an iron-deficiency anaemia or by an Addisonian anaemia the appropriate treatment of these diseases should be given in addition.

Post-thyroidectomy Myxoedema.—Myxoedema occasionally arises after subtotal thyroidectomy for toxic goitre. It should be borne in mind that so long as thyroid is given in full doses the secretion of thyrotrophin will be depressed and the thyroid remnants will never hypertrophy. After the hypothyroid symptoms have been controlled with thyroid therapy an endeavour should be made to see whether treatment can be withdrawn. The daily dose of thyroid should be reduced by $\frac{1}{2}$ gr. (32 mg.) each week; this procedure gradually lifts suppression of thyrotrophin and gives the thyroid remnants a chance to hypertrophy. It may or may not be successful.

Myxoedema Coma.—The cause of myxoedema coma is usually inadequate dosage of thyroid during very cold weather, but occasionally it is an infection. On account of its rapidity of action *laevo*-triiodothyronine sodium seems to be the preparation of choice, but because the condition is rare the correct dose is uncertain. Suggested doses are 0.1 to 0.25 mg. injected intravenously every 12 or 24 hours until the patient comes out of coma. This treatment should be supported by endeavouring to raise the body temperature gradually by means of an electric blanket, and, if an infection is suspected, by the administration of penicillin. The intravenous administration of fluids is contraindicated because in this disease there is fluid retention.

Masked Hypothyroidism.—Mild hypothyroidism may present as anaemia, constipation, debility, menorrhagia, amenorrhoea, or climacteric symptoms, and patients with these conditions, when due to hypothyroidism, are benefited by thyroid in doses of 1 or 2 gr. (65 or 130 mg.) daily.

Hypopituitarism.—Hypothyroidism secondary to hypopituitarism is treated on the same lines as spontaneous myxoedema.

Simple Goitre.—Simple goitre is an expression of hypothyroidism. Diffuse goitres may be treated with thyroid, which may cause reduction in their size or even their disappearance, but nodular goitres do not usually respond. The rationale is to inhibit the secretion of thyrotrophin, which is directly responsible for the glandular enlargement. Tablets of thyroid, B.P., are given at first in daily doses of 1 gr. (65 mg.); each week the daily dose is increased by $\frac{1}{2}$ gr. (32 mg.) to tolerance, the ultimate dose being 3 to 5 gr. (200–320 mg.). If no reduction in the size of the goitre is observed after a few months the treatment should be abandoned, but otherwise it should be continued, the maximal effect being obtained after at least a year. Recurrence may be prevented by the taking of 2 or 3 drops of Lugol's solution every fortnight.

Thyroid therapy may be employed for a few months before the removal of a retrosternal goitre in an effort to reduce its size and thus facilitate the surgical procedures.

Obesity.—Thyroid hormone is not advocated for obesity unless the condition is due to hypothyroidism.

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ASSESSMENT OF THE RESULTS OF FIVE YEARS OF CANCER EDUCATION

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During the past five years an intensive campaign of cancer education has been carried out by the Manchester Committee on Cancer in a defined "experimental" area with a population of just over 600,000. Its object was "to test the effect of saturating a defined area with intensive propaganda of every suitable kind, to develop propaganda techniques, and to assess effects on the lay public" (Paterson *et al.*, 1954). A "control" area of similar population structure was also defined in which no planned education took place.

Previous investigations had drawn attention to two facts: (1) how widespread was the belief that cancer is never cured (Paterson and Aitken-Swan, 1954); and (2) that where cancer is suspected fear is a potent cause of delay in seeking treatment (Aitken-Swan and Paterson, 1955).

The main effort of the campaign in the experimental area was therefore directed towards encouraging realization that some types of cancer are in fact curable. Attention was centred primarily on cancers of the breast and cervix uteri.

The first attempt at objective assessment of the impact of this campaign was through surveys of public opinion, contrasting experimental with control areas (Paterson and Aitken-Swan, 1958). The present article describes three further attempts at evaluation from other angles.

1. *A retrospective study of patients' delay in seeking advice.* The delay of patients with breast or cervix cancer whose symptoms were first noticed during the years before any education had taken place is compared with the delay of those whose symptoms were first noticed in the years during which education had been going on.

2. *Analysis of staging.*—Changes are analysed in the proportion of cases referred to this hospital between 1950 and 1956 presenting with growths of limited extent (often referred to as "early").

3. *An interviewing inquiry.*—New patients with breast or cervix cancer, resident in the experimental area and registered at this hospital between 1953 and 1957, were interviewed to find out indirectly if they were aware that cancer education was going on and if it played any part in their coming under medical care.

In presenting results after such a short period as five years (three years for the delay index) it is realized that the campaign could only have started to make a measurable impact on the area. Nevertheless, the first five years' work had been planned as an experiment, in regard both to the running of the campaign and to the methods of assessing its effects. An interim report at this stage therefore seemed indicated.

A Retrospective Study of Patients' Delay in Seeking Advice

One obvious index of impact of the education would be a demonstrable shortening, for at least some patients, of the period of delay in seeking advice. Delay, defined as the interval between the first symptom and first consulting a doctor, was analysed in this study by year of onset of symptoms and not by year of presenting at hospital. The population analysed, which we will call the "Christie Hospital series," can be defined as all patients registered at this hospital with breast or cervix cancer, resident in the experimental or control areas, whose symptoms were first noticed during the years 1950-5 inclusive, and where the interval between onset of symptoms and treatment was up to two years after the date of onset. This last qualification had to be added for statistical reasons in order to avoid the anomaly of having to add cases for an indefinite period if the final years of the series were to be fairly contrasted with the earlier. It was also not possible to achieve the ideal of ascertaining the necessary facts from all such patients in the two areas.

Although the great majority of patients with breast and cervix cancer in this region are sooner or later referred to the Christie Hospital a check made at the experimental area hospitals (through the courtesy of the surgeons concerned) showed that for the six years 244 patients with breast cancer and 52 with cervix cancer were treated at hospitals in that area and not yet referred to the Christie Hospital. A similar number can be presumed for the control area. The delay of this group could not be included in our statistics as these hospitals did not as a rule record the necessary data. It is important to note, however, that if in the experimental area the campaign did in fact induce more patients to seek advice earlier these would be the very cases which tended to be taken for surgery without radiotherapy, and the Christie Hospital series taken by itself therefore provides a minimum estimate of the impact of the campaign. Table I shows the numbers analysed.

TABLE I.—Christie Hospital Series: Numbers Analysed

Site	Area	Total	Excluded Because:		No. Analysed
			Delay Over 2 Years	Year of Onset Not Known	
Breast	Experimental ..	810	43	24	743
	Control ..	787	37	60	690
Cervix	Experimental ..	313	4	8	301
	Control ..	258	7	7	244

Results are shown (Table II) in three two-year periods equivalent to the pre-campaign (1950-1), intermediate (1952-3), and campaign years (1954-5). Because of the two-year lag on this type of analysis the latest figures measure effect only up to about the third (and not the fifth) year of active education.

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TABLE II.—Patients' Delay by Year of Onset Expressed as Percentage of Total Cases

Patients' Delay	Experimental Area			Control Area		
	1950-1	1952-3	1954-5	1950-1	1952-3	1954-5
<i>Breast Cancer</i>						
Total No.:	215	272	256	226	230	234
Under 1 month (immediate action) ..	28%	33%	38%	32%	28%	31%
1 under 3 months ..	21%	19%	18%	19%	24%	19%
3 " 12 ..	30%	28%	28%	30%	34%	31%
12 to 24 ..	16%	18%	15%	15%	10%	16%
Not known ..	4%	2%	1%	4%	3%	3%
<i>Cervix Cancer</i>						
Total No.:	102	109	90	97	75	72
Under 1 month (immediate action) ..	37%	43%	39%	29%	32%	24%
1 under 3 months ..	20%	20%	20%	22%	13%	12%
3 " 12 ..	28%	28%	30%	37%	39%	35%
12 to 24 ..	8%	5%	7%	6%	11%	6%
Not known ..	7%	4%	4%	6%	5%	24%

The results for breast cancer show that in the experimental area there has been a steady increase over the years in the proportion of women seeking advice in *under one month*. The difference between the proportions in the pre-campaign and campaign years is very nearly statistically significant at conventional 1:20 levels ($\chi^2=3.47$, $p=0.06$). Nearly all the patients making up the 38% in 1954-5 were interviewed, showing that in 6% of these cases patients actually attributed their "immediate action" to the campaign. No such improvement is seen in the control area. This definite change in the immediate-action group in the experimental area would appear to be the key effect of the education, and all other figures show remarkable stability.

Results for cervix cancer are difficult to interpret because the numbers are small and the proportion in the control area in 1954-5 in which patients' delay was not known was high. It may well be that this method of assessment falls down with cervix cancer because of the real difficulty of determining the date of first symptom. Evaluation from another angle is attempted in the next section, which examines the stage of disease when first seen, and in the interviewing inquiry.

Changes in Stage of Disease When First Seen

The second possible index of effectiveness of any public education would be clear evidence that a higher proportion of cases were presenting with growths of limited extent (the so-called early). Various analyses

TABLE III.—Cases Presenting in Stages 1 and 2

Site	Area	1950-2		1954-6	
		Total	%	Total	%
Breast	Experimental ..	321	55	391	64
	Control ..	306	67	343	64
Cervix	Experimental ..	174	50	146	70
	Control ..	144	52	128	53

were therefore made of the proportion of cases referred to the hospital over the period 1950 to 1956 in stages 1 and 2—for cervix cancer (international staging) and breast cancer (Manchester staging). Unfortunately, for the small units of population involved the numbers per year available for this type of contrast were such that random variation was considerable, and although a general trend seemed apparent it was not definite

enough for any dependable analytical study on a year-to-year basis. Nevertheless, the overall picture gives some indication of a possible effect, especially for cervix cancer (Table III).

Interviewing Inquiry

This inquiry was made amongst patients with breast and cervix cancer resident in the experimental area and registered at this hospital between January, 1953, and December, 1957—the population “at risk” of having come into contact with the education campaign. Those who made only one attendance or who were too ill, too deaf, or mentally unfit were omitted. Results are based on 603 (87%) of the 697 patients with breast cancer, and 221 (82%) of the 269 with cervix cancer eligible for interview. During a conversation ostensibly centred on the medical history it was hoped to learn indirectly what had caused the patient to seek advice when she did and if she was aware of the existence of the campaign. Many of the interviews were recorded, always with the patient's knowledge.

Table IV shows for each year since the interviewing study began the number of patients aware of the existence of the campaign either through hearsay or personal contact, and, separately, the number in personal contact with it *before* they had sought advice. Except where otherwise stated subsequent analyses refer to this second group of 244 cases (34% of the breast cases interviewed plus 18% of the cervix cases).

TABLE IV.—*Knowledge of Campaign*

Site	Year of Registration	Total Interviewed	Aware of Campaign	In Personal Contact with Campaign
		No.	%	%
Breast	1953	102	46	23
	1954	138	42	24
	1955	130	64	42
	1956	125	55	39
	1957	108	55	41
	All years	603	53	34
Cervix	1953	45	7	0
	1954	47	23	15
	1955	36	39	22
	1956	46	28	24
	1957	47	38	30
	All years	221	27	18

TABLE V.—*Type of Propaganda and Numbers Influenced*

Site	Year of Registration	Talks		Articles Only	
		Attended	Influenced	Read	Influenced
Breast	1953	2	2	21	9
	1954	7	6	26	5
	1955	9	7	46	16
	1956	8	4	41	13
	1957	13	5	31	9
	All years	39	24	165	52
Cervix	1953	0	0	0	0
	1954	0	0	7	1
	1955	2	1	6	2
	1956	0	0	11	1
	1957	3	0	11	0
	All years	5	1	35	4

Table IV shows that the campaign has become increasingly widely known over the years, the rate of increase being most marked for cervix cancer. One striking feature of the table, difficult to interpret, is the difference between the figures for breast and cervix cancer. Although each group should be a random

selection from the whole area, many more women with breast cancer knew of the campaign or had come into contact with it.

The type of propaganda remembered by the patients and the numbers who considered themselves influenced by it to seek advice are shown in Table V.

The “influence” of the campaign can be assessed only by what can be learnt from the patient. She did not know that the interviewer was specially interested in this aspect, and there seems no reason to suppose it could have any emotional connotations for her. It seems reasonable, therefore, to accept the patient's statement on this, but it should be noted that the group entered as “influenced” contains only those who were consciously aware of having been influenced. In Table V 20 patients who had both attended talks and read articles are included under “Talks,” as analysis shows that this was the main influential factor. Out of the 44 who had attended a talk 25 (57%) had been stimulated to take action, compared with 56 (28%) out of the 200 who had only read articles. Again there is a marked difference between results for breast and cervix cancer. About three times as many patients with breast cancer as with cervix cancer claim to have been influenced by propaganda (37% compared with 12%).

The 1957 survey of public opinion in the experimental area (Paterson and Aitken-Swan, 1958) provided an

TABLE VI.—*Knowledge of the Campaign in Patients and Non-patients*

	Patients with Breast or Cervix Cancer, Experimental Area, 1957	Non-patients, Opinion Survey, Experimental Area, 1957
Total No.	155	1,180
Heard of talks on cancer	28%	8%
Attended talk(s)	12%	4%
Read or saw articles in local papers	35%	39%

TABLE VII.—*Patients in Contact with the Campaign. Analysis of Those Not Influenced by it to Seek Advice*

	Breast	Cervix
(Influenced by campaign)	76	5
Not influenced by campaign:		
Too afraid to take action or dismissed the matter from their minds	69	12
Ignorance that their symptoms had any connexion with what they had read or heard	11	8
Vague about what exactly they had read or heard	9	12
Would have gone to the doctor promptly anyway, did not need to be told	14	0
Fatalistic acceptance—“too old to bother”	5	0
Other, emergency, condition found by doctor, etc.	20	3
Total in contact with the campaign	204	40

opportunity of ascertaining how many women in a random sample of 1,180 had heard of talks or had read articles about cancer in the local papers. Table VI contrasts this proportion with the proportion amongst the 155 patients (108 with breast cancer and 47 with cervix cancer) interviewed in 1957 (see Table IV).

The reasons for classifying patients who had attended talks or read articles as not having been influenced by the campaign are set out in Table VII.

The following quotations from recorded interviews illustrate some of these categories.

Patients Classified as having been Influenced by the Campaign to Seek Advice

1. Aged 52; no delay; breast cancer. This patient mentioned the campaign in her opening sentence. She went to her doctor promptly because of a talk given to her

ladies' church group. "It took all our fear away. It seems an odd thing to say people enjoyed a talk on cancer; but yes, they were very interested." She described the talk in detail.

2. Aged 47; 5 months' delay; cervix cancer. "I've read bits in the *Chronicle* about if you have bleeding after the change to see your doctor, and I thought this might apply to me. I wrote to Nurse Drew of the *Women's Own* for a booklet about the change, and it also said if bleeding continues after the change to see the doctor, so I thought I would at the first opportunity."

Patients Classified as not having been Influenced by the Campaign

3. Age 72; 6 months' delay; breast cancer. "I thought the article just applied to my case, but I dismissed it." She read a second article and "was impressed" but still did nothing.

4. Age 66; 4 months' delay; breast cancer. "When I read that article in the *Morning News* I said, 'Hullo, that's for me. But I didn't bother. It didn't frighten me—I know I should have gone sooner. I did believe what it said in a way, but I didn't want to interfere with their (the family's) holidays.'"

Two final longer quotations show clearly the prevalent attitude to cancer and the problems which face cancer education.

5. Aged 66; 8 years' delay; breast cancer. This patient said she had read articles in the local paper. "And then I went to two lectures that two doctors gave about lumps in the breast. But it never convinced me it were anything serious. I thought when I helped with tea and biscuits little did they know, talking to them afterwards, that I had a secret." "Their talks didn't encourage you to tell your doctor about it?" "Not a bit. It didn't alter things one bit. I didn't think the lump was doing me any harm or any danger, and I had had so much with my hip and my knee that I just thought I'd had enough." This patient had also been alarmed by stories from others. "She kept saying, 'Don't bother about it,' and then I had another friend and she wouldn't go for treatment and of course she died." "What was she frightened of?" "I don't think she was frightened of anything, but she didn't believe in operations—that's all I could get from her."

6. Aged 51; 4 years' delay; breast cancer. This patient spoke as if mystified by her behaviour. "I hung on and hung on," she said. "Of course, I know it was very wrong, but I don't think there's anyone that comes if they don't say anything right away, you know." About the articles she had read she said: "I used to read anything like that. I used to think to myself, well—I've always had faith, even when my husband was ill in hospital I never lost faith, and even with this I used to think it may be or it may not be; I don't know. And of course, as I say, if there's anything about it in the papers I always read it." "It didn't encourage you to tell your doctor about it, did it?" "I don't think that it did. Well, I used to feel sorry, you know; I used to think, 'Well, there's thousands of people like that.' I don't know if I'm the same or not. I kept wanting to go, but you know I kept holding back; I don't know why really."

The "Immediate Action" Group

Finally, the interviewing inquiry provided an opportunity of investigating the responsibility of the campaign in those cases where immediate action had been taken. Out of the 824 interviewed patients registered here between 1953 and 1957, 295 had sought advice in under one month. The check showed that 73 of these had been in personal contact with the campaign, a further 32 knew of it through hearsay, and the remaining 190 had never heard of it. What appeared to be the main factor in bringing these 295 patients under medical care is shown in Table VIII.

TABLE VIII.—*Patients who Took Immediate Action: Main Factor Bringing Them Under Medical Care*

	Breast	Cervix
Finding the symptom	100	31
Education campaign	36	2
Advice or insistence of friends	27	11
Severity of symptoms; emergency	7	21
Under doctor already; doctor calling to see someone else	21	16
Other cancer propaganda	8	1
Reading a "medical book"	4	2
Other, condition found by doctor, etc.	8	0
	211	84

It is difficult to analyse further the first group of 131 without a greater knowledge of personal factors. Twenty-five of them had read articles or had heard talks, but did not consider that this was what had influenced them. Patients with breast cancer described their reactions in such words as: "I'm not the sort who could delay." "I honestly don't think that reading anything influenced me one way or the other. I just couldn't have ignored what was obviously there." "I went because I knew it shouldn't be there and I wanted to get my mind put at rest."

Those with cervix cancer did not seem to have this sense of urgency, and often expected "a bottle" would put them right. More patients with cervix cancer than with breast cancer were in ill-health and under the care of their doctors at the time of onset of the cancer symptoms. Thirty-six with breast cancer and two with cervix cancer directly attributed their promptness to the campaign. This is 5% of the total 824 patients interviewed, and a direct measure of minimum success. The campaign may also have influenced patients through friends whose advice or insistence was the "cause" of their seeking advice at once, or in other indirect ways.

Further analysis of this small group of 38 motivated by the campaign to seek advice in under one month shows that all but five presented at hospital with growths in an "early" stage. It also shows that in 10 of the 38 cases there was a delay of two months or more after they had consulted a doctor—either medical or waiting-list delay or due to the patient failing to return after having been reassured.

Discussion

This picture of the effect of the educational campaign at three years (for the delay study) and five years (for the interviewing study) should be read in conjunction with the previously published survey of public opinion on cancer (Paterson and Aitken-Swan, 1958). Three points seem to stand out: (1) that a change in opinion and action can in fact be demonstrated by these methods, at least for breast cancer, after such a short period as three years of education; (2) that the change is extremely gradual; and (3) that the change is effected through a minority of the women reached.

On the objective factual side the following findings seem to have been established.

1. An improvement has been achieved in the experimental area in the proportion of patients with breast cancer seeking advice in under one month (Table II), and the campaign has been shown to be responsible for this.

2. There is some, albeit rather thin, evidence for both breast and cervix cancer that the proportion of cases coming with growths of limited extent has increased more in the experimental than in the control area. This is in interesting contrast to the absence of any improvement in the delay figures for cervix cancer.

3. There is a clearly demonstrated difference between patients with breast and with cervix cancer in their knowledge of, and response to, the campaign.

4. Three times as many patients (in the present study) as non-patients (in the survey of public opinion) had attended talks on cancer, although the talks were given at the regular meetings of women's societies and not at public meetings. This suggests, as does the previous point, that, to some extent at least, cancer talks attract those who have a personal concern with cancer.

5. So far as method of education goes, the informal talks at women's meetings are more effective but reach a smaller fraction of people than newspapers and other printed publicity.

These facts can be interpreted in many ways, and such interpretation must be to some extent speculative. The curious breast/cervix differences are almost certainly bound up with the fact that a painless lump in the breast is already widely feared to be cancer while the significance of the early signs of cervix cancer is less well appreciated.

The need in breast cancer is to diminish fear, and that ignorance is not the only or even the more challenging factor is plain from Table VII. Of all the patients in contact with the campaign, one-third were still too afraid to act upon advice received. The extracts given from interviews with some of these patients illustrate the difficulties of this type of problem. In contrast it may well be that the need in cervix cancer is to establish recognition of significant symptoms in some way or other, yet without inducing fear. On the other hand, improvement here may flow rather from an overall improved attitude to "doctoring" and an increased willingness to seek advice for all abnormal or disturbing symptoms. The doctor's action when such advice is sought is often as great a determinant of the outcome as anything the patient with cervix cancer may do, perhaps even a greater.

The low indices of impact shown by the interviewing inquiry may seem at first disappointing. In measuring effects of the campaign upon patients with proved cancer we are excluding from consideration the unknown number of women motivated by the campaign to have their breast lumps or unusual bleeding investigated. The standard of success—the number of women who were consciously aware of having been influenced by the campaign to seek advice within one month and whose condition proved to be cancer of the breast or cervix—is a stringent one, and it is not surprising if changes over such a short period as three to five years are small. It may well be that a much longer period of education has to be faced up to before substantial results can be expected. Much of this, as the opinion survey showed, depends not on effects upon individuals but in changing the whole climate of public opinion towards cancer so that rational action becomes accepted as natural. This idea must not be taken too far, however, as was shown by the difference already mentioned between patients' and non-patients' readiness to attend cancer lectures (Table VI).

These speculations raise the question of whether the emphasis on "saturation" of the educational area is the right one. This means depth rather than wide coverage, and yet results suggest that many will continue to resist being convinced. Whether repetition would make them more receptive is open to question—some examples quoted suggest that it would not. On the other hand, a minority can be stimulated to act if they are given

suitable information at the right moment. It might prove of more value, therefore, to see that sustained education reaches a wide population so that this minority may be as numerous as possible. They in turn become able to influence their relatives and friends—perhaps more effectively than formal lay education—should need arise. Analysis of the total cases has shown that the advice and persuasion of friends is the second most important factor bringing patients under medical care.

Summary

After three years of intensive cancer education in a defined experimental area the proportion of women with breast cancer seeking advice in under one month had risen from 28 to 38%. No such change is seen in a comparable control area where no planned cancer education had taken place. The comparable figures for cervix cancer suggest that delay has remained largely unaltered since pre-campaign years and between the experimental and control areas, but the statistical material is less reliable.

Analysis by stage of disease shows some increase in the five years in the experimental area in the proportion of patients, both those with breast and those with cervix cancer, presenting with growths of limited extent.

Interviewing of patients confirms that the campaign is making more impact on patients with breast than on those with cervix cancer. After five years of education 34% with breast cancer had come into contact with the campaign, compared with 18% with cervix cancer. Of those in contact, 37% and 12% respectively had been influenced by it to seek advice. Of the 244 patients in contact with the campaign, one-third were too afraid to act upon the advice given. Talks were more influential than articles but reached a smaller public.

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A recent statement from the National Academy of Sciences-National Research Council of the U.S.A. comments briefly on the problem of a relationship between leukaemia and radiation. Its comments are made on the *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation* (1958), and are as follows: "The question of induction of leukaemia or other types of cancer in man by very small doses of radiation has been treated in the United Nations report to suggest that the hypotheses of linearity and threshold effects as applied to the behaviour of somatic cells have equal likelihood of validity. Our committee inclines to the view that many forms of cancer, including leukaemia, arise through a more or less complex series of responses. While somatic mutations may be included among these, it seems doubtful that a strict linearity analogous to that seen in the genetic effects of radiation is as likely to hold in the case of these conditions. We note also that there is a considerable body of experimental evidence favouring non-linearity in specific instances. Also, the report seems largely to emphasize the two extreme possibilities, that of a linear relation and of a threshold, and gives little attention to non-linear relations. It is recognized that large-scale definitive experiments and demographic observations are needed since they may be of help in resolving these questions."