bone, downwards and slightly outwards along the lower margin of the orbit for about 3 cm. Such an incision will be on the inner side of the sac, and should go right down to the bone. The skin and subjacent structures are now reflected off the bone outwards until the lacrymal sac comes into view in the lacrymal groove. It may be recognized by its greyish-blue glistening appearance, but by adopting the above method of procedure it can hardly be missed. The sac is separated from the groove—first on the inner side, then on the outer side—by means of curved scissors and blunt dissector. Care must be taken to dissect the fundus carefully, so as not to injure the internal palpebral ligament under which the sac extends for a little distance. When the upper part of the sac has been freed, it is drawn out with forceps and its lower attachments are divided with scissors, which are eventually passed down along the duct as far as possible and made to cut across the duct. A free communication is established with the nose, and the mucous membrane of the duct is scraped with a sharp curette, or cauterized with the electro-cautery. The bleeding during the operation is often troublesome, and it is well to inject some adrenalin and cocaine even when the operation is being performed under general anaesthesia. The use of efficient retractors, such as Axenfeld's, adds materially to the comfort of operating. After flushing the wound or duct into the nose, the incision is sewn up, and healing is almost certain to take place by first intention. The stitches are removed on the third or fourth day. The line of the incision is hardly perceptible after a month or two.

In my experience, there is practically no epiphora after excision of the sac except under some exceptional physical or psychical stimulation. The reason for this is that the previous epiphora being largely the result of excessive secretion due to reflex irritation from the sac and conjunctiva, the normal glandular secretion is not more than can be removed by evaporation. Such being the case, I have never found it necessary to resort to excision of the lacrymal gland after excision of the sac.

Should the epiphora exist, it would not be a menace to the function of the eye as is the epiphora of dacryocystitis; and should the epiphora be distressing to the patient, the lacrymal gland can be removed without in any way endangering the eye, whose surface will still be kept moist by the secretion of the accessory lacrymal glands, and by the mucous secretion of the conjunctiva.

Indications for the Operation.

Excision of the lacrymal sac is indicated in:

1. Cases of dacryocystitis which have resisted conservative treatment by probing, etc., for three months or more. The radical treatment is more urgently called for where probing causes acute suffering, when the patient has already suffered from corneal complications, and where there is disease of the bony walls of the lacrymal canal.
2. Cases where the dacryocystitis is bilateral and the patient has already lost one eye from hypopyon ulcer, the removal of the sac on the side of the healthy eye is a matter of extreme economic necessity. At the present time insurance companies are loth to insure a workman who has lost one eye, but if the danger of a double dacryocystitis became common knowledge, I think all such cases would be absolutely refused.
3. As a preliminary to operations on the eyeball in cases of dacryocystitis. Here again the necessity for the operation becomes absolute if the fellow eye has already been lost through post-operative infection from the lacrymal sac.
4. Diseases of the sac which endanger general health—for example, tubercle, malignant growths, etc.
5. Lacrymal fistula.

As the outcome of a meeting held at Düsseldorf on February 6th, under the presidency of the President of the Rhine Province, Baron von Schorlemer, a society for the prevention of infant mortality has been formed. It is proposed that the society should co-operate with similar societies in other districts.

A BILL providing for the registration of nurses and for the licensing of persons as registered nurses is about to be introduced into the Minnesota State Legislature. There is (we learn from the *St. Paul Medical Journal*) nothing in the Bill that interferes with the liberty of any one to nurse the sick for hire, so long as the person does not claim to be a registered nurse.

MERYCISM OR RUMINATION IN MAN.

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RUMINATION in man, or merycism, has been known to medical writers since early modern times, Fabricius ab Aquapendente¹ being the first to describe instances of it in 1618. Rumination in man, as in the group of lower mammals, the ruminants, means the return of food, after completion of a meal, in limited and definite amounts into the mouth, where it is chewed again and swallowed, the whole process appearing perfectly natural, and taking a sufficient time, as a rule, for all the food taken at the meal to be remasticated. Certain variations in the process occur, and will be dealt with later. This curious abnormality in the alimentary habits of man is by no means common, but I have under observation several members of one family in which rumination has occurred, or is occurring in at least three generations, probably four, and there are signs of its onset in the fifth generation. I have also an instance of the phenomenon in another subject, of no connexion whatever to this family group.

As my cases are individually interesting from a medical point of view, and as the family history will appeal to students of heredity, I venture to record what facts I have been able to make out from an examination of the cases and from a somewhat extensive inquiry into the whole subject of rumination in man.

The following are brief notes of the cases, taking the family group first:

No. 6 (see family tree).—R. B., aged 36, tinplate worker, first came under my observation in October, 1905, complaining of regurgitation of acid matters into the mouth after meals, and some discomfort in the epigastrium coming on about half to one hour after meals; otherwise he was quite well. At first sight the complaint seemed to be one of ordinary acid dyspepsia or pyrosis, and it was only by close inquiry into the time of day that the sour eructations came on that the fact that the man was a ruminant, and had been so as long as he remembered, was brought out. He remembers very well how as a boy he used frequently to get into trouble for eating in school hours.

It was difficult at first to get an account of his rumination, because he looked upon it as a perfectly natural phenomenon, descending from his grandfather and father to himself, and to all of his sisters and brothers and to many of their children. What he wanted advice about was the sourness of the matters which came back into the mouth.

His account of his rumination is that whatever food he takes for dinner, whether solid or liquid, but especially meat, comes back to his mouth, beginning either immediately after his meal or at any time within an interval of a quarter of an hour. It is immaterial how well or ill he masticates his food in the first instance, regurgitation comes on with unfailing regularity, but meat, and certain forms, as tripe, always made the process more marked. The food returns in mouthfuls, without any unpleasant taste, appearing at two to three minutes' interval, and each bolus of food as it regurgitates makes a visible movement in the neck. Each mouthful is chewed again and then swallowed. This process continues for about an hour. The successive mouthfuls become more fluid, until finally the regurgitated material is of almost watery consistency. No difference in taste between the earlier and later mouthfuls that regurgitate can be appreciated.

If he were to reswallow the food without chewing it again he would get indigestion or discomfort over the stomach. The rumination comes on only after his dinner in the middle of the day. There is no distaste about the process, which seems perfectly natural to him.

It was the patient's custom when "well" to smoke immediately after his meals to try and prevent regurgitation, in order that his peculiar condition might not be noticed by his companions. He was, however, never able to effect this successfully and any attempt would invariably give him indigestion or "a lump in his chest." Bolting his food did not seem to have any marked effect either way on his habit. About sixteen months ago he began to suffer from "heartburn" and he found that when his food returned to his mouth it tasted sour. This condition gradually grew worse and he was to be admitted into the Infirmary with a view to studying the rumination, but whilst waiting for admission he entered a convalescent home, which he left after a month's treatment with his dyspeptic symptoms entirely relieved. He attributed his acidity to taking an excessive amount of alcohol, mostly in the form of beer. After he had recovered from his first attack he abstained until Whit week of 1906, when, on indulging again in alcohol, his previous symptoms returned, though with less severity than on the former occasion. He was then treated at home by his doctor up to within five weeks

of entering the Infirmary, but was not benefited in any way. Whilst under observation in the wards, the food brought up within a few minutes of the end of his dinner, also that brought up half an hour later was examined by Dr. E. B. Leesch, Director of the Clinical Laboratory, to whom I am much indebted for this assistance. The first mouthful examined was well masticated, the meat and bread being thoroughly mixed. Fluid from this showed no free HCl and 0.0657 per cent. of combined acid. The later mouthful was pink in colour from the tinctura coeci which was given as a placebo mixture, more fluid and more thoroughly mixed than the former. The HCl was the same, and pepsin was also present.

Besides sourness in the mouth, the only symptom that the patient complained of was a rather troublesome cough, probably pharyngeal, with considerable secretion of mucus. After eating rather freely, patient complained that his breathing was somewhat difficult about an hour and a half after his meal. His other systems appeared to be practically normal in every way. Previous to his present trouble, patient has always enjoyed good health, and has never suffered from any serious illness. Now that he has indigestion, he occasionally vomits about two hours after taking his food. The vomit is watery and of salty taste. He used to weigh 214 lb. eighteen months ago, but when admitted to hospital he was only 144 lb. He gained 6 lb. in two weeks whilst an in-patient. No treatment other than tinctura coeci as a placebo was ordered at first, but after observing the nature of the regurgitated food he was given bismuth lozenges and an alkaline bitter stomachic.

The six following cases (Nos. 15 to 20) are the children of R. B.:

No. 15.—Girl, aged 12. Food comes back with her after every meal when she has had meat, especially tripe, cowheel, or bacon. Some of the food she spits out, but she chews again the "biggest part" and likes the process. I saw her as a patient with cough and some mild gastric disturbance, and then she told me that she spat out the food because it had a salty taste. The regurgitation of food begins about a quarter of an hour after a meal, and the mother says that only three or four mouthfuls come up. She is a well-developed, bright child. The bowels are regular.

No. 16.—Girl, aged 10. Bright, intelligent girl. The history is much the same as with No. 15 (sister). The rumination with her is worst after breakfast, because she often has bacon with it. Then the food comes up in school time, and the teacher and other scholars want to know what she is eating. Her bowels are obstinate at times, and the food that comes up then is sour. Her mother calls this "biliousness," but there is no vomiting. She tells me that the rumination is distasteful after she has had bacon, and the mother says this is because bacon upsets her stomach. After food that she likes she enjoys the rumination. Well-nourished child.

No. 17.—Girl, aged 8. Does not ruminate quite as much as older sisters, but otherwise under similar conditions. Her bowels also are obstinate at times. Bright, intelligent, well-nourished child.

No. 18.—Girl, aged 4. Beginning to ruminate. Bread and butter and porridge, as well as meat, come up, and sometimes she spits the food out; but if she has had meat she chews this again. Bowels regular. She is a very fine, bright child.

No. 19.—Boy, aged 2 years 5 months. Mother states that he is beginning to ruminate, food coming back into his mouth, especially after taking meat; some he spits out. The mother, a bright intelligent woman who does not ruminate, states very definitely that as soon as the children began to walk they used to bring up mouthfuls of food, which at first they spat out; later they began to re-chew it, especially after a meal of food which they liked. She can see the movement of the neck as the bolus comes up. None of the children can do it voluntarily, though No. 16 was quite sure she could bring up food during the ruminating period. As far as the mother can tell, imitation plays no part in the development of the phenomenon. The youngest child (No. 20) is 3 months old, and at the breast. Out of curiosity I asked whether it possetted much, and the mother said Yes, and that all of the children when breast-fed did; but whether more than other babies she could not say. I am quite satisfied as to the genuineness of the history of regurgitation of food in the four older members of the family, and believe the mother's statements about the boy, which are confirmed by similar accounts regarding case No. 21. The statements as to possetting must be taken for whatever they are worth.

No. 1.—M. A. B., aged 47, stout, healthy-looking woman, who has enjoyed good health until recently, when she began to be troubled with a ventral hernia. States very definitely that her father and two of his three brothers ruminated. She has ruminated herself "ever since she can remember," which was before ten years. With her the rumination is after every meal, and worse when she has had meat, especially pork, bacon, or tripe, or after hurrying over any meal. There is nothing distasteful about the regurgitated food, which she chews again unless it continues over two or three hours, when the food is sour, and she spits it out. The rumination begins a few minutes after a meal, and may go on for one, two, or three hours, or up to the next meal. Much fluid with a meal or

flatulence makes the regurgitation more marked. Until she had the ventral hernia she felt nothing of the muscular action which produces the rumination, but now she has pain over the seat of the hernia with each act of regurgitation. No constipation. She has seven children, ages 27 to 10 years. Six of these ruminate, some worse than others, but the second child, a girl, aged 26, does not, as she "favours" her father. All the children began about the age of 5 years, and as far as she can tell it came on naturally and not as the result of imitation. Children not all healthy. Their histories are as follows:

No. 9.—T. B., aged 27; eldest child; clerk. Began to ruminate as long ago as he can remember. Used to be after every meal, but more so after meat, and especially after tripe. With him the rumination was limited in amount, not coming on for about an hour after a meal, and then only two or three mouthfuls came back, consisting mostly of meat, and not bread or potatoes. He chewed the food again, which tasted perfectly sweet, and not at all unpleasantly. Perridge would come back with him. He had no control over the process; he often wished he had, for his companions used to notice, and remark, "What! eating again," and if he swallowed the food without re-chewing it he felt very uncomfortable. The amount of chewing the food had at a meal had no effect on the extent of the rumination. No constipation, but teeth were bad, and he now has only five of his own. He continued in this way until 1903, when from March to August he had indigestion, with acidity, for which he was treated. During this time the rumination practically ceased, and after he got well never returned to anything like its original extent. He was married in September, 1904. At the present time the rumination seldom comes on, but always does after tripe for a meal. He does not feel so well as when he regularly ruminated, and wishes he could go back to it. He has flatulence, and feeling of stomach discomfort. Nothing ever stopped the process when he was well. He has a girl, aged 2 years (No. 21), and says that he believes she is beginning to have food regurgitate into her mouth. He can see her making movements as if it were coming up, but she does not chew anything again. His own mother, who ruminates (No. 1) confirms this, and is most emphatic about the returned food not being due to vomiting. Solid food comes up into the child's throat, and she, not knowing what to do with it, is liable to choke.

M., girl, aged 25, has never ruminated.

No. 10.—Girl, aged 22. Has ruminated since she was about 5 years old; has no control whatever over process, which comes on after all meals, and especially when tripe, bacon, or pork has been eaten. The rumination commences directly after the meal is over and lasts for an hour or an hour and a half. The regurgitated food tastes quite natural, unless the process goes on over a couple of hours, when it is sour. Is dull and heavy-looking, very listless and apathetic, and subject to epileptic fits, for which she is under treatment; troubled with constipation.

No. 11.—Boy, aged 19. Has ruminated since he was about 5 years old, and does so very markedly now after all meals, and especially when tripe, cowheel, bacon, or pork has been eaten. He is similar to No. 10 in other ruminating characteristics. Is a well-made youth and an athlete, having won prizes for running; enjoys very good health; no constipation.

No. 12.—Girl, aged 16. Began to ruminate when about 5 years of age, but only does so slightly, some days not at all. Affected by similar food to brothers and sisters; has a large head and is mentally dull and stupid-looking. Two days after birth the anterior fontanelle swelled to the size of an egg, but soon went down, and the head swelled. Had "water on the brain," and did not walk until 5 years of age.

No. 13.—Girl, aged 13. Ruminates much as her brothers and sisters, and from about the same age; is a bright, intelligent child; quite healthy; no constipation.

No. 14.—Boy, aged 10. Ruminates more than any of the others, but otherwise much as older brothers and sisters; gets into trouble and is teased by playfellows at school, where his habit is noticed; began when about 5 years of age; is well-nourished and quite healthy; no constipation.

No. 3.—M. J., aged 42. Stout, healthy-looking woman, and never ailed anything. Bowels regular. Does not look a nervous type. Has ruminated "ever since she can remember," which was probably before the age of 10. With her the rumination comes on after every meal, no matter what food she has eaten. It is always, however, more marked after eating meat. Fluids increase the amount of regurgitated matters, but, as a rule, she takes little drink with meals, as she never wants fluid then. A cup of tea with no food would not come back. The rumination is worse after a hurried meal, and she has "nearly choked a time or two" by the lumps of solid food which come up after she has not chewed them properly in the first instance. She chews the food before reswallowing it, and says there is nothing disagreeable about the phenomenon unless the food continues to come up some time after the meal. The first mouthfuls come up "at once," or two to three minutes after the meal, continuing for two to three hours. When I saw her the process just stopped at 3.30; she had had dinner at 12.30. Anything that comes back after about two hours is "sour," and she spits it out. Nothing stops the rumination with her. She is not often troubled with indigestion, but has bilious attacks at times, and then the rumination is distasteful, the food being sour. None of her children (four boys, ages 15, 12,

6, and 2 years) ruminate. She is doubtful about her grandfather and uncles being ruminants.

No. 2.—T., male, aged 46. Not seen. Reported by brothers and sisters to ruminate very slightly and to spit out the food. Has four children, none of whom ruminate.

No. 4.—J. W., male, aged 40. Not seen. Reported by brothers and sisters to ruminate slightly. Said to have one son only, who does not ruminate.

No. 5.—L., aged 38. Ruminates, but not every day, and spits out the food which comes back, although it tastes natural. Fatty food and cow-heels especially affect her. Is a stout woman, subject to rheumatism, and very deaf. Also rather dull mentally. Has five children, two boys and three girls, ages from 16 years to 1 year. All extremely bright, healthy, intelligent children. None ruminate.

No. 7.—F. B., aged 34. Brings back his food after swallowing; masticates it and swallows it again. Has done so as long as he can remember. His swallowed food tastes quite naturally when received into the mouth again. The act of rumination is not voluntary, he cannot return the food at will, neither can he check the return. Rumination is most marked after certain kinds of food, of which tripe is the most effective. He does not do it as much as his eldest sister does. The action appears to be quite visible to onlookers, the bolus of food being readily detected as it passes up the oesophagus. General health excellent. Both R. and F. state that the habit is acquired after the age of 11 years, but the mothers emphatically say at an earlier age. Otherwise this man confirms everything that R. B. says. He knows very little about his father and his uncles. Has two children, a boy aged 5 and a girl aged 2½.

No. 7A.—Boy, aged 5. His aunt says that he began to ruminate about twelve months ago.

No. 8.—S., aged 30. Ruminates only slightly, and after same foods as her sisters. Some days free from it. With her the regurgitation usually comes on about half an hour after a meal. Has not noticed how long it continues. Has no control over it. The food tastes naturally. Is a stout, healthy-looking woman, intelligent, though rather deaf. Has a baby, a girl aged 1 year and 5 months. Somewhat delicate looking child. No signs of rumination.

This family history of rumination is very interesting, there being evidence that it has occurred, or is occurring, in five generations. The eldest woman tells me most emphatically that her father and two of his three brothers ruminated, and that their father did also. There were three aunts, but nothing is known about them. Then eight brothers and sisters, and at least ten of their thirty children ruminate more or less. Finally, the father and grandmother of the only child in the fifth generation are decidedly of the opinion that rumination is beginning in this little girl aged 2 years. The family is healthy as a whole. The father of my adult subjects died aged 52; one of his brothers who ruminated was older and the other younger than this. Their father lived to over 80.

M., died, aged 82.

Italic letters signify ruminants—M. for male, F. for female. Roman type, non-ruminants. Age in years, when known, given after the letters. M² or F² signifies marked rumination. Numbers before letters for reference to case notes.

An Account written by a Professional Gentleman of his own Experiences of Rumination.

A. B., a man, aged 27 years, first noticed the occurrence at about the age of 9 years. The condition comes on at varying times after taking food, sometimes immediately, and at other times varying from a few minutes to an hour or an hour and a half afterwards. Most frequently it may be said to come on within half an hour of taking food. The principal conditions which seem to affect or modify the act are as follows:

1. *The Composition of the Meal.*—The condition seems to be most marked if a fairly large quantity of liquid be taken along with the food. If solid food alone be taken regurgitation does not occur. If, however, a quantity of liquid, say a pint of water, be drunk immediately after consuming a fairly large mixed meal, a great part of the water alone is almost at once brought back into the mouth, then at intervals varying from one to five minutes, portions of the solid food are regurgitated. As a general rule the condition is much more pronounced when the food taken has been agreeable to the palate. In this respect it almost appears as if there were some attempt at selection (if such a possibility could exist), as it has been noticed, not in one instance only, but very frequently, that where a large mixed meal has been taken—that is, where a full

dinner menu has been gone through—certain articles of the meal, or at least certain portions of the contents of the stomach consisting chiefly of one article, have been solely and repeatedly brought back, say, for half an hour after partaking of the meal.

2. *The Mastication of the Food.*—The condition seems to be affected in a marked degree by the amount of mastication the food is subjected to before being swallowed, food incompletely or slightly masticated being brought back to the mouth much more frequently than the same food which has been subjected to prolonged mastication. This is especially noticeable if a fair amount of liquid has been taken at the same time.

3. *The Effect of Tobacco.*—If smoking be indulged in immediately after a meal rumination seldom occurs.

Time of Occurrence.—Although the condition may come on after any meal, it has been definitely noticed to occur much more frequently after some than others. Thus it does not often occur after breakfast, though meat is taken then, but chiefly after lunch (noon) or after dinner (about 6 p.m.). Although patient has always been in the habit of taking a fairly substantial supper about 10 p.m., the condition has never occurred after this meal, although he seldom retires before two or three hours afterwards. Perhaps it ought to be mentioned that he always smokes after this meal.

Frequency of Occurrence.—This varies very greatly. It sometimes occurs on successive days, or at intervals of several days or even weeks. The process is never accompanied by any feeling of nausea or unpleasantness. The general health has been good, with only slight dyspeptic trouble, chiefly in the direction of flatulence. About two and a half years ago suffered from mucous colitis, a complete cast of the colon about 8 in. long being passed on one occasion.

HISTORY.

Merycismus (μυρκεῖν, to chew the cud) and *ruminatio humana* were the terms applied to the phenomenon by those who first described it.

It is a strange fact that such a striking departure from the normal habits of man should not have been described before the seventeenth century, a careful search through the works of the earliest anatomists and physicians who described rumination in animals, by Peyer,² writing in the seventeenth century, being unsuccessful in finding any references to it. It is hardly probable that the condition developed suddenly in the time of Fabricius ab Aquapendente; it is more likely that the unique circumstances of his two cases attracted the attention of contemporary physicians to rumination in man, and led to the publication of further instances of it.

The first of the cases recorded by Fabricius was a Paduan nobleman whose father had a horn the size of a small Spanish olive growing from the middle of his forehead. The other case, seen by John Burgower,³ who wrote a thesis on rumination in man (Basel, 1626), was a monk with two small horns growing on his forehead. This

monk's brother, who did not ruminate, also had two horns on his forehead. The history of horns and rumination in these two men, which apparently is authentic, led Bartholinus⁴ and others to believe that all ruminating men had, in addition to these peculiarities, multiple stomachs like ruminating quadrupeds, and other contemporary writers believed they all had either horns or a parental history of horns. Sachs,⁵ however, collected notes of 100 cases of men with rudimentary horns, and only one of these, namely, the above-mentioned monk, was a ruminant, and none of the cases recorded since those of Fabricius have had any similar history. Other writers (Schurig⁶) wove even more fantastic theories as to the parentage of human ruminants, but I need hardly say that the act of going over a meal again is the only one of the several characteristics in which ruminants differ from other mammals which a man with merycismus possesses, and the latter no more has bovine ancestry, horns, or a multiple stomach, than he is an ungulate, polygamous, or devoid of upper incisor teeth.

John Conrad Peyer in his *Merycologia*, or commentary on rumination in general, refers to nine cases of rumination in man, eight of which had been published by other writers before the date of his book (1685).

The cases he describes are all unusually curious and interesting. The first and second are those already referred to as recorded by Fabricius ab Aquapendente and Burgower. Next is Sennert's case, a man of 40, who as a child lost his mother, and was fed during infancy and early life with warm milk from a cow, a diet on which both the child and his habit were coincidentally nurtured.

Salmuth's case was without special interest. Windthier's was a Swede—a *bon vivant*—who after food was obliged to retire to a corner, where he went over his meal again as quickly as he could. When asked whether the rumination afforded him any pleasure he replied "that it was sweeter than honey, and had a more delightful relish." This man had been troubled with acid eructations in his boyhood, and the rumination developed at the age of 30. His son, aged 24, also ruminated, but he could control it, and did so in public for shame and from modesty.

The case of a London man, described by Velsch, was not one of true rumination, but an hour or two after a meal the contents of the stomach came up into the mouth by ruminating movements, and the man spat out the fat and other materials which disagreed with the stomach. An interesting history is that by Ludvig of a girl (juvencula) of about 15, who, in contradistinction to many ruminating men who are gross eaters, ate but little. It was not every day, but frequently, that the food which she had taken the night before came back. This she swallowed again with displeasure, as the taste of it was unpleasant.

Wild's case was an idiot son of an idiot mother, who, after passing his first years—as, indeed, he did the whole of his life—amongst ruminating animals, developed the habit himself. And another case of imitation is recorded by Peyer himself, this time a healthy Swiss whose family possessions were in cows, and amongst which he lived most of his life. The wife of this man also developed the habit from watching her husband.

The last case is taken from Reissel, and was a man who ruminated when at home and enjoyed it, but not in public, because he was too much laughed at for his peculiarity. He evidently had control over the process, which is unusual.

The earliest reference to rumination that I have been able to find in the work of an English observer is in the appendix to the *Thesaurus Medicinæ Practicæ*, written by Thomas Burnet, M.D., and published in London, 1673. But there is nothing of interest in this, cases published by the earlier writers alone being referred to very briefly. In 1691 Slare⁸ communicated to the Royal Society an "account of a ruminating man" in which he described a typical case. A much fuller paper is that by Copland⁹ in 1821. In this is an interesting account of previously recorded cases, and also of a patient under Copland's observation who began to ruminate gradually after pre-existing dyspepsia. Next year Hill¹⁰ gave a short note of the result of a *post-mortem* examination on a subject of rumination in which the stomach was found to be quite normal in appearance. There are also notes of odd cases in the *Lancet* by Elliotson, 1835,²² Wilson, 1839-40,¹¹ Read, 1845,² and MacIntosh, 1876.¹³

Little information is to be found in modern textbooks, but concise and practical accounts of the phenomenon are given under the heading Rumination or Merycismus in some monographs on diseases of the stomach, such as those by Hemmeter,¹⁴ by Riegel¹⁵ in Nothnagel's *Practice of Medicine*, and by Ewald.¹⁶

There are very full and interesting papers by Bourneville and Séglas,¹⁷ Koerner,¹⁸ Singer¹⁹ and by Lemoine and Linossier.²⁰ As far as I have been able to trace, no paper on the subject has appeared in recent English journals, though I believe that the condition is by no means rare in England. Several papers have appeared in American journals.

DESCRIPTION.

Rumination differs from regurgitation of food in the fact that the matters brought up from the stomach in the former are swallowed again, either after or without further mastication, whilst in the latter condition they are more frequently spat out. Regurgitation of small amounts of food is commonly met with in dyspeptic troubles, especially those associated with flatulence, and ceases with the

cure of the stomach condition. Rumination, on the other hand, may be totally unaccompanied by any stomach disorder, and even if it be temporarily associated with a dyspepsia, continues after the gastric abnormality is relieved.

It is also quite distinct from the power which some people have of being able to produce an emesis and empty their stomachs voluntarily. I have only met with one instance of this, in a medical student many years ago. He was able to empty his stomach after drinking a glass of beer, but it had to be within a few minutes of taking the beer, or the power to produce the emesis failed. In such a case there must be an undue laxity of the cardia to allow the contents of the stomach to be pumped up by the action of the abdominal muscles, aided, probably, by a movement of the inspiratory muscles with the glottis closed. MacIntosh's ruminating man could, however, empty his stomach without any pain or inconvenience at any time of the day, and had been able to do this from his earliest infancy.

The rumination comes on at varying times after all meals, or after a special meal, such as dinner. In a typical case it will begin a few minutes after the meal is finished, continue for an hour or so, and then cease. It may, however, continue for a longer time, as in some of my cases, where it goes on for two to three hours. Several, or very many, mouthfuls generally come up, or only two or three, as in my case No. 9.

As a rule, it occurs independently of the amount of solid food eaten or of the chewing the food may have undergone before being swallowed in the first instance, but in some subjects it is certainly worse after a hurried meal. Thus Halliday²¹—a medical man—in describing his own case, states that the act was more marked with him after a hurried meal of solid food, and he looked upon it as reserve force in the mastication of his food. MacIntosh's case ruminated from early infancy. He used to be a slow eater, and, when an apprentice, found that this was against his getting his fair share of a meal with his fellow apprentices. So he deliberately bolted his food at the meal, and then went over it again at his leisure, chewing it properly the second time. My last case (A. B.) also found the rumination worse after a hurried meal. In some instances it occurs more markedly if too much liquid is taken with the meal. Some of my cases state that meat always emphasizes the rumination, and some forms of meat, as tripe, bacon, or pork, make it specially marked. The material which is regurgitated is, as a rule, composed of a uniform mixture of the various foods taken at the meal, but in some cases only certain articles of food return. Some ruminants (Elliotson²²) state distinctly that the foods first eaten come back first, but this is hard to believe. My last case also states that there is a certain selective action on the part of his stomach during the rumination, and I have heard of another similar instance where the fat of bacon alone is ruminated.

The food brought up into the mouth may be remasticated or immediately reswallowed. Riegel states that the former process is not general in subjects other than inmates of asylums, but my own observations do not agree with this. On the contrary, my cases state that unless they do remasticate the food before swallowing it again they have much discomfort. When it is remasticated there is absolutely nothing distasteful in the act; it seems to the subjects to be a perfectly natural thing to do. In fact, they wonder why all other people do not do the same, and it has been described by Halliday as being accompanied by no discomfort; in fact, it was "rather palatable."

Salmuth's Swede said of the regurgitated food: "It is sweeter than honey, and accompanied by a more delightful relish." My cases also gave me similar information as to the natural and "sweet" taste of the food, and it is only when the food comes up over a prolonged period of time after a meal, or when the stomach is out of order that it tastes "sour," "salty," or "acid," and is distasteful. Some of the children spit out the food now and then because it tastes "salty" from the beginning, but this is only when they are out of health, or "bilious" as their mother says. When they are well they eagerly ruminate, especially after a meal which they have enjoyed.

Alt's²³ patient had remarkable regurgitant powers.

One day after having his stomach washed out the man swallowed, with $\frac{1}{2}$ litre of spring water, two gold-fish, $5\frac{1}{2}$ and $6\frac{1}{2}$ cm. long. The ear applied to the epigastrium could hear the fish splashing about in their novel aquarium. In twenty minutes the patient quickly said, "Now!" when up came the larger gold fish without any accompanying water, and eight minutes later the other one followed. They were lively and well and none the worse for their unusual experience.

Mode of Onset and Power of Control.

Hemmeter states that the rumination first arises as a voluntary act, and then becomes involuntary. This was certainly not the case in the subjects under my own observation; with them the onset was gradual and quite involuntary. Halliday had power to ruminate at will from boyhood, and he used to ruminate regularly, especially after dinner. It is possible to control the act—perhaps more readily in the intellectual classes—by an act of will—Singer says by a voluntary reverse action of its mechanism—but none of my cases had any control whatever over the process. Cambay,²⁴ a medical man, had apparently full control over his own rumination, though, as a rule, it went on without his paying any attention to it. Blanchard,²⁵ also a medical man, had less control over the process in himself. Sometimes he could bring up the food immediately after an involuntary regurgitation if he tried, but would fail after a few seconds' interval. At other times he was quite powerless to control the process, but he never could tell why his power varied so much.

In some cases smoking effectively checks the rumination, as in my last case, and Halliday says that when he began to smoke at 18 he largely gave up the habit, but odd mouthfuls would even then frequently return, though never against his will.

The General Health.

In all my cases the general health is good, with the exception of passing attacks, more or less severe, of indigestion, and in one subject of mucous colitis, and the nutrition is good. Halliday was quite healthy, except for attacks of migraine. Constipation may, however, be present. If dyspeptic symptoms be associated with the rumination and the food be spat out considerably, the general health and nutrition will necessarily suffer. Constipation is said to be frequently severe, and it was certainly troublesome in some of my cases, though I could not see that it was more marked than in non-ruminants.

Apart from dyspepsia, habitual spitting out of the food will, if prolonged, lead to distinct emaciation, as in a case met with by Sauvage,²⁶ where a man, after ruminating for thirty years, was ordered by his father confessor to spit out the food. The weight was regained when the man, on the advice of a physician, returned to his old habit. Vincent²⁷ also recorded the case of a man who began to regurgitate food on a sea voyage, but he spat out most of it, and became so emaciated that he consulted a doctor, who thought he would die. On being advised to chew the food again and swallow it, he did so, and lived to 83.

ETIOLOGY.

Social Position.

It is met with in all classes of society, and Einhorn²⁸ would have it that the professional and educated classes are frequently affected. My last case is a professional gentleman, and I know of other cases in the well-to-do middle classes.

Heredity.

Judging from the family history of my patients, and from cases of other observers, heredity undoubtedly plays a decided part in the development of the phenomenon, and this is not to be wondered at if physiological rumination be a neurosis, for nervous symptoms are decidedly hereditary.

Runge²⁹ met with a subject of rumination in the professional class whose father ruminated, or rather spat out the food which came up into his mouth, and whose boy also had the habit. In the boy's case the process was first noticed when on a transatlantic voyage. There was no neuropathic element in the family. Other observers have met with more than one case in a family (Elliotson, etc.).

Imitation.

At the same time the question of imitation must be considered, for some children born with a predisposition to the abnormality, who might not otherwise develop it, might be jealous of the achievements of their brothers and sisters, and successfully cultivate their latent powers. That it can be developed by imitation from apparently virgin soil is shown by the cases recorded by Koerner.³⁰

A boy of 6, and a girl of 3 years, had a governess who was a ruminator and hysterical. The mother first noticed that they kept in their cheek pouches food, which they ate unwillingly, until they were able, when unobserved, to spit it out. She broke them off this and thought they were cured of their bad habits, until one day, when they thought they were unobserved, she saw them bending forward and by means of movements of the abdominal muscles bring up the greater part of a meal and spit it out, so she watched them closely and inspected their cheek pouches after each meal. It thus came to light that the children could voluntarily bring up from the stomach food which they had eaten seven hours previously, which they either spat out or chewed again and reswallowed. The services of the governess were then dispensed with and by resolute treatment the children were cured of their bad habit.

Peyer refers to a Swiss who, living among cows all his life, developed the habit and taught it to his wife, and Perinetti³¹ recorded the case of a boy, 7 years old, who, having been for two years in early life suckled at the udder of a goat, acquired by imitation his foster-mother's ruminating habits.

AGE.

As a rule other observers state that the rumination develops between 10 and 20 years of age, but in my cases it came on much earlier; in fact, as one mother said, as soon as the children began to walk and to have more meat to eat. At this early age the phenomenon is not complete and the children spit out a good deal of the food. Whether the babies at the breast posset more than usual I cannot say. The children who were taught by their governess were 3 and 6 years old, and Somers³¹ met with a mentally-defective child who ruminated at 5 years of age. Blanchard, himself a medical man, ruminated from his earliest infancy. As an instance of the phenomenon developing after adult life Blanchard mentions the experiences of Brown-Séquard,³² who brought it on by irritating his stomach through his investigations on gastric chemistry. Repeating Réaumur's and Spallanzani's experiments, he used to swallow sponges, containing in the centre various foods, tied to pieces of string by which they were pulled up when saturated with the gastric juice. After doing this for some time his stomach rebelled, and rejected the sponges on its own initiative. Then Brown-Séquard found that he had induced an irritable stomach which regurgitated its contents and eventually developed permanently ruminating characteristics. The rumination went on regularly as a rule, but he could prevent it by a strong act of will.

Two interesting instances of merycism occurring in extreme old age are recorded by Elliotson—an old lady, aged 89, who had ruminated regularly from early childhood, and Ducasse,³³ a man of 70, who had also ruminated all his life. These cases suggest that the habit has no deleterious effects on the health when it is physiological.

SEX.

In my series males and females are affected with equal frequency, but the majority of cases previously recorded were in males, a fact which led some observers to believe that males are the more liable, and others to suggest that probably females are equally affected but will not acknowledge a habit of which they may be ashamed.

PREDISPOSING OR EXCITING CAUSES.

Merycism may develop after an infectious fever, as small-pox (Filhol and Tarbès³⁴), or varicella (Ducasse), or at sea (Vincent), or from a severe blow on the stomach (Boucher³⁵). But stomach troubles are also said to be frequent precursors of it, as indigestion (Copland), bolting of food (Singer, Salmuth), and a surfeit of food (Percy³⁶). Constipation is not uncommonly a marked coincident symptom. Affections of the nervous system are also looked upon as being important in the causation of the condition. It is frequently met with in asylum patients, and also in neurotic and hysterical people (Koerner), in epileptics (Bourneville and Séglas), neurasthenics, and in anaemic subjects.

Mental strain may bring it on, or may check the habit in one subject to it. Thus, Ducasse refers to one case in which getting married stopped in a few days the habit which the man had had for many years, and Koerner reports another case in which rumination developed just after marriage and passed off in six months.

It may also disappear when a subject passes through an illness—as, for instance, that attending cancer of the pylorus, from which one case ultimately died (Ducasse), or gout (Percy), or spontaneously (Bourneville and Séglas, Koerner).

CHEMISTRY.

The nature of the gastric juice varies, and apparently has no definite causal effect. My case when free from his pyrosis had normal gastric juice, according to Dr. Leech's analyses; and I believe all the other members of the family, when well and in normal ruminating condition, have healthy stomach secretions, and there is no chemical defect which requires the aid of a second mastication of food. Other observers have similarly found normal gastric juice, whilst others (Boas,³⁷ Jurgensen,³⁸ Minassian,³⁹ Riesman⁴⁰) found hypochlorhydria, and yet others (Alt) hyperchlorhydria.

Alt made observations on a man who could repress at will his ruminating habits. He examined the matters brought up from the stomach under different conditions, and found that when the rumination went on without being interfered with they were normal, and that the various foodstuffs were well digested. When, however, the rumination was stopped for a time, the stomach contents were found to contain an excess of hydrochloric acid, with the amylaceous matter very incompletely acted on. In this case, then, rumination appeared to be a corrective for hyperchlorhydria, at each remastication of the food so much more saliva being brought into contact with the starches, and more alkaline matters taken into the stomach. But whatever might have been the case with this man, as Lemoine points out, it does not follow that the same explanation holds good for rumination as a whole, for although hyperchlorhydria is very common, merycism is not, and also hypochlorhydria is as often met with in ruminants as is an excess of acid.

Minassian had a female under his care, a hasty and hearty eater, who gradually developed rumination in consequence of dyspeptic troubles. With her the hydrochloric acid was almost entirely absent, and treatment with this drug in a few weeks cured her of the habit.

VARIETIES OF MERYCISM.

Most writers agree that there are simple or physiological and secondary or pathological forms of rumination.

In Koerner's experience, simple rumination follows a heavy meal, and commences half an hour after ingestion of food. The regurgitated matters keep their normal taste, they are reswallowed, and the subject maintains his weight. On the other hand, dyspeptic rumination follows a very small meal, and commences almost immediately. The regurgitated matters are acid and disagreeable, and are spat out, and there is loss of flesh. This arrangement of symptoms by no means agrees with my own observations, for I found that simple rumination may begin immediately after a light meal.

Lemoine and Linossier also divide all cases into simple and pathological rumination, and of the latter they describe three varieties: (a) neuropathic, with or without dyspepsia; (b) directly related to dyspepsia; (c) of dyspeptic origin, but persisting after relief of the dyspepsia.

All my cases are of the simple or pathological variety, and I have had no experience of rumination as secondary to, or symptomatic of, disease.

PATHOLOGY.

The pathology of merycism is a matter of great uncertainty and debate. Whilst the act of reverse peristalsis may be reflex, and the result of some special susceptibility of the gastric mucous membrane, it is difficult to specify the anatomical or functional causes which provoke the reflex act. The atavistic theory is not acceptable, as man has no ruminator in his developmental genealogical tree. Lemoine and Linossier think that merycism is a gastric neurosis, and that the act of regurgitation is reflex, and due to an exaggerated sensibility of the gastric mucous membrane, either congenital or acquired.

Singer looks upon rumination and regurgitation as similar processes and the expression of a nervous constitution. The most important cause of rumination is a relative insufficiency of the cardiac orifice of the stomach which temporarily comes into play.

Ewald confesses that he is quite ignorant of the proper cause of the affection and is content to agree with Dehio in describing it vaguely as a perverse combination of motor processes or a reflex functional neurosis. I have myself no better suggestion to make than this last one.

MORBID ANATOMY.

Several *post-mortem* examinations have been made on subjects of rumination and in the majority of cases the stomach was apparently perfectly normal. But the cardiac orifice and lowest portion of the oesophagus have been found dilated and forming an ante-stomach, a condition known as *antrum cardiacum*. In one case of an old man, the whole stomach was enormously dilated, and the cardiac orifice admitted five fingers. Arnold⁴¹ described three other cases with a circumscribed dilatation of the oesophagus above the cardia. In the first two cases of rumination in man recorded by Fabricius ab Aquapendente *post-mortem* examinations were made, and instead of finding multiple stomachs, as they expected in those days; they saw nothing but great dilatation of the stomach in the first case, and thickening of the wall of the oesophagus in the other, a man who in life had a voracious appetite and who died early (28) of marasmus.

Some observers hold that, although the stomach is apparently normal, its musculature is abnormally developed, a condition which is quite conceivable, though there is no macroscopic evidence of this in the majority of cases.

MECHANISM.

Cambay, a medical man who ruminated, stated that when the merycism was about to commence he felt a sense of fullness, and then a sensation of bending and a kind of contraction of the stomach, which seemed to act on the contents which distended it; then, with slight assistance from the diaphragm and abdominal muscles, a small amount of the stomach contents was pressed towards the cardia, on relaxation of which the bolus passed into the oesophagus and up the pharynx. After the first bolus had been remasticated and swallowed again the succeeding movements of regurgitation were carried out by slight action of the stomach, without assistance from the diaphragm or abdominal muscles. Blanchard thought that each return of food was due, in his own case, to slight movements of the diaphragm and abdominal muscles, which could be seen if observed with the abdomen bare before a looking-glass. Cambay, Blanchard, and Bérard⁴² also stated that the bolus of food halted for a while in the pharynx before being passed into the mouth, from which position it can either be re-swallowed if bitter, as sometimes is the case, without passing into the mouth, or be carried to the mouth for remastication. The mechanism of the act consists, according to Lemoine and Linossier, essentially of a spasm of the diaphragm and of the inspiratory muscles, which diminish the intrathoracic pressure, and dilatation of the oesophagus, whilst the abdominal muscles compress the stomach.

Singer describes it as aspiration of the contents of the stomach through the relaxed cardia, the diminished air pressure in the thorax being due to an act of inspiration with a closed glottis which can be suppressed by an act of expiration. He believes that the dilatation of the cardia arises from gulping down large mouthfuls of food.

DIAGNOSIS.

Eructation is the simplest form of regurgitation of the contents of the stomach. This is invariably associated with gases or air in the stomach, the latter being generally previously swallowed, as in the condition met with in hysterical patients, known as *aërophagy*. The eructations in these cases are almost entirely of air and no food, and are accompanied by much noise. There is no difficulty in the diagnosis of these cases.

By regurgitation is understood the return of more of the food matters from the stomach along with some air. Such a condition is met with very frequently, the regurgitated matters, small in amount, coming into the pharynx and back of the mouth, and generally having a distinct acid reaction—heartburn or pyrosis.

Oesophageal Diverticulum—In addition to regurgitation from the stomach, the matters may come up from an oesophageal pouch and diverticulum. In this latter case the regurgitated matters must necessarily be limited in amount, and if the question of diagnosis arose, a chemical examination would show the absence of hydrochloric acid and pepsin in food from an oesophageal diverticulum.

TREATMENT.

As to treatment, in many cases, especially in the poorer classes, it is probably useless trying to control the ruminating act when the phenomenon may be called physiological. In the more intelligent classes, by practice, an expiratory effort, at the time of the development of the negative pressure in the thorax, might have some good effect, and cases have been published in which by an act of will the process could be brought on or warded off. The subjects of rumination should be advised to eat their meals slowly, taking considerable pains to chew the solid food well before it is swallowed, and to avoid all specially predisposing foods. They should also take very little fluid with their meals. No simple stomachic drugs were of any use, in the case I had in hospital, in controlling the rumination.

Smoking acts as a deterrent in some instances.

Where there are any concomitant dyspeptic symptoms these should be relieved, and should they have been the exciting cause of the rumination, their relief would probably benefit the *merycismus* (Minassian, etc.). My last patient found that the rumination did not come on if one of certain stomachic medicines were taken immediately after a meal; of these the best were potassium bromide, compound solution of bismuth, aromatic spirits of ammonia, compound tincture of gentian, and sodium bicarbonate. If any of these drugs were taken when the rumination was present the process was stopped or greatly diminished.

If the subjects of rumination feel ill after suppression of what is to them a natural process, they must on no account interfere with Nature's demands.

In conclusion, I wish to thank my house-physician, Mr. Donald Core, for kindly visiting and taking notes of Cases Nos. 5, 7, 8, and 10 to 14; and my clinical clerk, Mr. Douglas Rodger, for his assistance with notes on Case No. 6.

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The Milroy Lectures

ON

KALA-AZAR,

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS
OF LONDON.

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LECTURE I.

THE ORIGIN AND COURSE OF THE EPIDEMIC.

[ABSTRACT.]

I REGARD my good fortune in being appointed to deliver the Milroy Lecture this year as being due to a desire on the part of this College to recognize the work now being done in the investigation of tropical diseases. As my subject is one which must be unfamiliar to most of my audience, I will commence with an extended definition of the disease, embracing the main points I shall have to deal with much in the order in which they will be taken up.

Kala-azar, then, is the epidemic manifestation of a fever, endemic in extensive areas of India, which has spread slowly for thirty years up the Assam valley as a wave of greatly-increased mortality, dying out largely as it passes on, after causing a decrease in the population of the affected tracts and the falling out of cultivation of much land, travelling along lines of communication, and checked by high elevations and extensive areas of unpopulated jungle, and now happily largely on the decrease. It is precisely similar in nature to a previous epidemic in Bengal known as "Burdwan fever." Cases of the epidemic disease, individually considered, are identical with the sporadic form known for centuries as "malarial cachexia," and is characterized by very persistent fever, of an alternating, remittent, and intermittent type, commonly mistaken for typhoid in the earlier remittent stage, but rapidly leading to a cachectic condition, with great enlargement of the spleen and later of the liver, and extreme wasting, the fever lasting from a few months to several years, and commonly terminated by some complicating affection; the mortality being from 98 per cent. at the height of the epidemic down to 75 per cent. at its end. The disease in its progressive stages is constantly associated with, and pretty certainly caused by, a minute protozoal organism, which has been shown by a remarkable cultivation outside the human body to be one stage of a flagellated parasite, while a study of the conditions most favourable to this development of its extracorporeal stage strongly indicate some biting insect as the carrier of the infection—a view which is also in accordance with a number of facts regarding the spread of the disease and the success which has attended efforts to check its further extension and to stamp it out of infected places, made before the discovery of the parasite, and also recently confirmed by certain feeding experiments.

To-day I propose to deal solely with the subject in its epidemiological aspect; taking it up as a disease, individually considered, in the second; and describing the life-history of the parasite and its bearing on the mode of infection in my third lecture.

THE ORIGIN OF THE EPIDEMIC.

Kala-azar first attracted public attention in 1882, when Dr. Clarke, the Sanitary Commissioner with the Government of Assam, in his annual report, gave an account of the disease based on the notes of 120 cases compiled by Mr. McNaught, the Civil Medical Officer of the Garo Hills. He described it as a very severe form of malarial cachexia, which was depopulating certain areas at the foot of the Garo Hills, and believed by the Garos to be infectious, and obtaining its name from a peculiar dusky hue which the sufferers presented, the term meaning "black fever." The disease had been known there in its sporadic form since 1869, when the country was occupied by the British, but the exact date of origin of the epidemic was obscure when I went to Assam in 1896. I therefore visited the Garo Hills to examine all the medical and administrative records, and ascertained that the Government land rent was paid in full up to 1875, when it was recorded that a