

Xerostomia (mouth-dryness), with dryness of the nose and eyes / by Thomas R. Fraser.

Contributors

Fraser, Thomas R. Sir, 1841-1920.
Royal College of Physicians of Edinburgh

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Xerostomia (Mouth-Dryness), with Dryness of the Nose
and Eyes. By Professor Thomas R. Fraser, M.D.,
F.R.C.P.Ed.

Recorded cases of mouth-dryness or xerostomia (as it has been called by Mr. Jonathan Hutchinson and Dr. Hadden) are so few in number that the description of a case now under my observation may serve a useful purpose, even if it add but little to what is already known. That little is comprised in the circumstances that the nose and eyes are involved as well as the mouth, and that several observations were made on the secretions of these parts which have not been recorded in connection with other cases.

The patient, Maggie D., æt 27 years, a table-maid, was first seen by me in February 1892, through the favour of my friend, Dr. Mackness, of Broughty Ferry. She then had been affected for about three and a half years with inability to shed tears and with dryness of the eyeballs; and for about eighteen months, with dryness of the mouth and nose, accompanied with difficulty in masticating and swallowing food. Her family history disclosed no neurotic tendency, unless it be that a sister suffers much from asthma. She herself had been in good and comfortable conditions as a domestic servant for ten years; but she had been affected with various nervous symptoms during that time. For example, seven years ago, after recovering from scarlet fever, she "lost her voice," and for three weeks was able only to whisper; and since then, aphonia, lasting for several days or weeks, has occurred two or three times. Above all, however, about eight years ago, she began to suffer severely from neuralgia of the head and face, with violent shooting pains in the course of the lingual and inferior dental nerves, and associated with a condition of pallor and breathlessness. This continued for at least three

years, and apparently subsided under treatment with iron; for, although eight teeth were extracted, no relief was thereby obtained.

In 1889 she was unexpectedly summoned to her home, on account of the serious illness of her mother. The news caused her much alarm and distress; and, on arriving at her mother's house, she found that she was unable to shed tears, although her condition was one of great grief. Since this time she has never been able to weep.

In April 1890 the remaining teeth were all extracted, as they had become decayed and blackened.

In June 1890 she was supplied with a set of false teeth, and suffered much, for six or seven weeks, from the irritation produced by wearing them. When this irritation had subsided, the tongue was observed to be tender, and soon afterwards the mouth became dry, requiring water to be frequently sipped to relieve the discomfort and enable food to be masticated and swallowed. Following the mouth-dryness by a brief but uncertain interval, the nose also became dry.

The patient is a well-developed, well-nourished, healthy-looking, intelligent woman, of cheerful disposition. Her condition in February 1892 was as follows:—The lips are dry and rather pale. On examination, the blood showed moderate anæmia, for the hæmocytes number 3,500,000, and the leucocytes 6000, per c.mm.; there is 42 per cent. of hæmoglobin, and the blood has a specific gravity of 1038. The gums, inner surface of the cheeks, and the fauces are dry and rather pale. The tonsils are not enlarged. The back wall of the pharynx looks particularly dry and glazed, and has red vessels coursing over it. The tongue is perfectly smooth, dry, and glazed, without any fissures or furrows, and is bright red in colour. The filiform and fungiform papillæ are indistinguishable, while the circumvallate group are barely discernible. The whole surface of the buccal cavity, though soft, is so dry that no perceptible moisture is conveyed to the finger or to blotting-paper placed on it for a few seconds; but this dryness ceases at the epiglottis, and therefore does not extend into the larynx. Both parotid glands are moderately enlarged,

the left parotid more so than the right. The orifices of Wharton's and Stenon's ducts are readily seen, and the ducts appear to be normal, unless it be that the papules of the former are rather more prominent than usual. On different occasions, pressure on Wharton's and Stenon's ducts has caused small quantities of fluid to exude from their orifices.

The dryness of the mouth, with the consequent difficulty in swallowing, has caused the patient to confine her diet largely to milk, soups, and puddings, and when solid food is taken to assist mastication and deglutition by mouthfuls of water. Even between meals she constantly sips liquids to remove the disagreeable and sometimes painful sensation of dryness and hotness, and also to assist articulation, as the free movement of the tongue is interfered with by stickiness of the buccal cavity. The appetite and digestion are good, there is no constipation, and the patient thrives well on the restricted diet. Butcher meat causes indigestion, but fish agrees well with her.

Not only, however, is mouth-dryness present, but there is also dryness of the nose and eyes. The nasal mucous surface is quite dry. The conjunctival surface of both eyes is also dry, although not absolutely so; and for more than three years the patient has been unable to shed tears under any provocation, whether emotional or physical. The left eye is a little congested. There is a constant sensation of roughness in the eyes, which is increased by rubbing them. The eyes become sore when exposed to wind, or when they are kept open for a short time, and they soon tire when the patient reads or sews; but in none of these circumstances do tears appear. My friend, Dr. Berry, was good enough to make an examination; and he reports that the lachrymal gland secretion is almost absent, the conjunctival secretion being apparently normal, and that there is some accumulation of epithelium on the orbital surfaces, which is accounted for by the absence of tears.

Coincidentally with the occurrence of dryness in the mouth and nose, the skin also became involved. It is dry over all the exposed surfaces, with rough scaliness on the arms and

face, and an eczematous rash on the palms of the hands. It was subsequently found, however, that xerodermia is not a constant condition, that the palms of the hands are often moist, and unlike the mouth, nose and eyes, the skin could be rendered profusely wet by stimulation of its glands.

Every other system and function appears to be normal. The common and reflex sensibilities of the mouth, nose, and eyes, and of all other parts are unaffected. Taste, hearing, vision, and smell are sufficiently acute. The respiratory, circulatory and alimentary organs are healthy. Menstruation is regular, but the patient believes that during two or three days before and also after the appearance of the menses, the mouth dryness is more marked than at other times. The urine is normal in quality and quantity, and the urea has averaged about 400 grains per diem.¹

As the patient remained in the hospital for several weeks, a number of observations were made in the hope of defining still further the conditions that were present. In the carrying out of these observations, I was much indebted to Mr. James V. Paterson, the clinical clerk in charge of the case, and to Drs. Clarkson and Livingstone, resident physicians in my wards.

It has been stated that the patient frequently suffers from a sensation of undue heat in the mouth. Thermometric observations showed that the temperature of the mouth was usually higher than that of the axilla. On some occasions the difference was found to be only a few tenths of a degree, but not infrequently the mouth temperature was from one to two degrees higher than that of the axilla. The difference was least in the early morning, and greatest in the afternoon and evening. The following are the details of the temperatures taken on eight consecutive days:—

¹ It is obvious that the word xerostomia is insufficient to define the conditions present in this case. For the mere mouth-dryness it is possible that the word stomaxerosis would be a better one than xerostomia, in so far that the construction of the former could better be extended to the analogous conditions of the nose and eyes; which would then become rhinoxerosis and ophthalmoxerosis, respectively. With either construction, however, it is difficult to suggest one convenient word that would include the three conditions combined,—stoma-rhino-ophthalmoxerosis being undoubtedly cumbrous.

FIRST DAY.			SECOND DAY.		
Time.	Axilla.	Mouth.	Time.	Axilla.	Mouth.
5.30 A.M. . . .	98°·6	98°·8	5.30 A.M. . . .	99°·2	99°
12 NOON. . . .	99°	99°·2	12 NOON. . . .	98°·2	99°·4
4 P.M.	98°·6	99°·6	4 P.M.	99°	99°·4
8 P.M.	98°·6	99°·2	8 P.M.	98°·6	99°·4
THIRD DAY.			FOURTH DAY.		
Time.	Axilla.	Mouth.	Time.	Axilla.	Mouth.
5.30 A.M. . . .	98°·2	99°·2	5.30 A.M. . . .	98°·6	98°·6
12 NOON. . . .	99°	99°	12 NOON. . . .	97°·8	98°·6
4 P.M.	99°·3	99°	4 P.M.	97°·4	99°·3
8 P.M.	98°·2	99°·6	8 P.M.	98°	98°·6
FIFTH DAY.			SIXTH DAY.		
Time.	Axilla.	Mouth.	Time.	Axilla.	Mouth.
5.30 A.M. . . .	98°	98°·6	3.30 A.M. . . .	97°·8	98°·4
12 NOON. . . .	98°	98°·6	12 NOON. . . .	97°·6	98°·5
4 P.M.	98°·4	99°·4	4 P.M.	98°·5	98°·7
8 P.M.	97°	99°	8 P.M.	98°·4	99°·4
SEVENTH DAY.			EIGHTH DAY.		
Time.	Axilla.	Mouth.	Time.	Axilla.	Mouth.
5.30 A.M. . . .	98°·2	98°·2	5.30 A.M. . . .	98°·4	98°·4
12 NOON. . . .	98°·4	99°·2	12 NOON. . . .	98°·8	98°·8
4 P.M.	98°·6	99°·2	4 P.M.	99°·2	99°·4
8 P.M.	99°	99°·8	8 P.M.	98°·6	99°·6

At the same time, during a two-days' pyrexia, with a maximum temperature of $102^{\circ}8$, in the course of a "cold," the temperature curves of the axilla and mouth were almost exactly the same,—the temperature of the mouth, therefore, not having been raised above that of the axilla by the pyrexia.

The reaction of the mouth moisture was found to be sometimes slightly acid and at others neutral. So dry is the mouth that when a piece of bread placed in it is masticated for several minutes, the bread still remains crumbly, as if no moisture had been absorbed by it. Starch paste moved about in the mouth by the tongue and jaws for eight minutes did not change its original appearance, and when tested with Fehling's solution, immediately on being removed from the mouth and also an hour afterwards, gave no evidence whatever of the presence of dextrose or maltose. A portion of the same paste, when placed in the normal mouth for one minute, produced an immediate and copious reduction in Fehling's solution.

A little dilute acetic acid placed on the tongue failed to cause any moisture to appear in the mouth. This as well as all other acids which were tried caused smarting almost amounting to pain.

A small quantity of largely diluted solution of potash kept in the mouth for two minutes also caused much smarting. The tongue became redder in colour, and a little mucus appeared in the mouth. After the mouth had been well washed with water and then dried with a soft cloth, it again slowly became slightly moist. A little starch paste was placed in it, and, after five minutes, removed and tested with Fehling's solution, but no reduction occurred.

A small piece of pyrethrum root cut into small chips was masticated by the patient, with the result that a very little watery fluid appeared in the mouth. The mouth was dried with a soft cloth, and the orifices of Wharton's and Stenon's ducts were kept under observation for about a minute, but no fluid could be seen to proceed from them, although the mouth had again become very slightly moist.

Another small piece of pyrethrum root, broken into small

fragments, was softened by being soaked in a little water for an hour. Two small fragments then placed in the mouth of a healthy person caused an almost immediate and profuse salivation. The remainder, and much the greater portion, was chewed by the patient for seven minutes, with the result that some slight moisture appeared in the mouth. A little thin starch paste was then placed in the patient's mouth, and retained there for seven minutes. When removed, it was found to have a neutral, perhaps faintly alkaline reaction. A few drops tested with Fehling's solution gave no glucose reaction. After adding to the remainder a little carbonate of soda solution, so as to render the mucilage unmistakably alkaline, it was digested for thirty minutes at a temperature of 100° Fahr.; but still no reduction occurred when a little of it was tested with Fehling's solution. Saliva from a healthy person was then added to the mucilage, and in a few minutes the mucilage freely reduced Fehling's solution.

In a healthy man, the positive pole of a galvanic battery placed upon the tongue and the negative upon the skin over the parotid gland caused, in a few seconds, a copious flow of saliva. This was repeated in our patient, the application being continued for one minute, but no effect whatever was produced. A reversed current applied also for one minute, and afterwards an interrupted current, were equally inoperative.

One-tenth of a grain of nitrate of pilocarpine was administered by subcutaneous injection. In three minutes the skin had become moist, and in eight minutes there was moderate sweating of the face, limbs, and trunk, the pulse was rapid, and the mouth was distinctly, though only slightly, moist. Starch paste was now placed in the mouth and well moved about by the tongue and jaws for five minutes; it was then tested with Fehling's solution, and entirely failed to produce any reduction. The mouth was then dried with a soft cloth and the orifices of Wharton's ducts observed, with the result that while a little fluid slowly collected at the base of the papillæ, no fluid could be seen to issue distinctly from the orifices themselves.

This observation was on other occasions repeated with the one-sixth and the one-fourth of a grain of nitrate of pilocar-

pine, and the results were the same. On the occasion, however, in which the one-fourth of a grain was injected, pressure on Wharton's ducts caused a small quantity of fluid to exude from their orifices. In each case, pilocarpine caused not only a slightly moist condition of the mouth, but also of the nose. The dryness of the eyes, however, was not perceptibly lessened.

A few observations were made for the purpose of determining whether the buccal glands retained or had lost their power of eliminating substances from the blood. After fifteen grains of iodide of potassium had been taken, the mouth was washed with water, and eleven minutes after the administration a little water was placed in the mouth and moved about for three minutes. This water was then tested for iodine with boiled starch and chlorine water, but no blue colour was produced. This observation was repeated four times at intervals of quarter of an hour, and on no occasion was any iodine found. In a control experiment, in a healthy person, iodine was easily and abundantly found in the saliva, ten minutes after fifteen grains of iodide of potassium had been taken. The urine of the patient, passed within half an hour after the iodide had been administered, gave abundant evidence of the presence of iodine. The patient was afterwards treated for several days with iodide of potassium, and these observations were frequently repeated, with the same results.

On separate occasions, mustard, smelling-salts, fresh onion, and even strong solution of ammonia were placed before the patient's face, and were also inhaled by her. These powerful stimulants of the nasal and ocular secretions produced no appreciable effect on the eye secretion, and but little immediate effect on the nasal secretion. Strong solution of ammonia, however, several hours after it had been freely inhaled, caused a discharge of mucus from the nostrils, and especially from the left nostril. Snuff, also, failed to increase the moisture of the nose and eyes. At the same time the patient sneezes occasionally on provocation, and she states that when she has a "cold," a scanty discharge proceeds from her nose. Since the illness began, the nose has shown an unusual tendency to bleed during "colds," after contact with irritating

substances such as ammonia, and even when "blown" with a handkerchief, the blood proceeding always from the left nostril.

As happened in several other cases, there is in our patient also a liability to inflammation of the parotid glands. This was shown, for example, when she received pilocarpine in some of the observations that have been referred to. On one occasion, eight hours after the one-sixth of a grain had been subcutaneously injected, both parotids became enlarged, painful and tender, and continued so for five days, and during the first forty-eight hours of the parotitis, the general temperature was pyretic. Similar attacks of parotitis have taken place on several other occasions, when the only discoverable provocation was some unimportant exposure to cold. Exposure to cold, during unusual moisture of the skin, was, indeed, the probable cause of the parotitis that several times followed the administration of pilocarpine; for when special care was taken to prevent exposure, parotitis did not occur after even large doses of pilocarpine.

Before coming under my care, the patient had been treated with opium, ergot, jaborandi, iodide of potassium, iron, and various preparations of mercury. She has since received tincture of valerian, liquor arsenicalis, iodide of potassium, and, occasionally, nitrate of pilocarpine by subcutaneous injection. None of the above substances has materially improved the abnormal conditions. Recently, however, much relief has been obtained by the placing in the mouth, thrice daily, of five minims of a 2 per cent. solution of nitrate of pilocarpine. I anticipate that by a continuance of this treatment, with a readjustment, if necessary, of the dose and frequency of administration of the pilocarpine, the inconvenience and distress from which the patient now suffers will at least be prevented, whether the parts be restored to an altogether normal condition or not. In the hope of producing a normal condition, physostigmine and iodide of iron will also, by and by, be administered, and the nervous apparatus of the glands will further be stimulated by galvanism.

Such facts as have been recorded in previously described cases of this affection, as well as in the case now described, have been summarised in the following Schedule:—

SUMMARY OF

Reporter and Reference.	Sex and Condition.	Age.	Extent of Affection.			State of Skin.	Onset, Sudden or Gradual.	Suggested Cause.
			Mouth.	Nose.	Eyes.			
DR. A. C. BARTLEY. <i>Medical Times and Gazette</i> , 21st November 1868, 603; see also Hutchin- son, <i>Clinical Society's</i> <i>Transactions</i> , xxii. 26.	Lady.	77.	Yes.	...	...	...	Probably gradual.	Some febrile affection.
DR. BRADBURY. <i>Medical Times and Gazette</i> , 3rd May 1879, 495; quoted from <i>Boston</i> <i>Medical Journal</i> , 6th March 1879.	Man.	24.	Yes.	...	...	...	...	...
MR. JONATHAN HUTCHIN- SON. <i>Clinical Society's Trans-</i> <i>actions</i> , 1888, xxi. 180.	Widow.	60 or 65.	Yes.	No.	No.	...	Rather sudden.	Disappoint- ment in love, although 60 or 65.
MR. JONATHAN HUTCHIN- SON. <i>Lancet</i> , 3rd November 1888, 868; and <i>Clinical</i> <i>Society's Transactions</i> , 1889, xxii. 25.	Widow.	50.	Yes.	No.	No.	Perspires easily and free- ly.	Rather gradually.	Troubles in early life, but no mental dis- tress or shock coinciding with onset.
DR. HADDEN. <i>Clinical Society's Trans-</i> <i>actions</i> , 1888, xxi. 176; and <i>Lancet</i> , 17th March 1888, 523.	Widow.	65.	Yes.	?	Yes.	Perspira- tion dimin- ished.	Gradually.	...
DR. W. ROWLANDS. <i>Lancet</i> , 14th January 1888, 104; and <i>Clinical</i> <i>Society's Transactions</i> , 1888, xxi. 178.	Lady.	60.	Yes.	No.	Yes.	Very dry.	Suddenly.	News of sudden death of a friend.
DR. BROADBENT.	Lady.	...	Yes.	...	...	...	...	...
DR. BUTLIN.	Woman.	23.	Yes.	...	...	...	...	...
DO.	Woman.	46.	Yes.	...	...	...	...	...
DR. CROCKER.	Woman.	Elderly.	Yes.	...	...	...	...	...
DO. <i>Lancet</i> , 3rd November 1888, 868.	Woman.	Elderly.	Yes.	...	...	...	...	...
DR. BARLOW. Quoted from Mr. Hutchinson, <i>Clinical</i> <i>Society's Transactions</i> , 1889, xxii. 26.	Lady.	Old.	Yes.	...	...	...	...	...
DR. SEIFERT.	Man.	75.	Yes.	Yes.	...	...	...	...
DO. <i>Wiener klinische Wochen-</i> <i>schrift</i> , 14th November 1889, 881.	Man.	65.	Yes.	Yes.	...	...	...	...
DR. L. MORGAN. <i>Medical Press and Circu-</i> <i>lar</i> , 2nd January 1889, 4.	Woman, a knitter.	35.	Yes.	Yes.	No.	...	Sudden.	Went to bed ap- parently well, after highly- seasoned sup- per, and woke in morning with dry mouth.
MR. GEORGE FOY. <i>Medical Press and Circu-</i> <i>lar</i> , 10th April 1889, 385.	Widow.	70.	Yes.	No.	No.	...	...	Violent shock from sudden death of a relative.

RECORDED CASES.

Duration.	Description of Tongue.	Teeth.	Salivary Glands and Ducts.	Reaction, etc., of Mouth Secretion.	General Health and Disposition.
8 months.	Dry, sore, with longitudinal rugæ.	All gone.	Openings of Stenon's ducts not discoverable; openings of Wharton's ducts appear impervious.	...	Quaint lady, cheery and well.
...	Dry, leathery, and deeply serrated transversely.	Had never "erupted." Has remains of inferior six-year molars.	...	...	Perfectly well, and food apparently completely digested. Had subsisted entirely on soups and soft moist aliments.
2½ years.	Absolutely dry.	...	...	...	General health fairly good.
4 years.	Dry, clean, red, and much fissured or sulcated.	...	...	...	Good appetite and digestion and fair strength.
10 months.	Red, cracked in all directions, devoid of epithelium, and absolutely dry.	Had been nearly all extracted 20 years previously.	Nothing abnormal could be found in salivary glands; openings of Stenon's ducts not discoverable.	Slightly acid, and unable to act on starch.	General health and digestion good.
10 years.	Like dry, raw beef, and papillæ on anterior surface absent.	...	...	...	Thin, nervous temperament, and fairly good health; digestion good.
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...
Few years.	...	...	...	...	...
4 years.	Dry, red, and cracked.	...	...	...	Healthy and hearty.
3 years.	Dry, red, and cracked.	Well preserved.	...	...	Healthy, but of nervous temperament.
18 months.	Red, free from apillæ, sulcated, glazed, but soft.	...	...	...	General health good.
About 18 months.	Dry, shrunken, and cracked transversely.	...	...	...	Low spirits by death of friend; but a healthy country woman.

Reporter and Reference.	Sex and Condition.	Age.	Extent of Affection.			State of Skin.	Onset, Sudden or Gradual.	Suggested Cause.
			Mouth.	Nose.	Eyes.			
DR. ARCHANDER. <i>Virchow and Hirsch's Jahresbericht</i> , 1891 (for 1890), xxv. 232.	Woman.	44.	Yes.	...	...	...	...	...
DR. HUGO SUMMA. (Doubtful case.) <i>The Alienist and Neurologist</i> , April 1890, 219.	Lady.	30.	Yes.	...	...	...	Quickly?	Pregnancy.
DR. FRASER. Case described in this paper.	Woman, domestic servant.	27.	Yes.	Yes.	Yes.	Usually dry, but perspires a little.	Dryness of eyes, suddenly; of other parts, gradually.	Eye dryness followed news of serious illness of a relative; dryness of other parts followed extraction of teeth, and irritation from false palate.

The above summary contains the more important of the details recorded in 19 cases of xerostomia. There have not been included among them several cases in which temporary or intermitting mouth-dryness occurred as a symptom in the course of some other affection, such as have been described by Mr. Hutchinson¹ and Dr. Weir Mitchell.²

Of these 19 cases, 16, or 84·2 per cent., occurred in women and 3, or 15·8 per cent., in men.

The ages of 15 only are stated; the youngest being 23, and the oldest 77. Eight were 50 years old and upwards, but as 3 of those whose ages have not been noted are described as "old" or "elderly," it is probable that 11 out of 18, or 61·1 per cent., were 50 years old and upwards. 7 out of 18, or 38·8 per cent., were from 23 to 46 years of age.

Out of the 19 cases, only mouth-dryness is associated with 13, or 68·4 per cent. In 3 cases, the mouth and nose, in 1 case the mouth and eyes, and in 2 cases the mouth, nose, and eyes are recorded to have been affected.

The state of the skin secretion has so seldom been referred to that little can be learned of the frequency of involvement

¹ *Archives of Surgery*, 1892, iii. 99 and 323.

² *Lectures on Diseases of the Nervous System*, 2nd edition, 1885, 209.

Duration.	Description of Tongue.	Teeth.	Salivary Glands and Ducts.	Reaction, etc., of Mouth Secretion.	General Health and Disposition.
7 years.	Wrinkled and not glistening.	Became entirely carious during the 7 years.	From projecting orifices of Stenon's ducts a little saliva could be expressed; none from Wharton's ducts.	...	...
About 3 months.	Red devoid of epithelium and furrowed.	...	...	...	Patient recovered, apparently in a few weeks, under treatment.
Eyedryness about 4 years; dryness of other parts, 2 years and 4 months.	Dry, very smooth, and red.	All gone.	Parotid glands, especially left, rather enlarged; others normal; ducts appear normal.	Usually neutral, occasionally acid. Does not contain ptyalin.	Health and digestion good, and spirits usually good.

of the sweat glands. In 3 cases, however, the skin secretion was decidedly lessened.

A probable cause is indicated in only 8 cases. In 4 it was a nervous perturbation, which, in 2 cases, was immediately followed by mouth-dryness, and in the third by paralysis of the lachrymal secretion only; but in the fourth it is not noted whether the onset was sudden or gradual. The only other recorded sudden onset is stated to have followed the eating of a highly-seasoned supper. In 1 case the affection occurred during a pregnancy, which was accompanied with prostration and much vomiting.

The tongue in 9 cases was cracked, wrinkled, or furrowed, and in 3 it was smooth. In nearly all cases it appears to have been clean, denuded of epithelium, and with the appearance of raw beef, whether fissured and cracked or not.

The state of the teeth has been noted in only 6 out of the 19 cases. In 5, the teeth had all gone or been extracted because of decay, or had never "erupted"; and in only 1 are they described as well preserved.

Reference is made to the state of the glands and ducts in 4 cases. In only 1 were the parotid glands enlarged, and in none was any abnormality discovered in the ducts. The

characters of the salivary secretion were examined in only 1 case, besides the case recorded in this paper. In both cases the mouth-moisture was occasionally acid in reaction, and no ptyalin could be discovered in it.

The duration of the affection varied from several months to ten years; but as the mouth-dryness was cured in 1 case only, the duration would appear to be unlimited.

All observers agree that the absence of the salivary and other buccal secretions had no injurious influence upon the general health or the digestive functions. It was, however, productive of difficulty in masticating, swallowing, and speaking, and, occasionally, of tenderness and a sensation of heat, and even of pain in the mouth. The sensation of heat may be explained by an actual elevation of the temperature of the mouth, such as occurred in the case described in this paper.

There does not appear to exist a sufficiency of physiological or pathological knowledge to supply any definite etiological explanation of this singular affection. In only a few of the recorded cases has even an attempt been made to associate its origin with any antecedent event in the history of the patient. In these few cases some mental perturbation occurs so frequently as an antecedent as to render it a probable cause. Whether the central as well as the peripheral part of the glandular nerve-apparatus has thereby sustained a lasting injury is not, however, clear; but it appears to be indicated that a continuing injury is sustained by the peripheral portions, at any rate. It is difficult otherwise to explain the failure to excite secretion of substances, such as pilocarpine, which undoubtedly act upon the peripheral glandular nerves, and are capable of doing so independently of any action upon the central nervous system. The evidence also appears to indicate that the glands and ducts are not themselves permanently or importantly injured, unless it be in cases of long duration where permanent changes may occur. In recent cases, at any rate, there is therefore reason to hope that a cure may be effected by therapeutic measures.