Day 1.—On this day the patient was taking the ordinary hospital diet for children of his age. The first meal was at 5 A.M.; dinner, consisting of minced meat and rice pudding, at 12 noon; tea, including an egg, at 3.45 P.M.; supper, consisting of milk and bread-and-butter, at 6 P.M.

TABLE I.

Hour of day.	Quantity of urine passed.	No. of c.c. $\frac{N}{10}$ silver nitrate solution reduced by 5 c.c. of urine.	No. of c.c. $\frac{N}{10}$ silver solution reducible by total urine.	Corresponding to a reducing power per hour of :—
	Cubic centimetres.			Cubic centimetres.
A.M. 9.30	60	10.0	120.0	—
P.M. 12.30	53	10.5	111.3	37.0
4.0	46	13.0	119.6	34.2
5.55	27	16.0	86.4	45.0
9.30	55	11.0	121.0	33.7
A.M. 12.45	35	9.0	63.0	19.3
3.45	28	5.5	30.8	10.2
6.0	25	5.5	27.5	12.2
Totals	329	—	679.6*	—

* Corresponding to 2.79 grammes of homogentisic acid.

Here the maximum excretion per hour was between 4 P.M. and 5.55 P.M.—i.e., from four to six hours after the chief meal, but the results are somewhat obscured by the overlapping of the effects of several meals rich in proteid.

Day 2.—On this day the diet was so arranged that the articles richest in proteids were given at the chief meal, which, as before, was at 12 noon, and hourly specimens of urine were fortunately obtained from 4 P.M. to 9 P.M. inclusive. It is clearly seen that although there is a conspicuous rise in the specimen passed at 1.30 P.M. the maximum excretion was between 3 P.M. and 7 P.M.

TABLE II.

Hour of day.	Quantity of urine passed	No. of c.c. $\frac{N}{10}$ silver nitrate solution reduced by 5 c.c. of urine.	No. of c.c. $\frac{N}{10}$ silver solution reducible by total urine.	Corresponding to a reducing power per hour of :—
	Cubic centimetres.			Cubic centimetres.
A.M. 9.55	26	6.0	31.2	—
11.40	43	5.5	47.3	27.0
P.M. 1.30	25	16.0	80.0	43.6
2.50	30	10.0	60.0	45.0
4.0	30	14.5	87.0	84.5
5.0	32	15.0	96.0	96.0
6.0	20	15.0	60.0	60.0
7.0	31	14.0	16.8	86.8
8.0	25	10.0	50.0	50.0
9.0	24	8.5	40.8	40.8
10.55	65	3.0	39.0	20.3
A.M. 12.55	27	6.0	32.4	16.2
2.0	5	6.0 or 7.0	8.4 (?)	7.7
4.40	16	7.0	22.4	8.4
8.0	41	8.0	65.6	19.6
Totals ...	440	—	806.9*	—

* Corresponding to 3.327 grammes of homogentisic acid.

The total excretion of homogentisic acid was increased, owing to some increase of the proteid food, partly in the form of plasmon. The effect of the early breakfast at 5 A.M. is still clearly marked.

Day 3.—On this day the meal richest in proteid was given at 9 A.M. instead of at noon, and the maximum output

of reducing substance per hour was also three hours earlier—viz., between 12.15 P.M. and 4.25 P.M. The rise during the hours immediately following the meal is again very noticeable. The total reducing power of the 24 hours' urine was on this day somewhat larger still.

TABLE III.

Hour of day.	Quantity of urine passed.	No. of c.c. $\frac{N}{10}$ silver nitrate solution reduced by 5 c.c. of urine.	No. of c.c. $\frac{N}{10}$ silver solution reducible by total urine.	Corresponding to a reducing power per hour of :—
	Cubic centimetres.			Cubic centimetres.
A.M. 6.0	32	6.0	38.4	—
8.0	30	(?)	(?)	—
9.25	26	5.0	26.0	18.3
11.15	46	8.0	73.6	40.1
P.M. 12.15	29	9.0	52.2	52.2
4.25	99	14.0	277.2	66.5
6.0	46	8.5	78.2	49.3
9.30	95	6.5	123.5	35.3
11.45	31	7.5	46.5	20.6
A.M. 2.50	35	6.0	42.0	13.6
4.45	41	4.5	36.9	19.2
Total	510	—	—	—

It will be at once apparent that these results do not bear out Mittelbach's observation that the reducing power of the urine reaches its maximum within two or three hours of a proteid meal, but show, on the other hand, that in the case of my patient, although such a meal is quickly followed by a much increased excretion of homogentisic acid, a still larger amount is excreted during the second period of four hours than during the four hours immediately following the meal. In a word, they tend to support the view that the change from tyrosin to homogentisic acid takes place in the tissues after the absorption of the former, rather than the alternative view that the change in question is brought about in the alimentary canal.

Chandos-street, W.

A CASE OF "MYXASTHENIA," WITH REMARKS ON KINDRED AFFECTIONS.

By WALKER OVEREND, M.A., M.D. OXON.,

LATE SENIOR PHYSICIAN TO THE TOTTENHAM HOSPITAL AND RADCLIFFE TRAVELLING FELLOW, OXFORD.

THE patient was a woman, aged 44 years. As regards her family history, her father had died from heart disease with dropsy at the age of 65 years. There was no history of gout in his case, but he had been a great sufferer from dyspepsia with excessive flatulence. Her mother died early from chronic phthisis. The patient's individual history was as follows. She had been in a feeble and unsatisfactory state of health for the previous 20 years. As a child she had had diphtheria and a severe attack of pertussis. She was considered a delicate and anæmic girl. After her first confinement, at the age of 24 years, she suffered from descent of the womb with ulceration of the neck and was kept on her back for weeks together. At one time she had an attack of acute gastritis when even small quantities of liquid were not retained. The late Sir Andrew Clark, who regarded the condition as due to a vicious state of the mucous membranes, recommended small solid meals, and she commenced to improve. Of late years she had consulted several eminent medical men. One of these physicians, probably assuming the presence of a gouty diathesis, advised the Sali-bury regimen of beef cakes and hot water, which she faithfully followed for 12 months with no obvious advantage. Another suggested massage and over-feeding, but this did not improve matters. It may not have been thoroughly carried out.

On examination the patient was found to be a tall woman, with light brown hair, pale blue and tired-looking eyes, and a blonde and fairly healthy complexion. She complained of dryness of the tongue and throat, of pains after food, and of a disinclination to eat on account of flatulence. The parched feeling in the throat often rendered her sleep disturbed and unrefreshing. The tongue was red, dry, glazed looking, and much fissured transversely. The cavity of the pharynx appeared to be large. On opening the mouth the palate was seen to be drawn up high, giving a complete view without depressing the tongue. The tonsils were small. The whole of the mucous membrane was dry, pale, and shiny. There were several streaks much paler than the rest, which, the patient said, became pink towards night. Immediately below the left tonsil there were two small granulations, each of about the size of a pea, which had given her much trouble. They swelled at times and caused pricking pains below the angle of the jaw. There were several sensitive papillæ at the root of the tongue. She had declined treatment by the galvano-cautery. There were no varicose veins. The gastric pain came on about two hours after food and was at its worst at midnight. At that time it shot through the body to the back and was only relieved by the eructation of wind. She complained of rheumatic pains during the night in the elbows and wrists. During the day she suffered from heartburn. Meat was followed by less pain than milk. The bowels were always confined and the motions were difficult, hard, and lumpy; it was often necessary to use an injection. The urine was normal. To allay the pain in the pharynx menthol spray had been employed. For the dryness of the mouth, which was worse at night, she had found effervescent tabloids of belladonna and cubebs very useful. Powders of bismuth and soda had prevented the gastric pain and sulphate of soda combined with carbonate relieved the constipation. I prescribed compound tabloids of mucin (mucin with sodium bicarbonate), two to be taken before and two after a meal, the throat to be swabbed or painted at bedtime with a solution prepared by dissolving one tabloid of mucin containing menthol in a wineglassful of warm lime-water¹ and the powders of bismuth and sodium sulphate to be continued.

The term "*myxasthenia*."—The condition forcibly reminds one of the class of cases described by Mr. Stuart-Low² under the names of "desiccation," "irritation," and "ulceration of the mucous membranes." Since no designation has hitherto been proposed to describe this constitutional defect, I venture to suggest that of "*myxasthenia*," which has the advantage of bringing into line with it the closely allied but somewhat undefined condition of neurasthenia. A more correct term would be *myxanadenia* (*a*, not, and *αδην*, a gland), but this is an awkward word. The myxasthenic state would consequently imply atrophic changes in the mucous or goblet-celled epithelium.

Muciparous glands and mucin.—Mr. Stuart-Low³ describes the situation of these glands in the nasal, buccal, and pharyngeal cavities. He asserts that they are so numerous and productive that one must conclude a proportion of the mucus is utilised, after swallowing, for the protection of the pyloric region of the stomach, which, in the sitting and standing postures, becomes the most dependent part of that organ. The mucous membrane of the small intestine contains cells with striped free borders, but goblet cells are few and far between. Its function must therefore be largely absorptive in character. The large intestine, again, contains vast numbers of goblet cells secreting a plentiful supply of mucus, which is used for protective and lubricating purposes. The respiratory tract is normally covered with a thin stratum of mucus, also derived from goblet cells. The latter must be distributed throughout the respiratory tract, certainly as far as the finer ramifications of the bronchi. Mucin itself may be manufactured⁴ from the salivary glands and the sinews of the leg of the ox, also from ox-bile. The addition of chloride of sodium renders it more tenacious, a fact of some significance with regard to the precipitation of biurates in synovial fluids. The molecule appears to be complex, as under certain circumstances it splits up into a carbohydrate and a nucleo-albumin.⁵

The nerves of mucous membranes.—The vital importance of

a normal supply of mucus for the general requirements of the body and the particular necessities of mucous membranes is not sufficiently realised.⁶ In fishes, where a thin layer of cutaneous and protective mucus is an urgent need, the secretion of this material is largely dependent upon the integrity of the vagus nerve. The latter supplies the length of the lateral line, a structure which is an important mucus-secreting organ. We are ignorant of the exact part which nerve influences play in the production of mucus in the higher animals. The vagus and sympathetic supply the pharyngeal, gastric, and small intestinal areas. It is possible that the vagus likewise sends twigs to the large bowel by way of the solar plexuses, since several physiologists affirm that stimulation of the nerve elicits movements of this part of the bowel as well as of the small intestine. A diminished or an increased secretion of mucus may be determined by trophic or irritative degenerations (neuroses) occurring within the vagal centres or at points intermediate along the course of the nerves between the central nervous system and the terminals within the mucous membranes.

Necessity of a nomenclature.—It seems advisable to adopt a series of new names in order to fix our ideas more definitely and to serve as a guide for future investigations. At the present time, however, we are able to refer to a few general varieties only, which new facts may considerably extend and amplify. We can conceive of quantitative mucous changes in the direction of excess and of diminution, also of a condition where there is a more profound and qualitative alteration in which the secretion may contain little mucin, but a large proportion of some other material such as nucleo-albumin or fat. The term "*orthomyxia*" may be used to express a perfectly sound and healthy state of the mucous secretion. Quantitative changes may be termed "*metamyxia*," and we may refer to them as a "*metamucous*" state. "*Metamucous*" is more mobile and acceptable than "*metamyxic*." Where the change is in excess the terms "*hypermyxia*" and "*hypermucous*" would be suitable, and would contrast with the converse condition, which would be "*hypomyxia*" and "*hypomucous*." When there is a profound allotropic (excessive viscosity) or a qualitative modification, the terms "*paramyxia*" and "*paramucous*" would be applicable. Under this division may be included the production of extremely viscid mucus, or of membranes, such as occurs in glairy or membranous enteritis and the like.⁷

Application of the terminology.—Among bronchial affections whooping-cough is remarkable. In this disease the whole of the bronchial mucous membrane appears to be involved, and it is often accompanied by similar changes in the naso-pharyngeal, gastric, and colic areas. There may be increased production of mucus throughout these regions. Pertussis probably arises from an irritation (originating from the presence of toxins produced by the growth and multiplication of a specific bacillus) which implicates, in addition to cortical and emotional centres, the medullary origin and the peripheral terminations of the vagus. It is therefore a state of general hypermyxia with, as subdivisions, hypermyxia naso-pharyngea, hypermyxia bronchialis, hypermyxia gastrica, and hypermyxia colica. The presence of the excessive amount of mucus within the naso-pharynx, the bronchi, and the stomach is one of the factors which excites the paroxysms of cough and vomiting,⁸ and the occasionally brilliant results of naso-pharyngeal douching and spraying,⁹ of emetics and laxatives,¹⁰ become comprehensible. Hypermyxia colica has been already described as "*mucous disease of the bowels*" by Dr. Eustace Smith. It is quite possible that a hypomucous or paramucous condition may sometimes follow, due either to exhaustion or to a disordered activity of nerve influences, which may prove the starting-point of atrophic rhinitis, pharyngitis, gastritis, or asthma. A paramucous variety probably exists in some

⁶ "Myxotic," as a general term, might be used to correspond with neurotic.

⁷ All conditions with exudations consisting of fibrin are excluded.

⁸ The virus may also affect the medullary centres of cough and vomiting and the rima.

⁹ Syringing of the external auditory meatus can act only in the way of reflex inhibition.

¹⁰ With regard to laxatives these are certainly indicated where there seems to be an excess of gastric mucus. I have found of the greatest value a prescription containing liquor bismuthi combined with minimal doses of the tinctures of podophyllin, jalap, rhubarb, with cocaine, carbolic acid, and aromatic cascara, taken four times a day, no free purgation being allowed. In this connexion Dr. Eustace Smith (Allbutt's System of Medicine, vol. ii., p. 243) remarks that an acute watery diarrhoea may suppress all laryngeal and pulmonary symptoms. It looks as if the virus (or its toxins) was manufactured chiefly within the bowel, or had selected as its habitat the portal circulation.

¹ Mr. W. Stuart-Low: Mucin in Desiccation, Irritation, and Ulceration of Mucous Membranes, THE LANCET, Oct. 12th, 1901, p. 972.

² Loc. cit.

³ Loc. cit.

⁴ Burdon-Sanderson: Handbook to the Physiological Laboratory, p. 444.

⁵ For further details consult Mr. Stuart-Low's paper.

forms of the rare affection known as "plastic bronchitis." The plugs are quite soluble in lime-water (Wilson Fox). According to the old theory of Beau¹¹ asthma is a bronchial catarrh "with a highly viscid sputum the dislodgment of which into the larger tubes terminates the attack"; in other words, it is probably in some instances a paramucous condition dependent upon trophic or irritative changes occurring in the pulmonary vagus or its centre. As an example of the hypomucous variety may be mentioned dry bronchitis of the gouty diathesis (?). Naso-pharyngeal conditions of hypomyxia are seen in atrophic rhinitis and pharyngitis sicca. I have just referred to hypermyxia naso-pharyngea. Paramucous conditions do not appear to occur. The affection of the stomach represented by the term "desiccation of mucous membranes"¹² corresponds to hypomyxia gastrica. It might also be termed "myxanadenia," "myxatrophia," or "myxasthenia gastrica." Such a condition is the forerunner of gastric pain and dyspepsia, erosions, and ulceration. Some varieties of irritative gastritis, witness that associated with pertussis, and some forms of chronic gastritis, may be pure examples of hypermyxia gastrica. The problematical occurrence of membranous gastritis serves to illustrate the term "paramyxia gastrica." With regard to the large bowel conditions of metamyxia in the direction of excess occur as already stated in the disease called "mucous disease of the bowel." Under this terminology it would be classified as "hypermyxia colica."³ The converse condition is seen in many obstinate cases of constipation, due without doubt to a diminished production of mucin and probably to a myxatrophic condition of the lining membrane of the colon. I could name it "hypomyxia colica." The disease known as "glairy enteritis," "membranous enteritis," or "catarrhal enteritis," in which the membranes consist of inspissated mucus, of nuclealbumin, or even of fat, is obviously a paramucous condition—namely, "paramyxia colica." Trophic or irritative degenerations of the vagus may play a part in its origin.

Relations to gout, diabetes, and cholelithiasis.—Abnormal dryness of mucous membranes may occasionally be an accompaniment of the gouty and diabetic diatheses. The entire pathology of gout is not exhausted in the idea of uric acid, nor is that of diabetes altogether embodied in that of sugar, since we know that these two substances are merely the outward manifestations of a profound disturbance of metabolic activity the elucidation of which is still reserved. The presence of mucin in abundance within the synovial fluid where uric acid deposits most frequently occur, the existence of a carbohydrate moiety in the mucin molecule, and the diminution of saliva and desiccated tongue of diabetic patients are suggestive facts which may lead to the discovery of interesting relationships.

Clacton-on-Sea.

CARCINOMA MAMMÆ: ON THE NECESSITY FOR TAKING STEPS DURING THE OPERATION FOR REMOVAL TO OBVIATE THE RISK OF SUBSEQUENT DISSEMINATION.

BY CECIL H. LEAF, M.A., M.B. CANTAB., F.R.C.S. ENG.,
ASSISTANT SURGEON TO THE CANCER HOSPITAL, BROMPTON, S.W.,
AND TO THE GORDON HOSPITAL FOR FISTULA, ETC.

In this paper I wish to call attention to a subject which I believe to be important—viz., the necessity of occluding as far as possible the emergent lymphatics and veins of the breast when operating for cancer of that organ. During the last few years new operations, of which I need only mention Halsted's, have been devised whereby we remove in a much more thorough and systematic manner than formerly any structures which we think may possibly be invaded by

the growth. In spite, however, of the advances which have been made three facts remain. In the first place, it must be admitted that, no matter how careful the surgeon may be, the mere fact of his operating in the neighbourhood of a malignant growth renders infection of some part of the wound at least possible; secondly, that though the surgeon may be morally certain that he has removed wide of the disease he cannot be absolutely so. In the third place, during the operation innumerable lymphatics and small veins are cut across. Without in any way meaning to imply that infection of the wound is a usual occurrence or that some part of the growth is invariably left behind, I do maintain that the possible risk of dissemination which may result from either of these contingencies taking place should always be borne in mind and as far as possible provided against at the time of the first operation. I believe that the chance of subsequent dissemination taking place may be much lessened, if not entirely prevented, by occluding the mouths of those lymphatics and veins which drain the mamma and which have necessarily been cut through during removal of the organ. I need only mention two cases to show that after operations for removal of the breast extensive dissemination may occur.

CASE 1.—A woman, aged 42 years, was admitted into the Cancer Hospital, Brompton, S.W. Three years previously she had noticed a lump in her left breast. This had grown and had eventually reached "the size of a child's head." The breast was removed in the country. The wound healed but always looked like "a scald." Two and a half years after the operation the whole of the left side began to get hard and the hardening process spread to the other breast which eventually completely disappeared. Small lumps of the size of a hempseed now began to appear on the skin on the right side and in the lower part of the abdomen. The patient lost the sight of her left eye and small lumps in the scalp now made their appearance. On admission the condition was as follows: the skin over the operation wound on the left side and that over the site of the right breast was tense, shiny, and hide-bound. There were seven little nodules over her right and three over the left temple, three in the middle line of the scalp, two in the right posterior triangle of the neck, two in the skin over the right supra-spinous fossa, two in a similar position on the left, three over the lower ribs on the right side, and one over the acromial end of the spine of the left scapula. 22 nodules were counted scattered over the abdomen. The inguinal glands on both sides were enlarged. In all, nearly 60 of these little nodules were present. There was atrophy of the left optic disc and ptosis, sometimes more sometimes less marked, of the left eyelid. Originally there were numerous nodules situated in the skin over the left scapula, but these had become replaced by the brawny hardness. The diagnosis I made of the condition was cancer en cuirasse, associated with multiple carcinomatosis of the skin and possibly of internal organs as well. The point, however, which I wish to bring out is this: that here we have a case of dissemination coming on after an operation. I look upon this case as one of infection by the blood-stream and I think infection took place at the time of operation.

The next case is a remarkable one and has been recorded by Dr. J. Ritchie and Dr. J. Purves Stewart.¹

CASE 2.—A breast which was affected with scirrhus was removed with some of the axillary lymphatic glands from a woman, aged 47 years. Five years and eight months afterwards she had a severe attack of pain in the back and limbs. Nine years and three months after the operation she died from secondary carcinoma of the bones. This was proved microscopically. As Dr. Ritchie and Dr. Stewart state, the case is remarkable for the great length of time which elapsed between the operation and the first evidence of bone infection—namely, five years and eight months.

These and many other similar cases which might be quoted show conclusively that after operations general dissemination, occurring either early or late, is by no means of rare occurrence. This is not to be wondered at when, in view of the two contingencies mentioned above actually occurring, it is remembered that no steps whatever are taken to prevent it during the operation. Before, however, discussing the means which I would advocate it may be well to indicate in the briefest manner possible the most important routes taken by the lymphatic vessels and veins which run from and drain the mamma. 1. The

¹¹ Auld: The Pathology of Bronchial Affections, p. 86.

¹² Stuart-Low: loc. cit.

¹³ The frequent occurrence of mucous degenerations of the bowel in the insane (asylum dysentery) where extensive trophic and degenerative lesions in the nerves and nerve-centres co-exist, is worthy of note (Dr. T. Clave Shaw, Brit. Med. Jour., Oct. 26th, 1901). The croupoid fibrinous exudations and deposits which occur in tropical dysentery do not concern us, since they are obviously due to severe inflammatory processes involving both mucosa and submucosa.

¹ Transactions of the Edinburgh Medico-Chirurgical Society.