to complete the mutilation. (4) I have therefore given it up in favour of a three to six months' temporary jejunostomy. (5) I have done this simple operation for gastric ulcer (non-malignant) only fourteen times in the last ten years, and therefore am unable to dogmatize about it. But ten of my patients appear to be cured, two partly relieved, and two unrelieved.

Temporary jejunostomy is the nearest approach I know to putting the stomach at rest, and it enables the physician to "work his wicked will" unimpeded by the presence of food in the stomach. I need hardly add that temporary jejunostomy alone is contraindicated in any case where there is obstruction to the flow of food, through either the stomach or the pylorus.—I am, etc.,

Bath, April 6th. CECIL TERRY.

SIR,—One point in the correspondence about duodenal ulcer and its treatment, either by gastro-enterostomy or by partial gastrectomy, has not been stressed. In the North, where duodenal ulcer is very much commoner than gastric, the small number of gastro-jejunal ulcers which form occur almost entirely in those who have a family history of the disease. At least that has been my own experience, but being now unable to have ready access to the material I cannot give the figures. An investigation of this kind would yield fruitful results.

It seems to me that the incidence of stoma ulcer and of recurrent duodenal ulcer should be considered in this light by a statistician, together with the figures for the cure of duodenal ulcer in those who survive perforation, so as to see what the actual correlation is. In 1913, as a result of watching the after-history of seventy cases of perforation, I began to show students that perforation alone cures a duodenal ulcer in six out of ten cases: in the acute type of ulcer the percentage is about 90 and in chronic ulcer about 50. The failures, and they are lamentable, occur in cases with a family history of ulcer. Only very occasionally do they result from narrowing of the pylorus. Similar observations at three to seven weeks after perforation show how very rapidly huge duodenal ulcers can disappear. The reason is clear. Perforation takes the core out of the boil and the suture employed everts the unhealthy, clogged mucous surface, and allows it to clean itself. Anyone who has done the emergency surgery in a large ward for a number of years knows that cases of perforation of an acute ulcer seem to arrive in epidemic fashion. The subject would bear investigation by the public health authorities and might be regarded as a type of food poisoning.

There are two inferences. First, that gastro-jejunostomy is never justified at the operation for perforation of a duodenal ulcer. This fact has been well recognized in this country for many years now. Secondly, that the causes of acute and chronic duodenal ulcer are not necessarily identical.—I am, etc.,

London, W.1, April 1st. G. H. COLT.

"Cancer and Causation"

SIR,—Presumably, Professor G. W. Nicholson published his communication in the *British Medical Journal* (March 30th) with the laudable intention of helping Dr. A. H. B. Kirkman and "a large majority of the medical profession" who are profoundly dissatisfied "with the mass of contradiction and the confusion of ideas that represent the cancer problem, so-called." Clarity of thought and lucid exposition are of course essential to the proper presentation of any problem, so I anticipated that a perusal of the paper would afford an instructive lesson in the art of thinking and of expressing thoughts. I have been disappointed, perhaps because I expected more perspicuity on the part of one who has devoted so much of his time to "Studies on Tumour Formation." It is embarrassing to the sympathetic reader that the author should be fighting for breath, so to speak, in an attempt to render intelligible certain simple views which are neither new nor difficult to understand, although Professor Nicholson's literary efforts are such as to lead us to an opposite conclusion. This unfortunate impression militates considerably against the success of his undertaking.

To pass to details, I would like to suggest that the title itself is by no means as definite as titles should be. What does "Cancer and Causation" mean? Is "The Causation of Cancer" intended; or does it mean "Cancer and Causation (in general)"—whatever that may signify? We have some indication in the text that "causation in the living organism" is the explanation; but in any case the title is vague and indefinite—an inauspicious start. Then surely the paragraph on malignancy is a notable example of obscurity of expression or of confusion of ideas, for there cannot be anyone who could comprehend malignancy as a *cause*, or not a cause, of cancer. The idea is to me meaningless. Besides, there was no necessity to drag such a proposition into the discussion at all.

Again, rightly or wrongly, I cannot follow Professor Nicholson in his argument that "the cause of cancer is a reaction of the organism to stimulation." I should have thought that the tissue reaction was cancer. One cannot regard, for example, the mental reaction leading to criticism as the cause of criticism. The cause is the stimulus of the mental reaction—in the present case Professor Nicholson's paper. To argue otherwise is what most people would describe as sophistry.

As to the other views mentioned, I have no fault to find with them, as such, for they are my own, and may be found scattered through my writings on malignant disease during the last twenty years (see *Some Aspects of the Cancer Problem*, 1930, and the original papers to which reference is made therein). Apparently Professor Nicholson is unacquainted with them. That cancer is a biological phenomenon of some kind is a very old idea. It is difficult indeed to say who was the first to attach a biological significance to the condition. It is a view I have always held myself, as my descriptions of the nature of malignant neoplasia clearly demonstrate. Some years ago I wrote:

> "Whether we have been looking for too much and are expecting to find more than there is to find, the future alone can decide. For ourselves we feel that if we have not now presented a complete biological cycle of events . . ."

I agree that in cancer, with the multiplicity of exciting factors concerned, it is the tissue reaction (growth process) which is important. But this is not a new idea, for ten years ago I published the following statement:

> ". . . The most important aspect—namely, the *specific process*, as I call it—has been neglected in the hunt for a specific cause, or for specific causal factors acting in conjunction. Still, it is the result rather than the cause, as I hope to show, that is important, for undoubtedly malignant neoplasia is a specific process, but that is not to say that because a process is specific the cause must also be. Those who ascribe specific processes to specific factors are on hazardous ground, for there is plenty of evidence that specific processes of a similar character to that we are discussing . . . may be induced by many inciting factors."

I imagine that no one would deny to-day that there are many factors which have carcinogenic properties.

In conclusion, may I say that I admire the courage and generosity of those who are prepared, as we all should be, to recognize any honest endeavour, for officialdom has too long reigned dictatorially over scientific enterprise. In the case of Mr. Morley Roberts we have witnessed such an endeavour, but probably we are not all agreed as to the merits, strictly considered, of his

writings. His ideas are not original, as Professor Nicholson presupposes, nor have they the support of scientific research, except by way of inference relating to the work of others. Moreover, as Mr. Sampson Handley has stated in the Preface to *Malignancy and Evolution*, the chief contention is obviously fallacious.

I hope Professor Nicholson will forgive the remarks I have made. The task he undertook was a thankless one, and it may well be one that is impossible of fulfilment at the present time. Nevertheless, I would repeat to all concerned the advice given to me by one of my surgical teachers when through him I was asked to write my first book: "Pray for the gift of lucidity." I am still doing so.—I am, etc.,

W. BLAIR-BELL.

Eardiston House, nr. West Felton, Shropshire, March 31st.

SIR,—The contributions of Professor Nicholson to the study of cancer have been of such outstanding value that one hesitates to question the soundness of any of his considered opinions. It is quite possible that the point of view of Mr. Morley Roberts has not been fully appreciated in every quarter, but the suggestion that the general body of research workers in cancer has neglected or failed to apprehend something of profound significance in Mr. Roberts's exposition is not justified. To suggest, further, that this exposition is sufficient to clarify the "mass of contradictions and confusion of ideas that represent the cancer problem, so-called," is too flattering to Mr. Roberts and much too severe on those who have added greatly to our knowledge of the cancer process in recent years.

In a well-balanced approach to the subject there is no wide breach between the nature of the stimulus and the biological reaction which it evokes. Surely those who attempt to analyse the nature of the stimulus as an exciting cause of cancer are guided at every turn by the response of the cellular entities to which their experimental stimuli are applied. Our need at the moment is to encourage the acquisition of fresh facts from every source and to make a much bigger effort than hitherto to co-ordinate existing knowledge. The belittlement of any line of investigation, if it be followed scientifically, in either aetiology or therapy, is unwise, and would lead us back to that excessive tendency to disputation which has often in the past obscured real issues, and from which we are happily emerging.

Professor Nicholson invokes the science of logic. It is competent and correct to state that the major premise on which he and Mr. Roberts found their whole argument may be entirely wrong, and should never have been accepted by them or by others without much closer scrutiny. I refer to the idea that there exists a vast multiplicity of exciting causes of malignant growth. The most significant grouping of facts which has emerged in recent years is that the so-called carcinogenic agent in tar has a relation to substances which are regarded as growth factors in the body. Through the whole range of the multicellular animal world there is provision made for the repair of lost or damaged tissue by the proliferation of adjacent cells under stimulation, be it from extravasated blood, the viscid coating without which a granulating wound of the surface cannot progress, or those infected discharges which are actually made use of by Winnett Orr to accelerate healing in an osteomyelitis. These stimuli to healing can, it is true, be evoked in a great variety of ways. We see them on the under surface of the hyperkeratotic mass of arsenic or old age, in lupus ulceration or the chronic ulcer following burns which cannot heal on account of mechanical traction, in the dermatitis from *x*-ray exposure, in the ducts and passages of the body wherever organic debris may collect on however fine a scale. These substances, however produced, are taken for granted as effective factors in healing. What association have they with cancer? They are good servants but bad masters. Acting where cellular loss has been sustained, they induce a proliferation which is later slowed down by differentiation as normal repair. Acting over long periods, where no repair is required or where mechanical or vascular changes stultify the attempt, these substances may induce a functionless proliferation which we know as a malignant growth. The tar which is found in every pharmacopoeia as a healing agent is carcinogenetic on the intact surface.

This is at least a valid hypothesis. The carcinogenetic quality lies in the misapplication of a stimulus which has a benign effect where there is a functional need. I would go further even than Professor Nicholson in regarding cancer as a biological process, because the stimulus is considered to be as intimate an essential of biology as the response which is evoked. Perchance Professor Nicholson will admit that those who maintain an interest in the stimulus are not necessarily working on a "logical fallacy."—I am, etc.,

J. J. M. SHAW.

Edinburgh, April 1st.

SIR,—I was interested in Professor Nicholson's paper, where he emphasizes his view that cancer is a biological problem, and that it is a *single* reaction of the organism to stimulation of *many and varied types*. The following quotation from a paper by myself on "The Biological Significance of Ovarian Tumours in the Fowl," in the *Journal of Cancer Research* (vol. xiv, No. 4, October, 1930), may be of interest, therefore, in the present connexion:

"It might seem from these observations that, if the cells of a tissue are stimulated to a prolonged, abnormal, and unnatural degree of functioning, whether by a local irritant or physiological impulses, there is a possibility, especially if cells with a considerable reserve of developmental potentialities either in them or behind them, and of an embryonic nature, are involved, that there will be hasty and irregular improvization of the cell machinery to meet the call. The finely adjusted balance of the activities of the tissue cells to one another and to the body as a whole of ordinary conditions will be upset, and a state of disorder, anarchy, and disharmony ensue, which may easily lead to tumour formation—that is, to a continuous piling up of cells which, owing to their mode of origin, are in reality useless and unable to perform their intended function.

"Behind this view is, of course, the idea that *function* dominates the life and activities of the cells, that they have a purpose in life, and that they react to all and any type of stimulus by attempting to exhibit, in whole or in part, their specific function. This signifies also that hypertrophy passes by easy gradations into tumour formation. In the condition of limited progression, from which the name is derived, hypertrophy occurs most typically in tissues the cells of which have no reservoir of cells with developmental potencies behind them, and where time is allowed for a stabile edifice to be constructed."

One of the main conclusions was as follows:

"The idea underlying the present view is that unnatural hyperstimulation, whether by means of a general nature, such as nerve impulses, hormones, cledones, etc., or locally by irritants, leads through hypertrophy and hyperfunction to a condition of perversion of growth and dysfunction or absence of function. To stimuli of very varied nature the organ, tissue, or cell reacts uniformly by increasing the machinery for functioning and thereafter exhibiting increase of its intrinsic and specific function. As in other machinery, however, persistent and erratic overworking leads to breakdown and disintegration. This conception applies not only to tumours, including leucosis, but also to other disease conditions, of which pernicious anaemia may be cited as an example."

It is necessary to add that I did not know of and had not read Mr. Morley Roberts's book.—I am, etc.,

J. P. MCGOWAN.

Aberdeen, March 30th.