ache and nausea, so, although apyrexial, 0.6 g. of sulphostab was given intravenously on 13/9/42. Had no recurrence of pyrexia, and was discharged fit on 19/9/42. *Clinical features*:—Sulphostab was withheld, as it was hoped he would develop pyrexia. However, temperature did not surpass 99.6° at this time, but patient looked ill and complained of headache and nausea. Eventually, after having sulphostab, his general condition and appetite improved and headaches disappeared; he was discharged fit six days later. Eye examination on 18/9/42: Edges of both disks hazy; disks slightly swollen about 2D. No haemorrhage in retina, but not good colour. Conclusion: Bilateral papillitis. *Laboratory findings*:—Thick blood films, 10/8/42, no spironema seen; 12/8/42, spironema seen. Cerebrospinal fluid, 7/9/42: Clear—not under pressure; cells less than 5 per c.mm.; protein not increased; chlorides (as NaCl), 700 mg. per 100 c.cm. Venous blood, 12/8/42: Kahn-negative. Urine, 12/8/42: Much urobilin present—much urobilinogen.

Case 9.—Unit D; has worked in vicinity of Caves A and D. Slept in the open on several occasions while on manœuvres. No history of being bitten while sleeping in open. Admitted to hospital 10/8/42; temperature normal. No lice in clothing and no marks of insect-bites on body. Temperature rose to 102° on day of admission. Spironema seen in thick blood film; 0.6 g. of sulphostab given intravenously while pyrexial. Next evening the temperature was normal and remained normal until 19/8/42, when it suddenly rose to 102.4°. Thick blood film: No spironema seen; 0.6 g. of sulphostab given intravenously while pyrexial. Temperature normal next day and until 10/9/42, when he was discharged fit for duty. *Clinical findings*:—Pain in lumbar region, attacks of dizziness. Aching behind eyes and unable to focus clearly on print even when apyrexial. Eye examination on 5/10/42: Slight papillitis left disk. *Laboratory findings*:—Thick blood films, 10/8/42, spironema seen; 19/8/42, no spironema seen. Cerebrospinal fluid not examined. Venous blood, 10/8/42: Kahn-negative. Urine, 10/8/42: no urobilin.

Case 10.—Unit E; dug trench near Cave E. Admitted to hospital 10/8/42 complaining of headache and shivering. Temperature 103.8°. No lice on clothing or evidence of insect-bites on body. Spironema found in thick blood film on 10/8/42; 0.6 g. of sulphostab was given intravenously. Next day temperature normal, and remained normal until 25/8/42, when he was discharged from hospital. Admitted to another hospital complaining of headache and general malaise. Ran a low fever, and was transferred to this hospital on 31/8/42. Continued to run a low fever until 11/9/42, when he had a rigor and temperature rose to 101.8° and 0.6 g. sulphostab was given intravenously. Temperature fell to normal 13/9/42, and remained so. *Clinical features*:—Headache, eyache, unable to read much because of aching behind eyes. Ran a low fever for 3 weeks. Eye examination: On 7/9/42, slight papillitis about 2D both disks; 21/9/42, left disk slightly more swollen than on 7/9/42. *Laboratory findings*:—Thick blood film, 10/8/42, spironema seen. Cerebrospinal fluid: Clear fluid not under pressure; cells, 20 per c.mm. (lymphocytes); protein not increased; chlorides (as NaCl), 740 mg. per 100 c.cm. Venous blood, 10/8/42 and 24/8/42: Kahn-negative. Urine: 10/8/42, much urobilin present; 3/10/42, urobilin present.

Case 11.—Unit F; slept in Cave F 28/9/42. No knowledge of insect-bites. Reported sick on 8/10/42, suffering from pains in head, back, and shoulders, and one severe attack of shivering. Admitted to hospital 8/10/42; temperature 103.2°. No lice on clothing or marks of insect-bites. Spironema found in blood film on day of admission. Was given 0.6 g. sulphostab intravenously while pyrexial; in 36 hours was apyrexial, and has remained so for 28 days. *Clinical features*:—Herpes of lips, headache, backache. Eye examination: Slight degree of papillitis. *Laboratory findings*:—Thick blood film, 8/10/42: Spironema seen (also seen by dark-ground examination). Cerebrospinal fluid, 11/10/42: Clear fluid not under pressure; cells less than 5 per c.mm.; protein not increased; chlorides (as NaCl), 727 mg. per 100 c.cm.; sugar, 90 mg. per 100 c.cm. Venous blood, 8/10/42: Kahn-negative. Urine, 8/10/42: much urobilin present.

Case 12.—Unit F; slept in Cave F 28/9/42. Insect-bites on left arm. Reported sick on 10/10/42 with fever. He was detained in the local M.I. Room and treated for sandfly fever. He was apyrexial on 12/10/42 and returned to duty. Admitted to hospital on 20/10/42; temperature 103.6°. No lice on clothing or marks of insect-bites. Spironema found in blood on day of admission; 0.6 g. of sulphostab was given intravenously while pyrexial. Next day was apyrexial, and has remained so for 14 days. *Clinical features*:—Headache, shivering—probably admitted to hospital during the first relapse, having been infected on the same night as Case 11. Eye examination on 24/10/42: Nothing abnormal. *Laboratory findings*:—Thick blood film, 20/10/42, very numerous spironema seen—also seen by dark-ground examination. Cerebrospinal fluid, 21/10/42: clear fluid, not under pressure; cells 4 per c.mm. (lymphocytes); protein not increased. Chlorides (as NaCl), 755 mg. per 100 c.cm. Venous blood, 20/10/42: Kahn-negative. Urine, 20/10/42: urobilin present in large amounts.

Summary and Conclusions

Ornithodoros tholozani has been found in caves in Cyprus. Soldiers sleeping in these caves have contracted relapsing fever. As this tick is a known vector of relapsing fever in other parts of the Levant it may be concluded that tick-borne relapsing fever also occurs in Cyprus. Twelve cases are described.

The incubation period of the disease varies. While usually lasting from 8 to 10 days, it appears likely that in some cases it can be as short as 2 days or as long as 5 weeks.

In 2 cases long periods of low continuous fever occurred as well as acute attacks of high pyrexia.

All cases were treated by intravenous arsenicals while pyrexial. Five of these relapsed in spite of treatment, but only two relapsed more than once.

Choroiditis was observed in one case, papillitis in 4 other cases. No other neurological complications could be discovered except for changes in the cerebrospinal fluid.

The cerebrospinal fluid in 4 cases showed a lymphocytic pleocytosis. In one case 300 cells per c.mm. were observed. In 2 cases the chloride concentration in the cerebrospinal fluid was reduced to 680 mg. per 100 c.cm.

All cases in this short series gave negative Kahn reactions.

In 7 cases the urine was examined for urobilin by Schlesinger's test. Marked urobilinuria* was observed in 6.

[More recently, one of us, K. C. D., has succeeded in infecting guinea-pigs with blood from a further case of relapsing fever contracted in Cyprus. This substantiates the view that the disease is tick-borne, since the louse-borne type is not transmissible to guinea-pigs, and that the spirochaete is *S. hispanica*, not *persica* as previously considered.]

We are very grateful to Major J. Clark, R.A.M.C., for his kind co-operation in searching the caves and for forwarding the ticks for identification; to Dr. J. G. Shelley for his careful ophthalmological examinations; and to Capt. B. T. Broadbent for photographing the specimen. We wish to thank Col. J. S. K. Boyd for his kind interest in this work.

PROPHYLAXIS OF PARALYTIC ILEUS BY ADMINISTRATION OF MORPHINE

BY

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The clinical impression has been formed in the last few years that morphine is of value in the prophylaxis of "paralytic ileus." We are unaware of any previous statistical evidence for this belief, but we regard the following analysis as of value, because the treatment was altered from a non-morphine to a morphine routine with the specific object of lessening its post-operative incidence. The accepted definition of post-operative "paralytic ileus" is the failure to pass flatus within 60 hours at the end of an operation, and Caesarean section, owing to the laxity of the abdominal wall and haemoperitoneum, is recognized as predisposing to this condition.

The data submitted for analysis consist of particulars relating to 500 consecutive patients upon whom Caesarean section was performed when under the care of Dr. W. J. Clancy in the City General Hospital, Sheffield. In the pre-morphine period the drug was given only when necessary to relieve pain, while in the second period the routine was as follows: Morphine gr. 1/4 was given 6-hourly for the first 24 hours (if the patient was asleep the injection was given on awaking, and so on 6-hourly). If distension was present the morphine was continued in the same way for a second period of 24 hours. In any case morphine gr. 1/4 was given at night for the first four nights. Fluids were limited to 3 pints a day until flatus was passed, after which the diet was rapidly increased to normal.

There were 160 Caesarean sections before the morphine routine was introduced, with 8 cases of ileus, and in the second

* This appears to be a general occurrence in relapsing fever, and is being described elsewhere.

period there were 340 Caesarean sections, with 3 cases of ileus, thus giving rates of 5% in the pre-morphine period as compared with 0.88% in the morphine period a difference of 4.12 ± 1.40 , which is greater than could easily be ascribed to chance. The statistical problem, therefore, is whether it may be validly deduced that the lower rate could have resulted from the institution of morphine therapy.

The criterion of statistical significance adopted throughout the analysis is that any difference to be real—i.e., unlikely to have occurred from the play of chance—must exceed twice its standard error. It is unlikely that such will occur by chance more than five times in a hundred trials.

TABLE I.—Annual Number of Births, Caesarean Sections, and the Occurrence of Ileus in the Two Periods

	Births	Caesareans	Paralytic Ileus	Caesareans as % of Births	Ileus as % of Caesareans
Non-morphine period:					
1935	1,027	21	0	2.04	0
1936	1,186	22	1	1.85	4.5
1937	1,276	39	1	3.06	2.6
1938	1,219	46	4	3.77	8.7
1939 (to Aug.) ..	1,003	32	2	3.19	6.3
Total	5,711	160	8	2.80	5.0
Morphine period:					
1939 (Sept. to end)	519	11	0	2.12	0
1940	1,549	37	0	2.39	0
1941	1,066	55	1	5.16	1.8
1942	1,304	46	1	3.53	2.2
1943	1,568	76	1	4.85	1.3
1944	1,936	73	0	3.77	0
1945 (to July 1) ..	919	42	0	4.57	0
Total	8,861	340	3	3.84	0.88

It may be noted that the number of births in the second period is 50% higher than in the first, but this is hardly relevant to the problem, and it also should be noted that the proportion of Caesarean sections to births has increased from 2.80 to 3.84% (difference $1.04 \pm 0.31\%$)—outside the probability of chance, owing to the increasing percentage of complicated cases admitted.

The following information was supplied with regard to each case: (1) Date of operation and hospital number. (2) Age of patient. (3) Parity. (4) Type of operation—classical, repeat classical, lower segment, repeat lower segment. (Some slight errors may be involved here, as cases of repeat section were labelled according to the time under discussion, for in some instances it was impossible to ascertain which operation had been performed previously.) (5) Indication—mechanical, haemorrhage, toxic, or cardiac.

TABLE II.—Age Distribution

	Under 25	25—	30—	35—	40+	Total
Pre-morphine	46	52	43	17	2	160
Morphine	43	77	82	94	44	340
Total	89	129	125	111	46	500

$$\chi^2 = 50.5. \quad n' = 4. \quad P < 0.01.$$

It is clear that the age groups are not similar, there being an excess of patients over 35 in the second group, which is not readily accountable to chance and is undoubtedly due to the increased age of confinement found after the conscription of women.

TABLE III.—Parity

	1	2	3	4+	Total
Pre-morphine	99 (4)	40 (3)	10	11 (1)	160
Morphine	172 (1)	101 (1)	25 (1)	42	340
Total	271 (5)	141 (4)	35 (1)	53 (1)	500

$$\chi^2 = 6.99. \quad n' = 3. \quad P > 0.05 < 0.10.$$

No difference greater than could be ascribed to chance is found between the two series as regards parity. The figures in parenthesis indicate the distribution of ileus cases, and it seems clear that parity may be exonerated as a factor relevant to ileus.

TABLE IV.—Type of Operation

	Classical	Repeat Classical	Lower Segment	Repeat Lower Segment	Total
Pre-morphine	67 (3)	28 (1)	62 (4)	3	160
Morphine	131 (1)	59 (1)	134 (1)	16	340
Total	198 (4)	87 (2)	196 (5)	19	500

$$\chi^2 = 2.53. \quad n' = 3. \quad P > 0.30 < 0.50.$$

Here again the distribution of the two series by type of section is not dissimilar, nor does paralytic ileus (figures in parenthesis) seem to be particularly associated with any one type.

TABLE V.—Indication

	Mechanical	Haemorrhage	Toxic or Cardiac	Total
Pre-morphine	148	10	2	160
Morphine	270	49	21	340
Total	418	59	23	500

$$\chi^2 = 14.2. \quad n' = 2. \quad P < 0.01.$$

In the morphine period the indication was other than mechanical to a greater degree than in the pre-morphine period, this in all probability being due to the increased age of the group.

The tabulations above suggested that both age and indications warranted more detailed analysis, as follows:

TABLE VI

Indication	Age					
	Under 25	25—	30—	35—	40+	Total
Pre-morphine period						
Mechanical ..	46 (3)	47 (2)	40 (2)	13	2	148
Haemorrhage ..		5	2	3		10
Toxic			1	1 (1)		2
Total ..	46 (3)	52 (2)	43 (2)	17 (1)	2	160
Morphine period						
Mechanical ..	33	65	69 (1)	72 (2)	31	270
Haemorrhage ..	8	9	11	14	7	49
Toxic	2	1	1	8	6	18
Cardiac		2	1			3
Total ..	43	77	82 (1)	94 (2)	44	340

It will be seen that with one exception all the cases of "paralytic ileus" (figures in parenthesis) occurred where the indication was mechanical. But even among these cases the incidence of ileus was lowered in the morphine period from 4.7 to 1.1% (difference 3.6 ± 1.56 , which is significant).

The difference in age of the two groups can also be said to have little to do with the results, though here the numbers are too small for statistical proof. In the second, or morphine, series the ileus cases occurred in the older age groups, while in the earlier series they occurred in the younger groups.

Using two age groups only, then on the basis of the ileus rates experienced among the mechanical indications in the pre-morphine period we should expect (as shown in Table VII) 11.6 cases to occur in the morphine period. Actually only 3 occurred.

TABLE VII.—Mechanical Indications Only

Age Group	Pre-morphine			Morphine		
	Caesareans	Ileus	Rate	Caesareans	Expected Ileus	Actual
Under 30	93	5	5.37	98	5.3	0
30+	55	2	3.64	172	6.3	3
					11.6	

$$\frac{\text{Difference}}{\sqrt{\text{Expected}}} = \frac{8.6}{3.4} = 2.52$$

Taking the square root of the expected number as an approximation to the standard error of the difference, the

ratio of the difference to its standard error exceeds 2, and the decrease in the second period may therefore be regarded as a real one.

Discussion

The objective of the analysis was to ascertain whether or not the two series of patients were similar in all respects except as regards treatment and to make allowances for differences which might be found. The results show similarity in regard to parity and type of operation, but dissimilarity in regard to age and indication. While the conclusion must be that the "paralytic ileus" rate was lowered after morphine therapy started, the statistical analysis can only be claimed to show that the decrease was greater than could easily be ascribed to chance and that it was not due to inherent differences in the two series as regards age, parity, and type of operation or indication.

Conclusion

The essential difference between the two series of cases from the clinical point of view is the introduction of a morphine routine in the second group, and we feel that the results (5% paralytic ileus as against 0.88%) are attributable to this factor, as the two series are as near parallel as can be expected in 500 consecutive Caesarean sections.

We wish to express our indebtedness and thanks to Dr. E. Lewis-Fanning, of the Medical Research Council's Statistical Staff, for the statistical analysis and comments, without which this paper could not have been written. We also thank Dr. W. J. Clancy for his help and co-operation in this subject for some years past, and Dr. J. Rennie and Dr. J. Clark for permission to publish this article.

ACID-FAST ORGANISMS IN GASTRIC RESTING JUICE

BY

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This investigation was undertaken after a physician had remarked that he occasionally had acid-fast organisms reported in the gastric juice of patients when he was certain that the tubercle bacillus was not present in the patient's sputum.

The Investigation

Technique.—The specimens of gastric resting juice were obtained from out-patients attending Guy's Hospital for fractional test meals. None of them were known or suspected to be suffering from tuberculosis. Each specimen was treated with antiformin, and smears were made and stained by the Ziehl-Neelsen method, decolorization being carried out with both 25% sulphuric acid and 90% alcohol. The smears were each subjected to a ten-minute microscopical search for acid-fast bacilli. When these were found the neutralized and washed centrifugalized deposit was planted on Loewenstein's medium and incubated at 37° C. for at least six weeks, and a portion of the deposit was also injected into a guinea-pig.

Findings.—171 specimens were examined. In seven of them acid-fast organisms were seen. None of the seven showed more than two or three such organisms per slide in a prolonged search. They were mostly of a short and stout shape, unlike true tubercle bacilli, and often had a ragged deformed appearance. On culture three of the seven specimens gave a growth of saprophytic acid-fast organisms which grew equally well at room temperature and failed to produce tuberculous lesions in a guinea-pig. All seven specimens on guinea-pig inoculation had failed to produce any lesions when the animal was killed seven weeks later. The fractional test meal carried out on these seven cases at the same time that the resting juice was obtained showed in two cases hyperchlorhydria, in one case hypochlorhydria, and the remaining four gave a normal result. Control investigations carried out on three patients suffering from open tuberculosis (two children and one adult) showed typical tubercle bacilli present in large or moderate numbers in the resting juice.

Conclusion

In 4.6% of resting-juice specimens examined acid-fast organisms were present. These organisms were also alcohol-fast. As pointed out by Van Diense and Hooghiemster (1938) alcohol resistance of an acid-fast organism is not sufficient to identify it conclusively as the tubercle bacillus. In this case they proved to be saprophytes, ingested very possibly with fruit and vegetables, on which they are commonly found.

It appears, from the cases investigated, that under normal conditions the chance of tubercle bacilli being found in the gastric resting juice of non-tuberculous patients is very remote.

Since the examination of gastric washings for the tubercle bacillus is a valuable diagnostic proceeding it should be noted that mere films where acid-fast bacilli are few and possibly deformed in appearance may perhaps be misleading without further investigation.

REFERENCE

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MASSIVE SURGICAL EMPHYSEMA, PNEUMOTHORAX, AND PNEUMOPERITONEUM

BY

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Massive surgical emphysema developing suddenly during or after intubation of the tracheo-bronchial tract raises problems, including those of prevention and treatment, as shown in the cases described herewith.

Case I

A married woman aged 58 was admitted to hospital on Aug. 15, 1944, for bronchoscopy, as bronchial growth had been suspected. Premedication was by morphine 1/6 gr. and atropine 1/100 gr. General anaesthesia was induced by pentothal. The bronchoscopic examination (Aug. 18) was conducted uneventfully by Mr. K. W. Mackenzie, and no abnormality was found. A few moments after the bronchoscope had been removed the right eyelid was noted to be swollen. Very quickly this swelling spread to the face and neck. She became deeply cyanosed and respiration ceased. A needle was inserted into the anterior mediastinum above the suprasternal notch, but no air escaped. A laryngoscope was introduced into the throat, and the pharynx was found to be occluded by swollen spongy mucous membrane. The bronchoscope was then reintroduced, with difficulty. The trachea was found to be occluded by grossly swollen mucous membrane. After further manipulation the bronchoscope was introduced as far as the bifurcation of the trachea. The right main bronchus was occluded, but there was a very small passage in the much-swollen left bronchus, and oxygen was directed into it through the bronchoscope and artificial respiration started. By now she was pulseless and extremely cyanosed. At this stage the abdomen was noted to be grossly distended and tympanitic. Two needles were introduced into the flanks and air at once hissed out. Artificial respiration was continued and the pulse quickly returned, followed by spontaneous respiration and improvement of colour, the disappearance of the bronchial swelling being seen to occur during the next ten minutes. She was returned to the ward 1½ hours later, and recovered consciousness about four hours after leaving the theatre. She was given 51 g. of sulphamezathine between Aug. 19 and 25 to prevent mediastinitis. During this period the temperature remained between 97° and 100.8°. A radiograph of the chest and abdomen on Aug. 19 showed a right-sided pneumothorax and a considerable pneumoperitoneum. A further radiograph on Aug. 29 showed neither pneumothorax nor pneumoperitoneum. She was discharged on Aug. 31 symptomless, afebrile, and free of physical signs, and has remained well since.

No oxygen was administered to this patient until after the emphysema had developed, and it can only be surmised that the laryngeal, tracheal, or bronchial mucosa was damaged by the bronchoscope. It is not easy to account for the pneumoperitoneum, but the presumption is that air in the mediastinum forced its way through one or other of the weakly protected orifices in the diaphragm into the retroperitoneal space. There is no anatomical route to explain its passage from the retroperitoneal space into the peritoneal cavity. Rupture of the peritoneum by adhesions due to distension of the retroperitoneal space would be a possible explanation. The same difficulty arises in explaining the pneumothorax.