connected with aphasia, and have attempted to indicate, in an
elementary way, the manner in which the function of the speech
centres is educated and developed. I trust that I may have
awakened your interest in the subject, and that when you get
into practice you will do your best to study the cases of aphasia
which come under your observation, and so to aid in the advance-
ment and elucidation of this most interesting and important
department of human knowledge.

A CASE OF CHYLOUS TRANSUDATION INTO THE
PLEURAL, PERICARDIAL, AND PERITONEAL
CAVITIES.

By J. Mackie Whyte, M.A., M.D., Physician to Dundee
Royal Infirmary;

WITH AN ANALYTICAL REPORT ON THE FLUIDS,
By A. Lockhart Gillespie, M.D., F.R.C.P.Ed.

MARY F., æt. 21, mill-worker, admitted to Ward 8, Dundee Royal
Infirmary, on 18th June 1897, complaining of shortness of breath,
swelling of face, feet, and abdomen.

Family history.—Father died at 30, cause unknown; mother died
at 45, "of pleurisy"; one brother and one sister alive and healthy, none
dead.

Previous health.—Has been four times in hospital, and has under-
gone three operations for tubercular cervical glands. Has had erysipelas.
Now and again swelling of the feet. A fortnight ago, when in the Con-
valescent Home, patient became troubled with swelling of the feet and
abdomen, and shortly after with shortness of breath. On day of
admission she vomited, and had headache for first time.

State on admission.—Position orthopnoeic. Malar flush, otherwise
skin clear and pale. Complexion fair. Various scars about neck, also
some unhealthy sinuses. Anasarca of legs and feet, also over sacrum.

Circulatory system.—Pulse, 134; regular, small, apex-beat in fifth
space, left nipple line. No murmurs. No accentuation of aortic second.

Respiratory system.—Resp. 38. The usual signs of fluid in both
pleural sacs, the upper border of dulness being at the scapular spine
and the third rib on the right side, while it was at a lower level on the
left. No signs of intrapulmonary disease.

Tongue slightly furred, moist. No appetite. Diarrhoea now and
then. Liver and spleen seemed of normal size. Free fluid in peritoneal
sac, the dulness in sitting posture extending up to within a finger's
breath of the umbilicus. Circumference at level of umbilicus,
33 in. Urine, sp. gr. 1022, acid, buff colour, no albumin.

On the day following, Dr. R. M. Clark, my house physician (to
whom I am indebted for most of these notes), aspirated the right
pleural cavity, obtaining 56 oz. of a turbid, pale green, inodorous fluid. Much relief was given by this and the subsequentappings. These were—(1) 35 oz. from left pleural cavity on 24th June; (2) 62 oz. from right pleural cavity on 30th June; (3) 84 oz. from same on 6th July; (4) 86 oz. on 12th July; (5) 84 oz. on 16th; (6) 78 oz. on 20th July; (7) 61 oz. on 23rd, all from same cavity; (8) 153 oz. from abdomen on 26th July, and (9) 48 oz. from left pleural cavity on 29th July.

The general appearance of all the specimens seems to have been pretty much the same. The first specimens were less milky looking than the later. When kept the fluid became more milky in a few hours; it showed little tendency to decompose; when shaken with ether it was slightly cleared; when kept a few days a distinct cream rose to the surface. Under the microscope there was at first surprisingly little to be seen, a casual leucocyte here and there, no fat cells, but some minute particles exhibiting Brownian movements.

To resume the history. The patient took her food well, almost ravenously, yet her general condition grew worse. In favourite attitude she sat with her legs over the side of the bed, and with her back supported by pillows. The average amount of urine was 30 to 40 oz. for the first fortnight, 16 to 20 oz. thereafter. The bowels usually acted once to three times in the twenty-four hours. Temperature showed a slight tendency to rise, especially during the last fortnight, when it usually stood at 99° in the morning, 100° at night.

Death occurred on 3rd August, and was probably hastened by rapid increase of pericardial effusion. Permission to make an autopsy could not be obtained, but specimens aspirated from the right pleural, the pericardial, and the abdominal cavities, were sent to the Laboratory of the Royal College of Physicians in Edinburgh, and Dr. Lockhart Gillespie kindly made an elaborate analysis of these, the details of which are given below.

I take it for granted that the fluid in the various cavities was to a large extent chyle. Pure chyle could only be got by tapping the lacteals, for even in cases of rupture of the receptaculum chyli the effused fluid is not only mixed with peritoneal secretion but with the lymph streaming in from the lower limbs, the abdominal wall, and abdominal viscera, through the ordinary lymph channels. Apart from the special characters of the fluid, one would surmise this to be a case, not of exudation through ruptured vessels, but of transudation, for otherwise one could not well account for the presence of fluid in four different cavities. The likely cause of the transudation was a rise in the pressure in the thoracic duct, through obstruction near its termination; one can but guess at the cause of this obstruction. Doubtless it was associated with the girl’s tubercular diathesis, and it is worthy of note that in most of the recorded cases of this nature either tuberculosis or cancer is the cause of the obstruction. One of the cicatrices low down in
the neck might have involved the orifice of the thoracic duct; or, as in Whitla's case, there might have been a development of miliary tubercles inside the duct, or there might have been a glandular tumour or abscess in the upper part of the mediastinum. The elevation of temperature showed there was some active disease in progress.

It will be observed that the fluid collected most rapidly in the right pleural cavity, 521 oz. being withdrawn from it between 19th June and 23rd July. Moreover, the intervals between the tappings diminished from eleven days to three. From the left pleural cavity 83 oz. were got in the two aspirations, and 155 oz. from the peritoneal cavity; in all 38 pints were withdrawn in forty days. And there were for certain several pints in the body at the time of death. This amount may be compared with the 31 oz. per day lost in Whitla's case of ruptured receptaculum, where the tappings extended over a period of three months.

It is difficult to see why the right pleural cavity should have been the favourite seat of effusion, seeing that it is much more closely associated with the right lymphatic trunk than the thoracic duct, but there may have been some abnormal distribution of the lymphatic vessels. No doubt, in a case like this, where there is a persistent cause, a complete aspiration predisposes to a rapid recurrence of the effusion, for the pressure of the fluid in any of the serous cavities serves within certain limits to counteract further effusion, and even, in favourable conditions, to promote absorption. The patient was, however, always relieved for the time being, and when she felt the dyspnoea increasing asked for relief.

The emptying of one cavity appeared to prevent reaccumulation from occurring so rapidly in others. The diminution in the amount of urine was, no doubt, also due to the diversion of the watery part of it.

Nutrition was fairly well maintained, chiefly, I suppose, through the portal system; possibly to some extent through the anastomotic system, which is generally quite sufficient of itself to compensate for complete obstruction of the thoracic duct in experiments on the dog. Reabsorption through serous surfaces is another possibility. Moreover, according to Foster, 40 per cent. of the fat which disappears from the intestine in digestion cannot be accounted for through either the thoracic duct or portal system.

The fluid in the legs was probably not chylous. She had on previous occasions been troubled with this. A very similar case recorded by Sidney Martin had œdema of the legs, which was shown by puncture to be due to clear fluid.

Analytical Report.1—On 5th August three bottles were received containing milky-looking fluids.

1 These analyses were carried out in the Research Laboratory of the Royal College of Physicians.
No. 1 contained fluid obtained from the abdominal cavity of the patient whose case is recorded above, aspirated shortly before death; No. 2 contained fluid from the left pleural cavity, and No. 3, fluid from the pericardium. Both these had been drawn off post-mortem.

All three specimens were milky, with no deposit, passed through filter-paper unchanged, and had a slightly putrid odour.

In each case the same procedure was followed, i.e. the specific gravity was ascertained by means of a picnometer, and 10 c.c. were dried at 110°, the residue weighed, and after incineration again weighed, to arrive at the proportion of solids and ash. Trichloracetic acid was added to 20 c.c., the precipitate filtered off, washed with boiling water, dried, and weighed; the filtrate was preserved and added to the wash water; then 40 c.c. was mixed with 40 c.c. of a saturated solution of neutral ammonium sulphate, the resulting precipitate filtered off after twenty-four hours, and 40 c.c. of the filtrate treated with trichloracetic acid, the precipitate of serum albumin which formed being dealt with as before. All the filtrates and washings were added to those already reserved, and were evaporated down to small bulk, acidified and saturated with ammonium sulphate at the boiling point, to separate out albumoses.

Other 40 c.c. of each were dried, the dry residue placed in a folded filter-paper within a Soxhlet's fat-extracting apparatus, and the fat removed by ether, the ether driven off, and the fat weighed. The inorganic chlorides remaining in the ash were weighed in the form of silver chloride. The remainder left, on subtracting the proteids and fat from the total organic solids, was looked upon as consisting of extractive bodies.

The appended table gives details of the results of analysis. For comparison, the data obtained by Hoppe-Seyler from a case of true chylous ascites have been added, along with the composition of blood plasma (Table I. p. 555).

From the results of analysis, the ascitic fluid is seen to be the richest in solid constituents, the pericardial fluid the poorest; this relationship persists in the proportions of the inorganic and organic constituents, total proteids, globulins, lower proteids, extractives, and of the inorganic salts other than chlorides. The coagulable proteids give the highest figure in the pleural fluid, owing to the amount of serum albumin present, then in the ascitic fluid. The percentage of the total proteid bodies recovered to the total organic solids, as also of the coagulable proteids, is highest in the pleural transudation, lowest in the ascitic. The relationship of the globulins present to the serum albumin in the ascitic sample is exactly the same as the proportion obtaining in blood plasma, 1 to 1.45 (in blood plasma, 1 to 1.45); much lower in the fluid from the pleura, 1 to 1.96; and lowest in the pericardial fluid, 1 to 2.03.

The specific gravities of the specimens are more those of
### Table I.

**Analysis of Milky Fluids from—(1) Peritoneal Cavity, (2) Pleural Cavity, (3) Pericardial Sac. In parts per 1000.**

|                      | Peritoneal Fluid | Pleural Fluid | Pericardial Fluid | Peritoneal Fluid in Case of Rupture of Thoracic Duct (Hoppe-Seyler) | Blood Plasma |
|----------------------|------------------|---------------|-------------------|---------------------------------------------------------------------|--------------|
| Specific gravity     | 1020·5           | 1018·8        | 1018              |                                                                     | 1027         |
| Water                | 951·9            | 956·0         | 957·5             |                                                                     | 901·51       |
| Total solids         | 48·1             | 44·0          | 42·5              |                                                                     | 98·49        |
| Total coagulable proteids |              |               |                   |                                                                     |              |
| Serum albumin        | 17·59            | 30·55         | 19·69             |                                                                     | 1·6 (circa)  |
| Globulins            | 12·11            | 10·31         | 9·66              |                                                                     | 4·49         |
| Albumoses and peptone| 2·89             | 1·216         | 1·05              |                                                                     | (5·95 Vierordt) |
| Fats soluble in ether| 4·55             | 3·82          | 3·95              |                                                                     | 1·204        |
| Extractives (by subtraction) | 2·86 | 0·614       | 0·45              |                                                                     | 2·919        |
| Chlorides in ash     | 3·74             | 3·82          | 4·15              |                                                                     | 5·591        |
| Remainder of ash     | 4·56             | 3·98          | 3·55              |                                                                     | 2·919        |
| Total proteids per cent. of organic solids | 81·38 per cent. | 87·75 per cent. | 87·32 per cent. |                                                                     |              |
| Globulin to albumin  | 1 : 1·45         | 1 : 1·96      | 1 : 2·03          |                                                                     | 1 : 1·45     |
| Coagulable proteids per cent. of organic solids |              |               |                   |                                                                     | 70·34 per cent. |
| Fat per cent. of organic solids | 11·43 | 10·55 | 11·35 |                                                                     | 16·39 | 1·77 |
| Extractives per cent. of organic solids | 7·19 | 1·7 | 1·33 |                                                                     | 13·27 | 6·13 |
exudations than transudations. The figure regarded by Reuss as indicative of the nature of pleural and peritoneal fluids, and above which they are probably exudative in character, is 1018. Transudations, according to the same observer, have specific weights—below 1015 in the pleural cavity, and 1012 in ascites.

But he places the lowest possible percentage of coagulable proteid in exudations at 4·0 per cent., the highest percentage of the same in transudation at 2·5 per cent. in hydro-thorax; 1·5 per cent. in ascites, and 1·8 per cent. in hydro-pericardium. In the specimens examined, the proportion of coagulable proteid is too low to allow of classification as exudations, and higher than in ordinary transudations. They must therefore be regarded as arising by simple transudation, with the addition of some substances not usually present in sufficient amount to cause increase of the specific weights and coagulable proteids. This is corroborated by the quantities of fat detected; they are not as large as in true chylous effusions, with leakage from the thoracic duct, but are present in sufficient amount to indicate that there was some obstruction to the flow of chyle.

The average percentage of fat in true chylous exudation may be put down at 1·0 per cent., Hoppe-Seyler found 0·85 per cent. in the peritonitic example noted in the first table. The results of the analysis of various chylous and opalescent effusions and transudations have been tabulated in Table II. From this it may be seen that Matthew Hay obtained 1·03 per cent., and Guinochet 0·948 per cent. of fat from chylous ascitic fluids, while 1·0 per cent. was found by Hasebroek in a chylous pericardial fluid. The amount obtained by the author in a case of opalescent pleural transudation, due to pressure on the thoracic duct by a lymphadenomatous growth, was very similar (0·315 per cent.) to those obtained in the present instance. Only 0·14 per cent. of fat was found in a similar opalescent ascitic fluid.

The percentage of the fats to the total organic solids in the three specimens is very similar, 10·55 per cent. in the pleural fluid, 11·35 and 11·35 per cent. in the ascitic and pericardial samples. The figures for the extractives are the most irregular, being almost nil in the pleural and pericardial, and much greater, but still comparatively small, in the ascitic fluid. The percentage which the coagulable proteids bear to the total organic solids is practically identical in the pleural and pericardial fluids, 10 per cent. below these in the ascitic. In each case, after precipitation of the coagulable proteids with trichloracetic acid, the presence of albumoses and peptone could be substantiated.

The only other point to which attention may be directed is the unusual relationship between the specific gravity and amount of solids in the peritoneal specimen compared with the other two. As a general rule, fluids, whether exudative or transudative, appearing in the pleural or pericardial cavity, are denser and
### Table II.

**Analyses of Milky Fluids per 1000.**

|                      | I. Opalescent Pleural. | II. Chylo-Pericardial. | III. Opalescent Ascites. | IV. Chylous Ascites. |
|----------------------|------------------------|------------------------|--------------------------|----------------------|
| Specific gravity     | 1016                   | (1016)                 | 1009                     | (1024.5)             |
| Water                | 959.3                  | 892.75                 | 985.37                   | 942.95               |
| Total solids         | 40.7                   | 107.218                | 14.63                    | 57.05                |
| Ash                  | 8.7                    | 9.336                  | 6.85                     | 9.95                 |
| Organic solids       | 32.0                   | 97.882                 | 7.78                     | 47.10                |
| Proteids             |                        |                        |                          |                      |
| Coagulable           | 28.12                  | 73.789                 | 3.3                     | 28.78                |
| Serum albumin        | 26.0                   |                        |                          |                      |
| Serum globulin       | 1.7                    |                        |                          |                      |
| Albumoses, etc.      | 0.42                   |                        |                          |                      |
| Fats soluble in ether| 3.15                   | 10.000                 | 1.4                     | 10.3                 |
| Extractives          | 0.73                   | 14.093                 | 3.08                     | 8.02                 |

Percentage to organic solids of—

|                      |                      |                      |                      |                      |
| Coagulable proteids  | 86.56 per cent.      | 75.3 per cent.       | 39.3 per cent.       | 61.1 per cent.       |
| Fats                 | 9.84                  | 10.2                  | 18.0                  | 21.8                 |
| Extractives          | 2.28                  | 14.5                  | 39.5                  | 17.1                 |

I. A. Lockhart Gillespie (Rep. Lab. Roy. Coll. Phys., Edin., vol. v.).

II. Hasebroek (Ztschr. f. physiol. Chem., Strassburg, Bd. xii.).

III. A. Lockhart Gillespie (loc. cit.).

IV. (1) Matthew Hay (quoted by Halliburton).

IV. (2) Guinochet (,, ,, )
heavier than peritoneal fluids. In the present instance the reverse is the case. This variation from the usual may be attributed to the amount of fluid aspirated on so many occasions from the pleural cavity, while the peritoneal cavity was only tapped once. The appearance of the pericardial fluid only a short time before death probably explains its diminished specific gravity.

ON THE TREATMENT OF SOME OF THE MORE COMMON EYE AFFECTIONS.

By G. A. Berry, M.B., F.R.C.S.Ed., University Lecturer on Ophthalmology; Ophthalmic Surgeon, Royal Infirmary, Edinburgh.

(Continued from page 454.)

Phlyctenular conjunctivitis.—A very common variety of conjunctival inflammation is one in which the congestion is less diffused. It is mainly the ocular conjunctiva which is affected, and that in more or less definitely circumscribed areas. These areas of congestion may be at any part. They are met with in single patches, or distributed more or less all over the white of the eye. Very often the mid-point of a congested patch lies on or near the corneo-scleral margin. The main characteristic, however, of this variety of conjunctivitis, and that which gives to it the name "phlyctenular," is the presence of little blebs on the surface of the congested portions of conjunctiva. These blebs vary considerably in size. Many of them are so small as to be only recognisable on close inspection. Very commonly they have a diameter of something like the thickness of a shilling. Occasionally they are met with three or four times this size. The larger ones are usually seen as collapsed bullæ, sometimes as regular pustules when their liquid contents have become purulent. At a later stage, when the epithelial covering has been shed, they are converted into small superficial ulcers.

Two points in connection with phlyctenular conjunctivitis call for consideration as matters of practical importance. In the first place, the condition is always indicative of some constitutional delicacy. To this point I shall return in discussing treatment. In the second place, more or less serious complications on the part of the cornea are to be feared. Corneal complications, however, are in this case of a different nature from those which have been referred to as existing in other forms of conjunctivitis. They are apparently not auto-infections caused by the specific action of the secretion from the inflamed conjunctiva. Indeed, altogether in this affection, when uncomplicated, the conjunctival secretions are not markedly altered, although no doubt there is frequently an increase in the watery constituent—a more or less pronounced degree of