pain. We were unable to find any cause for his condition, and he seemed very anxious to get well. Although he had been told by several doctors that his heart was diseased, he accepted our reassurance and explanation to the contrary. Examination revealed no organic disease, but there were tremor, profuse sweating of the palms and axillae, overaction of the heart, tachycardia, objective breathlessness, obvious nervousness, and shakiness. The blood pressure was 165/100 to 210/115; the pulse rate 68 to 152. While in hospital he was observed to have spontaneous attacks in which all his symptoms and signs were exaggerated.

Suprarenal denervation was kindly performed by Mr. Boyd, to his technical satisfaction, in August, 1940. The patient made an uninterrupted recovery, and during his stay in hospital appeared much improved; during air raids he showed no alarm, and said he was anxious to enter the Air Force and train as an air gunner. It was not thought advisable to make repeated examinations at that time, but he was asked to return to the hospital, and was seen by me in January, 1941.

He said he was much better, was tired of being a civilian, and wanted to know if he could now join the Air Force. A few questions revealed that he had done no work, and that on the only occasion when he had attempted it he "came over queer," just like he used to, and had to sit down. He expressed considerable anxiety about lower abdominal pain and scar tenderness. He wore a home-knitted woollen garment to protect his flanks from the cold.

Despite his protestations to the contrary, he looked as nervous and shaky as before. Tremor, sweating, overaction of the heart, and tachycardia were unchanged; the pulse rate was 100, the blood pressure 175/105. The only alteration was the change in his focus of attention: whereas he used to be concerned about his heart and lungs, he was now worried about his lower abdomen.

The lack of any sign of objective improvement in this case is not encouraging.

While the experiments of Cannon (1928) make it highly probable that the adrenal glands play their part in the mechanism of psychosomatic phenomena, there is no evidence that they hold a more important position.

(Lecture III will appear next week with a complete list of references.)

RAPID IDENTIFICATION OF CL. WELCHII BY THE NAGLER REACTION

BY

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The usual criterion for the rapid identification of *Clostridium welchii*, apart from its morphology and colony form, is the production of a stormy clot in litmus milk. However, this reaction may be falsely negative, for some strains of *Cl. welchii* are non-clotters, and with others the test fails because the inocula employed are too small. For example, in a test of 58 strains the seeding of a whole colony was insufficient to establish the growth of 32 of them in litmus milk; even the cultures that grew were slow to form a clot, 1 reacting in one day, 17 in two days, and 8 in three days. The reaction may also be positive in the absence of *Cl. welchii*, especially with mixtures of aerobes and anaerobes. Nagler's (1939) reaction—the production by *welchii* toxin of turbidity and sometimes a fine curdiness in human serum—constitutes a possible diagnostic test for *Cl. welchii*. The reaction, being inhibited by *welchii* antitoxin, has the great advantage of being serologically specific.* It has been found valuable in

routine diagnostic bacteriology of war wounds infected with *Cl. welchii*.

The reaction of a typical *Cl. welchii* and the technique finally adopted to elicit it are as follows. To one of two sterile 6-mm. (Wassermann) tubes is added 0.3 c.cm. of a mixture of equal volumes of human serum and Fildes's peptic blood digest broth; to the other tube, a control, 0.3 c.cm. of a similar mixture containing in addition 10% of concentrated *welchii* antitoxin. These test and control mixtures are conveniently made in bulk and kept at 2° C. Each tube is inoculated either with a drop of culture or with half the suspected *welchii* colony, and is observed after sixteen, forty, and sixty-four hours' anaerobic incubation at 37° C. If the reaction is positive the serum becomes turbid, and in strong reactions there appears a fine yellowish curd, which tends to float on the surface of the fluid. On spinning, three zones are seen—a compact deposit of bacilli, a more or less compact scum of fat-like material, and an intermediate fluid that is either turbid or clear, apparently depending on the packing of the fatty material in the top layer. When only a small amount of toxin is produced spinning does not cause the formation of a scum, but the fluid above the bacterial deposit is turbid. Reactions are recorded ++ or + according to whether or not a well-defined top layer is formed. The control tube shows turbidity due to bacteria only, which on spinning form a compact deposit at the bottom of a column of clear fluid.

In the hope of simplifying the technique several methods of eliciting the reaction with living cultures have been tested by both quantitative and qualitative methods. In the first the test fluids were inoculated with graded inocula of *Cl. welchii*, viable-counted by the method of Miles and Misra (1938). In the second—"the colony test"—the test fluids were sown with single colonies varying from 0.3 to 1.7 mm. on sixteen-hour blood-agar plates. A 0.9-mm. colony was found to contain 4,000,000 living organisms, so that these inocula were of the order of a million living bacilli. All tests were made with appropriate antitoxin-containing controls. The single-colony inoculum was adopted as representing most nearly the conditions of routine bacteriological testing.

Reagents and Conditions of the Test

Human Serum.—Different serum samples vary in sensitivity even when they are from one person. For example, the minimal inocula of a standard culture giving a positive reaction with three specimens of serum from one person were 400, 3,000, and 200,000 viable bacilli. However, all sera tested have been sensitive enough for use with single-colony inocula. Nagler recommends inactivation, but this is not necessary; indeed, in 5 of 12 colony tests inactivated serum proved slightly less sensitive than fresh serum. Macfarlane *et al.* (1941) and Nagler (1941) find that a suspension of hen-egg yolk in saline is more sensitive than human serum to toxin. Yolk saline, even when mixed with Fildes's broth, proved in 7 of 16 colony tests to be a poor growth-promoter of *Cl. welchii*, and the Nagler reactions with living cultures were consequently much feebler than those with the broth-serum mixture.

Antitoxin.—Concentrated gas-gangrene antitoxin (*perfringens*), with a minimum of 730 units per c.cm., prepared by the Lister Institute, was used throughout the tests.

Broth.—Nagler (1939) found that some strains of *Cl. welchii* grow only when broth is added to human serum. Comparative tests were made on serum mixed with nutrient broth (tryptic digest of ox heart) alone, and enriched with Fildes's extract or with 2% glucose. The superiority of Fildes's broth over nutrient broth for promoting growth is evident in Table I. This was confirmed in colony tests of 15 strains, when nutrient broth failed to promote

* Seiffert (1939) has described a similar flocculation in human serum to which *welchii* toxin has been added. This may be the same phenomenon, but since Seiffert specifically states that his reaction is not inhibited by antitoxin it must be assumed that the phenomenon is different. Nagler's name has accordingly been applied to the test investigated in this paper.

TABLE I.—Nagler Reactions in Nutrient and Fildes's Broth

Inoculum (approx.)	Nutrient Broth			Fildes's Broth		
	Serum M	Serum C	Serum H	Serum M	Serum C	Serum H
3×10^5	++	++	++	++	++	++
3×10^4	—	—	—	++	++	++
3×10^3	—	—	—	—	++	++
3×10^2	—	—	—	—	++	—
3×10^1	—	—	—	—	—	—

adequate growth of 7, whereas all grew excellently in Fildes's and glucose broth. Fildes's broth was adopted in the standard test, since glucose broth gave feeble reactions and sometimes induced an important modification in the positive reaction (see heading "Potato and Iron," below).

"*Aerobic Incubation.*"—In view of the difficulties attending constant manipulation of anaerobic jars, attempts were made to induce the reaction in air by modifying the broth with substances lowering the oxidation-reduction potential and by the use of paraffin seals.

Modified Brewer's Medium.—The addition of 0.05% agar and 0.01% sodium thioglycollate (Brewer, 1940) to the Fildes's broth - serum mixture permitted the aerobic growth of single colonies of all the strains (25) of *Cl. welchii* tested, and the reactions paralleled those incubated anaerobically. However, as Table II shows, growth

TABLE II.—Nagler Reactions in Aerobic Cultures

Inoculum (approx.)		Broth and Atmosphere				
Strain T	Strain S	F, Anaer	F, Aer	F+T, Aer	F+T, Aer	F+T+A, Aer
3×10^6	4×10^6	++	—	—	++	++
3×10^5	4×10^5	++	—	—	—	—
3×10^4	4×10^4	++	—	—	—	—
3×10^3	4×10^3	++	—	—	—	—
3×10^2	4×10^2	++	—	—	—	—

F=Fildes's broth. A=0.05% agar. T=0.01% sodium thioglycollate. Anaer=anaerobic. Aer=aerobic.

is established aerobically only from large inocula. The low sensitivity of the medium does not compensate for the relative ease of its incubation.

Potato and Iron.—Nutrient broth containing a small piece of autoclaved potato was no more effective than the modified Fildes broth in supporting aerobic growth. On the other hand, Fildes's broth was made highly sensitive by the addition of a 4 by 7 mm. strip of No. 26 gauge black stove-pipe iron (cf. Spray, 1936). One of three quantitative tests is given in Table III. The positive

TABLE III.—Nagler Reaction in Iron-Fildes's Broth and Fildes's Broth

Inoculum (approx.)	Iron-Fildes's Broth		Fildes's Broth	
	Extent of Growth	Nagler Reaction	Extent of Growth	Nagler Reaction
8×10^5	++	(++)	++	++
8×10^4	++	(++)	++	++
8×10^3	++	(++)	++	++
8×10^2	++	(++)	++	+
8×10^1	++	(++)	+	—
8×10^0	++	+	±	—

Nagler reactions in the iron broth are recorded in brackets because, although the difference in turbidity between the test and control mixtures was pronounced, test and control both yielded a clear supernatant fluid on spinning. The deposit was, however, much larger in the test mixture. Potato has the same effect. From the few

tests made it appears that, under the conditions of growth stimulated by 2% glucose (see above), potato, or iron, the flocculent material manifested by the action of toxin has a higher specific gravity than that produced in the Fildes mixture, and is consequently thrown down by the centrifuge. With four strains of Type A *Cl. welchii* and one of Type C *Cl. welchii* tested anaerobically in Fildes's broth - serum mixture, the floccules, which initially rose as a scum on spinning, with a further twenty-four hours incubation changed in specific gravity and sedimented instead of rising.

Liquid paraffin seals failed to induce satisfactory growth in any of the test mixtures incubated in air.

The iron - Fildes's broth - serum mixture alone of the attempted modifications is highly sensitive for aerobic Nagler tests. Unfortunately the ready sedimentation of the floccules makes the detection of slight reactions impossible, for only gross differences between the test and control centrifuged deposits are evident. The improvement of this "aerobic" test is under investigation.

Inoculum.—Since the Nagler reaction is due to the toxin, and the amount of toxin produced is directly related to the extent of growth, the minimum inoculum necessary for a strong reaction will depend on the rate of growth of the strain in the medium provided, on the toxigenic powers of the strain, and on the sensitivity of the human serum used. The quantitative experiment recorded in Table IV shows the effects of size of inoculum and of

TABLE IV.—Difference in Growth Rates of *Welchii* Strains in Nagler Reactions

Strain	Inoculum (approx.)	Time of Incubation			
		16 hours		40 hours	
		Extent of Growth	Nagler Reaction	Extent of Growth	Nagler Reaction
A71	8×10^5	++	++	++	++
	8×10^4	++	++	++	++
	8×10^3	++	++	++	++
	8×10^2	++	++	++	++
	8×10^1	++	—	++	++
	8×10^0	—	—	—	—
A72	3×10^6	++	++	++	++
	3×10^5	++	++	++	++
	3×10^4	+	±	++	++
	3×10^3	±	—	++	++
	3×10^2	—	—	—	—
	3×10^1	—	—	—	—

difference in growth rates of two strains on reactions in the same serum. Table V gives the reactions of single-colony inocula of three typical strains—a slow, a moderate, and a rapid grower. A definite threshold value for the

TABLE V.—Single-colony Nagler Reactions of Slowly, Moderately, and Rapidly Growing *Welchii* Strains

Strain:		7730			Sand 6			S13		
Time of incubation (hours)		16	40	64	16	40	64	16	40	64
Extent of growth		±	+	++	±	++	++	++	++	++
Nagler reaction		—	±	++	±	++	++	++	++	++

quantity of toxin which is necessary to give a reaction is apparent: a toxigenic strain may not react if the growth is poor. In a series of twelve quantitative tests with four different cultures and sera from three persons the number of viable organisms necessary to give a strong positive reaction ranged from 30 to 200,000. Since this is rather less than the number of viable organisms in an average-sized colony of *Cl. welchii* (4,000,000), a single colony should be a sufficient inoculum for a Nagler test. In colony tests of 58 strains, 47 grew well and gave strongly

positive reactions—31 in sixteen hours and 16 in forty hours. Six grew poorly, but on repeating the tests they all grew well and gave strongly positive reactions in forty hours, one requiring a more concentrated inoculum. A further 5 reacted feebly, although they grew well; on retesting with another serum 3 of these reacted strongly but 2 remained weak reactors. In routine practice the colony test was applied to 43 plates directly seeded from wound swabs or dust. Of these, 20 reacted strongly in sixteen hours and 15 in forty hours. Nine grew poorly, but growth was sufficient to give a definite reaction in all but two of them. These two were strongly positive when retested with a drop of broth culture as inoculum.

Incubation and Centrifugation.—Most strains are positive in sixteen or forty hours, and a few require sixty-four hours' incubation; but no change has been observed after sixty-four hours. Strong reactions are obvious without spinning, but the detection of weak reactions and the confirmation of negatives are impossible without a comparison of centrifuged tests and control tubes. It should be noted (see above) that a floating mass of floccules may be changed to a sedimenting precipitate with prolonged incubation of the test mixture.

Reactions with *Cl. welchii*

Fifty-eight strains have been tested: 3 stock cultures (one each of Types A, B, and C), and 55 recently isolated cultures—51 from wounds in 39 persons and 4 from sand and air. Nine of the wound strains were kindly sent by Dr. E. T. C. Spooner. Of the 46 strains isolated in this laboratory 45 were identified as *Cl. welchii* on morphological, cultural, and biochemical characteristics. Many were tested in guinea-pigs and mice, with antitoxin controls. One strain, even after repeated purification, slowly digested and blackened meat broth persistently, and fermented salicin but not sucrose; it gave typical disease in the guinea-pig and killed a normal but not an antitoxin-treated mouse. Of these 58 strains 56 (96%) gave strong reactions when the growth was good. Two grew well, but reacted feebly with serum from young adults, although they reacted strongly with a senile serum. One of these—beta-haemolytic on horse-blood agar, and pathogenic for guinea-pigs but not mice—reacted strongly with yolk saline. The other was non-haemolytic and non-pathogenic, and reacted feebly with yolk saline. These reactions, though feeble, were definite and were inhibited by antitoxin, but in view of the "specific" reaction by other clostridia cannot be considered as exclusively characteristic of *Cl. welchii*.

Reactions with Other Bacteria

Anaerobes.—Tests have been carried out on 174 cultures of anaerobes other than *Cl. welchii*. These included 67 of the *Cl. sporogenes* type, 6 *Cl. septicum*, 10 *Cl. tetani* of different serological types, 2 *Cl. multifementans tenalbus*, 1 each of *Cl. botulinum*, *Cl. sphenoides*, *Cl. histolyticum*, *Cl. tetanomorphum*, *Cl. oedematiens*, *Cl. bifermentans*, N.C.T.C. 2914, *Cl. sordellii*, N.C.T.C. 2919, *Cl. parasporenogenes*, *Cl. centrosporogenes*, N.C.T.C. 1341, *Cl. fallax*, and *Cl. hastiforme*, 66 not yet fully identified proteolytic anaerobes, 11 not yet fully identified saccharolytic anaerobes which by reason of spore position, colony form, or sugar reactions were known not to be *Cl. welchii*, and an anaerobic coccus. Of these, 165 gave no Nagler reaction, although some gave a slight turbidity in both test and control tubes. The remaining 9 cultures were feebly but definitely positive, the reaction being inhibited by *welchii* antitoxin, and appearing both in yolk saline and in serum. On human serum-Fildes's-agar plates they produced a well-defined opacity extending to a distance of about 2 mm. from the edge of the colony. Two were N.C.T.C. strains—

Cl. sordellii and *Cl. centrosporogenes*. Seven were recently isolated from wounds; they were all very similar and were most nearly related to *Cl. bifermentans*, although some differed from it in motility, action on Spray's iron milk (1936), and liquefaction of inspissated serum. None fermented the two *welchii* sugars—lactose and sucrose. Although the cultures had been thoroughly purified by alternate broth and plate subcultures, it is possible that the positive reactions were due to contamination with small amounts of *Cl. welchii* whose growth was enhanced in the Nagler test fluid at the expense of the predominating clostridium. Serial subculture in this fluid improved the Nagler reaction to a certain extent, but all attempts to reveal traces of *Cl. welchii* in the subcultures of these strains have so far failed. With all 7 cultures large doses mixed with calcium chloride failed to kill mice or guinea-pigs. On the whole the similarity of these cultures and their persistent non-*welchii* characters in media favouring the growth of *Cl. welchii* suggest they are non-*welchii* Nagler-reacting clostridia. Nevertheless the fact that all but 2 of the cultures came from wounds that contained *Cl. welchii*, and the impossibility of establishing the absence of *Cl. welchii* in the cultures without the use of a single-cell culture method, at present preclude a definite answer. All that can be said with certainty is that a feeble Nagler reaction is given by a few cultures in which it has so far proved impossible to demonstrate *Cl. welchii* by ordinary bacteriological technique. In the light of this fact the appearance of a feeble reaction must for the present remain inconclusive.

Aerobes.—In routine tests, 3 haemolytic aerobic spore-bearers were Nagler-tested; 2 were feebly positive.

Value of the Test and its Interpretation

Well-defined strongly positive Nagler reactions reliably indicate *Cl. welchii*, and the test is an exceedingly useful addition to the routine litmus milk tests. It is much more easily elicited than the stormy clot. When single colonies are used as inocula 80% of strains of *Cl. welchii* give a strongly positive Nagler reaction on first testing, whereas only 45% give a stormy clot in litmus milk. Spray's iron milk (1936) is more sensitive than litmus milk, but the "stormy clot" is produced in this medium by a number of other clostridia—namely, *Cl. aerofaetidium*, *Cl. butyricum*, *Cl. multifementans*, and occasionally *Cl. sphenoides*, *Cl. fallax*, *Cl. tertium*, and *Cl. septicum*. Hence the reactions in both milk media are less reliable than a well-defined Nagler reaction, which has the advantage of being serologically specific.

The test is effective, simple, and easy to apply, and yields results quickly with small amounts of materials. It cannot be used as the sole confirmation of an identification based on individual and colonial morphology because the feeble reactions given by some *welchii* strains are inconclusive.

A mixture of equal parts of Fildes's broth and human serum is preferred for the test. Being more sensitive to *welchii* toxin, yolk saline is a possible substitute for human serum, but it appears to be a poorer supporter of growth. Single-colony inocula are large enough for Nagler tests of all but the very poorest growers. They should be incubated until positive or up to three days; and they should not be recorded as negative until the growth has been good for at least two days. Centrifugation is necessary for accurate reading, but, in view of the occasional change in the specific gravity of the flocculent material, tubes must be read daily both before and after spinning.

For routine rapid identification the test should be applied to any colony suspected of being *Cl. welchii*, for there is a very good chance of obtaining a result in twenty-four hours. At the same time as the Nagler test is set up, a meat-broth culture should be sown and, if the first test is negative in twenty-four hours, used for a heavy

inoculum in a second test. This will probably yield a result by the second day. The test thus affords a method by which a positive specific result may be obtained within two or perhaps three days of taking the specimen.

Nagler reactions may be obtained on solid media. On Fildes's agar containing 10 to 20% human serum sixteen-hour colonies of *Cl. welchii* are surrounded by clearly defined zones of marked opacity 2 mm. wide. With longer incubation the zones extend, often up to 8 mm. By the addition of 4 units of *welchii* antitoxin per c.cm. of medium the formation of the zone is completely inhibited. (On antitoxin medium of this strength a few colonies of one *welchii* strain produced a thin ring of opacity about 0.2 mm. wide and about 1 mm. from the colony, apparently in the depth of the medium; it was completely inhibited by 24 units of antitoxin per c.cm.) The 7 Nagler-reacting cultures of *Cl. bifermentans* type, and the N.C.T.C. strains *Cl. sordellii* and *Cl. centroporogenes*, produced a similar opacity, which sometimes required forty hours' incubation before developing; in confirmation of the finding of Cook (personal communication) *Cl. oedematiens* produced a similar neutralizable zone; all other anaerobes tested produced none at all. This adaptation of the Nagler reaction to a solid medium has already proved a useful means of detecting *Cl. welchii* within twenty-four hours of taking the swab. Test plates are more sensitive than test fluids; great caution must therefore be exercised in the interpretation of feeble or slowly developing plate reactions. A control antitoxin-containing plate is essential.

Summary and Conclusions

The production of a turbidity in human serum by the toxins of growing *Cl. welchii* (Nagler reaction) is a valuable aid to the rapid identification of the bacillus for diagnostic purposes. Excellent results are obtained with a mixture of equal parts of human serum and Fildes's broth incubated anaerobically. The seeding of a single *welchii* colony into such a mixture produced a strong reaction in 80% of the tests after one to two days' incubation. The reaction is specifically inhibited by antitoxin. Feeble reactions are not unequivocally indicative of *Cl. welchii*, since they are given by certain other species of anaerobic spore-bearer. Human serum-Fildes's-agar provides a means of detecting *Cl. welchii* on plates within twenty-four hours of taking a swab.

I am greatly indebted to Dr. Herta Schwabacher and Dr. A. C. Cunliffe for their help with tests of wound anaerobes; to Dr. E. T. C. Spooner for *welchii* strains; to Dr. C. R. Amies of the Lister Institute, Elstree, for antitoxin; to Dr. R. St. John Brooks, Major MacLennan, and many others for strains of clostridia; and to Prof. A. A. Miles for interest and advice. The work was made possible by a personal grant from the Medical Research Council.

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M. Kobro and P. Owren (*Norsk Med.* 1941, **9**, 447) state that trichinosis had not been seen in Norway since 1882 until the summer of 1940, when an outbreak of seven undoubted cases occurred at Strømmen, near Oslo. Six showed the classical symptoms of the disease, such as oedema of the eyelids, gastro-intestinal disturbance, stiffness of the muscles, pronounced eosinophilia, and fever. One had atypical clinical symptoms with gastro-intestinal manifestations, but with albuminuria and ha-maturia. The cause of the epidemic was the consumption of inadequately cooked pork. All recovered.

THE AFTER-TREATMENT OF PARAPLEGIC PATIENTS FOLLOWING INJURIES TO THE SPINE

BY

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As the result of air raids there must now be in this country more cases of paraplegia following wounds and crushing injuries to the spinal column than ever before, especially amongst the civilian population. The immediate treatment of these most serious injuries is well known, but it may be emphasized that in first moving such cases it is wise to place the patient in the prone position on a stretcher or other means of transport, to prevent further crushing of the cord.

It is the after-treatment that is so important—that is, when the patient, having recovered from shock, having perhaps had a laminectomy performed to remove spicules of bone or to relieve pressure from the cord, having in many cases, especially among the males, had cystotomy, with suprapubic drainage and the like, has settled down and become accustomed to a paraplegic existence. After complacency has been established, life in these cases is not necessarily miserable, but it is full of surgical and medical pitfalls, the avoidance of which is essential to the preservation of a reasonable degree of comfort.

Let us, then, consider the treatment when the spinal injury has not resulted in speedy death. A very small proportion of these patients recover completely; but most of them remain paralysed, and in these cases the after-treatment here to be suggested will enable them to be comparatively free from pain, to enter happily into sedentary occupations and games, and to be mentally normal. The essentials are: (1) to ensure against infection of the urinary tract; (2) to guard against trophic ulcers and bed-sores; (3) to mitigate the serious discomfort of the incontinences; and (4) to make provision for adequate sleep and deal with mental anxieties by giving suitable sedative medicines.

Infection of the Urinary Tract

The "end" condition in nearly all paraplegics is a pyelonephritis with uraemia (in the absence of intercurrent disease, to which they appear to be no more subject than normal individuals). Patients often present a condition of retention with overflow, and these cases call for suprapubic cystotomy, which they usually get. But there has been a practice of inserting through the suprapubic opening a de Pezzer or Malecot drainage tube and letting it do its own work quite indefinitely, without daily irrigation of the bladder and frequent removal and sterilizing of the tube.

All such cases develop a mixed infection of the urine, very many have bladder calculi, and most have a pyelitis. Here we cast out these self-retaining tubes and insert a 12-inch or 16-inch sterilized Jaques catheter into the suprapubic wound. Another catheter is placed daily in the urethra and connected with a tube from an irrigator, which is hoisted about 2 feet 6 inches above the bladder, and the "wash-out" with boric or some similar lotion is carried out via the urethra, through the bladder, and out by the suprapubic tube. This is a reversal of the usual method of irrigation, but many years of experience have convinced me of its efficacy. A fresh suprapubic tube is now inserted, being fixed by strapping to the abdominal wall; it is then connected by a double clip with another tube leading to a urine bottle attached