quadriceps extensor was paralyzed. Sept. 28, 1906, the regular operation of arthrodesis was performed. Nov. 10, 1909, the foot came to a right angle with the leg, but not beyond that. Weight in standing without shoes was borne well. There was normal lateral mobility at the mid-tarsal joint. There were from 10 to 15° action between the scaphoid and cuneiform. Patient can walk about a block without getting tired. A large part of the trouble is due to the paralysis of the quadriceps. The result of the ankle arthrodesis is only partially satisfactory. A knee brace was fitted.

CASE IX. B. C., age sixteen years, entered Orthopedic Department of the Carney Hospital July 4, 1907. Diagnosis, infantile paralysis of left leg dating from early childhood. Examination showed marked atrophy of the left lower leg, and the foot in position of calcaneo-valgus. All muscles were paralyzed except the peroneals and the common extensor of the toes. July 12, 1907, after tenotomy of the plantar fascia, the regular incision was made, through which the head of the astragalus was removed and a wedge taken from the middle of the os calcis to allow proper connection of the foot. The calcaneo-astragaloid and the tibio-astragaloid joints were denuded of cartilage. Oct. 9, 1907, the foot was in good position, and there was no motion in the ankle-joint. A brace was fitted to be worn six months. An x-ray showed good bony union. (See radiogram No. IV.) Aug. 23, 1909, patient came in wearing the splint, which was broken. This was discarded and strapping and a flannel bandage ordered. Oct. 20, 1909, the ankle was found to be in good position and perfectly stiff.

CASE X. M. M., female, age thirteen years, entered Orthopedic Department of the Carney Hospital July 10, 1907. Diagnosis, infantile paralysis of the right foot dating from early childhood. Examination showed no muscular power in the foot except in the flexors and extensors of the toes. July 12, 1907, after tenotomy of the plantar fascia, the regular arthrodesis operation was performed and the tip of the fibula osteotomized and forced in by the plaster. Oct. 8, 1907, the patient was found to have a slight equinovarus and was readmitted to the hospital. The next day a tenotomy of the plantar fascia was done and the foot manipulated into a better position. April 16, 1909, the end result was found to be good. There was slight motion in the mid-tarsal joint, but the ankle was stiff. (See radiogram No. V.)

CASE XI. L. H., female, age nineteen years, entered Orthopedic Department of the Carney Hospital, Oct. 1, 1908. Diagnosis, infantile paralysis of the right foot since three years old. Examination showed a slight valgus, but the ankle was flail. Oct. 2, 1908, through the regular incision, the peroneals were resected; and in addition to the regular arthrodesis, the cartilage between the os calcis and cuboid was removed. The tips of both malleoli were osteotomized. Plaster was applied with the foot at a little less than a right angle. Nov. 20, 1908, a new plaster was put on. March 17, 1909, the plaster was removed. A flannel bandage was applied and massage begun. April 12, 1909, the ankle-joint was found to be in perfect alignment and stiff. The foot was permanently flexed 5° beyond a right angle. The patient stood with no deformity and walked with only a slight limp.

NOTE: In hospital cases it is not always possible to carry out the ideal treatment. But if a sufficiently extensive operation is performed, there is no reason for failure to get the desired result, a firm foot in good functional position, providing care is taken with regard to three principles: the removal of every bit of cartilage between the denuded bones; exact approximation

of these bones, osteotomies being done if necessary, and fixation for a long enough time.

CASE XII. J. J., female, age nineteen years, entered Orthopedic Department of the Carney Hospital, Sept. 21, 1902. Diagnosis, infantile paralysis of the right leg since two years old. Examination showed marked muscular atrophy with contracted peroneals and tendo Achilles which kept the foot in equinovalgus. Sept. 29, 1902, the regular arthrodesis operation was performed, and in addition the cartilage was denuded between the astragalus and os calcis. The peroneals having been divided and sutured with silk, the foot was put up in plaster in a slight valgus position, to take the strain off those tendons. Convalescence was uneventful. Oct. 13, 1902, a new plaster was applied, correcting the valgus. Dec. 22, 1902, the foot was found to be in excellent position, with nearly complete ankylosis. Jan. 19, 1903, the plaster was split, and baking and massage commenced. The patient was measured for a plate. Three years later, June 20, 1906, the result of the arthrodesis was found to be satisfactory, though the patient walked with a marked limp, due to a two-inch shortening of the right leg.

CASE XIII. A. G., age ten years, entered Out-Patient Department of the Massachusetts General Hospital April 5, 1909. Diagnosis, infantile paralysis of right lower leg since two years old. Examination showed fair power in *certus femoris*. Hamstrings were weak and there was no power in the *gastrocnemius*. A marked valgus was present, with only slight power in the *peroneal brevis*. Patient was recommended to the House for an arthrodesis. July 30, 1909, the regular operation of arthrodesis was performed with splitting of the astragalus. Small pieces of bone were placed in the longitudinal split to keep the astragalus apart. Sept. 3, plaster was in good condition. Sept. 16, a new plaster applied. Foot was in excellent position. Jan. 27, 1910, the ankle-joint was firm and there was no lateral mobility. Patient walked well with plaster. (See radiograms No. VI and VII.) X-ray showed new formation of bone, insuring a true bony ankylosis.

THE EFFECT OF TOBACCO ON THE EAR AND UPPER RESPIRATORY TRACT.*

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WHEN I accepted the secretary's invitation to prepare a paper on this subject I was strongly impressed with the notion that my principal task would consist in wading through a mass of literature, but, much to my surprise, that task really resolved itself into a diligent search for any literature bearing upon the question. Not that there has been any dearth of writing or talking about the evil effects of tobacco and alcohol; you are all familiar with the diatribes of a certain irresponsible type of temperance lecturer and with the grossly inaccurate statements of a number of lay periodicals, especially those intended for boys' reading. That the medical profession is in some degree responsible for the reckless and unreliable publications of the laity has to be confessed, for at least some of this misinformation has been taken from the writings of medical men. In

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some instances remarks thoughtlessly made by physicians have been used to support the teaching of fanatics, or medical writings have actually been garbed for this same purpose. Somewhat in this way many of our public school books became inoculated a few years ago with matter that was not only misleading, but so false as to produce a contrary effect to that designed by their writers. Works on physiology for use in instruction of grammar school boys and girls contained such exaggerated statements regarding the evil effects of alcohol and tobacco that the children themselves recognized their falsity. What good could be expected to come from telling a group of boys that the use of tobacco would stunt their physical progress and probably lead to imbecility, and that alcoholic liquors of any kind or strength were deadly poisons, when they had only to look at their own fathers and other male relatives for ocular refutation of such arguments. In fact, the average boy submitted to such instruction, if he has not already run the gamut of smoking, from home-made cigarettes of grape vine or corn silk to the common clay pipe, has his curiosity aroused and, after comparing the gloomy prophecy of the school physiology with his personal observation of men, is rather tempted to experiment on himself and ascertain at once whether he is fit to survive the ordeal of the first smoke and to learn the effect of wine or whisky.

There is cause for congratulation in the fact that the output of this particular kind of literature has diminished very markedly in recent years. The prohibitionist and the temperance advocates have become more temperate in their language of denunciation and have apparently decided to make their fight on the basis of truth. That is certainly the more sensible plan, for it would seem that the truth about either alcohol or tobacco would be sufficient to condemn them as being something less than blessings to humanity.

The scarcity of trustworthy literature upon this subject is very striking. Much that has been written is valueless because not based upon accurate observation, and the attitude of the authoritative textbooks on diseases of the ear, nose and throat is somewhat surprising. The majority of them have either ignored or practically side-stepped the question, apparently content with classing tobacco and alcohol among the possible causes of local disease, and devoting not more than a paragraph to the entire consideration of the subject. The explanation may be that experimental investigations for the proof of theories are so difficult of performance in this particular field, and that these authors have wisely preferred silence to vague theorizing.

Having purposely thrown aside all palpably unreliable or misleading material bearing upon the subject and made the effort to cull out from the apparently reasonable and trustworthy writings such as bear the stamp of scientific accuracy rather than mere assertion, one is confronted by a rather meager list of articles. From these I have attempted to sift the most valuable portions, as a judge might sift the conflicting evidence in a case,

in the hope that we might arrive at some fairly definite conclusions that would be acceptable as presenting what is actually known about the question at the present time.

If we should formulate an indictment against tobacco it would show that it is called a noxious weed and charged with committing the following overt acts: Causing cancer of the tongue or lips and possibly of the larynx; setting up a chronic catarrhal inflammation of the nose, throat and larynx; causing loss of the sense of smell and producing deafness; so altering the functions of the gastro-intestinal tract as to establish imperfect digestion; interfering with the circulation of the blood and giving rise to a distinctive disease of the heart; arresting physical development if used by young persons, and impairing mentality at any period of life; reducing the vital forces, especially the local resistance of the respiratory tract, and rendering the victim more susceptible than the non-smoker to affections of the nose and throat. In addition, the charge is generally made that the alleged ill-effects of tobacco smoking are due to a known poisonous alkaloid — nicotine — contained in the tobacco.

Let us, then, bring the prisoner before the bar of justice and consider who and what he is, the relative amount of good and bad in his character, his general conduct and whether it is possible that he could have committed the offenses named.

In preparation for use, tobacco leaves are piled in heaps and allowed to undergo fermentation, under the influence of bacteria and mold fungi, these minute chemists causing a partial destruction of the vegetable substance and the development of secondary products that impart flavor to the tobacco. Professor Stranch, of Vienna, has scientifically investigated the manufacture and composition of a variety of tobaccos and concludes that there is no apparent connection between the "strength" of tobacco and the amount of nicotine it contains. He says that at the present time we shall have to consider the strength of a cigar as due to an unrecognized chemical substance resulting from the union of some of the delicate products of fermentation with the air inhaled during combustion. He furthermore believes that tobacco is not smoked because of the nicotine it contains, for he finds that the best tobaccos contain the least nicotine, — from $\frac{1}{2}$ to 2%, — while the poorer grades contain from 2 to 8%.

Chemical analysis of the smoke from tobacco shows it to consist, according to Severson, of: Water, in the form of vapor; free carbon, in minute particles; ammonia compounds, in a state of vapor; carbon-monoxide and dioxide; and nicotine. Several investigators have attempted to determine the amount of nicotine that actually reaches the mouth of the smoker, and while their estimates vary somewhat, all agree that it is less than 1% of what is present in the tobacco, some contending that it is the merest trace. It must be remembered, too, that this small amount of so-called nicotine is in reality not pure nicotine, but a complex substance which

contains a fluid alkaloid, nicotine proper, a volatile substance containing ammonia, and a bitter resinous extract. The weight of evidence would seem to show that a much more dangerous feature of tobacco smoke is the volume of carbon-monoxide that it may contain. The percentage of carbon-monoxide in tobacco smoke probably depends in part upon the quality of the tobacco, but more upon the conditions under which it is smoked; it is least when there is a sufficient amount of oxygen to afford complete combustion and to convert most of the carbon into carbon dioxide. There will probably be more carbon-monoxide thrown off when the smoking is performed in a closed room than in the open air and, of course, more still where a concourse of people have been smoking for some hours in a poorly ventilated hall, — as at the smokers so popular with those inconsistent disciples of fresh air, the doctors. The ammoniated vapors in the cigar smoke are, likewise, not without possible deleterious influence upon the tissues and have to be considered in any estimation of the injurious effects of smoking.

The harmful elements existing in or produced during the use of tobacco, then, are principally nicotine, carbon-monoxide and ammonia compounds. In what manner may they occasion trouble? If employed in the form of snuff, or by chewing, the physiological effect of tobacco is in small doses sedative and mildly narcotic; in larger quantities it acts as an emetic, a diuretic and cardiac depressant, and in excessive amounts produces decidedly toxic effects. The physiologic effect of long-continued use of tobacco is said to be exerted mainly upon the nervous system, probably as the result of absorption into the circulation of carbon-monoxide or nicotine, the effect being a trophoneurosis.

When used for smoking, whether in the form of cigar, cigarette or through the medium of a pipe, the first effect is stimulation of the salivary glands and a soothing influence upon the nervous system. Some reliable observers attribute an aperient effect to moderate smoking, especially if indulged in just after meals, because of the induced contractions of involuntary muscle structures, but also show that excessive smoking tends to favor constipation because of the later paralysis of these same muscles. Prolonged or excessive smoking may also cause a dryness of the mouth and throat, a condition ascribed by some to interference with the normal secretions; by others to irritation of the mucous membrane by ammonia gases.

Since the custom of using snuff has almost entirely disappeared, no further attention need be paid to that. The chewing of tobacco might be expected to give rise to trouble directly, through the constant irritation of the buccal and pharyngeal mucous membrane, and indirectly as the result of nicotine absorption. As regards the first, there is no positive evidence of its harmful action in this way; it has been accused of exciting granular pharyngitis, but there is insufficient evidence to prove the connection. Regarding the

indirect effect of systemic absorption, it does appear probable that gastric disturbances, especially disordered digestion, and occasionally systemic intoxication, might occur. As these do not concern the special organs treated of in this paper we shall not discuss them in detail further than to say that they are sometimes serious and that occasionally a death has resulted from acute nicotine poisoning from chewing large quantities of tobacco.

The smoking of tobacco is such a universal habit and so directly concerns the upper respiratory tract that it will naturally be the most interesting feature of our study. Here again we have to consider the direct and indirect effects, this time of the smoke and its toxic elements. The direct bad effects are alleged to be the production of acute or chronic inflammatory changes in the mucous membrane of the pharynx or larynx, reducing the local resistant powers of the nasal and pharyngeal mucous membranes so that they become the easier prey of micro-organisms, and starting malignant growths of the mouth and larynx.

In the first place, no one has yet described any characteristic lesion of the throat or nose attributable to tobacco. The nearest approach to this is found in the fact that a considerable percentage of smokers show a chronic granular pharyngitis, and a small percentage suffer from a mild but chronic form of laryngitis. It has not been shown that granular pharyngitis is any more frequent in smokers than in non-smokers; some rhinologists inform me that they see quite as many women as men with granular conditions of the pharynx, although they rarely meet with a woman who smokes. In a very interesting paper on this subject, Lack has called attention to this point and makes the statement that in the great majority of these cases a careful investigation will show that more potent causes than tobacco are at work to produce this pharyngitis; that the pharyngeal condition is dependent upon abnormalities in the nose or a purulent disease of the accessory nasal cavities that has been neglected. That irritation from the ammonia contents in the smoke may possibly cause dryness of the pharyngeal mucous membrane, and even institute a chronic inflammation, with vesicular or granular development, must be admitted, but that it does actually accomplish this is not proven, and if, from all the cases in which it is clinically suspected we should eliminate those showing evidence of nasal disease which might have a causative relationship to the pharyngitis, the number left for observation and study would probably be very small. The same argument applies to chronic laryngeal disturbances; all other possible causes, including nasal abnormalities, must be eliminated before we can attribute any case of laryngitis to the effect of tobacco.

In this connection, however, it should be said that practically all observers are agreed that when inflammatory affections of the pharynx or larynx exist, no matter from what cause, excessive tobacco smoking is prone to aggravate the trouble.

This seems reasonable in view of the fact that clinical experience has shown that any slight atmospheric impurities — dust or smoke of any kind — may prove irritating to the inflamed nose, throat or larynx. Lack remarks, "It would be safe to state that moderate smoking originates no affection of the throat worthy of the name; at the most it causes slight hyperemia of the parts with which the smoke comes in contact, or an insignificant catarrh"; yet he adds, "When there is disease in the upper air passages the effect of excessive smoking is often manifested by a marked increase of the trouble."

As regards any local depleting effect, suggestions along that line seem to have been purely theoretical, and in contradistinction thereto must be taken into consideration Arnold's bacteriological experiments, proving that tobacco smoke is bactericidal to such germs as the diphtheria and typhoid bacilli, the staphylococcus and streptococcus. While Arnold did not offer this as an argument in favor of using tobacco, it must be acknowledged that the possible good effects, through the destruction of micro-organisms in the mouth and nose, offset the possible bad effects by irritation of the mucous membrane, unless smoking be carried to a degree far beyond any value it might have as a disinfectant and towards the dangerous increase of the irritative action.

There is not one scintilla of evidence that malignant disease of the throat is due in any way to the use of tobacco and, if it be admitted that carcinoma of the lip or tongue has been produced by smoking, it is clearly not tobacco but traumatism from the stem of the pipe, or other tobacco container, that is responsible.

Lastly, we come to consider the effect upon the special sense nerves. It has been suggested that there might be some effect upon the olfactory and auditory nerves analogous to the toxic injury of the optic nerve produced by tobacco or tobacco and alcohol acting in combination. At first sight it would seem reasonable to expect something of this kind, but as yet there is no satisfactory proof that such a condition ever occurs. You will recall that deSchweinitz has shown that tobacco, alcohol and other drugs may produce a lesion of the optic nerve and that the poison is selective in action, injuring or destroying a certain limited part of the nerve bundle, that is, the papillomacular fibers. So far as I can learn, nobody has conducted any similar studies of the olfactory or auditory nerves. I have found but one definite case of anosmia reported as due to tobacco and that is given with so little detail that it is impossible to judge whether the diagnosis was correct; the report states only that the man used tobacco to excess, that he had lost the sense of smell and had impaired vision, but it is not even shown that the eye symptoms were those characteristic of tobacco intoxication. Wyatt Wingrave has reported a series of 17 cases of deafness which he classes as due to the excessive use of tobacco and in which he believes the lesion was of a character comparable to that of the optic nerve in tobacco amblyopia. Corresponding to the central scotoma

of the visual field, he found loss of hearing for low tones. This defect appeared, however, in only half of his cases. The very brief notes on these cases in his paper are certainly insufficient to warrant an unqualified acceptance of his views. It would certainly be a unique experience for one otologist to have seen so many cases of so rare a disease and the report of such an experience should be accompanied by unquestionable evidence of their nature. Dr. Wingrave's testimony is unfortunately incomplete and consequently inconclusive.

The relationship between tobacco and deafness is probably quite as accurately established in a story told by Dr. Muir, relating a conversation with one of his Irish patients: "O'Sullivan, you are quite deaf; how long have you been so?" "Yes, sir, I am very deaf, and it's 'bacca as makes me so." "How do you know that?" "Well, sir, d'ye see, I've done time twice, and each time they stopped my 'bacca while I was in quod, and my hearin' returned." The deduction is quite as scientific as some of the medical men's conclusions.

Dr. Bramwell, from whose paper this story was obtained, speaks interestingly of his personal experience with tobacco and its effect upon his hearing. "I have myself repeatedly suffered from temporary deafness and can always make myself more or less deaf if I smoke too many Havana cigars or too much Cavendish tobacco, but Manila cigars have no prejudicial effect, however many I may smoke." Several writers refer to tinnitus as occasionally due to the effect of tobacco, and I have two friends who use that phenomenon as a guide to their smoking; both are fond of cigars and one of them smokes almost incessantly when he has a difficult problem to work over, only letting up on his smoking when his ears begin to ring or buzz.

Delie reports 6 cases of nerve deafness resulting from the excessive use of tobacco, four of them in persons under eighteen years of age. He believes that the tobacco produces a trophoneurosis of the auditory nerve by acting upon the circulation, through the sympathetic system, and, like other toxic neurites, the affection is progressive and should involve both ears simultaneously and without objective symptoms.

Another important question to consider is the relative danger of the different methods of smoking tobacco. On this point I may quote Dudley as follows: "There is a difference in the methods of smoking a cigarette and a cigar or pipe. In the two last mentioned the smoke is simply drawn into the mouth and expelled directly therefrom or through the nose, while the experienced cigarette smoker will inhale the smoke; that is, draw it to a greater or less extent into the air passages and in some cases to great depths in the lungs, and thus the absorption of the carbonic oxide and other gases will take place very rapidly, causing more or less deoxidation of the blood and thereby impairing its power to build up wasting tissues of the body. That such a result would follow deep and prolonged or frequently repeated inhalations of tobacco smoke is possible, but that it is possible to

inhale cigarette smoke deeply into the lungs, or even into the trachea, is open to question. However, this is the one really substantial objection to the use of cigarettes; all the talk about the injurious nature of the paper wrappers and the character of tobacco used in cigarettes is perfect nonsense. The tobacco employed in cigarettes is the same quality as that used in making cigars and there is nothing of an injurious nature in the paper holders. There is a varying quality for cigarettes just as there are differences in cigars. Cigarette smokers often use a considerable number daily, but we must not overlook the fact that one cigar contains as much tobacco as a dozen cigarettes. Inhalation of the smoke, whether of cigarette or cigar, is undoubtedly a reprehensible practice and is more common among cigarette than among cigar smokers, though only a small percentage of even the inveterate cigarette smokers actually inhale much of the smoke.

From such facts as I have been able to collect, then, and I append a list of articles that seemed to me worthy of consideration, it seems fair to offer the following conclusions:

1. It does not appear, at least it has not been proven, that tobacco causes any definite, characteristic lesions of the nose, throat or ear.
2. While it is possible that the excessive use of tobacco may, by indirect action, produce a toxic effect upon the olfactory and auditory nerves, with resulting impairment of the sense of smell or of hearing, there is not at the present time any definite laboratory proof for such an opinion, nor is there sufficient clinical evidence to substantiate the belief.
3. The ill-effects of tobacco smoke upon existing diseases of the throat, arising from other causes, is established and is the same as would be observed from any other form of irritation.
4. That gastric and systemic nervous disturbances may arise from excessive use of tobacco, in any of its forms, is unquestioned; the nicotine content of tobacco is a recognized poisonous substance and, in the process of smoking, there are evolved other injurious chemical products.
5. That carbon-monoxide is probably a more dangerous and injurious constituent of tobacco smoke than is nicotine, only a very fractional amount of which ever enters the tissues.
6. That if there is any more danger to be anticipated from cigarette than from cigar smoking it is to be looked for solely in the inhalation of the smoke; cigarette smoking without inhaling is no more injurious than is pipe or cigar smoking, probably not as much so, unless enormous numbers be smoked.

In conclusion, I beg to say that the author of this paper has tried to review the literature fairly, that he holds no brief for either alcohol or tobacco, that he has never yet encountered an agreeable alcoholic drink, has never tried chewing tobacco and has not learned to enjoy smoking, though he has occasionally smoked both cigars and cigarettes.

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New Instrument.

A SIMPLE CONTAINER FOR THE URETERAL CATHETER.

BY J. DELLINGER BARNEY, M.D., BOSTON.

IN a search for a simple, cheap and efficient container for ureteral catheters I have found every requirement to be fulfilled by a piece of rubber tubing cut one or two inches longer than the instrument it is to contain. It is ordinary rubber tubing, preferably of the "pure gum" variety, such as can be bought in any supply shop. A diameter of one eighth of an inch is best for the ordinary ureteral catheter, but for those with the bell-shaped extremity a diameter of one quarter of an inch is better. A little talcum powder is shaken through the tube to facilitate the introduction of the catheter. The latter is cleaned in the usual way after use and pushed into the tube. The two ends of the latter are then hermetically sealed. This is readily done by folding over the ends of the tube on itself and tying each one tightly by a few turns of silk or of ordinary string, a bowknot being tied at that end of the tube which contains the eye of the catheter. This not only facilitates the removal of the ligature, but also assures the proper end of the catheter being exposed at once.

We thus have the instrument encased in an air, dust and moisture-proof receptacle whose elasticity and pliability protect it from injury. I have carried a catheter done up in this manner in my bag for some months with no visible impairment.

To sterilize the catheter the whole thing is boiled for five minutes. The tube being watertight, sterilization is thus effected by dry heat. Experimentally, pieces of thread impregnated with *B. coli*, *B. typhosus*, *B. tuberculosis* and *staphylococcus pyogenes aureus* were enclosed in pieces of tubing, which were then sealed as described and boiled for five minutes, the sterilizer being meanwhile covered to insure a uniform temperature. These threads were then immediately removed, placed in bouillon and incubated. No growth resulted in any case, although the controls grew normally. These bacteria were selected