tionary; 12, or 4.8 per cent, are worse; 54, or 21.6 per cent, are dead; and one is unknown. It is seen that of the whole group 68 per cent are improved or better than that.

SUMMARY AND CONCLUSIONS

1. A brief discussion of phrenic paralysis operations is given.

2. The extent to which the operation is used in Canada is indicated. It would appear that it is not employed so widely as seems justified in carefully selected cases of tuberculosis.

3. The indications and contraindications are briefly discussed.

4. It is recommended that in the vast majority of cases the temporary operation rather than the permanent one should be used.

5. An analysis of 250 cases is given.

We wish to express our thanks to Dr. J. Earle Hiltz, assistant superintendent, who reviewed all x-ray films and prepared a number of the tables for us; to Dr. C. J. W. Beckwith, D.M.H.O., Cape Breton, for assistance rendered in the early years of our phrenic work; also to Mr. Allen d'Entremont who studied the case histories and charted the material therein, and conducted the follow-up on these patients.

BLOOD-CULTURE AS AN AID TO THE DIAGNOSIS OF CARCINOMA AND SARCOMA*

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THE occurrence of bacteria in neoplastic tissue is generally recognized, and is usually ascribed to local infection in the case of ulcerated growths, and to coincidence in the case of other neoplasms. In other words, the tumour tissue is regarded as a form of culture medium to which organisms are particularly attracted whenever they enter the blood stream. It has however to be admitted that bacteria are seldom numerous enough in cancer tissues to be seen by direct histological examination of sections.

Various workers, notably Doyen (1902), Schmidt (1903), Glover (1920), Nuzum (1921), Young (1921), Stearn (1929) and Aaser (1934) have approached the subject of cancer bacteriology as a problem in etiology, since, of course, clinical bacteriology starts out from the concept that certain bacteria specifically account for certain diseases. In the absence of convincing evidence to the contrary, the organism successively described in relation to cancer by the above-named and other workers continues to be regarded by many authorities as belonging to the category of secondary invaders or of coincidental and non-significant associates.

In the present communication the notions "causation" and "infections" are purposely avoided, for, indeed, the validity of those concepts is disputable in any case. It is simply a record of the findings in blood-cultures which have been taken routinely both in proved cancer cases and in suspected cases. The only point of interest has been to ascertain whether there is or is not a particular kind of bacterial flora in the blood of cancer patients which would enable a diagnosis to be made in difficult cases.

In a preliminary series of 104 proved cases of malignant disease, studied between 1933 and 1938, various routine media and mycological media were employed, using a pH from 7.0 to 7.6. The Kimble broth culture tube (60021, pH 7.4) was finally preferred. Growths were always scanty, even after subculture, except in the case of cryptomyces which grew readily after adaptation. The following results were obtained:

TABLE I.

Name of organism	*No. of cases*
Doyen micrococcus*	52
San Felice organism	6
Cryptomyces	17
Organisms other than these	19
Negative result	10

* This corresponds to the Glover organism of Table II.

During the past nine months, using the empty Kimble tube (60016), it has been possible to collect blood from nearly every case of cancer coming into the Royal Victoria and Montreal General Hospitals.* By this means all risk of contamination of the blood is done away with.

* This work was made possible by a grant from the Archibald Cancer Research Fund, McGill University.

* By the valuable cooperation of Drs. Morton and Raymond, respectively.

METHOD OF OBTAINING THE PRIMARY CULTURE

After sterilizing the skin of the forearm and drawing up the blood according to the instructions provided in the cartons (Kimble Glass Company, Chicago) the tube is shaken vigorously at short intervals for about five minutes. In this way the blood will continue to remain fluid. After standing overnight at room temperature, some 5 c.c. of the blood are introduced into one or more tubes of Glover's agar medium, prepared strictly according to the instructions published in the *Canada Lancet and Practitioner*, 1930, **74**: 92, and verbally explained by Dr. Murray Wright, of Philadelphia, whose guidance is here gratefully acknowledged. The pH of this medium is 6.5.

CULTURAL FINDINGS

The organism found in this series presented the characters described in the publication mentioned above, so that details need not be given here. Pyogenic cocci, streptococci, coliforms, Salmonellas, non-pathogenic sporogenes and others were all excluded by reason of the distinctive features of the Glover organism, namely, inability to obtain good primary cultures on other media, very slow development, peculiar steel-blue tint to the naked eye after 48 to 72 hours, distinctive motility, distinctive odour, non-fermentation of lactose, absence of gas formation on any sugars, filterability through Chamberland and Seitz filters.

RESULTS

The second series comprises 347 cases. Of these 152 were proved malignant (carcinoma, sarcoma); 56 others were definitely not cancer. The remainder are not yet utilizable, either because the diagnosis is not final or because the culture results are not fully available.

In the following table, "positive" means that besides the typical organisms an easily visible growth was obtained; "equivocal" means that though the organisms were found, there was only a very faint visible growth; "negative" means that neither macroscopic nor microscopic growth could be found after fourteen days' incubation.

TABLE II.

Cancer cases	*No. of cases*	*Cultural result* — *Positive*	*Equivocal*	*Quite negative*
Before treatment started	19	14	2	3
Treated by surgery or radiation*				
Still under treatment	24	21	2	1
Treatment ended				
6 months ago or less	35	28	1	6
6 to 12 months ago	17	13	1	3
2 years ago	16	12	3	1
3 to 5 years ago	15	10	2	3
Over 5 years ago	3	3	–	–
Untreatable and inoperable	23	22	1	0
Total	152	123	12	17
Percentage positive		88		12
Non-cancer cases	56	2	–	54
Percentage positive		4		96

* Mostly deep x-ray therapy.

The table shows that the organism in question has been found in blood-cultures in 135 out of 152 proved cases of cancer (both treated and untreated), whereas only 2 out of 56 cases clinically free of cancer gave a positive result. This method of study therefore seems likely to be helpful in the diagnosis of obscure cases.

Confide not to thy friend every secret thou possessest; how knowest thou that he will not sometime become thy foe? Inflict not every injury thou canst upon an enemy; it is possible that one day he may become thy friend.—*Maxim IX* of the Sheik Sa'di of Shiraz.

Reveal not thy secret to any man although he may be trustworthy, because no one can keep thy secret better than thyself.

Silence is preferable than to tell thy mind to anyone, saying what should remain unsaid. O simpleton! Stop the source of the spring; when it becomes full the brook cannot be stopped.—*Maxim X* of the Sheik Sa'di of Shiraz.