

Figure 3. Bacteremia—occurrence of gram-positive cocci in blood cultures.

Cases of hemolytic streptococcal (*Streptococcus pyogenes*) bacteremia were about half as frequent as those with pneumococcus in 1935, but their number declined sharply in the sulfonamide era. Very few such cases have been encountered since then and until 1957, when a moderate number again occurred. The numbers of patients with bacteremia due to streptococci of the viridans group fluctuated slightly and irregularly. On the other hand, enterococcal bacteremias were almost unknown or unrecognized before the antibiotic era, but there have been 23 to 36 cases each year since then. The greatest and most significant increase occurred in the number of patients with bacteremia due to *Staph. aureus*. There was a sharp increase in 1941, a temporary decline after the early use of penicillin, and a steady increase thereafter. In 1957 there were nearly four times as many cases as in 1935 and more than twice as many as in 1947.

The occurrence of invasion of the blood stream

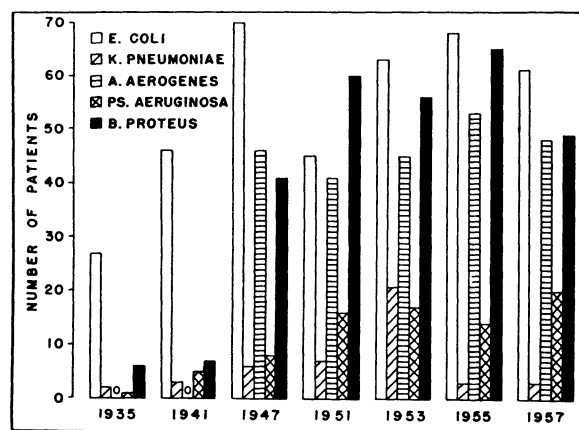


Figure 4. Bacteremia—occurrence of gram-negative bacilli in blood cultures.

with various gram-negative bacilli showed an even more striking trend. These bacteremias were infrequently observed prior to the sulfonamide era, cases of *Esch. coli* bacteremia accounting for the great majority of those seen in 1935. Patients with *Esch. coli* bacteremia increased in number markedly after the introduction of the antibacterial drugs. Large numbers of cases have continued to occur since then, except for a temporary and partial remission after 1947, that is, after the broad-spectrum antibiotics came into use. *Klebsiella pneumoniae* (Friedlander's bacillus) bacteremia occurred in a small number of patients each year, with a moderately increased number in 1953. *Aerobacter aerogenes* had not been identified in blood cultures at all until after 1941; however, in 1947, bacteremia with this organism occurred in 46 patients, and there have been about that number of cases each year since then. *Pseudomonas* bacteremia was rare in 1935, but there has been a moderate and steadily increasing number of cases each year since then (up to 20 in 1957). There were six and seven patients with *Proteus* bacteremia in 1935 and 1941, respectively, and the number rose sharply during the antibiotic era until there were 65 cases in 1955 and somewhat fewer in 1957. *Proteus* organisms thus vie with *Esch. coli* for top place among the gram-negative bacteremias. Not shown in the figure are the cases of bacteremia due to *Hemophilus influenzae* and various species of *Salmonella*, including *S. typhosa*. These accounted for a small and fluctuating number of cases each year.

Occurrence of Bacterial Meningitides

The numbers of cases of meningitis due to the most common pathogenic bacteria are shown in figures 5 and 6. The pneumococcus (fig. 5) caused the largest number of cases through 1951, with irregular fluctuations in the numbers occurring subsequently and a sharp drop only in 1957. Some of these fluctuations are undoubtedly the result of the varying numbers of cases in which a definite diagnosis of the disease was established (cases of purulent meningitis with pneumococcal bacteremia) but are not included because cultures of the cerebrospinal fluid were sterile due to the administration of highly active antibiotics prior to the initial lumbar puncture. Thus, the drop in the number of cases of pneumococcal meningitis in

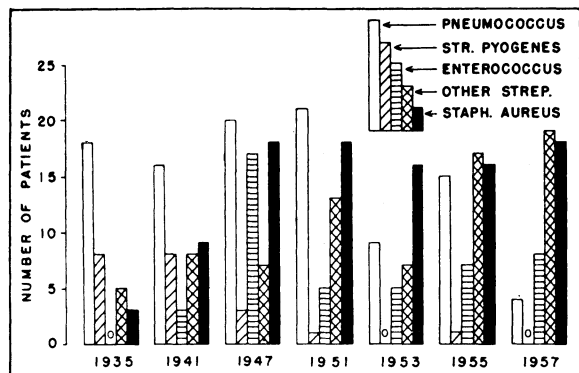


Figure 5. Meningitis—occurrence of gram-positive cocci in cerebrospinal fluid.

1957 is more apparent than real. A review of the records of patients with pneumococcal bacteremia during that year uncovered more than 20 patients in whom blood cultures were positive for pneumococci at the time of admission and who had signs of meningeal irritation with evidence of reaction in the cerebrospinal fluid. However, the first lumbar puncture in these cases was done after effective antibiotics had already been administered and both the blood culture and cerebrospinal fluid at that time yielded no growth. There were other such cases, but fewer in number, in each year after 1935.

Hemolytic streptococcal meningitis was second in frequency in 1935. The number of cases declined sharply after the introduction and widespread use of penicillin, and it has only rarely been encountered after 1947. Enterococci were not grown from the cerebrospinal fluid of patients with meningitis in 1935; they were first recognized during the sulfonamide era and have since increased to about the extent to which the cases of hemolytic streptococcal infections have decreased. Other streptococci, namely those of the viridans group and of specific groups other than A and D, showed a marked and irregular increase during the period of this survey and, taken together, were the most frequent gram-positive coccal organisms encountered in meningitis in 1955 and 1957. Meningitis due to Staph. aureus likewise increased from 3 cases in 1935 to 18 cases in 1947, and there have been about that many cases in each of the subsequent years of this study.

Among the cases of meningitis due to gram-negative organisms (fig. 6), the numbers of those caused by meningococcus or H. influenzae fluctu-

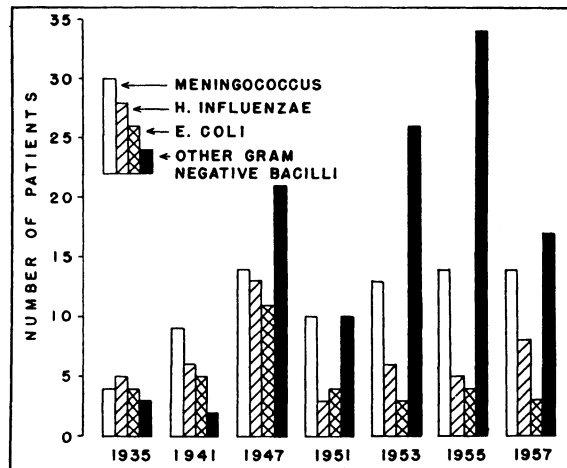


Figure 6. Meningitis—occurrence of gram-negative organisms in cerebrospinal fluid.

ated irregularly during the years of the survey. Cases of Esch. coli meningitis apparently increased through 1947, then declined sharply, and have been infrequent since then. On the other hand, cases of meningitis due to other gram-negative bacilli, which include mostly Aerobacter, Proteus, and Pseudomonas organisms, were infrequent at first; these increased markedly during the antibiotic era to a total of 33 cases in 1955, with an intervening drop in 1951 and another drop in 1957.

Occurrence of Empyema

In the cases of empyema (fig. 7 and 8), as in the meningitides, the pneumococcus was the most frequently found organism, and hemolytic streptococcus was second in frequency in 1935. The number of pneumococcal empyemas (fig. 7) declined sharply and steadily from 46 cases in that year to

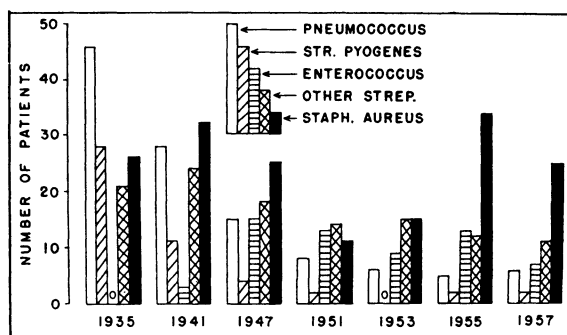


Figure 7. Empyema—occurrence of gram-positive cocci in pleural fluid.