injection of liq. adrenalin in doses of ten minims to twenty minims of the 1,000 solution, either intravenously or intramuscularly.

In all, with one exception, the radial pulse became perceptible, and with the same exception, recovered sufficiently to run a course not unlike the ordinary acute case so far as the meningeal element is concerned.

Each case was treated by intrathecal and intramuscular injection of antimeningococcal serum, in addition to the injection of liq. adrenalin.

The mortality rate in this series is thirty-three per cent, and while the numbers are far too small to allow one to state definite conclusions, it would appear that the prognosis in cases so treated is more hopeful than that suggested in the opening quotations.

ON THE USE OF ACETOZONE AS A GENERAL SURGICAL ANTISEPTIC.

By Lieutenant-Colonel G. GORE-GILLON.
Royal Army Medical Corps.

AND

Professor Hewlett, M.D., F.R.C.P.

The important properties of an ideal antiseptic appear to be (vide Browning and others, British Medical Journal, January 20, 1917):

1. Great potency against all micro-organisms in presence of protein material, as serum, etc.
2. No deleterious effect on phagocytosis.
3. Innocuous effect on tissues.
4. Stimulating effect on connective tissue cells so as to promote healthy granulations.
5. No toxicity.

In benzoyl-acetyl-peroxide we have a preparation that fulfils these conditions.

After previous experience of this substance in my surgical wards, I introduced it into this country in May, 1915, and have used it extensively in London Military Hospitals since then as an antiseptic solution in the treatment of septic wounds. Its formula is $C_6H_5CO \text{OO} COH_3$, and it is known as acetozone. It has been used for years as an intestinal antiseptic in enteric fever and mucous colitis by physicians, and as a throat spray, but its use as a general surgical antiseptic application to wounds is unknown here.

The curative effect of a solution of this drug (a) containing five grains to the pint and used cold as a bath (cost is 8d. a gallon at Army prices, and plenty of it is available); (b) or a seven-grain solution with one-third hot water added. Its action is very rapid indeed; unhealed amputation stumps heal quickly if put into a bath of this solution for half an hour.
Clinical and other Notes

daily and dressed afterwards with dressings of sterile lint or gauze soaked in the ten-grain solution.

I have seen numerous cases of septic wounds, which have resisted all other treatment for four or five months, heal up in three weeks by this method.

It can be applied to deep wounds by Carrel-Dakins tubes eight-hourly; by the bath method; or in a waterproof bag; or just dressed two or three times a day with wet dressings of ten-grain strength solution.

Mode of Preparation.

(1) The solution must be made by adding 5 to 7 grains to 1 pint sterile water at 112° F., left to stand for two hours, and should not be filtered.

(2) Or a ten-grain to one-pint solution can be used with dressings or Carrel-Dakins tubes, etc.

(3) In very septic cases, swarming with anaerobes, etc., a twenty-sixty-grain solution may be used.

(4) It should be made fresh every seven days and the bottle shaken before using.

Pure H₂O₂ is very unstable and momentary in its oxidizing power, while acetozone in solution is a fairly stable antiseptic, and its ozone-producing power is prolonged.

Acetozone has a remarkably pleasant, pungent ozonic odour, and the solution is colourless and does not stain linen.

Finally, it is an efficient sterilizer of the skin (used in a twenty-grain solution). It should not be used for the urethra.

Summary of Investigation of Bactericidal Potency of Acetozone.

At the request of Lieutenant-Colonel Gore-Gillon, R.A.M.C., we have carried out a number of tests on the germicidal power of Acetozone (benzoyl-acetyl-peroxide C₅H₅CO O O COCH₃). The tests have been done with the Staphylococcus pyogenes aureus and Bacillus mycoides (the latter as a type of a sporing organism).

Filtered solutions of acetozone were first used; but as the acetozone takes some time to dissolve, and as only small amounts of the substance are used, some undissolved residue is apt to be removed by filtration, and therefore the unfiltered solution was subsequently employed.

When the filtered solution was used the results were not nearly so good as when the unfiltered solution was used.

The method was to mix saline emulsions of the organism with the acetozone solution, kept at 37° C. for a definite time and then to sub-
Clinical and other Notes

culture into broth or on to agar. In some of the experiments broth or serum was added to the mixtures.

Saline Mixtures—Staphylococcus aureus.

Acetozone 1 in 437 and 1 in 583 killed within thirty minutes (shorter time not tested), 1 in 875 did not kill in 1½ hours.

'Twenty-four hours' Exposure.—Acetozone 1 in 1,744 killed in twenty-four hours, 1 in 4,360 did not kill in twenty-four hours. (Three concordant experiments.)

Sporing Bacillus Mycoides.

Acetozone 1 in 291 and 1 in 437 killed within one hour (shorter time not tested).

'Twenty-four hours' Exposure.—Acetozone 1 in 872 killed in both of two experiments; 1 in 1,744 killed in one experiment, but did not kill in another experiment; 1 in 4,360 did not kill in two experiments.

Twenty-four hours' exposure in presence of one-third broth or serum (1 vol. acetozone sol. + 1 vol. emulsion of organism + 1 vol. broth or serum).

Staphylococcus aureus.

\[
\begin{align*}
\text{Serum} & \quad \text{1 in 654 did not kill.} \\
\text{Broth} & \quad \text{1 in 4,370 did not kill.}
\end{align*}
\]

Sporing Bacillus Mycoides.

\[
\begin{align*}
\text{Serum} & \quad \text{1 in 654 did not kill.} \\
\text{Broth} & \quad \text{1 in 4,390 did not kill} \quad \text{experiments.}
\end{align*}
\]

Meat-broth anaerobic culture from a septic wound containing many sporing bacilli:

Acetozone: 1 in 290 killed (twenty-four hours' exposure). No other strength tested.

N.B.—Strengths of acetozone between those given were not tested, so that in some instances the numerical germicidal strength may be less than that stated.

The strengths of acetozone given are the actual strengths in the mixtures.

The experiments show that acetozone is quite a potent germicide and is active upon spores.

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1. There was no growth in the sub-culture after twenty-four hours' incubation, but growth after forty-eight hours' incubation.
ADDENDUM TO LIEUTENANT-COLONEL G. GORE GILLON'S 
PAPER "ON THE USE OF ACETOZONE AS A GENERAL 
sURGICAL ANTISEPTIC."

ADDITIONAL TEST, SEPTEMBER 1, 1917.

*Staphylococcus aureus* Pus.

Pus from an abscess of the neck containing a pure growth of
*Staphylococcus aureus*. Equal volumes of pus and acetozene solution
were mixed, incubated for twenty-four hours at 37° C. and then sub-
cultured.

<table>
<thead>
<tr>
<th>Acetozene</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 per cent</td>
<td>No growth.</td>
</tr>
<tr>
<td>0.75 &quot;</td>
<td>Slight growth.</td>
</tr>
<tr>
<td>0.5 &quot;</td>
<td>Growth.</td>
</tr>
<tr>
<td>0.25 &quot;</td>
<td>Growth.</td>
</tr>
</tbody>
</table>

The one per cent mixture was done in duplicate and both were
sterilized.

R. T. Hewlett.