

began at the level of the ninth dorsal segment. Roentgenographic examination revealed fluid in the left pleural cavity, and a small shell fragment to the left of the body of the eighth dorsal vertebra.

Operation was performed six hours after admission, when the general condition had somewhat improved. The entrance wound was excised, and a typical laminectomy performed. The spines and laminae of the seventh, eighth and ninth dorsal vertebrae were removed. There was a comminuted fracture of the left transverse process and lamina of the eighth, some of the loose fragments impinging on the dura. A small epidural clot was removed. Excision of the tract to the pleura was performed, further intrathoracic dissection being considered inadvisable owing to the general condition of the patient and the type of operative exposure required for access to the foreign body in this region. The wound was sutured in layers.

In the ten days' postoperative observation at the hospital, the wound healed by primary union, and complete bladder control returned. There was steady improvement in power and range of motion in the right lower extremity; there were slight motions at the left hip and knee, but none at the ankle or toes. There was reduction in the area of altered sensation.

Progressive improvement was reported from time to time. Five months after operation the patient was up and about with good power in the right leg and fair power in the left. The last report, seven months after operation, states that, except for slight weakness in the left leg, there is normal function in both legs.

Although it was an injury to the cauda equina, the following case is included because it presents the same picture of central injury with intact dura:

*CASE 4.—Penetrating wound in lumbar region with missile lodged in front of vertebra. Paralysis of right leg. Laminectomy and excision of tract. Progressive improvement.*

The patient, admitted, October 19, six hours after being wounded, with loss of power in the legs, inability to void, and severe, shooting pains down the right thigh and the leg, had received a large, ragged wound in the right lumbar region. In the right leg slight motion was present at the knee and absent elsewhere; on the left side slight motions were present at the hip, knee and ankle. Both knee jerks were absent; the left ankle jerk was present, the right absent. All sensations were lost in the distribution of the fourth and fifth lumbar and first sacral roots. Roentgenographic examination revealed a large shell fragment anterior to the body of the third lumbar vertebra.

The first stage in the operation consisted in laminectomy, because it was thought from the roentgenographic examination that the foreign body had traversed the laminae. The third, fourth and fifth lumbar spines and laminae were removed, without any fracture being disclosed. The tract of the missile was then excised. The tract was found to pass through the body of the third lumbar vertebra. Loose bone fragments were removed; the foreign body could not be felt. The laminectomy wound was closed, and the remainder of the wound treated by Carrell-Dakin's method.

There was postoperative pneumonia. On examination from the hospital, ten days after operation, power in the left lower extremity was greatly improved; slight motions were present at all the joints of the right. There was improvement in sensation.

Discharge from the wound continued for several weeks, ceasing after removal of the foreign body and some bone fragments. Four months after operation the patient was able to walk with the aid of a cane, the left leg was normal, and power was much improved in the right. No subsequent report has been received.

**Infant Breast Feeding.**—It is of paramount importance to the future of this country that infant breast feeding should be maintained and extended. There must be no avoidable spilling of infant life. Every little stranger is now no longer a somewhat unwelcome intruder, but a precious commodity to be jealously guarded.—Sir James Crichton-Browne, *Journal of State Medicine*, May, 1918.

## RÔLE OF THE BLOOD AND THE BONE MARROW IN CERTAIN FORMS OF GAS POISONING

### I. PERIPHERAL BLOOD CHANGES AND THEIR SIGNIFICANCE

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Hematologic examinations made during the past ten months in a base hospital in France on certain gassed patients (mustard gas) offer strong evidence that the deleterious action of the poison on the blood and bone marrow is an important factor in prognosis in many cases.

The first change in the circulating blood—apparently due to a stimulus to the bone marrow—is an increase in the erythrocyte and leukocyte count, that naturally varies greatly with the severity of the gassing and the individual's reactive powers. In view of the disproportionate increase of red and white cells, change in Arneth scale, etc., the possibility of this being due to a greater concentration of the blood may safely be disregarded. The leukocyte rise (due to the polymorphonuclear elements) may be as high as 36,000 per cubic millimeter, and in the present series averaged 12,000. Enumeration of the lobes of the nuclei (Arneth count) shows at this time a shift of the Arneth scale to the left, that is, young polymorphonuclears are entering the blood stream. This increase of leukocytes soon disappears in the slightly gassed patients, the count gradually returning to normal, and in the severely gassed patients falling rapidly. The shift of the Arneth scale to the right at this period indicates an exhaustion of the leukocyte-forming centers. If death does not interrupt the downward course, an extreme degree of leukopenia (at the expense of the polymorphonuclears) may be reached. Thus the leukocyte counts of four fatal cases were observed to fall steadily from (1) 10,200 to 2,900; (2) 17,800 to 3,200; (3) 20,400 to 7,600, and (4) 36,000 to 14,000 per cubic millimeter. Postmortem examination of the femoral bone marrow reveals only a slight mottling, shown histologically to be due to primordial cells and megaloblasts, with a greater or less disappearance of normoblasts, myelocytes and adult forms. This has been interpreted as an inadequate attempt at blood regeneration, and the resulting lack of leukocytes in the blood stream may be considered to amount to an important weakening of the body defenses. Even in the bronchopneumonia that frequently supervenes in severely gassed patients, little or no reactive rise in leukocyte count is observed. In the accompanying table, only those cases are credited with bronchopneumonia, in which it was found at necropsy, and yet there are in it several instances in which leukopenia coincided with extensive bronchopneumonia. It is recognized, of course, that death may occur while moderate leukocytosis still exists; but a high leukocyte count should undoubtedly be considered a favorable item in the prognosis of a serious case of gassing.

In two cases of especial interest, leukocyte counts taken nine days after gassing showed the extraordinarily low counts of 570 (Harden) and 520 cells per cubic millimeter (Kerr), chiefly due to an almost total

disappearance of polymorphonuclears. Both patients in ensuing daily counts showed a progressive rise with outpouring of myelocytes into the blood stream, but died with an extensive bronchopneumonia before the blood picture returned to normal. This may be interpreted as a partial recovery of the bone marrow from the initial insult, but not in time to help adequately to protect from the bronchopneumonia.

The question as to whether there is a real loss of leukocytes or a redistribution in the lungs at the expense of the blood stream must be taken into consideration, especially in view of the experimental work of Edkins and Tweedy<sup>1</sup> on gassed rabbits. The bronchopneumonic lungs and inflamed tubes have certainly shown the masses of leukocytes that are usually found in these conditions, so that, especially in view of the changes found in the bone marrow, the most probable hypothesis to explain the leukopenia in the blood stream would seem to be that the damaged source of supply was unable to furnish sufficient leukocytes for the local needs, and as well a superabundance in

the blood, as it normally is able to do. In this connection also the myriads of organisms and relative lack of pus cells in the sputum is of interest.

The changes in the other elements of the blood are less striking; the initial rise in erythrocytes is later replaced by a moderate anemia (occasionally reaching below 4 millions). That this is due to lessened blood formation, rather than increased destruction, is shown by the normal condition of the plasma, absence of choloria, and of poikilocytes or blast cells in the blood stream.<sup>2</sup> In convalescent cases, the increased blood regeneration is shown by a distinct increase in the number of skeined cells, as well as the return of the leukocyte count to or slightly above normal. In the earlier stages at least the coagulation time of the blood is decreased and platelets appear very numerous and large on a film, though no actual counts have been made. In the later leukopenic stage, the platelets are much sparser, and in one case a coagulation time of seven minutes has been noted.

Attempts to apply this theory of damaged blood and bone marrow to the treatment of gassed patients have

1. Edkins, J. E., and Tweedy, N.: The Early Changes in Lungs by Gas Poisoning and Their Significance, Report 2, Chem. Warfare Med. Com., April, 1918.

2. Pearce, R. M.; Krumbhaar, E. B., and Frazier, C. H.: The Spleen and Anaemia, Philadelphia, J. B. Lippincott Company, 1918.

BLOOD COUNTS OF GASSED PATIENTS

| Case         | Date Gassed  | Date of Examination | Lots   | Differential Count, per Cent. |                    |                               |              |             | R. B. C. in Mill. | Per Cent. Hb.      | Miscellaneous  |
|--------------|--------------|---------------------|--------|-------------------------------|--------------------|-------------------------------|--------------|-------------|-------------------|--------------------|--|
|              |              |                     |        | Poly-morpho-nuclears          | Small Lym-phocytes | Large Lym-phocytes and Trans. | Eosino-phils | Myelo-cytes |                   |                    |  |
| 1. H.        | 1917<br>7/21 | 1917<br>7/26        | 8,600  | 84                            | 13                 | 3                             | ...          | ..          | 5.2               | 89                 | Coagulation time 2.3 min.; died 6 hours later  |
| 2. B.        | 7/21         | 7/26                | 9,600  | 87                            | 12                 | 1                             | ...          | ..          | 4.6               | 90                 | Moderately severe case   |
| 3. V.        | 7/21         | 8/1                 | 9,600  | ..                            | ..                 | ..                            | ...          | ..          | 5.2               | ..                 | Much better; evac. to Eng. 8/12  |
|              |              | 7/26                | 10,200 | 94                            | 4                  | 2                             | ...          | ..          | 4.1               | 90                 | Severe   |
|              |              | 7/28                | 5,600  | 63                            | 31                 | 5                             | (mast 1)     | ..          | 4.7               | ..                 | Toxic psychosis  |
| 4. L.        | 7/21         | 7/30                | 2,900  | 24                            | 61                 | 6                             | (mast 1)     | 6           | 4.1               | ..                 | Died same day; no bron. pneu.  |
|              |              | 7/26                | 6,000  | 84                            | 14                 | 2                             | ...          | ..          | 4.7               | 81                 | Very toxic; died 8/1 br. pneu.   |
| 4. S.        | 7/21         | 7/26                | 10,600 | 77                            | 20                 | 3                             | ...          | ..          | 5.3               | 95                 | Mild   |
|              |              | 8/1                 | 12,600 | 82                            | 10                 | 5                             | ...          | 3           | ..                | ..                 | Much better; evac. to Eng. 8/10  |
| 6. C.        | 7/21         | 7/26                | 9,000  | 86                            | 11                 | 3                             | ...          | ..          | 4.2               | 97                 | Mild case  |
| 7. G.        | 7/21         | 7/26                | 8,000  | 53                            | 33                 | 14                            | ...          | ..          | 5.0               | 92                 | Very mild; evac. to Eng. 8/15  |
| 8. B.        | 7/21         | 7/26                | 12,400 | ..                            | ..                 | ..                            | ...          | ..          | 3.8               | ..                 | Severe; evac. to Eng. 8/6  |
| 9. H.        | 7/21         | 7/26                | 9,000  | ..                            | ..                 | ..                            | ...          | ..          | 5.7               | ..                 | Severe   |
| 10. S.       | 7/21         | 7/27                | 6,000  | 85                            | 14                 | 1                             | ...          | ..          | 3.6               | ..                 | Severe; delirious; evac. Eng. 8/13   |
| 11. W.       | 7/21         | 7/27                | 20,800 | 93                            | 4                  | 7                             | ...          | ..          | 3.0               | ..                 | Severe; died 7/30 lob. pneu.   |
| 12. L.       | 7/21         | 7/27                | 9,600  | ..                            | ..                 | ..                            | ...          | ..          | 4.7               | ..                 | Severe; died 7/30  |
| 13. G.       | 7/21         | 7/27                | 10,800 | ..                            | ..                 | ..                            | ...          | ..          | 4.9               | ..                 | Moderate   |
|              |              | 10/15               | 10,000 | ..                            | ..                 | ..                            | ...          | ..          | 4.8               | ..                 | Coag. time 2.3 min.; no br. pneu.  |
| 14. S.       | 9/29         | 10/30               | 12,800 | ..                            | ..                 | ..                            | ...          | ..          | 5.0               | ..                 | Better   |
|              |              | 11/3                | 8,800  | 73                            | 21                 | 5                             | 1            | ..          | 4.3               | ..                 | Better; evac. to Eng. 11/9   |
| 15. B.       | 10/3         | 10/15               | 10,800 | 82                            | 16                 | 2                             | ..           | ..          | 3.8               | ..                 | Arneih count: 1 lobe, 8 per cent.; 2, 14; 3, 32; 4, 32; 5, 14; slight shift to right |
|              |              | 11/1                | 9,000  | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Improved; evac. to Eng. 11/9   |
| 16. B.       | 10/17        | 11/3                | 16,000 | ..                            | ..                 | ..                            | ...          | ..          | 4.7               | ..                 | Worked for 6 days after gas-ing; died 11/9 lob. pneu.                                |
| 17. S.       | 10/12        | 11/3                | 6,200  | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Mild; did well until 10-31, then tuberc.; evac. to Eng. 11/15                        |
| 18. O.       | 10/12        | 10/15               | 11,000 | 72                            | 16                 | 8                             | 4            | ..          | 5.1               | ..                 | Coag. time 1.4 min.; Arneih 1, 0; 2, 22; 3, 24; 4, 38; 5, 16; i. e., shift to right  |
|              |              | 10/20               | 7,000  | ..                            | ..                 | ..                            | ...          | ..          | 5.0               | ..                 | Evac. to Eng. 11/9   |
|              |              | 10/30               | 8,000  | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Died 12/8; early br. pneu.   |
| 19. C.       | 12/1         | 12/6                | 6,100  | 76                            | 20                 | 4                             | ...          | ..          | 4.5               | ..                 | ..   |
|              |              | 12/9                | 5,600  | 65                            | 28                 | 6                             | ...          | 1           | 3.9               | ..                 | ..   |
| 20. K.       | ..           | 12/9                | 5,600  | 65                            | 28                 | 6                             | ...          | 1           | 3.9               | ..                 | ..   |
|              |              | 12/9                | 570    | 10                            | 70                 | 20                            | ...          | 4           | 3.6               | ..                 | ..   |
| 21. H.       | 11/30        | 12/10               | 1,400  | 20                            | 64                 | 12                            | ...          | 4           | 3.5               | ..                 | Severe; coag. time 3 min.  |
|              |              | 12/11               | 2,075  | 52                            | 23                 | 12                            | ...          | 13          | 3.5               | ..                 | Coag. time 7 min.; no skein cells  |
| 22. E.       | 1918<br>1/23 | 1/28                | 12,700 | 84.5                          | 9                  | 6.5                           | ..           | ..          | 5.0               | ..                 | Died 12/12; much br. pneu. at necropsy   |
|              |              | 1/30                | 16,400 | 80                            | 12                 | 8                             | 2            | ..          | ..                | ..                 | Shift of Arneih scale to left  |
| 23. S.       | 3/11         | 3/13                | 11,400 | ..                            | ..                 | ..                            | ...          | ..          | ..                | Died 2/1 br. pneu. |  |
| 24. T.       | 3/11         | 3/13                | 8,400  | ..                            | ..                 | ..                            | ...          | ..          | ..                | Mild; evac. 3/24   |  |
| 25. C.       | 3/12         | 3/13                | 12,400 | ..                            | ..                 | ..                            | ...          | ..          | ..                | Mild; evac. 3/16   |  |
| 26. A.       | 3/12         | 3/13                | 12,800 | ..                            | ..                 | ..                            | ...          | ..          | 4.5               | ..                 | Mild; evac.  |
| 27. S.       | 3/12         | 3/13                | 7,600  | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Mild; no burns; evac. 3/26   |
| 28. M.       | 3/12         | 3/13                | 14,000 | ..                            | ..                 | ..                            | ...          | ..          | 4.4               | ..                 | Mild; no burns   |
| 29. S.       | 3/12         | 3/13                | 18,800 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Moderate; sl. burns; evac. 3/23  |
| 30. B.       | 3/12         | 3/13                | 12,200 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Moderate; no burns; evac. 3/16   |
| 31. B.       | 3/12         | 3/13                | 16,800 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Mild; no burns; evac. 3/16   |
|              |              | 3/15                | 11,400 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Moderate; much cough; evac. 3/16   |
| 32. K.       | 3/12         | 3/13                | 7,200  | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Moderate; much cough; evac. 3/16   |
|              |              | 3/13                | 19,400 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Moderate burns; evac. 3/26   |
| 33. J. T. S. | 3/12         | 3/13                | 17,800 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Severe; bad cough; died next day   |
| 34. G.       | 3/12         | 3/14                | 13,200 | ..                            | ..                 | ..                            | ...          | ..          | ..                | ..                 | Severe; bad cough  |
|              |              | 3/15                | 11,400 | ..                            | ..                 | ..                            | ...          | ..          | 4.7               | ..                 | ..   |
|              |              | 3/17                | 3,200  | 84                            | 4                  | 10                            | ...          | 2           | ..                | ..                 | Now has br. pneu.  |

BLOOD COUNTS OF GASED PATIENTS—Continued

| Case   | Date Gassed | Date of Examination | Lots   | Differential Count, per Cent. |                    |                               |               |              | R. B. C. in Mill. | Per Cent. Hb.           | Miscellaneous   |
|--------|-------------|---------------------|--------|-------------------------------|--------------------|-------------------------------|---------------|--------------|-------------------|-------------------------|---|
|        |             |                     |        | Poly-morpho-nuclears          | Small Lym-phocytes | Large Lym-phocytes and Trans. | Eosino-philis | Myelo-cytes. |                   |                         |   |
| 35. C. | 3/12        | 3/13                | 23,000 | ..                            | ..                 | ..                            | ...           | ..           | 5.6               | ..                      | Severe D. I.  |
|        |             | 3/15                | 10,000 | 87                            | 12                 | 1                             | ...           | ..           | 5.2               | ..                      |   |
|        |             | 3/17                | 7,600  | 74                            | 11                 | 13                            | ...           | 2            | ...               | ..                      | Arneth: 1, 4; 2, 32; 3, 42; 4, 30;                                |
|        |             | 3/20                | 9,600  | 57                            | 22                 | 21                            | ...           | ..           | ...               | ..                      | 5, 2 (i.e. nor); Arneth: 1, 12;                                   |
|        |             | 3/27                | 18,000 | ..                            | ..                 | ..                            | ...           | ..           | ...               | ..                      | 2, 26; 3, 52; 4, 8; 5, 2 (sl. to left) i.e. bone marrow reacting; |
|        |             | 3/28                | 12,700 | ..                            | ..                 | ..                            | ...           | ..           | ..                | pleurisy                |   |
| 36. G. | 3/11        | 3/13                | 5,800  | ..                            | ..                 | ..                            | ...           | ..           | 4.2               | ..                      | Moderate  |
|        |             | 3/15                | 6,400  | 65                            | 23                 | 12                            | ...           | ..           | 3.8               | ..                      |   |
|        |             | 3/22                | 7,500  | 71                            | 28                 | 6                             | ...           | ..           | ...               | ..                      | Improved; evac. to Eng. 3/26                                      |
| 37. B. | 3/11        | 3/15                | 11,400 | 90                            | 4                  | 6                             | ...           | ..           | 5.0               | ..                      | Moderate  |
|        |             | 3/22                | 8,800  | 78                            | 18                 | 6                             | ...           | ..           | 5.0               | ..                      | Improved; evac. to Eng. 3/28                                      |
| 38. S. | 3/12        | 3/13                | 17,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Moderate  |
|        |             | 3/15                | 16,900 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Evac to Eng. 3/20   |
| 39. W. | 3/12        | 3/13                | 9,000  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild; evac. to Eng. 3/20  |
| 40. G. | 3/12        | 3/13                | 20,600 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Severe  |
|        |             | 3/15                | 14,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Much imp.; evac. to Eng. 3/22                                     |
| 41. H. | 3/12        | 3/13                | 14,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Moderate; evac. to Eng. 3/22;                                     |
|        |             |                     |        |                               |                    |                               |               |              |                   |                         | improved  |
| 42. R. | 3/12        | 3/15                | 18,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Moderate; evac. to Eng. 3/28                                      |
| 43. L. | 3/12        | 3/13                | 10,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild; evac to Eng. 3/16   |
| 44. H. | 3/11        | 3/13                | 11,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild; evac. to Eng. 3/22  |
| 45. H. | 3/11        | 3/13                | 16,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Moderate; evac. to Rouen 3/31                                     |
| 46. N. | 3/12        | 3/13                | 12,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild; evac. to Eng. 3/18  |
| 47. D. | 3/11        | 3/13                | 15,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Moderate; evac. to Eng. 3/22                                      |
| 48. S. | 3/11        | 3/13                | 9,400  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild; evac. to Eng. 3/22  |
| 49. M. | 3/11        | 3/13                | 14,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild; evac. to Eng. 3/22  |
| 50. M. | 3/11        | 3/13                | 13,600 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Moderate; evac. to Eng. 3/22                                      |
|        |             | 3/15                | 20,400 | 95                            | 3                  | 2                             | ...           | ..           | ..                | ..                      | D. I.; Arneth: 1, 16; 2, 50; 3, 26;                               |
| 51. C. | 3/13        | 3/20                | 7,800  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | 4, 8 (to left); died 3/20 br. pneu.                               |
| 52. P. | 3/13        | 3/15                | 13,400 | 84                            | 8                  | 8                             | ...           | ..           | ..                | ..                      | D. I.; evac. to Eng. 3/23; impr.                                  |
| 53. P. | 3/13        | 3/20                | 12,400 | 83                            | 9                  | 8                             | ...           | ..           | 4.6               | ..                      | D. I.; br. and lob. pneu.; died                                   |
|        |             |                     |        |                               |                    |                               |               |              |                   |                         | 3/21  |
| 54. F. | 4/18        | 4/20                | 36,000 | 91                            | 7                  | 2                             | ...           | ..           | 4.1               | ..                      | S. I.; delirious  |
|        |             | 4/24                | 14,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Died 4/28 br. pneu.   |
| 55. S. | 5/10        | 5/18                | 18,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Died 2 hrs. after bleeding, 5/18;                                 |
|        |             |                     |        |                               |                    |                               |               |              |                   | ..                      | cong. and edema; no br. pneu.                                     |
| 56. W. | 5/10        | 5/18                | 5,600  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Severe  |
|        |             | 5/20                | 4,600  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Died 5/22; ext. br. pneu.   |
| 57. M. | 5/11        | 5/18                | 14,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | D. I.   |
|        |             | 5/19                | 8,500  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Getting better  |
|        |             | 5/28                | 13,600 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Developed bro. pneu. and gan-                                     |
|        |             | 5/29                | 16,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | grene of lung; died 6/1 |   |
|        |             | 5/31                | 8,000  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      |   |
| 58. R. | 5/14        | 6/ 2                | 8,500  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild  |
| 59. B. | 5/20        | 6/ 2                | 8,000  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Mild  |
| 60. F. | 5/20        | 5/30                | 6,700  | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | D. I.; bad pulse; died 5/21 br.                                   |
|        |             |                     |        |                               |                    |                               |               |              |                   |                         | pneu.   |
| 61. T. | 5/12        | 5/29                | 18,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Badly gassed but doing well                                       |
|        |             | 5/31                | 13,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Bronchopneumonia  |
|        |             | 6/ 2                | 12,000 | ..                            | ..                 | ..                            | ...           | ..           | ..                | ..                      | Evac. to Eng. 6/2   |
| 62. K. | 5/20        | 5/28                | 640    | 10                            | 35                 | 5                             | (Turk)        | ..           | ..                | ..                      | Severe; burns bad; no br. pneu.                                   |
|        |             | 5/29                | 520    | 10                            | 60                 | 10                            | (50)          | ..           | ..                | ..                      |   |
|        |             | 5/30                | 1,200  | 4                             | 6                  | 4                             | (20)          | ..           | ..                | ..                      | Failing   |
|        |             | 5/31                | 5,400* | 1                             | 2                  | 5                             | (1)           | 84           | ..                | ..                      | Died same even.; much br. pneu.                                   |

\* 100 counts.

so far not seemed practical. The so-called bone marrow simulants would hardly seem apropos, with the factory out of gear and an intense stimulus probably already being furnished from the respiratory tract. Blood transfusions or leukocytic injections are impracticable on any extensive scale, and the preparation of extracts of animal leukocytes has not been possible. Any method of treatment, however, that would give promise of replenishing some of the lost protective power of leukocytes would seem well worth trial.

SUMMARY

1. Certain forms of gas poisoning cause, after an initial leukocytosis, a more or less extreme degree of leukopenia.
2. This usually persists even in the presence of bronchopneumonia and is very probably an important contributing factor to the high mortality of severe cases.
3. If the leukocyte count falls below 1,000 per cubic millimeter, a "myelocyte crisis" may bring about a partial amelioration; but in the two cases observed of this kind, this did not serve to protect from a fatal outcome.
4. Lessened blood formation is also indicated by the production of anemia without blast cell formation

and diminution in the number of blood platelets. In the earlier stages the coagulation time is decreased, and in the later stages of severe cases it is increased.

**Barbed Wire Disease.**—Vischer (*Cor.-Bl. f. Schweiz. Aerzte*, Sept. 28, 1918) has described a peculiar psychosis of war prisoners in all camps, including those interned as civilian aliens. The prisoners themselves have coined the term "barbed wire disease" for this trouble, and to those affected it is said the barbed wire within which they are inclosed acts as a red rag to a bull. At first after internment there are peculiar reactions due to shutting off of the outside world and mingling in close communion. The phase is one of stimulation. Men argue, become quarrelsome and envious, egosim is fostered. There is a rage for games. Gradually the picture changes to one of depression. Especially among the more finely organized, a state of apathy develops. One is no longer able to concentrate on anything. Even music becomes undesirable. The mental state resembles in some ways the so-called cafardism which was first noted before the war in the French foreign legionaries, and thus perhaps light is thrown on the motivation of that mysterious affection. Sleep is disturbed by dreams and there is an abnormal sensitiveness to sounds. Only a small percentage remain immune. The barbed wire acts throughout as the badge and symbol of servitude. The part played by the wire appears to be shown by the fact that prisoners who work in small squads in the open under guard do not develop the disease.