Pathogenicity for Man.—Definite evidence of the pathogenicity of this organism for man is very scanty, although there has been on the part of certain writers a tacit assumption of its association with a low form of gastro-intestinal disease. When found in the dejecta in diarrhoeal and typhoidal infections as the sole non-lactose fermenter, it has most commonly been regarded as simply an associated organism which has overgrown the more specific organisms and rendered their recovery impossible. In more recent years, however, a few cases have been reported in which this organism has been recovered from the blood, and has apparently been accountable for the symptoms in the respective cases.

Thus Straub and Kraus (1914) record two cases, of which the following are brief notes:

Female, aged 19 years, admitted January 6th, 1913. Pain on defaecation, with two or three stools a day, since middle of December, 1912. Stool formed, but containing mucus. On January 2nd pains in the umbilical region. Since January 4th vomiting of bilious watery material without blood. Little appetite. Temperature 39° to 40° C., pulse 130. Herpes labialis. Heart and lungs normal; abdomen tender on pressure, no distension; spleen not enlarged. Temperature fell by lysis from January 11th, and patient was discharged on February 8th. From the blood a pure culture of an organism allied to the *f. cal s* group, but liquefying gelatine, was recovered. Total leucocytes 4,500, with relative lymphocytosis. Serum of patient did not agglutinate *B. typhosus* or the two paratyphoid bacilli.

Male, aged 19 years. Admitted April 24th, 1913. Took ill on April 3rd with headache and rigors, but continued at work till April 14th. He then received ambulant treatment till April 24th. On admission he complained of stabbing pains in the chest, with cough, headache, and night sweats. Stools were regular. Temperature 39.9° C. Pulse 100. Spleen not palpable. Leucocytes 7,100, with 50 per cent. lymphocytes. Fever was continuous till April 30th, when a brief remission occurred. It continued, however, at 38° C. till May 12th, when it became normal. The patient was discharged on June 3rd. There is no record of haemoculture, but from the urine an organism giving all the characters of *B. faecalis alcaligenes* was recovered on May 17th. Twice during the pyrexia (on April 30th and May 3rd) the urine had been found sterile. This organism did not liquefy gelatine. The serum of the case did not agglutinate typhoid or paratyphoid bacilli, but agglutinated the homologous strain of *B. faecalis alcaligenes*, as well as that recovered from Case I, in a dilution of 1 in 1,000.

Rochaix and Marotte (1916) give a brief but concise account of two recent cases of benign typhoid-like illness in which typical *B. faecalis alcaligenes* was recovered from the blood.

The two patients complained of gastro-intestinal symptoms. During the first two or three days the temperature oscillated between 39° and 40° C., then fell progressively to normal in ten to twelve days. Blood culture performed on the day following admission gave a pure culture of *B. faecalis alcaligenes*. Six days later a second haemoculture proved negative. The serums of the two patients did not agglutinate paratyphoid bacilli, but agglutinated *B. typhosus* in 1 in 100 and 1 in 50 respectively. (Both cases previously vaccinated against enteric.) The homologous organisms were, however, agglutinated by the serums of the cases in 1 in 200 and 1 in 500 dilution respectively. Also the serum of the first patient agglutinated the organism recovered from the second case in 1 in 200 dilution, while the serum of the second patient agglutinated the organism of Case I in 1 in 1,000 dilution.

Two or three isolated and less authenticated cases are here omitted, and no evidence is on record of the occurrence of cases of this character in apparently epidemic form. The series of cases here recorded by Captain Shearman constitute the first record of what may be called an epidemic prevalence of infection due to *B. faecalis alcaligenes*.

Clinical Notes of Cases admitted into No. — General Hospital.

Nearly all the cases referred to by Captain Shearman were at first admitted into the Observation Ward of the No. — General Hospital, Egypt. This ward is one into which all cases of obscure pyrexia, in which no physical signs or symptoms are present to explain the occurrence of the fever when the patient first presents himself and in which in consequence there is a suspicion of enteric or typhoid fever, are received direct from the reception room. From this ward cases are weeded out day by day as an accurate diagnosis becomes possible.

The symptoms this group of patients complained of may be briefly summarized. In nine out of the eleven cases

there was a sudden onset with slight chill, severe headache, usually frontal but sometimes also felt in the occipital region, nausea, occasional vomiting, and general aching of the limbs. Abdominal pains with constipation were also usually complained of. In two of the cases the onset was gradual, but the symptoms complained of were those above enumerated.

On examination after admission there was very little to note except in a negative way. In all cases the face was flushed, the tongue furred, and all the usual phenomena of pyrexia were apparent. The pulse was under 100, and not dicrotic; nothing of note was found in the chest; the abdomen was slightly distended and tender on palpation, but no enlargement or tenderness of either liver or spleen was found. The urine was normal, and in each case the diazo test was negative. In one patient there was a diffused urticarial eruption, which disappeared in twenty-four hours, but returned a few days later.

The type of temperature recorded was interesting. In nine cases there was an initial period of pyrexia of from two to five days' duration, reaching a height of from 101° F. to 102° F., and falling by lysis. This was followed by a normal period of from two to five days, after which there was a second pyrexial period similar to the first, but lasting only two to three days, during which period there was a return of all the symptoms complained of at the beginning. In two cases there was a third rise of temperature similar to the first and second. In two cases no second pyrexial attack occurred.

Blood examinations, apart from the bacteriological findings, throw no light on the condition. The white cell count, with one exception, was in each case examined under 10,000 per c.cm., averaging about 8,800, and the differential count was normal.

No spirilla or malarial parasites were found. In one case a leucocytosis of 16,000 was found. As it is probable that cases similar to these are occurring elsewhere, and as in other places where paratyphoid fever is prevalent they might easily be taken for mild and unusual forms of that disease, it is important to call attention to their existence. The diagnosis, of course, depends entirely on the bacteriological findings.

Typical temperature charts from two of the cases accompany this note (p. 894).

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CYTOLOGICAL EXAMINATION OF THE JOINT FLUID AS AN AID TO PROGNOSIS IN PENETRATING GUNSHOT WOUND OF THE KNEE.

BY

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THE treatment of gunshot wounds of the knee-joint continues to be one of the most pressing surgical problems of the day. Consequently any method whereby a juster opinion of the future progress of the case can be made on its first examination is likely to be of considerable use. This fact must be my excuse for presenting a manifestly incomplete account of the method I have adopted at a base hospital in France for over a year.

The pathological principle upon which it depends is simple. Damage having been done to the joint, Nature sets about repairing the damage, and the first step consists in sending leucocytes into the synovial fluid. Now, it is a fundamental fact in the pathology of inflammation that aseptic damage to a part is associated with migration of mononuclear leucocytes chiefly, septic damage with migration of polynuclear leucocytes. Moreover, up to a point where negative chemiotaxis comes into play, the heavier or more virulent the infection the greater the migration of polynuclears. Pus, which consists of

practically 100 per cent. polynuclears, is a surgically visible sign that infection of the part has occurred. Hence determination of the degree of local leucocytosis roughly indicates the degree of local damage, and a differential leucocyte count made of a sample of fluid removed by aspiration affords evidence as to whether the injury is aseptic in a practical (as distinguished from a bacteriological or a strictly surgical) sense, or is septic. Manifestly the surgical treatment must differ in the two cases.

Starting from the point that normal synovial fluid of the knee-joint is acellular—when gunshot injury occurs and haemorrhage takes place into the synovia the ratio of leucocytes to reds found immediately must be that of normal blood, say, 1 leucocyte to 500 reds. With the subsequent migration of leucocytes due to inflammatory reaction the number of whites goes up. Thus I have notes of cases in which the ratios of leucocytes to red blood corpuscles were 3 : 500, 5 : 500, 9 : 500, 25 : 500, 50 : 500, 70 : 500, 125 : 500, 1,000 : 500.

Further, normal blood contains roughly 70 per cent. polynuclears, 30 per cent. mononuclears, and the leucocytes found in the mixture of synovial fluid and blood immediately after the injury must be present in these ratios. If the subsequent migration of leucocytes be called forth by an "aseptic irritant" the ratio will remain unchanged or the percentage of mononuclears may even increase. If the migration be called forth by a "bacterial irritant" the polynuclear percentage will increase. Hence, if a sample of knee-joint fluid removed from a patient in hospital shows, for example, 500 reds to 5 whites, and a differential count of the whites shows 50 per cent. polynuclears and 50 per cent. mononuclears, it differs fundamentally from another sample showing, for example, 1 red to 4 whites, when the whites on differential counting are 99 per cent. polynuclears and only 1 per cent. mononuclears. The case from which the first sample was taken is clearly one in which infection is absent or negligible, the second is one in which it has undoubtedly occurred.

So far as concerns the prognosis for a specific case, one cannot entirely depend upon the two factors that have been given above, but must also take into consideration the absolute number of cells present. This is to some extent true where the presence of a mononuclear increase indicates an aseptic condition (a joint with 20 c.cm. of blood effused into it must be in a worse condition than one with only 1 c.cm.), but it is markedly true when a polynuclear increase indicates that infection has occurred.

In the latter instance it makes a profound difference whether the cells are so few that films for examination can only be obtained from the deposit after centrifuging, or so numerous that they crowd the field of the microscope. If very few in number, a 99 per cent. polynuclear count is certainly evidence that infection has occurred and has been slight, but the migrated leucocytes may have effectively dealt with the invading micro-organisms and re-established sterile conditions. On the other hand, where the cells are numerous, not only does a 99 per cent. polynuclear count indicate that infection has occurred, it also indicates that it has been heavy, and, *a fortiori*, that it is less likely to have been overcome. Consequently, whereas a bad prognosis for the joint may be amply justified where there is a high polynuclear count and the absolute number of leucocytes is great, it is not necessarily justified, and may even be wrong, when the absolute number of leucocytes is quite small.

Results.

In all I have examined fluids and given prognoses in 89 cases. These are shown in the table. Cases notified as "no operation; joint settled down" were treated by complete physiological rest, obtained by bed and a back splint to the limb; they were not sent to England until temperature and pulse had been normal for at least a week. In cases notified as "joint opened widely" the ligaments were cut, and the limb was put up on a triangular splint.

The following table shows the prognosis for joint based on cytological and bacteriological examination of fluid removed by aspiration, and also the subsequent result furnished by the surgeon:

TABLE I.—Showing Prognosis and Result.

Prognosis.	Cases.	Result.	Cases.
Good ...	27	No operation; joint settled down ...	24
		Joint opened widely or amputation ...	3
Probably good ...	5	No operation; joint settled down ...	5
Doubtful ...	5	No operation; joint settled down ...	3
		Joint opened widely ...	2
Probably bad ...	11	No operation; joint settled down ...	2
		Lateral incisions into joint ...	4
		Joint opened widely ...	4
		Amputation ...	1
Bad ...	41	No operation beyond removal of foreign body; joint settled down ...	3
		Lateral incisions into joint ...	2
		Joint opened widely and/or amputation (amputation 17) ...	27
		Joint opened widely; death with or without previous amputation ...	9

Pathological Details.

Preparation of Films and Cultures.—Films are prepared after tubes of broth and of glucose agar have been sown. The glucose agar is used as a combined shake, stab and slope culture. After melting and cooling to about 45° C. the agar is heavily sown from the knee-joint fluid, well shaken, and allowed to set under the tap, the tube being held at an angle of 45 degrees. When solidified, a stab culture is made in the same agar, and the charged platinum wire is spread over the small sloped surface of the medium. In the one tube, therefore, gas formation, anaerobic growth (if anaerobiosis be not too strict), and aerobic growth can be detected. The stab is useful for obtaining samples of any anaerobic growth which would be difficult to obtain from colonies in the shake culture.

The films for cytological examination are made from the upper part of the clot or the deposit if there be no clot. The clot is chosen in preference to the fluid because it is richer in cells, and the upper part because it will probably contain a larger percentage of leucocytes than any other part. Having removed a small portion of the clot with a platinum wire a drop is examined direct with the low power. If the cells be many, films are made as in the preparation of ordinary blood films; if they be few, the fluid from the portion of the clot taken is allowed to drain away until the original mass has shrunk considerably, and smears are made on microscope slides with the remaining portion. After drying, some of these are stained by Leishman's, others by Gram's method.

The only real difficulty met with is when the fluid contains much synovia. Frequently it is then straw-coloured or orange, the clot is filmy, colourless, pale yellow or perhaps red from admixture of blood, and cells may be few. In any case the tendency of synovia to swell with water makes the latter part of Leishman's staining (that is, the washing with distilled water) difficult to carry out. The film is detached with great ease from the slide and the cells often stain so deeply that differential counting is impossible. Complete avoidance of water and rapid washing with methyl alcohol after staining one to two minutes with Leishman's dye usually provides films from which determinations can be made, though the nuclei stain much less deeply than those in which water has been used. Sometimes a good differential count can be made from a Gram-stained film counterstained with aqueous fuchsin. In practice I differentiate cells in the usual way, finally combining them into the "granular" and "agranular" groups.

So far as concerns the number of cells present, after noting the macroscopic appearances of the fluid I usually confine myself to forming a rough estimate of the total number of cells per c.mm. (as compared with a good film of normal blood) and of the ratio of reds to whites by counting them in twenty or more fields of the microscope. On several occasions I have tested the numbers thus obtained by actual counts on a Thoma-Zeiss slide after breaking up the clot finely and vigorous shaking, and find that the quick method gives values of sufficient accuracy for the purpose in hand.

After estimating the cell content and making the differential count of leucocytes a search is made for micro-organisms, both in the Leishman and the Gram film.

Upon these data and the presence or absence of growth in cultures next day the prognosis is based.

Obviously judgement is easiest where the prognosis is frankly good or frankly bad, but the dividing line will be

best shown by giving the actual values obtained in the "Probably good," "Doubtful," and "Probably bad" groups of cases.

TABLE II.

	Character of Fluid.	No of Cells (rough).	R. : L.	Polynuclears per Cent.	Micro-organisms.		Clinical Result.
					Films.	Culture.	
Prognosis "Probably good."	Bloody	500,000	45 : 1	70	0	0	Good.
	Bloody	500,000	45 : 1	57	0	0	Good.
	Bloody	1,250,000	20 : 1	73	0	0	Good.
	Bloody	1,250,000	500 : 1	79	0	0	Good.
	Clear	25,000	1 : 1.5	68	0	Staph.	Good.
Prognosis "Doubtful."	Straw bluff clot	200,000	1 : 1	94	0	0	Bad.
	Orange, turbid	200,000	116 : 100	97	0	0	Bad.
	Straw, blood (bright) deposit	5,000,000	8 : 1	85	0	0	Good.
	Slightly bloody	100,000	3 : 1	87	0	0	Good.
	Orange, turbid, slight blood deposit	250,000	4 : 1	93	0	Bacilli	Good.
Prognosis "Probably bad."	Straw, light clot	500,000	(a)	100	0	Cocci	Bad.
	Bloody	1,000,000	21 : 1	91	0	0	Bad.
	Straw, deposit of pus	1,250,000	No reds	94	Cocci	Cocci	Bad.
	Bloody, mucopus	1,250,000	1 : 2	100	0	0	Bad.
	Bloody, ill-formed clot	1,250,000	10 : 1	93	0	0	Bad.
	Dark, bloody...	3,000,000	11 : 1	100	0	0	Bad.
	Yellow, dark clot	1,000,000	4 : 1	99	0	0	Bad.
	Yellow, blood deposit	500,000	2 : 1	100	0	0	Bad.
	Yellow, curdy deposit	800,000	(a)	96	0	0	Good.
	Yellow, mucopus	800,000	No reds	91	0	0	Bad.
	Bloody	1,000,000	(b)	(c)	0	0	Good.

(a) L. = many times R.
(c) ? (degenerated).

(b) Great leucocytosis.

From Table II it appears that an 80 per cent. polynuclear count marks roughly the dividing line between good and bad prognoses. Similarly, the dividing line is roughly indicated when cells are present in considerable numbers by the ratio reds to whites equals 20 : 1.

So far as concerns the bacteriological side of the investigations absence of micro-organisms from films and cultures of a knee-joint fluid is so common, although the nature of the injury makes it certain that some degree of infection must have occurred, that such absence, considered by itself, carries but little weight in forming the prognosis. On the other hand, the presence of even two or three short chains of streptococci or clumps of staphylococci in a large film, associated as it usually is with copious growth in cultures, is highly significant of a heavy and still active infection.

In twelve cases I have made two or more examinations, samples of fluid having been withdrawn from the joint at intervals. Such repeated examinations are at times very useful, as they indicate, of course, the progress of the local condition. A second sample, taken twenty-four hours after the first, may be enough to clear up a doubtful case and enable one to say whether the joint will settle down or not.

Finally, it must not be supposed that prognosis in these cases can be converted into a mathematical certainty. Balancing of the data obtained in the manner set forth above and formation of an accurate prognosis will still demand good judgement on the part of the pathologist. The attempt is worth making, for the frequency with which micro-organisms are neither found in films nor obtained by culture is evidence that the knee-joint has great powers of dealing with infection when the natural processes are not hindered by "physiological unrest." After penetration by a projectile a knee-joint is in a precarious condition, and the unstable equilibrium may easily be upset by a well-intentioned but ill-judged procedure to the disadvantage of the joint, possibly even at the cost

of limb or life. Though the method advocated is obviously susceptible of many improvements the proportion of accurate prognoses made thereby is sufficiently high to indicate its practical value in helping the surgeon to decide in a given case whether he will operate or whether he will forbear.

PSYCHO-ANALYSIS.

BY

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READERS of the BRITISH MEDICAL JOURNAL know that I am not a fanatical devotee of psycho-analysis. I have so often questioned its principles and its methods that it may be supposed that I regard it as wholly useless. This would be a mistake. In my opinion psycho analysis performs a very useful function, which I will presently describe, and this being so, it is expedient that those who wish to avail themselves of its aid should know how to do so. At present there is no systematic exposition of psycho-analysis. There is a voluminous literature, but there is no systematic exposition. The writings of Freud and Jung, the chief priests of the cult, are disconnected, and from them we have to pick out the principles as best we can from among detailed records of individual cases. From this it has resulted that some of the most enthusiastic devotees of psycho-analysis have not grasped its principles.

It is true that psycho-analysis is past its perihelion, and is rapidly retreating into the dark and silent depths from which it emerged, but as it has in certain cases an unquestionable value, and as, moreover, the historian of medicine of the future will have difficulty in finding any account of it, it is well that it should be systematically described before it goes to join pounded toads and sour milk in the limbo of discarded remedies.

The first step towards the mastery of psycho-analysis is to obtain a command over its vocabulary, and the chief term used in the art is "The Unconscious." Upon this term the whole system is built, and it is therefore much to be regretted that there is no intelligible definition of it. Many have tried to define it, but no one has succeeded in producing a definition that is intelligible. This failure raises, of course, the *prima facie* presumption that the term has no meaning at all, that it is *vox et praeterea nihil*, and gives us the assurance that any meaning that does attach to the word is so misty, vague, and inchoate that to found practice upon it would be most unsafe. It may seem unlikely that men sufficiently intelligent to obtain positions as professors in universities would found a system of psychology and treatment on a notion so hazy and impalpable as to be wholly undefinable, but history, from Plato to Paracelsus, and from Paracelsus to Mill, shows that it has often been done, and no doubt it will often be done again. However misty and incomprehensible the notion may be, it seems that those who use the term as the basis of their system must attach some sort of meaning, if only a negative meaning, to it. I believe, though I speak with diffidence, that this is the case, and I shall try later on to explain the meaning that appears to attach to the term, as far as it has any meaning at all.

The next most important term used in psycho-analysis is "Libido." This has both an esoteric and an exoteric meaning. To the initiated it means lust, especially morbid and unnatural lust, incest, pederasty, bestiality, and so forth; but its exoteric meaning, as explained to those who are not fully initiated, and might be repelled by the esoteric meaning, is very different. To them it is explained as having the meaning of "wish," or "energy," or some other which is quite cleanly.

"Mentality" is another favourite term of the psychoanalyst. Its proper meaning is "mindness," which is of course nonsensical; but mentality does not sound as nonsensical as mindness. It sounds as if it meant something, and may be used when it is desired to strike an attitude, and impress the reader with a belief in the superior attainments of the writer.

"Oedipus-complex" and "Electra-complex" are other terms for incestuous lust. They are used for readers who are not fully indoctrinated with psycho-analysis, and might be disgusted with the plain term.