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THE TOBACCO HABIT OF WOMEN — ITS EFFECTS AND CONSEQUENCES.

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In observing little things we are often surprised to see what effects they may produce, although they at first seem to be very trifling. Who does not know what tobacco is? Yet how few are they who speak out against the evil results of the use of tobacco, and although this subject is very important from a sociological point of view, it is my object to keep strictly to the medical side of the subject. To show the reader how I came to undertake to study and investigate the effect tobacco has upon the human system, and especially upon women, I will, without intruding upon the reader's time, give a short narrative of the facts that led to it.

A few years ago it was my good fortune to be brought by fate to a place in the State of Tennessee, which could justly

be called the paradise of the State. Situated upon a mountain about 2,000 feet above the level of the sea, and some 1,000 feet above the surrounding country, it majestically overlooks the valleys below, and seems to be the king of the locality, and the splendid forests with which it is surrounded seem to be created by the mighty hand of nature to serve to the king mountains as a personal bodyguard.

Upon this beautiful spot of Southern soil is situated a small city, town or village—I am not sure what I shall call the place, but whatever it may be called will suit the place, for in learning and men of science it does rival a city; in gossip, a town, and in the small number of inhabitants it is a village. But no matter what it may be, I was puzzled and astonished by one fact, which, although it at first seems to be a trifle, yet has proved to be the effect of a cause which has very deplorable and injurious effects: namely, I was astonished to observe that in a place, which to all intents and purposes, has been endowed with all the gifts of nature, a healthy climate, good clean water, a scenery which would compare favorably with the finest scenes of Europe—in this place where life was to be seen in full vigor in the vegetable and animal kingdom, I was puzzled why the women of the place had a pale, yellowish face, which showed clearly that there was some cause that strained their vital forces. It was a prominent and phenomenal contradiction to the surrounding life, and such a face as a traveler sees in Germany, and even in the poorest Russian village was not to be seen.

After awhile I came to be consulted by the fair daughters of the mountains in a professional way. I found that my patients, women of the middle class, were almost all suffering from neurasthenia, and there was a general leakage of nerve and vital force, with all such evils as usually accompany such conditions in women.

Here I had to deal with what was evident to me, an effect from a general cause which produced the train of the symptoms stated, but the cause was a thing no patient ever gave a hint upon. My patients were mostly, what in a village are called the well-to do working people; all lived comfortably, all had the necessary commodities of life, and almost all had

their own domestic animals, lived in a healthy climate, and having to do their own house-work, they could not be suspected of living too luxuriously, as they have had enough of exercise in doing their work. Now, why then, in the conditions I have stated, where apparently all requirements of hygiene were present, except health itself, why did health absent itself so conspicuously?

I knew the cause was somewhere, and I began to look for it. The result was that I discovered that the women of the place were, as a general rule, *addicted to the tobacco habit*—that is, not smoking, but pulverized commercial tobacco, generally known as *snuff*, is taken in the mouth, where it is kept till it becomes entirely a fluid, being dissolved by the saliva, and then is thrown off. Before taking up the considerations of the effects of such a use of tobacco, let us first see what are the chemical constituents of tobacco; and the physical behavior of tobacco when used as either chewing, or what is popularly called *dipping snuff*. The chemical composition of tobacco, as given by Prof. W. H. White, M.D., F.R.C.P., in his "Materia Medica, Pharmacy, Pharmacology and Therapeutics", third, P. Blankiston's edition, page 349, is as follows:

TABLE A.

- | | |
|--------------------------------|--|
| 1. Nicotine, $C_{10}H_{14}N_2$ | 7. Coridine, $C_{10}H_{15}N$. |
| 2. Pyridine, C_5H_9N . | 8. Rubidine, $C_{11}H_{17}N$. |
| 3. Picoline, C_6H_7N . | 9. Hydrocyanic Acid, Hcy. |
| 4. Lutidine, C_7H_9N . | 10. Acetic Acid, $HC_2H_3O_2$ |
| 5. Paroline, $C_9H_{13}N$. | 11. Creosote, $C_8H_{10}O_2$ - $-C_7$
H_8O_2 - $-C_8H_{10}O$ - $-$. |
| 6. Collidine, $C_8H_{11}N$. | 12. Sulphur, S_2 . |
| 13. Carbon compounds. | |

Although the series of the composition of tobacco as given here is very interesting from a chemical point of view, all except the first on the list—nicotine—are of no importance to the subject of this paper, as it is a fact agreed to by all authorities that the effect of tobacco is due entirely to the nicotine it contains; therefore let us see what is nicotine, and what properties it possesses, and what effect it has when taken in the animal economy.

Nicotine is one of the main constituents of tobacco. The amount of it found in different kinds of tobacco varies, as can be seen from the following estimate:

TABLE B.

The amount of nicotine in ordinary tobacco, as given by—			
W. H. White, M.D., F.R.C.P.,	from 0.7 to 5.211	per cent.	
R. A. Witthaus, A.M., M.D.	“ 2.0 to 8	“	“
C. H. Leonard, A.M., M.D.	“ 2.0 to 10	“	“

From Table B it can be seen that the percentage of nicotine found in tobacco is quite large in comparison with the remaining compounds found in Table A, which are found in small quantities.

Now, having the amount of the active principle of tobacco, let us see what properties this active principle has, and what it is.

Nicotine is a colorless, oily, volatile alkaloid, turns brown upon being exposed to air or light. It has a burning, penetrating, caustic taste and odor, sp. gr. 1.027 at 15° C., is very soluble in water, alcohols and oils; it absorbs water from moist air.

Having so far seen what tobacco and its active principle are, let us now proceed to see what effect tobacco has upon the animal economy.

The primary effect of tobacco or nicotine, when first used, is to stimulate the involuntary muscle fibres and the secretory glands, as also the excretory organs of the animal body, to increased action; which, following the well-known law that the drug which at first stimulates an organ to increased action will, if used for a time, finally become a depressant. This is exactly what we find is the case with tobacco. It at first stimulates, then depresses, the activity of the animal. To show how tobacco is received by the animal cells I have collected some specimens of the much-abused ameba, and, first stimulating it with a few drops of saline solution to induce the ameba to throw out some pseudopodia, and by tapping the slide, I brought the ameba in contact with a minute particle of tobacco. It was interesting to notice how, after surrounding the particle and finding it unsuitable for itself, it at once began to move in its well-known way away from the particle; but when the same

experiment was repeated, instead of using a solid particle of tobacco a few drops of a saturated solution of tobacco was used—enough to occupy the whole space of the cover-glass. The changes were remarkable. It at first became elongated, then turned into a ring, the ring finally breaking up into pieces, each piece running together into a spherical mass and remaining so—evidently dead, as no amount of stimulation could induce a sign of vital phenomena to appear.

Leaving now for awhile the individual cell, I will take up systematically the consideration of the effects of tobacco upon the different systems of the animal economy.

When first taken in the mouth it stimulates the secretions of the salivary glands and causes abundant flow of the saliva. The saliva, with the amount of water it contains, acts as a solvent upon the tobacco, dissolving out the very soluble nicotine. The nicotine, coming in contact with the taste ends upon the tongue, evidently sets up a battle for existence of their cells, and the effect is that the taste-buds become hypertrophied first, and subsequently shrink and atrophy, thereby destroying the sense of taste.

Let some doctor take the trouble to examine the tongue of an individual who has been in the habit of chewing tobacco for a long time, and he will find that such an individual's tongue is flabby, large and yellow. If it is seen during the period of hypertrophy, the taste-buds—especially the circumvallate papillæ—are very much enlarged. Let such a person stop using tobacco at this time, and the tongue will become normal again; but if it goes on to the state of atrophy, then—even if the use of tobacco is given up—the sense of taste is entirely lost.

I happened to see a case which demonstrates the effect of tobacco upon the sense of taste. A woman who was addicted to the use of tobacco was serving as a cook in a family. The foods that she prepared were almost saturated with salt; yet she insisted that she could not taste any salt in the food. I finally examined her tongue, and found its condition as described above—that is, the sense of taste destroyed by the use of tobacco.

She was telling the truth—she could not recognize the taste of salt.

When the use of tobacco has been continued for a long time, and the period of stimulation is over, the depressing effect begins. The salivary glands meet the same fate as all other glands in the mouth, and the result is that their secretion becomes poorer. ptyalin is secreted very little, if any, and consequently starchy foods are sent to the stomach not elaborated by the saliva, and reach the gastric juice in a condition unsuited to the gastric juice. The vegetable proteids and the food are passed without change in the stomach, for the reason that what has happened in the mouth takes place in the stomach.

The food containing nicotine passing from the mouth through the esophagus at first stimulates the involuntary muscle fibres then relaxes them, impairing their resisting force, and thus creates in this important passage a condition which would favor an inflammatory process, and therewith favoring the beginning of morbid growths.

When the food containing the minutest portion of nicotine reaches the stomach its irritative nature so powerfully stimulates the coats of the stomach that it, both by the spasmodic contraction and powerful peristaltic movements, produces nausea and vomiting; but when tobacco has been used for a period of years the muscular coats become relaxed, peristalsis weak, and the pylorus open, allowing the free passage of any foods—even proteids; the cardiac and pyloric glands at first become hypertrophied, then atrophied. The gastric juice—which was at first secreted more than normal—is lessened, if anything; the inside of the stomach is covered with a thick, tenacious mucus, and the patient becomes a sufferer from chronic dyspepsia, pyrosis, etc. In the intestines the same changes take place as in the stomach, and the first stimulation is so powerful that Nasse in his experiments (*Beitrag Phys. der Darenburegung, Leipsic, 1866*) found that nicotine produced tetanic contractions of all intestines, which he proved were of a local and not nervous origin.

The peristaltic movement later becoming weaker and weaker, the patient begins to become constipated, so that finally the bowels refuse to move at all; and I know such patients who are compelled to depend upon some purgative every day in their life.

During the time that the above-stated changes take place in the alimentary canal the assimilative system suffers both from the food being unprepared for absorption and from the abolishment of the absorbing surfaces by changes that take place in the alimentary canal. The circulatory system comes in for its share, as every other system in the body; the vessels are affected in the same way as the intestines, hence from the stimulating effect arterial pressure rises at first, then when the relaxing effects begin there is a general fall of arterial pressure, and as an index of it the pulse falls, becomes softer and slower and the injured walls of the vessels are ready to become inflamed at the first opportunity, thus favoring arterio-capillary fibrosis and the consequences following such conditions.

The heart is affected by long-continued use of tobacco, as all involuntary muscles are; and that the effect is local can easily be proven. That an excised heart when stimulated with nicotine will bring on systolic contraction was first proven by DeBenham (West Riding Lunatic Asylum Report, vol iv, 1874). Hence it is evident that the first effect of stimulation will produce tachycardia, and D. E. Hughes, M.D., gives tobacco, when used in excess, as one of the main causes of tachycardia.

But the next is the depressing effect, and the relaxation of the heart muscles brings the opposite result—that is, bradycardia, favoring the formation of thrombosis and embolism, and—what is as bad—bradycardia gives rise to congestion of the brain, the portal and the renal systems.

But of all effects tobacco has upon any part of the circulatory system, the most interesting is the effect it has upon the individual blood corpuscles. Here when nicotine reaches the red blood corpuscles the fight between the alkaloid and the red corpuscles is for life and death, and the result depends upon the time which nicotine has been used, and the amount of the dose used.

I am aware that Prof. H. C. Wood, M.D., is of the opinion that the red blood corpuscles and the blood in general are not affected in nicotine poisoning. That is perfectly true, but the reason for this is that the dose of nicotine which kills is

so small and if the reader will turn to Table A and see the amount of carbon contained in nicotine, it will become evident that nicotine kills by virtue of the carbon it contains through interfering with hematosiis. Hence, when it is due to the pure alkaloid that death has been caused, and the blood is seen immediately after death, the changes, although they are present even then, are not distinct. But even then Dr. Hare has observed a change in the spectrum of hemoglobin, and he affirms (as quoted by Prof. Wood) that after large doses, microscopic changes in the red blood corpuscles can be seen.

The last statement of Dr. Hare is fully in accord with the results of my own investigations. If, instead of using nicotine, minute doses of pulverized tobacco are given to an animal for a period of time, the red corpuscle disintegrates in the living vessel.

Upon the leucocytes, tobacco has the peculiar effect of increasing them, both in number and size—a thing which I cannot find mentioned in any text-book; and so far as I know the effect of tobacco upon the leucocytes seems not to have been noticed before.

The respiratory system is the one which answers promptly to the effects of nicotine. Here, as elsewhere, the irritative action of tobacco sets up inflammatory conditions, and when nicotine is given in a dose sufficient to cause death, it kills by depressing (what Flourens calls *neudvitale*) the respiratory centre.

The abdominal organs suffer both from the direct irritation of the effect of tobacco and from the passive congestion due to the inability of the heart to perform its normal functions. Especially is this remarkable in the effects it has upon the internal reproductive organs of the female, but that I will speak about after considering the effect of tobacco upon the nervous system.

If I were asked which particular tissue or organ in the human economy suffers most from the injurious effects of the habitual use of tobacco, I would not hesitate to answer that of the tissues the nervous tissue suffers most, and of the organs the eye and the reproductive organs of the female, are those which—no matter what the condition of the other parts—never escape without being injured.

The experiments of Hare, Rosenthal, Vulpian and Krockner have definitely shown that the functions of the motor nerves are always and permanently abolished through the use of nicotine. Lautenbach (as quoted by Wood) states that the sensory nerves are also affected, and my experiments prove that this is true.

Upon the brain, Drs. Wood and White both agree that nicotine has but little effect; but I have noticed that those who habitually use very much tobacco (chewing or dipping) suffer from loss of memory. In one instance this effect was so apparent that the person was aware of the defect of memory, so that she did not trust herself to remember the most trifling thing.

That tobacco interferes with the nutrition of the nerves, as well as of the whole body, is proven by the total nervous exhaustion and the general neurasthenic condition of those who use it very much.

Having shown the effect of tobacco upon the nervous system, it will become evident why the effect of tobacco is so injurious to the eye. It is a well-known fact that retrobulbar neuritis is always caused by the use of tobacco (*Diseases of the Eye*, Gould and Pyle). Dr. Deschweinitz, speaking about toxic amblyopia, states that "atrophy of the nerve may result." But of all, the following is as emphatically and definitely spoken as it is instructive:

E. Nettleship, F.R.C.S., writing concerning the effect of tobacco on the eye in his "*Diseases of the Eye*," edited and revised by W. T. Holmes Spicer, M.A., M.B., F.R.C.S., fifth edition (Lea Bros.) p. 440, says: "There is no doubt whatever that tobacco, whether smoked or chewed, does act directly upon the optic nerve, and in such a manner as to give rise to definite and usually very characteristic symptoms. The amblyopia seldom comes on until tobacco has been used for many years." Again, on page 270, writing about amblyopia, Nettleship says:

"My own opinion, based on the examination of a large number of cases, is that tobacco is the essential agent, and that the disuse, or greatly diminished use, of tobacco is the one essential measure of treatment"

The above needs no comment to show what effect tobacco

has upon sight through the nervous system, while the effect tobacco has through the same avenue upon the female reproductive organs is enormous in the suffering it causes.

That the supply of nourishment (blood) to the reproductive organs, as to all parts of the body, is regulated and presided upon by the nervous system, is a well-established fact. Now, when due to the effects of a long-continued use of tobacco, the nerve force is exhausted, it is evident that the nervous control over the blood supply being impaired, the supply of blood to the different organs of the body will be abnormal and irregular. Especially is this true about the reproductive organs, which get their blood supply from tributary sources. The abnormal supply of blood will tend to cause inflammation of the reproductive organs, which by virtue of their physiological functions easily take on inflammation. But the worst is that excessive use of tobacco causes the existence of all conditions that predispose, and if existing for a continued length of time will actually produce prolapsus of the womb, a condition of frequent occurrence and justly dreaded by all women.

Now let us see how the excessive use of tobacco favors prolapsus of the uterus.

I believe I have made it plain that the effect of tobacco upon the involuntary muscles of the body is at first stimulating, then relaxing. Now, if we bear in mind that any condition which increases the weight of the uterus weakens the uterine supports and at the same time causes pressure from above, we see that these causes produce all that is necessary to bring about prolapsus of the uterus. So let us see if all the conditions for prolapsus of the uterus are present from the excessive use of tobacco.

The irritation of the tobacco will set up a low form of inflammation, and the irregular blood supply—due to the loss of nervous control—will cause the congestion of the organ. The relaxation of the walls of the uterus will produce a state of flexion, bending the uterus and thus causing the menstrual blood to be retained in utero, which will increase its weight by retaining the fluid. The relaxing effects of the tobacco acting also upon the uterine supports will weaken their supporting power, and the congested viscera from above, to-

gether with the patient straining at stool—due to the constipating effect of the tobacco—will furnish pressure from above, and all united will produce prolapsus of the uterus.

Having seen the effects of the excessive use of tobacco, let us see what are the consequences of the habitual use of tobacco.

The consequences are that a mother who habitually poisons her economy with tobacco will give birth to sickly, mal-developed babies, as the baby had to depend during all its life in utero—from the time the vitellin food gave out—upon the mother's blood to supply nutrition. And it is reasonable to expect that such an infant, with defective vital forces, will not be fit to struggle through the common diseases of infancy and childhood.

But, more than only being physically mal-developed, such an offspring from a mother—and sometimes from both parents—addicted to the use of tobacco, chewing or dipping, and suffering from neurasthenia, has in him or her all predisposing conditions for diseases of the mind.

In order to show what influence neurasthenia in one or both parents has upon the minds of their children, it may be interesting to consider such an authority as Dr. A. Cullere, who, writing about the etiology of hereditary insanity, says :

“*La folie héréditaire est le resultat de l'hérédité accumulée et progressive. Sans vouloir rechercher les liens qui unissent les affections nerveuses aux autres maladies chroniques, nous admettons avec la plupart des auteurs qui ont spécialement étudié ce point de clinique, que le principe héréditaire psychopathique prend sa source dans le états neuropathiques ou neurasthéniques des ancêtres.*” — *Traite Pratique de Maladies Mentales*, Paris, 1890, p. 278.

From what Dr. Cullere says it is evident that the whole progeny of neurasthenic parents is liable to hereditary insanity; and who would think such grave results are the outcome of the habitual use of tobacco, which seems to be a trifling thing?

After what I have said about the effects of the tobacco habit on women, I would not be surprised to have such a question as the following addressed to me:

“Dr. Stolper, from what you have written about the effects of tobacco, which is a universally-used article in everyday life, it is evident that you blame the use of tobacco for the greater part of all the evils to which human flesh is subject. Why, then, has not more trouble in general practice and in the clinics been attested to be due to tobacco?”

To such a question I would answer—

Because the effects I have described manifest themselves only after a long period of time, and as life is short some individuals will pass their natural life before the effect of tobacco manifests itself upon them. That the quantity needed to produce the symptoms is *certeteris paribus* a matter of idiosyncrasy, a very small quantity may produce alarming symptoms in one, while in others enormous quantities may be necessary to produce any effect.

Again, much depends upon the manner in which tobacco is used, and the quality of the tobacco. Chewing and dipping are more injurious, because the tobacco is taken in the mouth; the nicotine being very soluble, some part of it is retained in the body; while when smoked—nicotine being volatile—the greater part of the alkaloid is volatilized. It is self-evident that strong tobacco is far more injurious than the milder kinds.

Finally, the cause existing, the effects sooner or later manifest themselves; but the doctor not being let into the secret that tobacco is used (especially if the patient is a woman), or if he knows that it is used he may not consider that there is connection between the use of tobacco and the diseases for which he was consulted, but will take one of the effects of the use of tobacco as the cause, treat the effect as the cause, and so lose the original cause from view.

These are the reasons why the effects of the use of tobacco have not attracted the attention which they fully deserve.