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An Address ON THE MEDICAL ASPECTS OF TOBACCO.

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By SIR HUMPHRY ROLLESTON, BART.,
K.C.B., M.D. CAMB., F.R.C.P.

REGIUS PROFESSOR OF MEDICINE, UNIVERSITY OF CAMBRIDGE.

THE medical aspects of tobacco interest us all in our capacity as medical advisers of others, and, in addition, probably a certain proportion from a personal point of view. As in the case of alcohol, our opinions are inevitably coloured by our own tastes, for the teachings of the laboratory cannot always be rigidly applied to human practice or correspond with the empirical lessons of a lifetime. Animal experiments cannot well take into account idiosyncrasies, and with regard to alcohol and tobacco personal peculiarities are so important that they must often over-rule any hard-and-fast laws.

HISTORY.

Tobacco-smoking is very ancient, and its history shrouded in the obscure clouds of its own smoke, for it has existed in South America (Orinoco) and the West Indies from very early times; and in China old undated monuments bear engravings of pipes. In North America there is a tradition that during a time of dire famine a heaven-sent maiden descended among the Hurons and wrought a miracle by causing Indian corn, potato, and tobacco to spring up. In 1492 Christopher Columbus not only discovered America but the island of Tobago and the chiefs of Cuba in the act of puffing rolls of tobacco leaves, a primitive form of cigar called "tobago." The Spaniards learnt smoking in America about 1530, and it was first introduced into England by Sir John Hawkins in 1565 or by Sir Francis Drake and Sir Walter Raleigh in 1585. Jean Nicot (1530-1600), the French Ambassador to Sebastian, King of Portugal, sent some tobacco seeds, which he obtained from a Flemish merchant at Bordeaux, to Catherine de Medici in 1559, and thus led to its use in France and to the immortalising of his own name in those of the plant, *Nicotiana tabacum*, and of nicotine—one of the many instances of man getting more credit than is his due. Dr. C. Singer, however, points out that André Thevet, in his "Singularitez de la France antarctique autrement nommée Amerique" (Paris, 1558), stated that he brought the seeds of the tobacco plant to France and started growing it there in 1556, or three years before Nicot. About this date Cardinal de Sainte Croix, Papal Nuncio to Portugal, and Nicolo Tornaboni, Nuncio to France, first introduced tobacco into Italy as a cure for the morbus gallicus (syphilis) and called it the "herbe sainte." The name tobacco has also been derived from the language of the island of St. Domingo. "Tobacconist" originally meant one who smokes and not the seller of the commodity. The word "cigar" probably comes from the Spanish "cigarar" (to roll), and the spelling "sewar" occurs in Twiss's "Travels through Spain" (1733) and is not unfamiliar now.

The use of tobacco since its introduction into this country from America by Sir Walter Raleigh in 1585 has, like other innovations, good or bad whichever it may seem to you, excited opposition as well as welcome. Henry Buttes, "Master of Artes and Fellowe of C.C.C. in C." in his "Dyets Dry Dinner Consisting of eight severall Courses" (1599), made tobacco the last course and said that "It cureth any grief, dolour, opilation (obstruction), impostume, or obstruction proceeding of cold or winde." King James I. in his famous counterblast (1604), vigorously condemned it; Raphael Thorus, a Fellow of the Royal College of Physicians and a devotee of tobacco,

wrote "Hymnus Tabaci sive de Pacto" (1627), and with Matthew Gwinne, also a Fellow of the College and a poet, had the hardihood to argue in favour of the weed in a medical disputation held at Oxford for the edification of James I. in 1605. William Barclay, Mr. of Art and Doctor of Physicke, in "Nepenthes or The Vertues of Tobacco (Edinburgh, 1614), recommended it for many diseases, dropsy, arthritis, gout, epilepsy, and as an "antidote of hypochondriacal melancholie"; he must have been rather an optimist, for he continues: "It prepareth the stomache for meat; it maketh a clear voice; it maketh a sweet breath," and after further extolling its medicinal powers, "in few words it is the princess of physical plants." In 1615 the Vice-Chancellor of Cambridge found it necessary, as, indeed, he probably would even in these more enlightened days, to proclaim that "no graduate, scholler, or student presume to take tobacco into St. Mary's Church, upon payne of finally expelling the University," and Charles II. forbade Cambridge men "to wear periwigs, smoke tobacco or read their sermons." In "A brief and accurate Treatise concerning the taking of the Fume of Tobacco which very many in these dayes doe too too (sic) licenciously use" by Tobias Venner, Doctor of Physicke in Bathes (London, 1637), it is written "Indians call it petun or petum, which indeed is also the fittest name that both we and other nations may call it by, deriving it of peto, for it is farre fetcht and much desired. And thus much for the name." He adds that "it is hot and drie in the third degree, and hath a deleteriale, or venomous qualitie, as I suppose: for it being any way taken into the body, it tortureth and disturbeth the same with violent ejections both upwards and downwards, astonishes the spirits, stupifieth and beaummeth the senses and all the members. To conclude, therefore, I wish them that desire to have mentem sanam in corpore sano, altogether to abandon infanum praeposterumque Tabacci usum." In 1624 Pope Urban VIII. published a decree of excommunication against snuff-takers and Innocent XII. extended this to smokers in 1690. In the interval (1634) smoking had been prohibited in Russia on pain of having the nose cut off. Strange as it may appear, Oliver Cromwell and the Puritans smoked tobacco, though the Society of Friends and the Salvation Army banned this form of indulgence. As recently as the early fifties in the last century tobacco was at a very low ebb in this country; snuff was going out of fashion, and the increasing practice of smoking was regarded by society as a low, vulgar habit suitable, indeed, for labourers, Bohemians, and the scum of society, thus re-echoing King James' "surely smoke becomes a kitchen far better than a dining chamber." In 1837 there was much discussion in THE LANCET on "The Great Tobacco Question: Is Smoking Injurious to Health?" In the previous year Samuel Solly, F.R.S., surgeon to St. Thomas's Hospital, asserted that it was one of the causes of general paralysis, and in the correspondence that later raged he quoted three cases of delirium tremens in non-alcoholics in the hospital due to smoking, and stated that it caused spermatorrhoea, a condition then attracting undue attention. A more modern and very keen anti-tobacconist, H. H. Tidswell, who regretted that he acquired the habit in the medical school of St. George's Hospital, considers that "it may truly be described as suicide or self-destruction by early instalments," and regards it "as a form of narcophilia which may soon develop into narcomania, dulling the intellect and poisoning their wives by their smoky breath, thereby causing sterility," thus recalling the lines in the well-known "Ode to Tobacco,"* which appeared in C. S. Calverley's "Fly-Leaves."

* It is interesting to note that, according to Mrs. L. Creighton (Life and Letters of Thomas Hodgkin, 1917, pp. 19, 118), this ode was really written in 1849 by Hodgkin's two Quaker sisters, aged 16 and 17, for an essay society at Tottenham, and was unprinted, misled by the close resemblance to his style, a friend of Calverley's caused them to be published as his in "Temple Bar" in about 1887. Calverley died in 1844. For a collection of amusing verses reference may be made to Walter Hamilton's "Poems and Parodies in Praise of Tobacco," 1863.

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" How they who use fuses
All grow by slow degrees
Brainless as chimpanzees,
Meagre as lizards.
Go bad and beat their wives,
Plunge (after shocking lives)
Razors and carving knives
Into their gizzards."

At the present time there is a vigorous anti-tobacco crusade in the United States of America, where, in 1913, it was calculated that the yearly consumption was 3.59 lb. per head of the population, as against 2 lb. in this country. There is thus, as in other ways, a parallelism of the views held about alcohol and tobacco, but it is at least doubtful if prohibition in America will embrace weeds as well as wine.

Pipe-smoking is, of course, a very ancient way of using, or, as it was once expressed, drinking, tobacco, as the finds in prehistoric graves testify. Makeshift pipes of very various kinds, such as the rather grim utilisation of the thigh bone of a child or the more commonplace knuckle bone of a lamb, are described in "The Pipe Book," by Alfred Dunhill; the earliest written accounts of a tobacco pipe are those in Gonzalo Fernandez de Oviedo y Valdes' (1478-1557) "Natural Hystoria de las Indias" (1526) and Jacques Cartier's narrative of the exploration of the St. Lawrence estuary (1536); the first refers to a Y-shaped tube the two prongs of which were apparently held in the nostrils, thus confirming the view that smoking was evolved from inhalation, and describes as a very bad vice that of the Indians in taking the smoke, which they call tabaco, in order to lose consciousness; Cartier describes the Indians using "a hollow piece of stone or wood like a pipe—i.e., like the musical instrument which that name denotes." Some of the prehistoric pipes were straight and more like the modern cigar- or cigarette-holder than the now familiar pipe.

Cigars of scents were smoked in India in the seventh century A.D., but the rolling up of tobacco leaves appears to have been initiated later, though it was in existence when America was discovered; Thuret in his "Cosmographie Universelle" (1575) gives an illustration of Indians smoking cigars shaped like cornucopias. Cigar-smoking was popularised in this country by officers who learnt it in Spain during the Peninsular War (1808-14), and cigarettes were similarly brought from the East as a result of the Crimean War (1854-56), but did not become really common until 30 years later. The first well-known man in society to smoke cigarettes was Laurence Oliphant (1829-88), the brilliant mystic and author who brought the habit from Russia. The influence of war is shown by the much greater frequency of women smokers during and since the Great War, and as perhaps an aftermath the recent action of some railway companies in relaxing the regulation against smoking in waiting-rooms and labelling some carriages "non-smoking."

Tobaccos vary considerably in their nicotine content; Cavendish tobacco contains 4.15, Latakia 2.35, and mild honeydew 1.6 per cent. According to THE LANCET's analysis, pipe mixtures have the highest nicotine content, and British cigars a higher than Havana. The nicotine content of the tobacco and of its smoke, however, do not vary directly, the way in which the tobacco is smoked and the degree of combustion being the important factors: thus Virginia cigarette tobacco contains (1.4 per cent.) nearly twice as much nicotine as Manila cigar tobacco, and yet the cigar smoke contains more than double the amount of nicotine in the cigarette smoke (Dixon); the smoke of Virginian cigarette tobacco contains 0.08 per cent. only of its nicotine content when smoked as a cigarette, but when burnt in a pipe 37 to 53 per cent. of its nicotine content. The degree of combustion is most complete in cigarettes of all kinds, least in a pipe, and midway in the case of cigars. In pipes as much as 70 to 80 per cent. of the nicotine in the tobacco may pass into the smoke; a good deal, however, turns on the length of the

mouth-piece; a long pipe is, therefore, better than a short one; thus a clay pipe or a churchwarden allows the nicotine to condense in the stem to such an extent that very little passes into the smoke. As the nicotine collects in the moist area of the cigar behind the burning tip, and may, if it does not undergo complete combustion, be carried into the mouth by the hot smoke, a thick or moist green cigar is more harmful than a thin or a dry one, and the bitter end should be abandoned and a half-smoked cigar not re-lit. It has been stated that a smoker who re-lights a pipe or cigar absorbs more poison than he would from ten ordinary smokes (Kionka). According to Dixon the smoke of one cigar contains as much nicotine as 12 to 18 cigarettes.

COMPARATIVE EFFECTS OF PIPES, CIGARS, AND CIGARETTES.

The general opinion is that cigarette-smoking is the form likely to give the worst results, then cigars, and lastly, pipes. On the other hand, the order has been reversed; the evil reputation of cigarettes has been ascribed by Turner, who speaks of them as "the smokers' L.S.A.," to their patronage by the unstable neurotics who are unable to stand cigars and pipes. Two reasons given for the more evil influence of cigarette-smoking are: (1) that many more cigarettes than pipes are smoked, and (2) that cigarette smoke is inhaled, whereby nicotine and carbon monoxide are more certainly introduced into the body, and furfural exerts its irritating effect on the mucous membrane of the nasopharynx, and produces a smoker's throat and cough. According to Armstrong, cigarette smoke contains up to 1 per cent. carbon monoxide, but more when smoking is rapid than slow; a Havana cigar smoked quickly giving as much as 8 per cent., or the same as in South Metropolitan gas. The blood of cigarette smokers may show CO absorption even up to 5 per cent. (Dixon). On the other hand, cigarette smoke is diluted more freely with air than pipe smoke, 80 as compared with 50 per cent., and a heavy cigarette-smoker commonly consumes less tobacco than a pipe- or cigar-smoker; often he is like a patient with a tic and throws the cigarette away when half smoked, so that the larger the number of cigarettes used the smaller is the amount of each smoked. The content of nicotine in cigarette smoke is much less than that in the smoke of pipes, that of cigar smoke being between these two extremes. The effects of cigarette-smoking appears to be chiefly due to carbon monoxide (Dixon), pyridine, furfural, and ammonia, whereas cigar smoke is powerful mainly on account of its nicotine content. There appears to be some divergence of opinion as to the influence of the cigarette paper; some say that it is harmless, others, as Kionka, that the paper collects the products of distillation, which are volatilised and absorbed. Virginian cigarette smoke contains furfural, and THE LANCET analysis states that one cigarette will provide as much as two ounces of whisky, while Turkish cigarettes supply very little, and cigars and pipe tobacco none. Furfural, pyridine derivatives, ammonia, and carbon monoxide are distillation products from vegetable material and are not, like nicotine, in any way special to tobacco, but by their irritating effects on the mucous membrane of the throat and upper air passages may in some way account for the evil reputation of cigarettes. Cigar-smoking usually gives a much greater feeling of satiety than cigarettes or even pipes. Much, no doubt, depends on the condition—moist or dry—of the weed, and whether or not it is smoked to the bitter end; the state of the pipe, clean or foul, and the length of the stem also bear on the effects produced. Cartridges or plugs, as in Sir Morell Mackenzie's and other hygienic pipes, which seem to have gone out of fashion, to absorb the products of combustion, may diminish the bad effects. The other methods of "using tobacco," an old East country expression now, like others, not only naturalised but surviving in America—namely, chewing and snuffing—are said to be attended by so little absorption of

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nicotine as to be comparatively free from untoward symptoms.

Tolerance to smoking tobacco is usually acquired within a short time, and according to Dixon and Lee due to slow destruction of nicotine by a ferment, and so long as destruction keeps pace with absorption toxic symptoms are avoided. But idiosyncrasy to the effects of tobacco is not uncommon and may be quite active and prevent acquisition of tolerance or may render the individual indifferent. Though tolerance may be lifelong, it often diminishes with advancing years, especially, I fancy, with the presence of arterio-sclerosis; hence, old people give up the habit as the result of experiencing unpleasant symptoms, such as giddiness, cardiac irregularity, or pain. Idiosyncrasy shows itself in the curious way in which some persons can smoke a considerable amount of tobacco in the form of cigarettes, but none in a pipe or as a cigar. Tolerance may be modified or even abolished by disease; for example, influenza. Sometimes a confirmed smoker may, without being conscious of a change in the quantity or quality of the tobacco smoked, be knocked over, as if he were a novice. Kionka considers that the tolerance is of a limited character, and that when a seasoned smoker oversteps the mark he suffers more than the novice because his tissues are saturated with nicotine. The first sign of failing tolerance is a vague distaste for tobacco, which may lead to frequent trials of new brands or mixtures. It has often seemed to me that the average man has, roughly speaking, a certain capacity for smoking, and that if he is a very heavy smoker for some years, his smoking life, so to speak, is thereby curtailed. There are, of course, many exceptions, but that such a rough relation exists between consumption of tobacco and the duration of tolerance seems not improbable in the light of carbohydrate and protein metabolism, in which excessive fatty or meaty diets may in time lead to diabetes gout.

IS TOBACCO-SMOKING AN ADDICTION?

Tobacco-smoking becomes a habit and, no doubt, there is a considerable psychological element in the habit, for a man may be quite happy, at any rate for a time, with an empty or unlit pipe in his mouth, and I have known a porcelain cigarette, resembling in appearance a chocolate one, console a constant smoker. An extreme example of the influence of the cigarette habit was a man I met non-professionally during the war, who told me that he smoked 100 cigarettes in the day, which, supposing each cigarette had ten minutes' life, would provide more than 16 hours' occupation daily; he had given it up with the result that his work was so interfered with that he returned to his cigarettes. The way in which cigarette abstinence interrupted his work was not, as I supposed, by making him feel restless, but by slipping his writing by his becoming conscious that his left hand was automatically fumbling on the table in front of him where the cigarette box stood in normal times. Is tobacco-smoking an addiction? Opinion on this point may differ. Prof. W. E. Dixon, who says that the inveterate cigar-smoker must continually be absorbing a small quantity of nicotine to keep his nervous system in a comfortable state, and that the constant cigarette consumer feels the need of carbon monoxide, denies that smoking is an addiction. The question turns on the meaning attached to the word "addiction," and may therefore be a verbal problem. The Ministry of Health's Departmental Committee on Morphine and Heroin Addiction (1926) defined an addict as "a person who, not requiring the continued use of a drug for the relief of the symptoms of any organic disease, has acquired, as a result of repeated administration, an overpowering desire for its continuance, and in whom withdrawal of the drug leads to definite symptoms of mental or physical distress or disorder." That smoking produces a craving for it when an attempt is made to give it up, as Sir James Lamb has so graphically described in "The Confessions of a Drunkard," is undoubtedly, but it can

scarcely be accurately described as overpowering, and the effects of its withdrawal, though there may be definite restlessness and instability, cannot be compared with the physical distress caused by withdrawal in morphine addicts. To regard tobacco as a drug of addiction may be all very well in a humorous sense, but it is hardly accurate.

THERAPEUTIC USES OF TOBACCO-SMOKING.

During the Plague of London smoking was regarded as a sure protection against the disease, and women and children and boys at Eton had lessons in this prophylactic measure; even now some smokers proclaim that smoking immunises them against influenza infection; it is true that *in vitro* tobacco smoke has a bactericidal effect which persists after filtration through cotton-wool, and so, as nicotine is thus removed, is due to other bodies, such as pyrrhol and formaldehyde. But in the mouths of smokers Puntoni found that tobacco smoke has very slight bactericidal powers even for micro-organisms with very little resistance to antiseptics. In the past tobacco as an enema was employed to relax muscular spasm so as to allow a dislocation to be reduced, and with rather less reason—i.e., its antiseptic properties—as an external application for many other conditions, such as wounds and ulcers, erysipelas, the itch, syphilis, and cancerous growths; and to relieve pain in rheumatism and after operations. Infusion of tobacco has occasionally been used as an abortifacient, and in Germany young women are stated to seek employment in tobacco factories with this object in view. The spasm of bronchial asthma may be reduced by smoking, but only when it is carried to a nauseating degree. Tobacco has dropped out of the British Pharmacopoeia, but it certainly has its uses, especially as a sedative, as every smoker knows; it may act as a charm for the fidgets. I remember a lady in a small Scots village who only got relief from the post-prandial fidgets by smoking one of her husband's pipes, and was hard put to it to conceal this method from her servants when they came into the room unexpectedly.

BAD EFFECTS OF TOBACCO-SMOKING.

Just as many more therapeutic uses than are now recognised have been ascribed to the use of tobacco, so, as has already been mentioned, have numerous evil effects been referred to its abuse. Now, as tobacco smoke contains nicotine, carbon monoxide, and pyridine bases, and as it undoubtedly has a familiarly striking effect on raw youths, it must be acknowledged that it, maybe, has evil effects. Some of them will be mentioned, but considering the universality of the habit and the large number of heavy smokers, the comparative rarity of undoubted lesions due to smoking is remarkable. In this respect there is a great contrast between the price paid by those who smoke and those who drink alcohol to excess. It has sometimes been argued that these methods of meeting the need for narcotics go hand in hand and that smoking leads to alcoholic indulgence, but probably few smokers would admit this indictment, and, indeed, the contrary may well be argued—namely, that as a sedative and narcotic the popularity of the tobacco habit has ousted alcoholism. But there can be little doubt that the injurious effects of excessive smoking are materially augmented by, if not in part due to, simultaneous alcoholism.

Nervous System.

Nicotine exerts, as Langley showed, a definite action on the nerve cells in the path of the autonomic nerve-fibres, first exciting and then paralyzing them. It is therefore to be expected that smoking will, in virtue of the nicotine and the carbon monoxide contained in the smoke, affect the nervous system, and a large number of manifestations occur in disposed persons. Binet, from a review of experimental observations, concludes that tobacco exerts a toxic effect on the brain. Muscular tremor, similar to that of Graves' disease or senility, can in some individuals

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be produced with the regularity of a laboratory experiment, and, as in the case of vertigo, have been ascribed to chronic poisoning by carbon monoxide; in others jumpiness and irritability, or neuralgia, vertigo, insomnia, or headache are produced. Mendenhall's physiological investigation of the effect of smoking, which points to the sensory and motor effects being mainly due to the contained nicotine, shows that the immediate results are conditional on the state of the sensory mechanism; when this is depressed the immediate effect of smoking is stimulation, and when the sensory mechanism is hyper-excitable smoking exerts a depressing effect. But the depressing effect on the sensory threshold is much more prominent than the stimulating influence. Motor reactions are disturbed in the direction of diminution of efficiency, especially of the finely coordinated movements. Turney describes transient motor paralysis consequent on slight over-exertion or pressure on nerves, and also accepts transient aphasia due to tobacco, but these must be very exceptional.

An important question is the influence of smoking on the higher intellectual centres; after a transient preliminary stimulating effect on mental processes, during the act of smoking, its sedative effect develops. It is rather alarming to find that in America 2000 psychological tests on medical students showed that smoking lowers mental efficiency in from 10 to 23 per cent., and especially in imagery, perception, and association. Adolphe Abrahams, while recognising that these tests may not be conclusive, believes that smoking diminishes the general capacity for work, impairs memory for names, and renders sleep less refreshing; and Turney, who admits to being a moderate smoker, considers that some of the indolence, dreamy apathy, and premature senility often seen in heavy smokers is due to their indulgence. He also refers to migraine and epileptic fits being increased by smoking and disappearing when the habit is abandoned. That psychoses are definitely due to excessive smoking is probably rarely, if ever, true; more often the constant smoking is a manifestation of the neuropathic constitution. But it would be difficult to deny that abuse of tobacco may not do harm to a neuropathic person, and so be a contributory factor.

Tobacco Amblyopia.

Tobacco amblyopia, with a central scotoma more marked for colours than for white light, is regarded by Gowers as probably due to a primary degeneration of the macular fibres with a secondary retrobulbar neuritis. According to de Schweinitz, moderate smokers of 60 or over, who have not altered the quality or quantity of their tobacco, may, after a long period of immunity, suffer from the characteristic papillo-macular scotoma. While recognising the influence of the so-called cumulative effect of tobacco as a possible explanation, he regards this as unsatisfactory, and believes that sclerosis of the small nutrient arteries of the retina and optic nerves is a contributory factor. It is said that tobacco amblyopia is almost entirely due to excessive pipe-smoking, and that a foul condition of the pipe is an important, if not essential, factor; according to Weidler, though amblyopia is specially associated with the use of shag, it is but rarely solely due to smoking, alcoholism being an accessory, thus illustrating the action of two poisons combining to exert a powerful influence. Complete abstinence from both poisons and full doses of nux vomica should lead to a cure, but relapse of the amblyopia may follow if the excessive use of the poisons is resumed. It is said that in tobacco amblyopia the dilatation of the pupil resulting normally on stimulation of the skin of any part of the body is either in abeyance or obtained only by increased stimulation (Dorrell).

Deafness is ascribed to smoking and is probably due to extension of pharyngeal catarrh to the middle ear, but it has also been referred to toxic effects on the internal ear. The tinnitus of otosclerosis is increased even by very moderate smoking. It is an

interesting question whether the vertigo is due to the toxic effects, including vascular disturbance, on the semicircular canals, thus being analogous to tobacco amblyopia, or whether it is central.

Effects on the Heart.

On the heart the unpleasant effects of smoking may be divided into: (1) The "tobacco heart" of young smokers, characterised by palpitation, rapid action, and frequent extrasystoles. (2) Arrhythmia at any time of life and more noticeable after 50 years, when extrasystoles are common and more easily induced. The late Sir Clifford Allbutt wrote: "One case is known to us of a man whose general health is excellent, who is by no means a neurotic subject, and whose heart stands work well in all other respects, in whom intermittence of the heart may occur for many days if he remain for an hour or two in a room with many smokers. He dare not sit in a close smoking-room or in the smoking compartment of a railway carriage. The intermittence may not begin until the next day, or the next but one, but then comes on with the certainty of a laboratory experiment; it gets worse during the next day or two, and then gradually passes off in a few more days. He never suffers from any cardiac disorder unless exposed to tobacco, but this proclivity has hung about him for many years. He has no dislike to the drug, nor does he feel any immediate discomfort from it." I have no doubt that he was here describing his own symptoms, and often thought of this when he hospitably handed cigarettes to his guests ignorant of his idiosyncrasy. For the possible comfort of smokers with extrasystoles it may be mentioned that coffee also causes extrasystoles, and that the effect of abstinence from coffee and, perhaps, tea may be worth a trial before definitely deciding on "no tobacco." (3) Angina and anginoid pain due to smoking are more often seen in the later half of life. Manifestations of the more severe form of angina are said to be rare. I have seen it in two doctors fond of cigars and have heard of others. It may be noted that nicotine, unlike adrenalin, constricts the coronary in addition to other arteries, thus offering a reasonable explanation of angina. Sir Clifford Allbutt, who was rather critical of the subject, especially of Huchard's hypothesis of spasm of the coronary arteries, had seen only three well-marked cases, and obviously considered that cases of true angina had been thus described; no doubt there is a merciful tendency to take this view if possible, and it may be comforting to quote Mauriquand and Bouchat's definite dictum that angina solely due to tobacco is never fatal, but the obvious difficulty is to be certain that a given case is entirely due to tobacco. The late Sir Richard Douglas Powell and others have classed the tobacco cases as vasomotor or false angina. Minor degrees of anginoid pains, such as subternal oppression and tightness on exertion such as to stop the patient in going uphill, are not uncommon. Attacks of syncope sometimes appear to be due to smoking. The pulse of smokers is usually somewhat faster than it is, or would be, when they have given up the habit, and the average pulse-rate in smokers is some ten beats a minute faster than in non-smokers.

A point of some interest is the effect of smoking on physical efficiency. The prejudice against smoking by athletes while training is very old, and, though it is open to discussion, seems still to be on the whole generally approved. From a statistical inquiry into 304 male students at the Antioch College, Yellow Springs, Ohio, Earp found that the non-smokers were more successful both in scholarship and athletics than the smokers. From inquiry from athletes I gather that the most successful are non-smokers, and that some, but not all, are convinced from their own experience that smoking handicaps them. Adolphe Abrahams, however, from very considerable experience of athletes is not convinced that tobacco alone makes more than the most trivial difference to an athlete who trains well in other respects. An old Cambridge Blue for the quarter-mile told me that

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he gave it up on one occasion for a few weeks without any improvement in his time, and that Sir Clifford Allbutt told him that in his experience it took six weeks to get the nicotine out of the system. The question might arise whether or not the popular belief that smoking impairs the wind is explicable as the effect of nicotine or, as might seem more probable, of carbon monoxide combining with the hæmoglobin and so paralyzing some of the red blood corpuscles.

Blood Pressure.

Tobacco-smoking raises the systolic blood pressure from 5 to 20 mm. Hg, the diastolic pressure being less influenced; at the same time the rate of the heart is increased by about ten beats per minute. The rise of systolic blood pressure is transient, and after half an hour falls to normal or below. In moderate and habitual smokers who have acquired tolerance the fall of blood pressure is gradual and the soothing effect of tobacco probably compensates for the changes; indeed, apart from any other factors confirmed smokers tend to have a low blood pressure; this has been insisted on by Dr. de Havilland Hall, and according to the late Sir Lauder Brunton a systolic blood pressure of 100 mm. Hg in a strong healthy man without any evidence of tuberculosis spelt excessive smoking in 19 out of 20 cases. In young people without acquired tolerance to tobacco, Prof. Dixon's curves show that the initial rise of systolic blood pressure is suddenly followed by a fall which may be so considerable as to cause the familiar symptoms of collapse, which may last for an hour or more. Although it is rarely seen in ordinary practice, there appears to be some evidence that tobacco-smoking produces sufficiently severe spasm of healthy blood-vessels to cause definite symptoms; Erb, who described intermittent limp in 1898, ascribed it to excessive smoking, and Schlesinger and Turney confirm this view. Parkes Weber considers that excessive cigarette-smoking is a causal factor in thrombo-angitis obliterans among young non-syphilitic Jews in the East End of London. Spasm appears to be induced more often and, perhaps, more readily in arterio-sclerotic than in healthy vessels, and possibly tobacco smoke may, in virtue of its nicotine content, be responsible for anginoid and cardiac pain and for angina abdominis.

Experimentally, nicotine produces definite arterial degeneration in rabbits; Huchard and others have noted the hogg of tabagism, and it has been thought that tobacco specially damages the abdominal arteries. The late Sir Clifford Allbutt, a non-smoker, reviewed the question of the causal relation to arterio-sclerosis in his open-minded manner in 1915, and came to the comforting conclusion that if tobacco-smoking is a cause at all of arterio-sclerosis, it is a very slow one, at any rate to most persons, so that its effects being mingled with other conditions of senility are almost impossible of discrimination, and ten years later, in his last message, he did not find any later evidence to weaken his opinion that the effect of tobacco in causing hyperpiosis or senile atheroma, if any, is negligible.

Alimentary Canal.

The responsibility of irritation exerted on the lip by the hot stem of a clay pipe in causing squamous-celled carcinoma is now mainly of historic interest. The clay pipes have largely gone out of use. The sore tongue and the white patches of leukoplakia on the tongue of smokers are well known; among Fournier's 224 cases of leukoplakia, 80 per cent. were syphilitic, and other estimates are lower, down to 50 per cent. Among 40 cases analysed by Fox two women only were non-smokers, and 35 were habitual smokers, and syphilis appears to be an underlying cause, and is probably responsible for the great majority of the cases that go on to carcinoma.

The effect on the stomach is important; X ray mouth meals have shown that after a short period increased contractility the motility of the stomach

becomes paralysed for an hour or so (Danielopolu); as the subjective feeling of hunger very probably depends on contractions, the relief of hunger by smoking may be thus explained; it is said that dilatation of the stomach may thus result. According to Linkin the potassium sulphocyanide in smokers' saliva inhibits protein digestion, and nicotine diminishes the secretion of pepsin and rennin. Hyperchlorhydria due to pyloric spasm may be induced by excessive cigar-smoking or by pipe-smoking excessive for the individual, and thus difficulty in diagnosis from peptic ulcer may arise, perhaps more often in men about 50. In the presence of oral sepsis excessive secretion of saliva may lead to gastritis. In the rather rare tobacco dyspepsia there is from inhibition of the sympathetic exaggerated vagal action and pyloric spasm, thus imitating duodenal ulcer, tobacco dyspepsia beingpressor thus differs from the other toxic dyspepsias which are depressor in character (Ryle). The comparative infrequency of tobacco dyspepsia may serve as an excuse for quoting the parody—

"To smoke or not to smoke, that is the question,
Whether a mild cigar assists digestion,
Or whether it begets a kind of quaintness."

The stimulating effect of nicotine and pyridine compounds on the intestine may in intolent young people cause rapid diarrhoea, and in seasoned individuals serve a useful purpose in promoting defecation. On the other hand, spastic constipation may result, and even enterospasm of various parts of the colon, with persistent abdominal pain most resistant to treatment other than abstinence from tobacco.

On the respiratory tract, tobacco-smoking is responsible for pharyngeal catarrh which may spread to the larynx and bronchial tubes, causing cough, hoarseness, bronchial catarrh, and so emphysema of the lungs. The irritating effect on the throat and upper air passages exerted by cigarette smoking has been ascribed to furfural, pyridine, and ammonia, and not to nicotine.

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