most vending machines had ten columns, and could sell, at most, ten different brands. To offer their customers even a minimum sampling of the present array, the vendors have to install two machines in one location, or else invest in the new 20-column type. Differences in price are also a problem for the machine distributors, since the machines can be paid only in standard coins.

The consumer's taste is changing fast, and no manufacturer can be sure what direction it will take. In 1953, 21 brands were listed as "significant" (that is, as selling over a billion cigarettes a year); by July 1954, the number had gone up to 30. Each company will have to make hard decisions on which of its brands to push, which to modify, and which, perhaps, to discard. The industry seems to feel that already there are too many varieties on the market to survive, and that a "weeding out" is inevitable.

Medical Aspects

A survey of current medical knowledge on the relationship between the smoking of cigarettes and cancer of the lung

Every year for about 30 years the frequency of cancer of the lung as a cause of death has progressively increased. Today many serious medical investigators are convinced that the increase in frequency of lung cancer is closely related to the smoking of cigarettes. The concern with cigarettes as a medical problem has called forth other research to determine the relation between smoking and heart trouble; smoking and peptic ulcer; the particular ingredients in tobacco which may be harmful; the extent to which cutting down on tobacco intake will diminish the risk of disease; and the psychological and physiological effects of the tobacco habit. But it is the relation between cancer of the lung and smoking which has stirred up the most controversy.

Regular cigarette smoking is believed by such leading American surgeons as Dr. Evarts Graham and Dr. Alton Ochsner, by investigators and physicians in medical schools and health departments, and by the American Cancer Society, to be an important or major factor contributing to the development of cancer of the lung. Many physicians in private practice are apparently convinced that the relation between regular cigarette smoking and cancer of the lung is now proved. They have discontinued their own cigarette smoking and also advise their patients to cut out or cut down their smoking.

The tobacco industry has met the challenge in part by setting up a medical research program of its own, headed by Dr. Clarence Cook Little of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine. This project is still too new to have yielded any significant data, and its formation has been criticized as resembling burglar-financed research toward the perfection of a crackproof safe. However, several independent criticisms of the cigarette theory of lung cancer have been advanced by outstanding investigators, the foremost being Dr. W. C. Hueper, Chief of the Environmental Cancer Section of the National Cancer Institute in Bethesda, Maryland. Dr. Hueper and some other experts regard the evidence linking lung cancer and cigarette smoking as insufficient or contradictory, and the theory generally as not proven.

No one has claimed that regular cigarette smoking is *the* cause of lung cancer. Many factors or "causes" can operate to produce cancer. Many "carcinogens"—cancer-producing agents—pervade our environment. Those who consider smoking an important or major factor contributing to the development of cancer of the lung say merely that tobacco smoke inhaled into the lungs is one of the carcinogens and possibly the most important.

Since World War I thoracic surgeons and physicians specializing in diseases of the lung have been impressed by the frequency with which they have encountered cancer of the lung among patients who gave a history of heavy cigarette smoking. When this association between smoking and lung cancer became so common that it could no longer be ignored, and when statistics indicated that cancer of the lung was becoming a leading cause of death in men, groups of investigators in the United States, England and other countries began to study 1) whether the increase in the frequency of lung cancer was real or apparent, and 2) whether its association with regular cigarette smoking was more than coincidence.

Prior to 1900, cancer of the lung was infrequently recorded in post-mortem studies and even more rarely diagnosed during life. After 1900, with the increasing use of chest X rays and the bronchoscope, cancer of the lung began to be diagnosed

Continued on next page

cigarettes MEDICAL ASPECTS

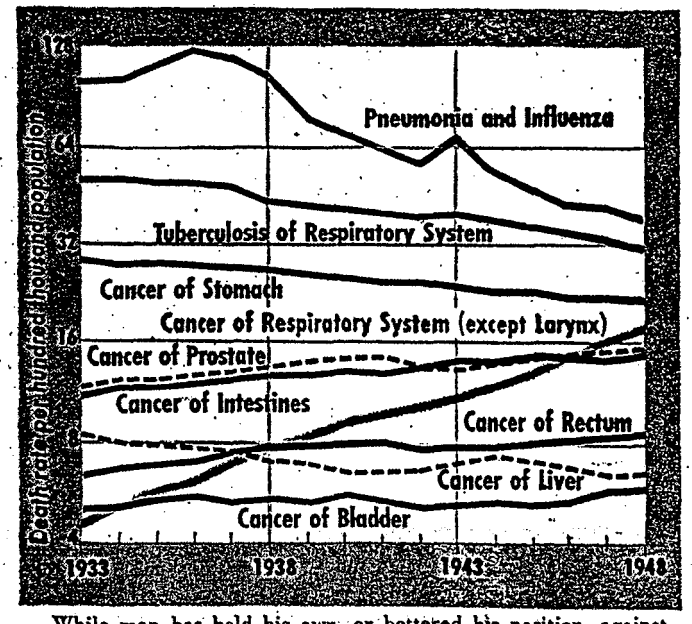
more frequently and to be observed more regularly in post-mortems. Although the progressive increase in the incidence of cancer of the lung has not been the same in different countries, the disease is now recognized as a leading cause of death on all continents and in every country, or at least wherever there are adequate diagnostic and pathological facilities and where vital statistics are gathered.

Some doctors argued at first that the increase in reported cases of cancer of the lung merely reflected an improvement in diagnostic techniques. But the recorded increase in cancer of the lung is greater in males than in females (from two men for every woman in 1933 to 1936 to an estimated ten for one today), and it is hard to believe that physicians are better able to diagnose lung cancer in men than in women.

THE INCREASE IN LUNG CANCER

During 1951, nearly 20,000 deaths in the United States were attributed to cancer of the lung—1.3% of all deaths during that year, and 9.2% of all deaths charged to cancer. According to Dr. Charles Cameron, medical director of the American Cancer Society, "Cancer of the lung is showing the most rapid increase ever ascribed to any non-infectious disease in medical history." Since cancer of the lung usually starts in the surface lining of the bronchial tubes of the lung, the carcinogens must be those that are inhaled into the bronchial tubes and lungs. Among suspect inhaled materials are industrial fumes; industrial and domestic soot derived from coal and fuel oil furnaces; exhausts from internal combustion machines (gasoline and diesel); asphalt or bituminous road surface dust; and tobacco smoke. All these materials are believed to have cancer-inducing properties.

DEATH RATES FOR SELECTED DISEASES AMONG WHITE U. S. MALES



While man has held his own, or bettered his position, against many fatal diseases, lung cancer deaths have risen sharply

THE SEARCH FOR CAUSES

Up to this point there is no disagreement among the health experts. The controversy starts when doctors estimate the relative importance of these environmental materials in causing cancer of the lung. The conflicting reports so far released have been based on animal experiments, on medical studies in human beings, and on statistical analyses.

The cancer-inducing effects of industrial and other air pollutants have been studied experimentally in laboratory animals. These experiments have yielded conflicting data, particularly because of the difficulty of finding animals which develop lung tumors comparable to those in man. Experiments with the smoke of tobacco and cigarette paper have also yielded inconclusive data. One group of experiments showed that benzpyrene, a chemical long known for its carcinogenic effects, is not only present in the smoke from cigarette paper, but can actually cause cancer of the lung in certain strains of mice. This report has been highly publicized especially by those who would like to see the cancer onus removed from tobacco itself.

In general, animal experiments have been of doubtful value to investigators of human lung cancer. Dr. Cameron says: "The problems of carcinogenesis [origin of cancer] . . . are extremely complex and far from understood as yet. What will cause cancer in one species will not necessarily cause it in another. What will cause cancer in one tissue of a given animal will not necessarily cause it in another tissue of the same animal. Thus it is conceivable that tobacco smoke does contain an agent which is carcinogenic for the lungs of human beings. It may not be so for the lungs or any other tissue of a mouse, or a guinea pig, or a dog. Here it is appropriate to point out that no one has ever succeeded in producing cancer in an experimental animal with chromium or any chromium-containing compounds, yet the statistical evidence that chromates can cause cancer of the lung in workers occupationally exposed to them is conceded by everyone."

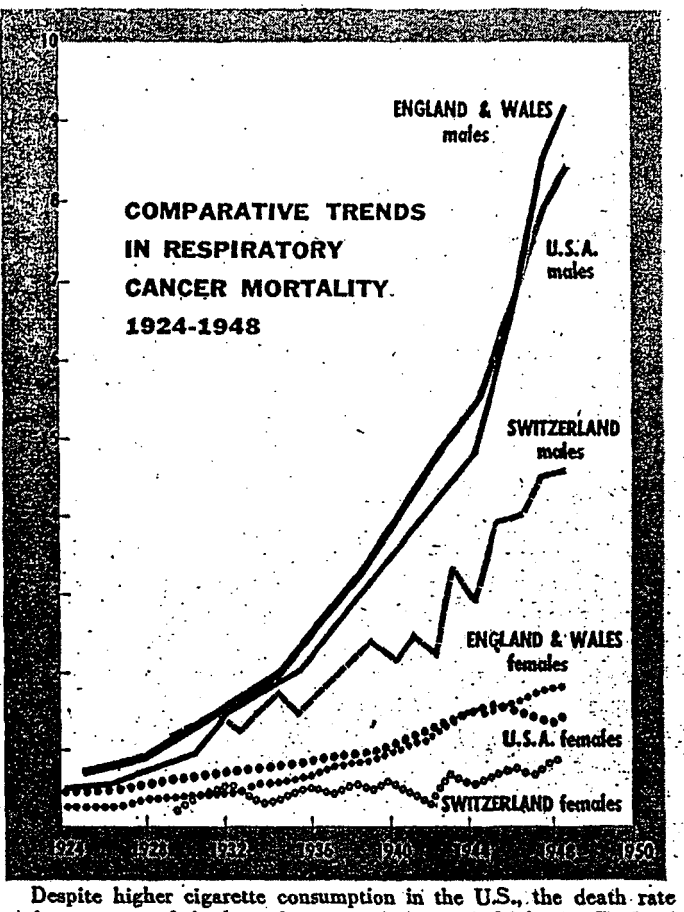
STATISTICAL EVIDENCE

Since actual experimentation on living human beings is ruled out by the nature of the disease, researchers have fallen back on a technique known in public health as "epidemiology." Broadly speaking, epidemiology deals with the mass behavior of all diseases, not just acute epidemic infectious diseases. Statistical evidence is always a very important part of the study of the epidemiology of a disease. According to Dr. Leonid S. Snegireff, Associate Professor of Cancer Control of the Harvard School of Public Health: "The epidemiologist often finds puzzling situations which he can solve by applying epidemiological principles without first knowing all the detailed pieces of the puzzle. For example, experience with many diseases shows that exact knowledge of the specific agent which causes a given disease process is not essential for the achievement

of effective control over morbidity and mortality in a particular disease." Thus, to cite a few examples, the last major cholera epidemic in Great Britain was brought under control in 1866 by appropriate measures of sanitation and purification of water supply—17 years before Dr. Koch isolated the cholera vibrio germ. The precise cause of rheumatic fever is not known, yet there are effective measures for controlling the disease. The precise cause of dental caries is not known, yet there is no doubt that fluoridation of the water supply can help control the disorder. It is not necessary to await the isolation and identification of all the carcinogenic agents in our environment, to point the way to halt the rapid increase in the mortality from cancer of the lung. Of all possible environmental carcinogens, tobacco smoke is one of the few that the individual can control. According to Dr. Morton Levin, Assistant Commissioner for Medical Services of New York State and a leading student of the epidemiology of cancer of the lung, "There is already more than enough evidence incriminating cigarette smoking to justify advising the public to stop smoking cigarettes as a means of lowering the incidence of lung cancer" (Problems in the Study of Occupation and Smoking in Relation to Lung Cancer, Drs. Morton L. Levin et al. October 11, 1954). This point of view is shared by others, here and abroad.

What is the statistical evidence of a causal relationship between smoking and cancer of the lung? Since 1950 more than a dozen independent studies have reported a disproportionately high percentage of heavy cigarette smokers among lung cancer patients. Most of these studies are what is known as "case-history" or "retrospective" studies. The tobacco intake of patients in whom cancer of the lung has already been diagnosed is compared with that of control groups (non-cancer patients) representative of the population from which the cancer patients were drawn. All these studies have been interpreted as demonstrating a greater liability to cancer of the lung in regular cigarette smokers, to cancer of the lip in regular pipe smokers, and to cancer of the mouth in regular cigar smokers—a liability that increases with the quantities smoked.

Because of certain weaknesses in the design of retrospective or case-history studies, the American Cancer Society, the British Research Council and individual investigators have also undertaken statistical studies by the "prospective" or "population" method. Preliminary reports of the studies of the American Cancer Society and the British Medical Research Council are available and they confirm in their broad features the results of the case-history studies. From all these studies, says Dr. Alexander G. Gilliam of the National Cancer Institute, "It may now . . . be regarded as an established fact that white, male cigarette smokers in England and the United States suffer a substantially greater risk to cancer of the lung than non-smokers. The evidence from other countries is less convincing and complete and no substantial data bearing directly on this question are yet available for non-white population or for female population." However, according to Dr. Hueper, a world-renowned authority on environmental carcinogens, "the cigarette theory is almost entirely based on statistical data having at best circumstantial value and being in part of questionable origin." (Address before American Pharmaceutical Manufacturers Association, December 10, 1954.)



Despite higher cigarette consumption in the U.S., the death rate from cancer of the lung, larynx, and sinuses is higher in England

In support of the cigarette smoke thesis it is stated that both in England and in the United States an increase of per capita cigarette consumption, particularly by men, has generally paralleled the trend of mortality in cancer of the lung. This evidence is, however, disputed by Dr. Hueper and others. Dr. Hueper points out that the age-adjusted rate of increase in the frequency of lung cancer deaths was greater between 1914 and 1930 than between 1931 and 1944. He believes that the rapid increase in cigarette smoking during the Thirties and Forties should have given the later period a greater increase in lung cancer fatalities if cigarette smoking were a significant factor.

Women as a group did not begin to smoke cigarettes regularly until well after World War I. Since then there has been a relatively greater increase in smoking by women than by men, but the relative increase in lung cancer has

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been far greater in the male. This inconsistency in the cigarette hypothesis has been "explained" on the basis of sex differences in susceptibility to cancer of the lung. However, Dr. Hueper's studies of lung cancer in different countries show different ratios of women to men subjects with lung cancer. It seems most unlikely, says Dr. Hueper, that such differences can be attributed to fluctuations in intensity of any one single factor, such as cigarette smoking. It seems more plausible, says Dr. Hueper, to attribute the sex differences in cancer of the lung to differences in exposure to carcinogens present in air polluted with industrial wastes, gasoline fumes, etc., with which men have more daily contact than women.

Dr. Hueper contends that a real and progressive increase in lung cancer began to be noted in most industrial countries at the turn of the century *before* cigarette smoking had become an important habit. The progressive increase in lung cancer has continued in all industrialized countries, but the rate has varied in different countries, states, provinces, communities and population groups. These differences in the incidence of the disease cannot, Dr. Hueper says, be explained by the degree and spread of the cigarette habit. It *can* be more reasonably explained, he says, by a study of the growth of industry and transportation in different countries and by an analysis of the multitude of carcinogenic agents released into the air. Carcinogenic materials are believed to be present in effuents of domestic and industrial furnaces, exhaust of gasoline and diesel engines, dust from rubber tires and asphalted and oiled roads —in other words, in the air breathed by residents and workers in urban-industrial regions. Thus the marked and growing predominance of males among lung cancer victims could be traced to the following factors:

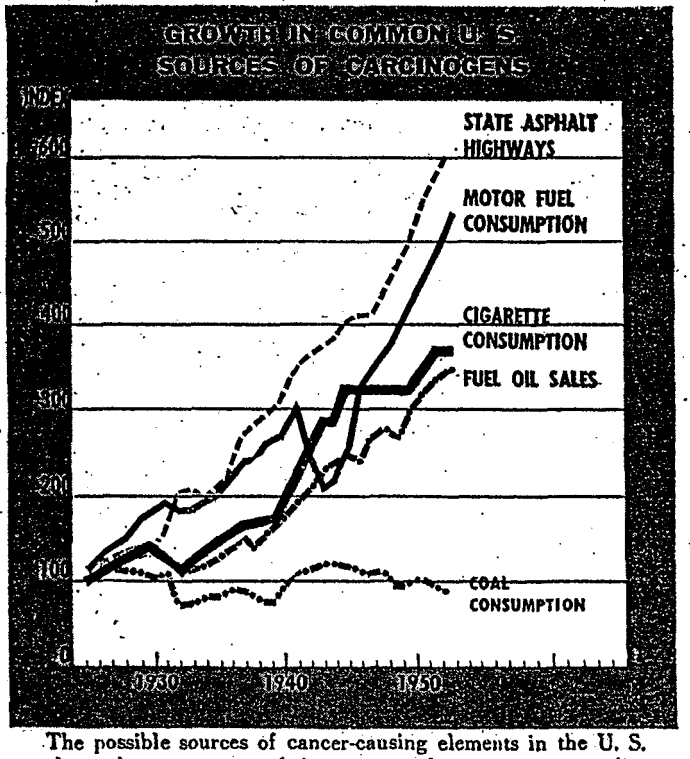
1 Males are more extensively employed than females in occupations where known or suspected atmospheric carcinogens are produced and used, and they work in such jobs more consistently over longer periods of their lives.

2 Males predominate in outdoor occupations, especially in urban areas, where they are exposed to carcinogenic pollutants contained in the general atmosphere.

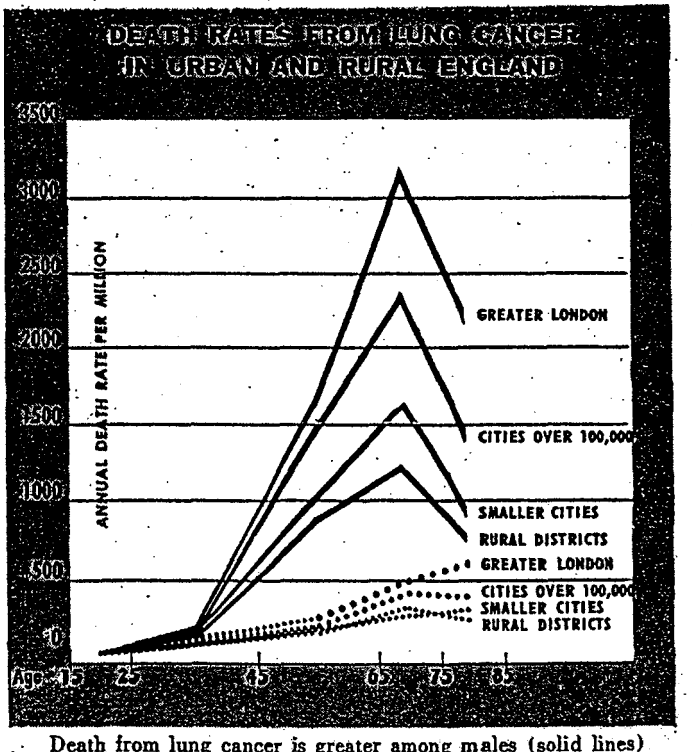
3 Males far more often than females perform heavy physical labor requiring deep and rapid breathing, and consequent greater penetration of air pollutants into the lungs.

4 Males more often than females work through the entire span of their occupational lives within urban areas with proven carcinogenic atmospheric pollution, while females tend to remain in the cleaner residential areas.

All studies have shown a remarkable drop in lung cancer incidence when the researchers turn from urban-industrialized areas to rural districts. English studies as well as those of Drs. Hammond and Horn of the American Cancer Society explain these differences on the ground that cigarette smoking is more common among urban than among rural residents. Dr. Hueper and others, however, believe



The possible sources of cancer-causing elements in the U. S. show the same sort of increase as lung cancer mortality



Death from lung cancer is greater among males (solid lines) than females (dots) and in the city than in the country (1950)

that urban air—polluted with carcinogens derived from industry, transportation, etc.—is the greater villain.

LUNG CANCER IN INDUSTRIAL WORKERS

Dr. Hueper has shown that the incidence of lung cancer is highest among certain industrial workers, especially those in non-ferrous metals, transportation, rubber and plastics, iron and steel. Many industrial workers are exposed to fumes and vapors of chromium, nickel, arsenic, coal tars, petroleum oils, furnace soot and mineral pigments; all of which have known carcinogenic properties.

The English lung cancer rate is considerably higher than of the United States, although the English smoke 30% fewer cigarettes per capita than Americans. This observation, which appears to undermine the cigarette theory, has been argued away on the assumption that Americans do not smoke cigarettes to the very end, while the English, for economic reasons, do. A group of Austrian doctors has pointed out that lung cancer mortality is at different rates in Upper Austria, Kaernten, Steirmark, and Tirol, although the four provinces show approximately the same per capita consumption of cigarettes. The doctors suggest that the high lung cancer mortality among the people living along the northern slope of the Alps may be related to climatic-atmospheric conditions such as winds bringing the industrially polluted air of Vienna into the valleys of the northern alpine regions. Similar observations have been reported on the possible role of prevailing winds in altering the relative frequency of lung cancer in different areas of the English Midlands. The Austrian doctors, moreover, found that lung cancer mortality rates in communities located along main highways, where the atmosphere was polluted with exhaust fumes and dust from asphalted roads, were double those of villages and towns far away from heavy traffic.

Few proponents of the cigarette smoke theory will claim that all the differences between town and country can or need be explained on the basis of differences in cigarette smoking. They agree that urban residence imposes a more sustained and intense exposure to atmospheric pollutants, and that some of these pollutants might of themselves induce the disease. Should the present population studies in England and America demonstrate that the relative risk of cancer of the lung is substantially greater in rural smokers than in rural non-smokers, and that the absolute risk in rural non-smokers of the two countries is the same, then the cigarette hypothesis would be very greatly strengthened.

According to Dr. Gilliam, another question that must be answered by current studies is why there is so much variation in the incidence of cancer of the lung in different large cities of 100,000 or more population. "It is difficult to believe," says Dr. Gilliam, "that smoking habits in our large cities are sufficiently different to account for variations of this magnitude."

It is hoped that these and other questions will be answered, at least partly, by population and other studies presently in progress.

At this time, one cannot take issue with the statement of the Board of Directors of the American Cancer Society that "available evidence indicates an association between smoking, particularly cigarette smoking, and lung cancer. . . ." However, it has not yet been established that this association is more significant than the parallel association of lung cancer with atmospheric pollution. Exposure to atmospheric pollution can be controlled only by vigorous community action. Smoking, however, is a factor over which the individual can exercise personal control.

In February 1954, in written reply to a question asked in the British House of Commons, the Minister of Health stated:

> "The Standing Advisory Committee on Cancer and Radiotherapy had been considering the relationship between smoking and lung cancer for three years. As a result of preliminary investigations, a panel under the chairmanship of the Government Actuary was set up in 1953. The committee, having considered the report of the panel and reviewed the other evidence available, were now of opinion:
>
> 1. It must be regarded as established that there is a relationship between smoking and cancer of the lung.
> 2. Though there is a strong presumption that the relationship is causal, there is evidence that the relationship is not a simple one, since:
>
> (a) the evidence in support of the presence in tobacco-smoke of a carcinogenic agent causing cancer of the lung is not yet certain;
>
> (b) the statistical evidence indicates that it is unlikely that the increase in the incidence of cancer of the lung is due entirely to increases in smoking;
>
> (c) the difference in incidence between urban and rural areas and between different towns, suggests that other factors may be operating—e.g., atmospheric pollution, occupational risks.
>
> 3. Although no immediate dramatic fall in death rates could be expected if smoking ceased, since the development of lung cancer may be the result of factors operating over many years, and though no reliable quantitative estimates can be made of the effect of smoking on the incidence of cancer of the lung, it is desirable that young people should be warned of the risks apparently attendant on excessive smoking. It would appear that the risk increases with the amount smoked, particularly of cigarettes."

Although "excessive" smoking is usually defined as more than one pack a day, susceptibility to the effects of tobacco varies widely. A half pack may be excessive for one person and moderate for another.

THE BRITISH ANSWER

It is interesting to note in passing how the British tobacco companies have met the challenge of lung cancer. Instead of setting up their own study, they have offered about $700,000 to the British Medical Research Council, the leading medical body in the country, to develop an objective research program on the relation between lung cancer and environmental carcinogens.

If there is doubt as to whether regular smoking is a major contributory cause of cancer of the lung, there is none about the causal relation between smoking and "chronic

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bronchitis" or "cigarette cough." This is a cough which tends to be worst when one rises in the morning and often produces a considerable amount of thick sputum. Such a cough, of course, is not necessarily due to smoking. Persons with a chronic cough should have a physical examination and chest X ray. *Every* adult should have a chest X ray at least once a year; heavy smokers should have chest X rays twice a year. Other tests, such as bronchoscopy and cytological smear studies of the sputum, are often recommended by physicians when the patient reports spitting blood; suffers repeated attacks of "pneumonia"; or experiences delayed healing of "pneumonia."

EFFECTS ON OTHER ORGANS

At a conference at Cornell Medical Center (December 1953), Dr. Graydon Boyd, specialist in diseases of the nose and throat and Associate Professor of Surgery at New York University Medical School said, apropos the effects of smoking on the nose and throat: "I think as far as prevalence of symptoms is concerned there are more in the nose and throat than from any other effect of tobacco. Of 18 leading otolaryngologists interviewed prior to this meeting, 100% believed tobacco smoking to be irritating to nose and throat." Smoking is also believed to have a close relation to chronic laryngitis and larynx tumors.

Smoke not only irritates the respiratory tract; it contains chemicals that can affect other organs by toxic and possibly by allergic effects. The most important of these chemicals is nicotine, which acts on the nervous system in a variety of ways. One effect appears to be a tranquilizing action on the higher nervous centers. Nicotine also has important effects on the blood vessels and the heart. Patients with Buerger's disease (thrombo-angiitis obliterans) must give up smoking of any kind—cigarette, cigar, or pipe—if they are to avoid gangrene. Even a single cigarette can produce a recurrence or an aggravation of the disease. Even if smoke is not inhaled and the nicotine therefore not absorbed from the lungs, much of it is absorbed from the mouth. The effect of smoking on Buerger's disease may be due to the capacity of nicotine, absorbed from smoke, to cause spasm or constriction of the walls of the blood vessels; or to an allergic sensitivity of the person to some ingredient of tobacco. Many doctors also prohibit smoking of any kind in ordinary arteriosclerosis of the vessels of the extremities; in eye disorders associated with spasm of the blood vessels of the retina, and in Raynaud's disease, a disorder in which there is intermittent impairment of circulation in the fingers or toes. Smoking tends to cause a constriction of the blood vessels in many people but it is not known how much of this effect is due to the toxic action of nicotine; how much to allergy to tobacco products; and how much to nerve reflexes induced by smoke in the mouth and the lungs.

Smoking has also been known to cause extra heart beats and rapid heart beat. How harmful these toxic side effects are, can be determined only by the physician.

Some physicians believe that smoking has a harmful effect on the coronary arteries of the heart and can aggravate coronary artery disease—today the greatest killer of Americans. Their view received unexpected support from the population studies of the American Cancer Society. Drs. Hammond and Horn of the Society, reported that in their study of 187,000 men between the ages of 50 and 69, heavy smokers had a death rate from coronary artery disease twice as high as men who had never smoked. "Even light cigarette smokers were somewhat affected. On the other hand, cigar and pipe smoking seemed to have little or no influence on death rates from the disease." These findings, if confirmed, may mean that cigarette smoking imposes an added burden on the coronary artery circulation and the work of the heart. An alternative explanation is that nervous or psychological factors which predispose to the use of tobacco aggravate existing coronary artery disease.

Some physicians believe that *moderate* smoking has no adverse effect on the normal heart or on coronary artery disease. In December, 1954 the Board of Directors of the American Heart Association, cognizant of the importance of the problem and the paucity of reliable data, approved the following statement relating to this subject: "The American Heart Association is seriously interested in any possible relationship between smoking and heart disease. A committee is currently studying the problem. As soon as clear evidence is available a statement will be forthcoming."

DO FILTERS PROTECT?

Manufacturers of filter-type cigarettes have implied in their advertising that such cigarettes add a safety factor, protecting smokers from the effects of nicotine, tar and other materials in smoke. According to Dr. Irving S. Wright, past president of the American Heart Association and a leading authority on vascular—heart and blood vessels—diseases, "There is absolutely no evidence that there is any protection in terms of vascular disease from these brands; on the other hand there is quite strong evidence that such protection is completely lacking." According to Dr. Wright, this statement holds true for *all* types of filter cigarettes.

Filters do reduce the inhalation of tars and other materials in smoke, and conceivably may reduce the intake of carcinogenic materials. However, Dr. Ernest L. Wynder of the Memorial Hospital, New York's leading cancer hospital, points out that, "As long as we do not know what the carcinogenic material is we do not know whether the filter will remove any or all of this material."

The effect of smoking on gastro-intestinal function and on patients with ulcer of the stomach or duodenum has not received the attention it deserves. Drs. Batterman and Ehrenfeld of New York University School of Medicine, reported in 1949 that while tobacco smoking is not a factor in the *cause* of peptic ulcer, smoking "may result in functional disturbances which may simulate organic disease or

aggravate . . . functional or organic disease. It is particularly the person with an active peptic ulcer who is likely to be harmed by smoke. His response to active treatment will be much less satisfactory than that of the patient who gives up smoking entirely." These views are also shared by leading specialists in gastro-intestinal diseases. It has not been shown that low-nicotine or filter-type cigarettes reduce the damage of smoking in persons with active stomach or duodenal ulcer.

SUMMING UP

In summing up the evidence, it seems established that smoking is harmful in vascular disorders of the extremities and the eyes; and in active peptic ulcer. Inhaling smoke is also definitely irritating to the nose, throat and larynx. The evidence is inconclusive with respect to the effects of smoking on athletic ability, and on heart disorders.

As for cancer of the lung, the most reasonable view at this time relates its phenomenal and alarming rise in frequency in industrial countries partly to the diffusion into the air of carcinogens derived from industry and transportation, partly to unusual exposures to carcinogens in many occupations, and partly to excessive cigarette smoking. The control of respiratory or lung cancer would appear to require a three-pronged effort by individuals, communities, industries and voluntary health agencies (such as the American Cancer Society) against 1) air pollution, 2) occupational exposure and 3) excessive cigarette smoking. How significant a factor regular cigarette smoking is in contributing to lung cancer remains to be determined. Until more conclusive evidence is reported, it would seem prudent to reduce cigarette smoking to less than a half pack a day or to smoke a pipe or cigars in moderation. There is no conclusive evidence that smoking low-nicotine, or filter, or king-size cigarettes offers substantial protection to those with disorders which are known to be aggravated by smoking.

What can be said *for* the smoking habit?

All living organisms are characterized by the property "irritability." When an organism receives a stimulus, it reacts by a discharge of energy. Human beings are exposed to an enormous number of stimuli in their environment. Among the most important of these are the stresses and strains of modern society—of family, occupation and community tensions. To contend with these tension stimuli, and find relief from them, man has adopted a number of habits, including smoking. Reaching for a cigarette, lighting it, holding it in the mouth, inhaling and blowing out clouds of smoke are motor activities that relieve tensions. Tobacco also provides at least one chemical, nicotine, which appears to have a tranquillizing effect on the nervous system. These effects may be so valuable to some individuals that they will willingly risk whatever harm may be associated with the habit. On the other hand, there are many for whom these risks are not worthwhile and who should therefore cut out or cut down on their smoking.

POSSIBLE INDUSTRIAL CAUSES OF LUNG CANCER

CHROMATES FROM
CHROME ORE SMELTING, PLATING, PIGMENTS, PAINTS, INKS AND ABRASIVES

NICKEL CARBONYL FROM
NICKEL ORE REFINING, PLATING AND BUFFING

ARSENIC FROM
ARSENIC MINING, SMELTING, PESTICIDES

ASBESTOS FROM
ASBESTOS MINING, PROCESSING AND WEAVING

TAR FUMES FROM
TAR MANUFACTURING, COKE OVEN SERVICING

ASPHALT DUST FROM
ASPHALT PITCH, SOOT, ROADS

RADIOACTIVE DUST FROM
URANIUM MINING, URANIUM REFINING

The tremendous growth of industry, no less than the increases in cigarette smoking, has paralleled the rise in lung cancer mortality. Many industrial waste products contain known carcinogens capable of polluting the air

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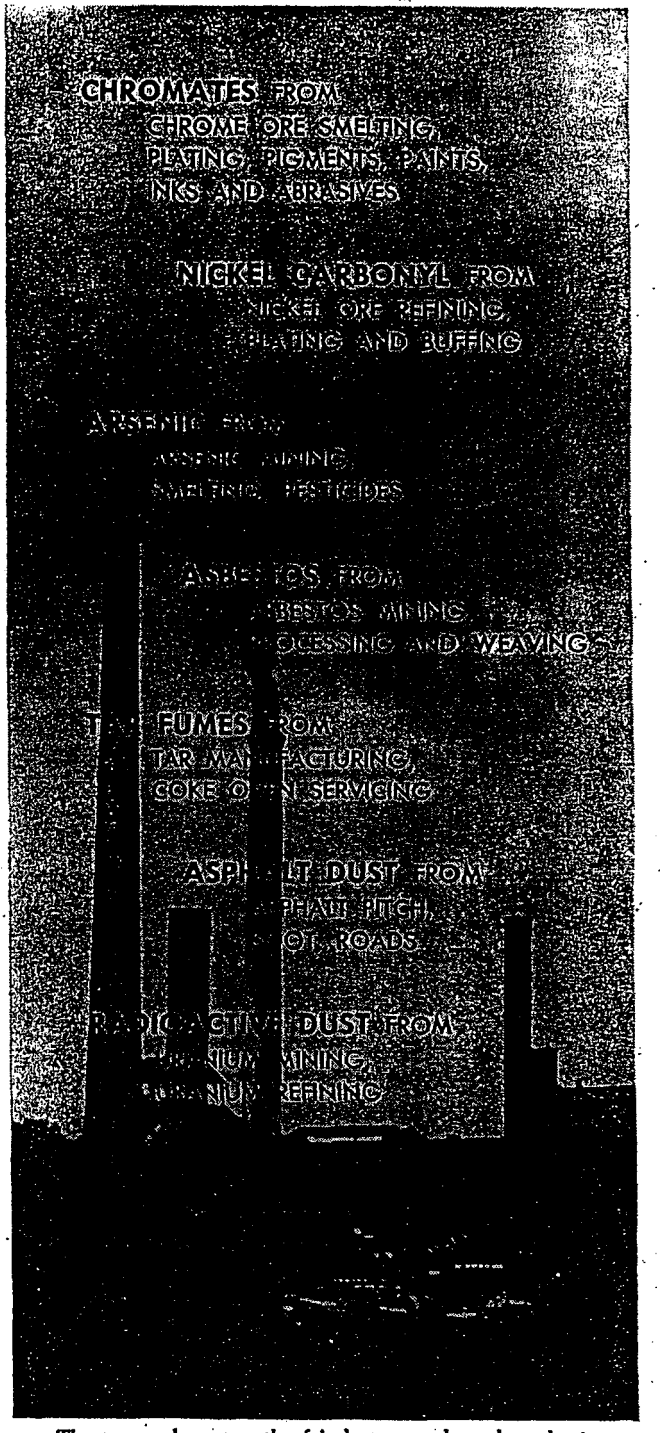

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