

A Meeting of the Technical Advisory Committee on the Fluorination of Water Supplies convened at 2 o'clock on Thursday afternoon, August 3, 1944, at the District Health Office in the State Office Building, 80 Centre Street, New York, N.Y., Dr. Harold C. Hodge presiding.

The following were present:

- Dr. Katherine Bain, Director, Division of Research in Child Development, Children's Bureau, Department of Labor, Washington, D.C.
- Dr. John Caffey, Attending Roentgenologist, Babies' Hospital, New York City
- Dr. Harold C. Hodge, Assistant Professor, Biochemistry & Pharmacology, University of Rochester, N.Y.
- Dr. Philip Jay, Assistant Professor of Oral Pathology, University of Michigan, Ann Arbor, Mich.
- Dr. Samuel S. Levine, Pediatrician-in-Chief, New York Hospital, New York City.

Invited Guest:

- Dr. F.A. Arnold Jr. (for Dr. H. Trendley Dean, Senior Dental Surgeon, National Institute of Health, U.S.P.H.S., Bethesda, Md.)

Departmental Working Committee:

- Dr. Edward S. Rogers, Assistant Commissioner, Medical Administration
- Dr. V.A. VanVolkenburgh, Assistant Commissioner, Local Health Administration
- Dr. Anne Bahlke (for Dr. James E. Perkins, Director, Division of Communicable Diseases)
- Dr. Elizabeth M. Gardiner, Director, Division Maternity, Infancy & Child Hygiene
- Dr. Harry L. Chant, District State Health Officer, Middletown

Dr. B.F.Mattison, Acting District Health Officer,
Kingston
Mr. F.W.Gilcreas, Associate Sanitary Chemist, Division
of Laboratories & Research
Mr. Charles A. Cox, Chief, Bureau of Water Supply,
Division of Sanitation
Dr. David B. Ast, Assistant Director for Oral Hygiene,
Division Maternity, Infancy & Child Hygiene
Dr. Sidney B. Finn, Senior Dentist, Division
Maternity, Infancy & Child Hygiene
Miss E.S.Sheerar, Statistician

CHAIRMAN HODGE: I will call the meeting to order, and ask Dr. Ast to perform what introductions are necessary, so that we are all acquainted.

... Dr. Ast went around the table and gave the name and connection of each person present ...

CHAIRMAN HODGE: I believe you have all received a copy of the agenda for this meeting?

DR. AST: Yes, it was sent to each one.

CHAIRMAN HODGE: Dr. Ast thinks that if we have a brief resume of the matters that were considered at our last meeting and of the current plan as presented here (indicating agenda and papers thereto attached), it will bring up the questions that we would like to have discussed.

Is there anyone who would rather start with some questions that are burning in his or her mind before Dr. Ast reviews this material?

(There was no response.)

CHAIRMAN HODGE: Does that seem like the reasonable way to go about this? Does it strike you as all right to proceed in that manner?

DR. CAFFEY: Yes.

DR. AST: At the last meeting of the Technical Advisory Committee which took place in this room in April the plan was outlined and discussed in detail setting up the method of procedure, the question of toxicology and possible safeguards which may be necessary in such a plan. At that meeting the Technical Advisory Committee unanimously approved the plan in substance. There was one strong minority opinion voiced by Dr. Dean, who is not officially a member of the Committee, and note was made of that minority opinion.

At that meeting it was decided that the several members of the Committee interested in their specialized fields would prepare the types of examinations which would be necessary in order properly to safeguard this study.

A meeting was held with Dr. Levine to discuss the pediatric examinations, and we have incorporated in the plan which was sent to you the examinations which Dr. Levine thought were important in this study.

Similarly a conference was had with Dr. Pomerans and Dr. Caffey for the roentgenologic studies, and we have incorporated those recommendations in our plan.

The plan was set up in the detail which the several members of the Committee thought necessary, and members of the Department staff considered these various details and the practicability of these detailed studies, whether or not they were possible due to questions of personnel and finances, and some of the items which were recommended for study will come up for discussion at this meeting.

I think, Mr. Chairman, that ought to set us off on the specific questions unless there are other points someone would like to ask about.

CHAIRMAN HODGE: If each of you have a copy of the outline of the program for the Newburgh-Kingston Study, it might be a straight forward procedure to start with the first paragraph and ask if there are any questions or discussion thereon, and proceed stepwise through until we have covered the ground.

DR. ROGERS: May I just lay before the Committee one point of view that I think we would like to have you keep in mind in this discussion? Dr. Ast has prepared this in its present form, with the intent that this, together with such modifications

as we may make therein today, shall be the form that will be used henceforth to describe the plan. If the plan is to be presented to the various foundations, for example, on the question of private foundation support, this statement is the statement that will go before such foundations, or before the Children's Bureau, or before the Budget Director, or whatever it may be; therefore, we wish to have it a fairly complete statement, in sufficient detail to be descriptive and so worded that it can be used for such purpose.

I don't know whether you want to proceed further with the discussion as set forth in the outline of the agenda under "Discussion of Desirability of Obtaining Support by Private Foundation" at this time. Perhaps it would be better to go through the plan first, though there is a considerable problem in relation to that which I would like to have presented before the Committee for advice, not of a technical nature, but advice of an administrative nature for the most part.

CHAIRMAN HODGE: Dr. Rogers, would it be in order for you to present the desirability of obtaining support for this from a private foundation at this time?

DR. ROGERS: Yes, I can present now the problem that has led us to that particular question, and I do think the advice of

this group thereon would be very valuable to us. It is somewhat as follows: At the time we last convened I believe we had a small budget, some \$6000 or \$7000, approved for a very modest program under federal funds administered by the Children's Bureau. Two things developed which changed that. One, on the advice of this Committee we have revamped the plan considerably and have increased the cost as a result very much. Two, the Children's Bureau felt, and feels -- I believe Dr. Bain may wish to comment on this -- that it is not within their proper function to subsidize pure experiments, but they were willing to approve of this one for one year, and possibly for two years, but not for any more than two years. That was a little bit overlooked in our first negotiations with the State Budget Director, who has somewhat reversed his attitude where we do not have the funds in sight for the completion of the project. In other words, he feels that if he approves the program at this point he has obligated the State to take on under state funds the guarantee of the completion of this project under state funds should the Children's Bureau's funds not be continued beyond that two year period. Thirdly, there is the E.M.I.C. program, which you have all heard about. I had better define that. It is the program for the Emergency Maternity and Infancy Care of service men's

families, which is also administered under funds from the Federal Government handled by the Children's Bureau. This has had to be handled at the state level administered under funds that were available to us for general purposes, federal funds. There was no specific allocation for administration of this rather vast program in its first year, and in the second year Congress has only allowed 2-1/2 per cent of the total amount to be handled for administrative purposes, which of course is impossibly low. The result has been a complete exhaustion of all of our reserves of federal funds so that frankly we could not find there in the funds available to us the \$26,000 even if the Children's Bureau were willing to grant it on a year-to-year but possible ten-year period.

Because of all of those problems -- and I don't think they are incapable of solution, but they would be difficult of solution -- there would be uncertainty from one year to the next, so it has seemed to us that we might perhaps do better if we went to one of the large foundations for support on this. A few of them have already indicated interest in studies of this kind. It seems to me to be a dead ringer for the type of thing that foundations like to do, and properly should do.

We have made no commitments in that direction whatever, but

in considering the matter we have thought of the Kellogg Foundation as being a logical one to approach, and I have written a letter of inquiry to Dr. Morris in that connection. We have not heard from him as yet, have we?

DR. AST: No.

DR. ROGERS: To what fund or foundation we go is immaterial. There is precedent as far as the State is concerned in the use of grants from private foundations for this type of work. It establishes no problem from that point of view, so I would simply like to ask the Committee whether or not in your judgment that is a reasonable line of thought, and if so whether you have knowledge of groups that might welcome an opportunity to work in this type of thing, which is significant, and should it seem to me appeal to a foundation.

CHAIRMAN HODGE: Are there comments or suggestions someone would like to make?

DR. BAIN: Would you like me to say a little bit from the Children's Bureau point of view in relation to this?

DR. ROGERS: If you would, please.

DR. BAIN: You see our funds come from Congress for two purposes. We get direct grants for research, and then we get grants under the Social Security Act for administration for grants

to states. In former times what we would do under the circumstances in a study like this that we were interested in was to put an item in our budget, and we went to Congress asking for a special sum to do a research project, and in former years we have gotten such sums. At the present time Congress is not allowing us money for research in that sense; that is, they are turning down every item so labeled. We continue to put them in, but they are turned down. We just do it because we think we ought to at least keep up the spirit of wanting to do some research, but items for direct research will be turned down I think during the duration of this war, at least I don't expect we will be able to get any.

Now can Social Security funds be used for research purposes. Social Security funds cannot be used for research because the Act itself states that it is a service program, so that we feel we are not justified in allotting funds therefrom for a long time research. I think we have perhaps stretched it a little bit in this instance in agreeing to do so, but we would not feel we had a right to commit funds of that sort for research purposes because we don't believe they have been appropriated for that use. If we could get research funds that would be a different story.

DR. AST: May I make a statement, especially for the

record? I think we have all discussed this before, but we ought to have this on the record. The Department does not necessarily regard this project as an experiment or as a research problem, but rather as a demonstration. The epidemiological evidence which we have to date I think we all agree is conclusive that the use of fluorine in potable waters will reduce the incidence of dental caries. In the proposed project, in addition to our dental studies we plan to do pediatric examinations and x-ray examinations, which may be regarded in the form of a service rather than a demonstration, because in spite of the fact that we are making these examinations to give us specific answers it is expected that these examinations will reveal certain defects which parents would not otherwise know existed in children and would probably lead to many corrections, so I think we are justified in regarding this as a demonstration rather than as an experiment or as a study.

CHAIRMAN HODGE: I am not sure this is a polite question, but is there any money at all available at present?

DR. ROGERS: Yes, but I think it is a question of robbing Peter to pay Paul. There is a fund that the Children's Bureau would approve, and I presume having approved \$6,000 or \$7,000 they would approve \$26,000, if we could scrape it up, but as I

say we have been completely depleted by reason of this E.M.I.C. program, which is an emergency program, and has taken up the reserves we would normally hope to go to for special work. You see this has to be financed over and above your basic operation, your basic program. We can go to the State of New York if it is necessary, and I dare say that we can get a state appropriation for this. That would not be available until next April however, and there is an intense mass psychological reason for not waiting until then. Furthermore, it might be kind of difficult to get the control idea through the Legislature. We could get it for the direct service part of it I am quite confident, but I am not so sure they would look favorably upon a control study in which state funds were used. They would feel they were open to criticism by the people of Kingston for having selected Newburgh to benefit from anything of this kind.

CHAIRMAN HODGE: Is there any objection to splitting the fund among several donors?

DR. ROGERS: No, it is administratively a little more difficult, but if necessary that could be done.

DR. CAFFEY: There would not appear to me to be any objection to a foundation supporting this on any score; in fact, as has been said it appears to be the sort of thing that a foundation

would normally like to sponsor and support. I cannot make any suggestions as to which one to approach, but if one can be interested in it I should say it would be worth the try.

DR. ROGERS: It is hard for me to believe that today we will have any difficulty interesting foundations in this. Today foundations and private interests are anxious to give money away, and I think the reasons are well known to you. Ten per cent of what they actually give is all they lose, and for that they get a tremendous advertising reward. Indirectly it is a form of government subsidy I suppose because if they did not give it to the foundation the Government would take it.

DR. CAFFEY: Is there anybody interested in the manufacture of fluorine, for example, that might be happy to subsidize the whole thing?

DR. LEVINE: I agree that this type of project is entirely appropriate for seeking private foundation funds to promote it. However, I think it is a general policy among most foundations today not to subsidize long term projects. They like to grant funds from year to year and not commit themselves for a ten-year project. I know for I have been turned down on innumerable occasions where a long term project has been involved, whereas they will evince interest in programs that will take a year or

two to complete and will usually lend their support to such short term projects. I think that may be your main difficulty. If that can be overcome, there may be foundation funds available that could be tapped.

CHAIRMAN HODGE: I would like to bring before you two pieces of evidence that would not seem to support Dr. Levine's contention. The International Cancer or the National Cancer Foundation -- I'm not too sure of the exact name -- recently has made the statement that it believes that the future lies in large long term correlated projects. The International Foundation for Infantile Paralysis has in the last year gotten two or three of its people that it has been mostly interested in to submit five-year and longer programs involving more than, let us say, just orthopedic surgery or virus work, so recently there have been correlated approaches, and I believe at the present time there is a decided swing toward the setting up of relatively long term programs that have a number of fields collaborating. Therefore, this may come at a very timely period.

DR. LEVINE: I would like to have that optimistic attitude, but I am afraid my past experiences with foundations will not support it.

DR. CAFFEY: Right.

DR. LEVINE: That attitude would not be supported by my experience.

DR. CAFFEY: Nor mine.

DR. VAN VOLKENBURGH: That has been my observation as well. However, there is one point that came up in connection with the Department's survey of tuberculosis facilities over the state in determining whether facilities should be supported locally, or by the state, or how the matter should be handled, that you might be interested in. There the problem came up as to whether funds should not be solicited from one of the foundations, and the Public Health Council -- I guess you know the membership of that group -- that are more or less in touch with foundation affairs were distinctly of the opinion in view of the fact that the state had so much money gathered from taxes that they don't know how to spend it the Foundations were not too favorably disposed toward granting subsidies, at least to the New York State Government, so I think maybe that should be given some consideration. Personally, I feel this is just the type of study that ought to be supported and may be put into effect through one of the foundations.

CHAIRMAN HODGE: If someone has some suggestions of people that you know, friends, or friends or friends, or good

contacts, etc., let us hear them.

DR. AST: May I ask would there be any objection to accepting funds from a commercial house?

DR. CAFFEY: Who accepting funds?

DR. AST: The State Department of Health. For example, I am thinking now of the General Chemical Company, which is interested in the manufacture of fluorine, or Wallace & Tiernan who manufacture the type of equipment we would use in the fluorine treatment of the water.

DR. ROGERS: Perhaps if they did it jointly there would be no objection, if there were more than one concern involved in it or a collection of a particular type of concern. Do you know what I mean by that?

DR. CAFFEY: Not quite.

DR. ROGERS: More than one chemical company.

DR. CAFFEY: Various manufacturers, say, of fluorine?

DR. ROGERS: Yes, or of the equipment. While personally I cannot speak for the state policy, and none of us here can, I would personally say it would be undesirable to accept money from a commercial interest because of the implied obligations. Whether they were said to be non-existent or not would not matter, they would still be there as far as the state was concerned. We have

had some precedents of that sort of thing in the past where private interests have tried to give grants to the state in an attempt to buy public opinion by good will to keep down increased tax legislation and for various other things. That is a pretty complicated thing, but if a sort of foundation were formed by a group of commercial interests for this purpose I think that would get around it because then it would ^{not} be singling out any single firm or industry.

DR. BAIN: That is the thing that is being done in the Nutrition Foundation. A group of them have gotten together, and it is a non-commercial board that operates it.

DR. ROGERS: Yes. That I think would be a little complicated, but I dare say it could be done.

CHAIRMAN HODGE: I believe the present status of the problem, so to speak, is clearly before us, and I suggest we might drop it for the moment and bring it up again at the conclusion of our discussion to see whether anyone has turned over any gray cells and found a good angle from which to approach it underneath, that Dr. Ast or Dr. Rogers can follow for some money.

DR. ROGERS: I would like to say I don't want the Committee to feel discouraged or in any way disheartened in this matter. I may be overly optimistic, but I do not anticipate any real

difficulty; in fact, we have several ideas as to ways in which we can probably obtain funds. We may be disappointed, but I do not see how we could be turned down. It seems to me too important and too valid a study to be turned down on. It is simply a matter of approach and getting the advice of this group as to whether or not we have it organized properly for this type of approach. You have all probably had more experience along that line than we have had. We have had a rather limited experience with foundations, and you probably know better than we do by far whether this is the type of material which we should submit to them.

CHAIRMAN HODGE: Let us now turn to the outline.

The only suggestion I have about the first paragraph, "Outline of Method," is that where the statement is made that this amount of sodium fluoride will bring the fluorine contents within the 0.9 to 1.0 parts per million, we might add a sentence that has this effect: Outside of the fact that about 10 per cent of persons drinking 1.0 part per million fluorine in the drinking water have mottled enamel of a very mild sort, there are no other known toxic reactions to the long time continued administration. That would sort of justify the reason for the selection of this concentration of fluorine. Do you think that is necessary?

DR. ROGERS: Is the inference exactly the fact? These toxic effects you say are not known.

CHAIRMAN HODGE: Right.

DR. ROGERS: But they have not been hunted for, have they?

CHAIRMAN HODGE: They are not known by the most rigorous methods of ordinary inspection.

DR. ROGERS: They have not been reported, you could say.

CHAIRMAN HODGE: Yes, by ordinary inspection as you see the populations that drink these fluorine-treated waters they don't look any different from their neighbors that drink fluorine-free water. Would you not say that, Phil?

DR. JAY: Yes, in some twenty-one cities that have been studied so far, with the fluorine content ranging from .5 parts per million up to 14 parts per million, other than mottled enamel, which was severe in areas containing over 4 parts per million, let us say, roughly speaking, there were no other effects we noticed.

DR. ROGERS: That were attributed to it?

DR. JAY: That were noticed by those of us who were working in those areas; at least they are not at all conscious of any other untoward effect due to the population drinking fluorine-treated water in such concentrations; in other words, they seem

like a normal population drinking fluorine-free water.

DR. CAFFEY: I think Dr. Rogers' point is well taken that these populations have not been examined by adequate medical methods to detect what might be determined as possible latent toxic effects. Is that not so?

DR. JAY: Except for the study that Dr. Dean described at the last meeting.

DR. CAFFEY: That was pretty sketchy.

DR. JAY: Perhaps Dr. Arnold would like to comment on that. He was engaged in that study.

DR. ARNOLD: That was sketchy in the sense of small numbers, but the population was using 8 parts per million which is way and far beyond what you are contemplating using here.

DR. CAFFEY: The eye examinations which Dr. Dean described, how were they done: by slit lamp examination or by regular ophthalmoscopic examinations?

DR. ARNOLD: By ophthalmoscopic examinations.

DR. CAFFEY: I had not realized that. Were blood examinations done?

DR. ARNOLD: There were complete x-ray and physical examinations made.

DR. CAFFEY: How about blood examinations, were they made?

DR. ARNOLD: Yes.

DR. CAFFEY: How elaborate was that?

DR. ARNOLD: Just blood count and hemoglobin.

DR. CAFFEY: But as you say that was only done on a very small segment of the population involved.

DR. ARNOLD: It was all the population there. We examined in the study town some 127 or 128 individuals, that is, over the age of 15, and in the control town we examined something like 120 individuals ranging in age mostly from about 25 up to 65, with about twelve fifteen, or sixteen or seventeen year olds in each group.

DR. CAFFEY: But outside of that study, there are many communities with natural fluorine in the water which is being ingested in these amounts, and of those how many have been examined in that way?

DR. ARNOLD: I don't know what you mean.

DR. CAFFEY: You say there are so many communities that are taking fluorine or ingesting fluorine naturally in these magnitudes of 8 to 14 parts per million in the water supply, and I want to know how many of those have had complete physical and ophthalmoscopic examinations of the eye or blood?

DR. ARNOLD: In only those two places. Those are the only

two places we studied that.

DR. CAFFEY: Then we may say that in large part the people taking natural fluorine water in these concentrations have not been examined carefully, is that right?

DR. ARNOLD: Yes, you may. There are far more than 21 cities using more than 1 part per million in the drinking water naturally, and it would bring the number of people so ingesting it up into the ten millions.

DR. CAFFEY: And of those only a very small part have been examined specifically for toxic effects presently existing or latent toxic effects?

DR. ARNOLD: Yes.

DR. ROGERS: Would we not be obliged to conclude from the evidence of Dr. Arnold's and Dr. Dean's work presented the last time that there was a very serious question as to the possibility of certain toxic effects from the prolonged use of large quantities of fluorine in the drinking water, and then beyond that lay the further question of the titration, as it were, the establishing of a curve, depending upon a much larger experience with populations at different levels, because they were using 8 parts to 14 parts per million, as I remember it, which is of course vastly different from the 1 part per million which we are contem-

plating using, and as a matter of fact your control in that series had .4 parts per million, is that right?

DR. ARNOLD: Yes.

DR. ROGERS: One part per million is much nearer to the .4 parts per million of the control in which they claim to have discovered no toxic effects than it is to the 8 to 14 parts per million in the groups where they felt there might be some toxic effects. We were very much aware of that, and I was depending upon their continuing their work, so I would like before we get through with this meeting today to hear from Dr. Arnold as to what further progress has been made toward carrying out that further study we were more or less depending on, and also I understand that there is a program contemplated in another part of the country rather similar in character, and perhaps he could give us some information in connection with that program.

DR. CAFFEY: Just in reference to this sentence that was proposed, I thought Dr. Rogers' point was well taken that there are a lot of unknown factors involved, so I don't think a statement should appear that would make anybody feel that the knowledge about possible toxic effects in large populations is really known because two small communities out of the ten million people that are now using natural fluorine drinking water is not a good sample.

DR. AST: I should like to ask the Chairman if he would accept as an addition to his original statement that about 10 per cent of the people who have been examined who are using one part per million of fluorine in the drinking water showed evidences of mottled enamel, this statement: In order to detect that mottled enamel one would have to be very well trained in finding mottled enamel, that the average dentist would not pick it up?

CHAIRMAN HODGE: Yes, that is just the fact. As long as Dr. Arnold is here, we can get him to speak on that because that was just an abstract, not a quotation, from the report of Dean and Elvove over the periods 1939, 1940, 1941, 1942, 1943 and 1944. I think that is the sense of it, isn't that right?

DR. ARNOLD: That is true. That is essentially on the classification we are using for mottled enamel, and I think as Dr. Ast has pointed out many dentists in these areas do not realize there are any mottled teeth involved. Our percentage comes from the fact that we have classified a case as being a case of mottled enamel if as many as two teeth show any evidence of a hypoplasia or hypocalcification. That is quite a severe criterion for saying mottled enamel is present; in fact, I don't think the term "mottled enamel" is descriptive of what we are

talking about there at all. You might change that and say that they showed some evidence of maldeformed (fluorides) rather than speaking of mottled enamel.

DR. JAY: I might amplify that by saying that I am probably the kind of dentist who is not good enough to be able to detect the mottled enamel that occurs in populations using one part per million of fluorine. It is very difficult to see.

DR. CAFFEY: I think these debatable points should be left out of a statement that it is contemplated will be used for soliciting help from foundations.

DR. JAY: If the foundation is going to read that 10 per cent of the population is apt to develop mottled enamel, they will not like it.

DR. CAFFEY: You could discuss that rather than putting it in the statement otherwise you leave a lot of implications that people reading the statement will not understand.

CHAIRMAN HODGE: At any rate, there are no known toxic symptoms that seem to make the use of 1 part per million dangerous to the general physical health or the oral health of the individuals ingesting it in that concentration?

DR. ARNOLD: Right.

CHAIRMAN HODGE: We might put in some statement to justify

why this limit of 0.9 parts per million to 1.0 part per million was chosen. Do you think it should be put in or not put in?

DR. LEVINE: My thought was if you were going to insert it, it should be put in the positive rather than in the negative: There is evidence available to indicate that 1.0 part per million does not induce any toxic effects, rather than in the negative way. I am not so sure, however, that it ought to be inserted, because as Dr. Caffey has said if this is for presentation to a foundation that can be discussed better than having a simple sentence put in.

The only other question I wondered about in this first paragraph is this: The responsibility for reporting the results of the fluorine examinations that have been done by your Division, Mr. Gilcreas, I presume are recorded to the State Department of Health. Supposing it should happen that by inadvertence or accident untoward effects should appear for two or three days. Who would be responsible for taking any action, if any action should be indicated? In other words, there should be a statement as in whom the responsibility should reside as to what decision should be made at the time, if action is needed. I don't know whether you follow what I mean or not?

MR. GILCREAS: No, I don't.

DR. LEVINE: It seems to me personally that we ought to be a little more specific about that point.

DR. GARDINER: I think the Division of Laboratories & Research of the State Department of Health should take that responsibility. It seems to me they are equipped to do it.

MR. GILCREAS: I think so. That is our responsibility.

DR. ROGERS: I should assume it would be, yes.

MR. GILCREAS: To see that something was done to correct any existing defect, the same as would be done in any ordinary treatment of water supply.

DR. LEVINE: Without there being any specific delegation of power?

MR. GILCREAS: Yes, it is axiomatic that if the thing has been set up that it is to carry 1.0 part per million of fluorine if for some reason Newburgh finds that it is running 2.5 parts per million we would do something about it right away.

DR. LEVINE: Let me rephrase that statement then. Supposing we found that 1.0 part per million did yield some toxic effects, who would be the one to decide whether this study should terminate, or whether the fluorine content should be diminished, or what action should be taken? In other words, as this thing is written up, nowhere is there any statement as to a director of

this study. I think that the ultimate responsibility for this study ought to rest upon somebody. If it rests on the Committee, then the Committee ought to be informed periodically of the actual results that are being obtained.

DR. BAIN: But you have to have somebody besides the Committee who is an active director of this, and I agree that that should be stated in this outline of plan.

DR. ROGERS: It does not certainly entirely rest with the Committee.

DR. LEVINE: Right, it is an advisory committee.

DR. ROGERS: We depend heavily on the Committee's advice and will seek it at every point, and would seek it before we made a decision to abandon the study or to change the study, but the authority for it resides with the Commissioner of Health.

DR. GARDINER: Right, but what I meant before, Dr. Rogers, was that those facts when reported to the Committee should motivate them to make certain definite recommendations for action to the Commissioner of Health.

DR. ROGERS: But I think Dr. Levine feels that the Commissioner of Health is a remote entity in this case.

DR. LEVINE: He would not be able to direct it personally in all of its phases.

DR. ROGERS: No, that would be a matter of delegation.

DR. LEVINE: Right, and that is why I posed the question.

DR. ROGERS: I am not sure how far legally and every other way it is his responsibility. Do you think we ought to set up in more detail the intimate organization of the program? Is that perhaps what you feel?

DR. LEVINE: Yes.

DR. VAN VOLKENBURGH: It does not show in the budget.

DR. BAIN: That is a thing that the foundations will want to know about as to who is actually going to be the person responsible day by day for the working out of this study.

DR. LEVINE: That is right.

MR. COX: It is a good point.

DR. LEVINE: In your budgetary setup you have provided for an Associate Research Dentist. I presume that will be full-time, but you have no other full-time people who might review the records from day to day.

DR. ROGERS: What is lacking then is a sort of organization chart?

DR. VAN VOLKENBURGH: An administrative chart.

DR. LEVINE: Right.

DR. BAIN: Exactly.

DR. ROGERS: That is a very excellent suggestion.

DR. VAN VOLKENBURGH: Showing the control of authority.

DR. LEVINE: Yes.

DR. ROGERS: That will be incorporated.

DR. LEVINE: I went ahead of the program, but did so because it tied in with my discussion of the first part.

CHAIRMAN HODGE: Is there any further comment on the section dealing with "Outline of Method"?

(There was no response.)

CHAIRMAN HODGE: We will pass next to "Examinations," the first of which as outlined here is "Dental." Has anybody any comment to make on that?

DR. AST: I would like to offer a piece of information in that respect. We have already completed the dental examinations for more than 1,000 children in Newburgh, ranging in age from five to fourteen, and the incidence of dental caries or I will say the dental caries' experience has affected better than 95 per cent of the children there; that is, more than 95 per cent of the children examined showed evidence of some dental caries' experience.

DR. BAIN: Have you anything on that from the control city?

DR. AST: No.

DR. JAY: Do you have any idea what the D.M.F. rate would be on the twelve to fourteen year old group?

DR. AST: I have all of my data broken down with me, and if you would like after this meeting I would be glad to answer that specifically.

CHAIRMAN HODGE: Is it of the order of 3, 6, or 10, just approximately? Is it like 3, or like 10?

DR. AST: I had better not guess but give it to you accurately. After age 13, 100 per cent of the children examined showed at least one D.M.F. At age 13 it was 7.34; at 14, it was 8.25.

DR. JAY: I can now tell you what the distribution of high and low acid counts would be there. I don't have to run the counts.

DR. LEVINE: Are these dental examinations made by the one man?

DR. AST: Yes, by Dr. Finn, and it is the sense of the Committee I think that the same examiner will make the examinations in both the study and the control areas throughout (the duration of) the study.

DR. LEVINE: ^S If he one of the dentists who can detect dental fluorosis when it is present even in slight degree as has

been stated?

DR. FINN: No. I think I will have to be a little more informed on that before I can recognize it definitely.

DR. AST: It is expected that Dr. Finn will secure the necessary knowledge so that he will be able to make lactic acid bacillus counts, and by viewing some of the areas where endemic fluorosis is present he will recognize readily this mottled enamel where it is present.

DR. LEVINE: One further stupid question is this one: Is there any reason to believe that the dental caries' experience in Kingston might be different than that in Newburgh?

DR. AST: I would be guessing, but I have no reason to expect any difference.

DR. LEVINE: You are not planning to examine 1,000 children in Kingston, are you?

DR. AST: Yes. The only reason we have not done so yet is because the school year came to a close before we got to it.

DR. JAY: Are they both surface waters?

MR. COX: Both water supplies are surface, and they are both filtered, both treated with the same chemicals, though in different doses to some extent, but --

DR. JAY: Both are surface waters?

MR. COX: Yes, upland reservoirs. The Newburgh supply is slightly more mineralized than the Kingston supply, but not to any marked extent. I mean by that that the hardness and alkalinity of the Newburgh supply are slightly higher than the Kingston supply, but otherwise they are substantially the same.

DR. JAY: And there are no striking racial differences in the two towns?

DR. AST: No, the communities are comparable in as many factors as we could possibly get them to be so far as population groups, size, climatic conditions, economic status, etc. The communities are thirty miles apart, both on the Hudson River, which I suppose has some bearing even though they do not use Hudson River water.

DR. VAN VOLKENBURGH: Is the age distribution the same?

DR. AST: Yes, sex, age distribution, color, are comparable. That was all presented in the paper before the American Water Works Association in detail. We went over that very carefully.

DR. BAIN: Do you expect to do any dental examinations on the children under five, for instance, those you are going to do special pediatric examinations upon?

DR. AST: We should like to, and if the chances present themselves we will, but I did not put that in the plan because

I could not see how we were going to get to them with our one examiner, with the large number of children that will have to be examined in both the study and control areas. There are about 3200 in each community who will have to be dentally examined, 3200 children.

CHAIRMAN HODGE: Are there further questions about the dental examinations?

DR. MATTISON: Although dental examinations are to be done in both the Newburgh and Kingston groups, there is not any mention of salivary examinations except under special studies which would be done in the Newburgh group. Would that not be indicated in the Kingston group as well?

DR. AST: It is intended that the salivary examinations will be made in both to tie up the lactic acid bacillus counts with the incidence of caries in each instance.

DR. MATTISON: That appears only under special examinations that are to be done in Newburgh, and that is the reason I raised the question.

DR. AST: We will take that point up when we come to special questions. I have a note on that which will clarify it, and we will take that up later.

CHAIRMAN HODGE: Is it fair to assume that you have each

read the next page or so under the heading of "Pediatric Examinations"? If you have not, will you say so because to expedite this discussion we would like to bring up only those points on which there is special question?

DR. BAIN: I have read it, and I don't understand what you mean in connection with those 500 children. Are you going to pick 500 scattered through all the fourteen years, which will mean 36 out of each year group? Is that the idea?

DR. AST: Right. There will be about 200 of those children who will be in the two to five-year-old group, and about 300 in the five to fourteen-year-old group. That was the intent, Dr. Bahlke, when we went over that, was it not, that there should be 200 in the pre-school group and 300 in the school group?

DR. BAHLKE: Didn't you say the figures would fall in just about that way, that if we took a random sample that would be about what the distribution was?

DR. BAIN: What I am after is this: What are you going to do with those 500 children? Are you going to carry on those 500 children each year?

DR. AST: Yes.

DR. BAIN: The fourteen-year-olds this year are going to be fifteen-year-olds next year, and so on, so they will be gone

in a few years, so you have eventually only a few left.

DR. AST: We plan to add to them each year.

DR. BAIN: Oh, you plan to add to them each year?

DR. AST: Yes.

DR. JAY: Then it is more of a cross-section study which will result than a longitudinal study?

DR. AST: We will not be able to do a very good longitudinal study with that group.

DR. BAIN: I don't think in ten years you will have many left out of the 500 you started with.

DR. AST: Not in a longitudinal study.

DR. BAIN: Isn't it your point to attempt to do a longitudinal study?

DR. AST: Yes, that is one of the points we will have to discuss how we will get to a longitudinal study. One of the suggestions that was made was that if we could get to an institution where children were kept from birth or from twelve to eighteen months and carried through to fourteen or so, twelve to fourteen, if we could get such a population, that would lend itself very well to a longitudinal study. We have taken that question up, and if you would like us to discuss that now I will be glad to tell you what our present discussions have been on it.

DR. BAIN: If you want to.

CHAIRMAN HODGE: I think we might just as well bring that up now, Dr. Ast, as later.

DR. AST: The question of a longitudinal study is one that has troubled us no end. We realize that if we are going to get worth while data it will have to be from a longitudinal study. We gave consideration to one institution not very far from Newburgh, a Catholic children's institution, where they had children from age two to fourteen or sixteen. I think they had a population of between 500 and 600 children. They had their own well water supply, and Mr. Cox has advised us that it would be quite feasible to fluorinate that water supply if there was any competent personnel in the institution to regulate it. Dr. Chant has investigated this institution, and has learned that in the past two years they are not keeping their children over any extended period of time, so we have had to drop that idea.

We then raised the question as to whether or not it was feasible to fluorinate an institution's water supply even in a city by fluorinating it at the intake, and Mr. Cox said that that is feasible, and perhaps he would like to amplify that. If that is possible, we should be able to get an institution, even an institution in the City of Albany, for example, the Brady Infant

Home, where they have children from birth through age six, which would give us some data, plus perhaps another institution where they had children from two to fourteen. If that is practical, I think we can work a longitudinal study. Do you want to discuss that?

MR. COX: It so happens there is a small chlorinator of the type manufactured by several companies intended for use in summer camps and small hotels that is actuated by a meter and that has a self-contained pump that would force a sodium fluoride solution into the water supply proportional to the rate of flow, and the matter of supervision can be simplified. Incidentally a very weak solution of sodium fluoride would be injected because the total weight per day would be so low. The only difficulty that might occur would be if the chief engineer, or a janitor, or somebody that might do the actual work, made, say, a 10 per cent solution instead of a 1 per cent solution. That, in turn, can be avoided by a technical representative of the institution, or even some of our own staff, preparing quite a sizable quantity, a barrellful, for instance, of the proper solution, because that would have to be done so seldom. In that way the man who would be operating the unit would not be directly responsible for the only weakness as I see it in this setup, namely, the preparation

of a solution by weighing out so much sodium fluoride and adding that to so many gallons of water. That is inherently extremely simple, but that is, as I see it, the only error possible, because if it is intended to use so many quarts of that solution per day the unit would not be able to add more than several times that, whereas if he had made a 10 per cent solution with a quart, instead of a 1 per cent solution, that could be serious. With a gallon it would be four times that, you see, making a total difference of 1 to 4. After much thought it occurred to me that that one weakness might be avoided by having some technical representative of the Committee who would be responsible for the preparation of the solution, and the rest of it would be very easily taken care of by the janitor or chief engineer, because most institutions have a pretty intelligent type of man in charge of that work.

DR. LEVINE: That would not require an analysis of the work routinely?

MR. COX: We could supplement that from time to time, but not a routine control, no.

DR. BAIN: Are there really institutions in New York that keep children for that many years at a time, just keep them on and on? I really thought New York was kind of an enlightened

state, and I did not suppose there were many institutions that would keep children over such a long period of time.

DR. GARDINER: Oh, yes, there are some. For example, at the Brady Home they keep them to age six, and then send them to another institution.

CHAIRMAN HODGE: If this point has been discussed adequately we will pass on to the next sub-division.

DR. JAY: I would like to bring up a very touchy problem. As I expressed myself in a letter to Dr. Rogers, I am afraid that there is a possibility that this project might die of overweight. It is so elaborate, and I am wondering if it need be. I am referring specifically to the physical examinations and the laboratory examinations over so large a group.

CHAIRMAN HODGE: That certainly is a very timely point. I don't know whether there is collusion here, but I could not imagine any better comment for introducing the next thing Dr. Ast wants to say. I will now turn the meeting over to Dr. Ast. He has several of these questions he wants to discuss, with the idea of cutting down the total number of things that are to be done. I suspect a good many of us feel sympathetic with your point of view, Dr. Jay.

DR. AST: There are some five points that members of the

Department have been discussing for some little time trying to determine whether or not all of the recommended examinations, physical examinations, laboratory tests, x-ray examinations, were absolutely essential in this. The questions came up because of the difficulty in getting personnel and the cost involved. For example, the first point I have here is: In view of the fact that competent personnel is not readily available today, would it be feasible to confine the x-ray and pediatric examinations and the laboratory tests, exclusive of salivary analysis, to the Newburgh children only? This suggestion is made on the premise that the normal development and growth for the various age groups is well established, and therefore only changes from the normal among the Newburgh children would be of interest in this study. If, however, changes should be detected, examinations could then be made on a sample of the Kingston children for comparative purposes.

DR. BAIN: Of course the premise there I think is not correct.

CHAIRMAN HODGE: What premise?

DR. BAIN: The premise that normal limits of growth and what not have been established. Who wants to say what the normal size of any child is? That was my point. What criteria would

you use in deciding whether the children were normal when you got this material unless you had a control group? What good is your skull measurement, or what good is your height measurement, unless you are weighing that against a control group? I say that because there are no absolute figures on how big a child should be at any particular age. Maybe you don't need any measurements, but if you are going to do measurements you have got to do them against a control group.

DR. CAFFEY: I think that last statement of Dr. Bain's could be questioned. There are a lot of good normal measurements from studies that normal child development clinics have made, in Boston and Denver, for example. The development of the skeleton is I think better established than we could establish it by taking x-rays of children in Kingston, for example. This thing came up, this question of how useful the x-rays in Kingston would be, before. I don't think they would be of any use because I, myself, would use the Voight's figures from the Harvard Child Development Clinic where they studied children at different age levels, and carefully excluded some on clinical examinations. In our discussion of this for the x-ray part of it, I recommended that we do no x-ray of children in Kingston. You, Dr. Ast, perhaps remember that came up. I think it would be a useless

procedure unless Dr. Ast wants to emphasize the service feature here. You would have to be careful what you got down if you are going to present this as a service, but I would rather compare the x-ray changes in Newburgh with what is known about normal bone density than to use an inadequate statistical group from Kingston. Therefore, I think in view of the expense of the roentgenologic examinations we should confine our x-ray of children to Newburgh. It is not to be expected that any toxic signs will turn up in the Kingston children, so how would you use this small group? As a control group? Statistically, I do not believe they are sufficient or there is enough of them to do that. I do not think you will x-ray enough to establish the normal for all children or even for the Kingston children.

As to weight and height, I should think there are good standards. There have been thousands of normal children analyzed carefully statistically for weight and height.

DR. BAIN: That is right, but you can get a different height for the Harvard than for the Denver, and different for the California than the New Haven, and still different for the Cleveland group. You can take any one of those groups and get a different norm.

DR. CAFFEY: You have to use wide limits of norm, and that

applies in Denver, and Kingston, and California. People using normals have to use a wide range of normals, just as I gather from the teeth mottling there is a wide range of normal.

DR. AST: Is it feasible to make one examination for the Kingston children at the outset of this study as well as for the Newburgh children, and then not make any further examinations of the Kingston children unless we find what seems to be a deviation from the normal in the Newburgh group?

DR. ROGERS: I don't see any point in making the first examination. I do see a point, however, in registering the group to be examined. That is a somewhat subtle point and perhaps I am overdrawing it, but it simply means this: at any given time in the future after you have studied the problem and something turns up, if you have gone to Kingston first and registered your 500 children, after two years, say, you can pick them up at any given time, so it means something with regard to their state of health the fact that they are there to be obtained and examined. Therefore, I think we should register the two groups simultaneously and keep within that register. If the child is removed from the community because he has tuberculosis, if we did not register him to begin with, we would go into Kingston, and that child would be out, you see. I don't know whether

I have made my point clear as to the necessity of registering both groups, but I think it should be done and I don't see any point in going beyond that register.

DR. CAFFEY: I think that is a little different problem than limiting the roentgenologic examinations to the Newburgh children. I agree with the point made by Dr. Jay that this study could be made top heavy, and I think one of the top heavy features is examining these normal children for comparison, for example, let us take something I am familiar with, bone, unless there appeared to be a marked deviation in the Newburgh children.

DR. ROGERS: Don't you think we even need to have a steering group in Kingston if we found an appreciable abnormality creeping into our Newburgh group?

DR. CAFFEY: It might be desirable, but I can't see now that you would use it.

DR. MATTISON: Could we have an expression of opinion as to the purpose of these pediatric examinations? Is it for the purpose of establishing comparability of groups or is it for the purpose of picking up any toxic reactions? If it is for the former purpose, then our control will be important. If it is for the latter purpose, the first examinations will be done in Newburgh, and nothing that you could get in Kingston later on

will do you any good; but if it is for the purpose of establishing comparability of groups then you have to have simultaneous examinations of both.

DR. CAFFEY: The dental examination, of course, has to be done in both, but I think that is all you have to do in the Kingston group, or whatever the dentists want for the effect on the mouth.

DR. LEVINE: What does this first sentence on page 2 mean: "A group will be selected and registered simultaneously in the control area but comparative examinations will not be made unless indicated"?

DR. AST: That is the point Dr. Rogers just made.

DR. LEVINE: Why do we say it is overweighted then? On the basis outlined here you are not planning to make examinations in the control area unless indicated.

DR. ROGERS: Dr. Caffey now thinks it is not necessary to make roentgenologic examinations in the control area for established norms could be used for comparative purposes.

DR. LEVINE: That seems to be taken care of as you have it outlined in the first complete sentence on page 2, so I don't get the point about the overweighting.

DR. CAFFEY: In the original plan we were going to set up

an x-ray outfit in Kingston. It seems to me now that would be superfluous for the purpose of the fluorine study. I don't think it would be useful.

DR. LEVINE: I don't follow that.

DR. AST: This sentence was put in in addition to the studies which we had determined on previously. Probably this sentence might better have been left out of the plan until we had determined that that was the proper procedure because in our discussion with you, Dr. Levine, we had determined that examinations would be made in both communities.

DR. LEVINE: In other words, this was in answer to the question that Dr. Jay raised?

DR. AST: I am anticipating approval.

DR. LEVINE: In other words, I have not approved of this until now? (Laughter)

DR. AST: That is right.

DR. LEVINE: I would think if you can get serial longitudinal examinations of the youngsters starting at an early period in the City of Newburgh that that is a better control for our purposes if you can follow them at every three months, or every six months, or whatever period you arrive at, than to have a cross-section of another group of children in Kingston. I do

think in some of the special examinations it may be difficult, for example, not so much height, weight, and anthropometric measurements but I am thinking in term of audiometer readings, it may be that only 5 or 10 per cent of the children in the City of Newburgh may show some deviation in hearing of a relatively minor degree as the result of fluorine and otosclerosis. We don't know then whether that 5 per cent or 10 per cent is a normal deviation or whether it is the result of fluorine, whereas if we had an analogous group in Kingston we might say, "Well this age period does not result in a reduction in hearing of 5 per cent or 10 per cent in the high pitch planes." I am speculating entirely.

Lately there have been studies going around indicating that all children have a riboflavin deficiency⁺ of Vitamin A. They are visible by slit lamp studies. If you in your Newburgh studies find there are certain deficiencies determined by the slit lamp, are they the result of riboflavin deficiency or are they the result of fluorine? You might need a comparable group in Kingston to differentiate the causation of these defects.

DR. GARDINER: In other words, the variables that ordinarily exist in any community.

DR. LEVINE: That is right.

DR. ROGERS: This register control could take care of that, and you would not have to examine the children in the control area until it was determined to study some special deviation.

DR. LEVINE: I am not so sure it would not be desirable to have certain of the specific examinations done on a group of children in Kingston, particularly those in which there are no standards available.

DR. CAFFEY: That is what I was going to say, for opacities of lenses we have no standard, but let us eliminate things we do have standards for.

DR. LEVINE: That is right, so if this were put, "A group will be selected and registered simultaneously in the control area, and comparative examinations made if indicated," and then raise the question as to whether certain studies ought to be made on that group in issue, I would be perfectly content to lower the ante. How about you, Dr. Bain?

DR. BAIN: Yes, I would agree with you on that I think. On the height and weight stuff I would agree with you because I would rather see those eliminated and just not do them if you don't have any base to put them against for I don't know what standards you would take.

DR. LEVINE: You mean to eliminate those examinations in

the Newburgh children?

DR. BAIN: Yes. Why do them if you have not anything to balance them against?

DR. LEVINE: Because of the serial study. If these children in a certain age group are not gaining two or three inches in height a year, it might be that the fluorine might tend to stunt growth, whereas if they are making the average gain in height then we might assume that falls within the realms of normal. It is an approximation, true, but unless you go into real statistical analysis I don't believe that a difference of a tenth of an inch or even a quarter of an inch per year is going to matter much even if you found it in the two areas, in Newburgh and Kingston. I would like to see height, weight and complete physicals done on these children.

DR. BAIN: It would take somebody who was a pretty good measurer to do those, if any reliable data are to be drawn therefrom.

DR. LEVINE: If the same person does it all the time, I think they develop a certain degree of adeptness.

DR. ROGERS: What is the status of Watsell's work trying to standardize certain factors?

DR. LEVINE: I think it is very good.

DR. ROGERS: Would that be an aid to us?

DR. LEVINE: You would not have to do it on the whole 500, but you might do it on a sample group. It would show you a trend as to whether the child was growing according to his own norm.

DR. ROGERS: Do you think it would be fair to say this then: Since it is the relative growth of the child that we seem to be arriving at as an objective rather than his comparison with another group, which might mean nothing even if we did them in Kingston, we have a right to say that Kingston was normal, or Boston was normal, and so on, so it is relative growth, isn't it, of the child against his own expectancy that we are concerned with?

DR. BAIN: Suppose he is not going along as he should, are you going to infer that that is due to the fluorine if you have not anything to back it up against in the other group?

DR. ROGERS: If they are out of the disproportion of children, and not growing normally, I should think we would have to take stock of that, would we not?

DR. LEVINE: Then the burden of proof would rest on you to prove it was not due to the fluorine.

DR. GARDINER: If it is to be expected if we examined in both cities that there would be a similar set of findings.

DR. LEVINE: Yes.

DR. GARDINER: But have we any way of assuming that, and if there were then could we eliminate Kingston if when we started they were parallel let us say?

DR. ROGERS: Would we have to go to Kingston? Isn't there data available from these other studies even if there is not the same for this city or the other city? Does it not all when put together indicate what a normal trend is in a certain age group?

DR. BAIN: I wish it did. I think it is terribly difficult to say what is a normal in anything.

DR. CAFFEY: I don't see why we can't use the standards that are used in ordinary pediatric practice. Admitting they are not accurate from the standpoint of millimeters, why can't we use in this study the standards that are used in good pediatric practice, for instance? You cannot do any better than that.

DR. BAIN: Most pediatricians are getting away from standards because they are so difficult to use. They judge the child's individual ^{growth?} group in relation to his body build and not in relation to other individuals.

DR. CAFFEY: They still measure and weigh babies.

DR. ROGERS: Is the examination of 500 children going to advance our state of knowledge if this is as insecure as it

apparently is? 500 is a pretty small number.

DR. BAIN: Very small, I know it is.

DR. ROGERS: Would it really be worth doing?

DR. BAIN: That is why I raised the question as to whether the weight and height is going to give you anything really significant. Dr. Levine thinks it is. Maybe it is.

DR. LEVINE: I would like to expand my point of view on this. The question was raised whether the physical examinations or the special examinations were more important in so far as this particular study is concerned, and I took the position that the physical examination could be done not necessarily by a specialist in pediatrics, that any good competent man could do a decent physical examination, providing we had substantiation of the findings by the special examinations tested directly for fluorine intoxication. If these special tests could be done, it seems to me the physical examination is not terribly important. We ought to have one, and we ought to have a good one, and done by a competent man, but he does not necessarily have to be a pediatrician providing we get all of those special tests or those that we think important done. Would you agree with that point of view?

DR. BAIN: I will agree with that.

DR. ROGERS: You would just do the physical examination once?

DR. LEVINE: No, I think I would do the physical examination at the beginning, and I would do it periodically thereafter, not necessarily as often as the special, but I think it would be poor medicine to do one physical examination and then not follow your children at all.

DR. AST: Would a physical examination annually be sufficient?

DR. LEVINE: Not in infancy. It is considered good pediatrics to do a physical examination on a child every three months up to six or seven and then every six months thereafter, and I think we ought not to lower those standards. They ought to conform to good pediatric practice, but not any more than that.

DR. BAIN: That is not the real supervision that the child is going to get. I judge he will probably be seen by his own physician as well. This is additional information, so there is no reason for doing more examinations than you are going to get information out of.

DR. LEVINE: Is this additional information or is this examination the only examination the children are going to get?

DR. AST: We don't expect the people of Newburgh to stop taking their children to physicians because we are putting on this study there. They are taking their children now to pediatricians, whether they are taking them every three months as would be considered good pediatric practice I don't know. However, I think it is very important to emphasize here that we must always keep in mind the primary objective of this demonstration. It is to determine the efficacy of fluorine in reducing the incidence of caries, and these additional studies are all safeguards to see whether we are getting into any trouble with the use of fluorine in other directions. The question, therefore, boils down to how many of those safeguards do we really need.

DR. CAFFEY: Suppose at the end of one year someone poses the question as to whether the use of ^{fluorine} fluorine is affecting the growth or development of these children, if you don't weigh and measure them how are you going to answer it?

DR. BAIN: And I might raise the corollary to that: If you do weigh and measure them how are you going to tell the answer to it?

DR. CAFFEY: These children are the same size and same weight that normal children are according to the standards that are used. We can't devise new standards of measuring weight and

growth in this demonstration.

DR. JAY: Let me swing the pendulum in the opposite direction. Some reference was made to studies that we are contemplating at Michigan. I think that is what you had in mind, Dr. Rogers?

DR. ROGERS: Yes.

DR. JAY: We are about to proceed to fluorinate the water of Grand Rapids, Michigan, which has a population of 160,000, and we are contemplating no physical examinations at the present time. The examination is going to be dental and salivary. Now then should the studies which are being continued by the Health Service point out any untoward effects through long exposure to fluorine, should we consider that? At the present time we are not going to do physical examinations except as I have indicated. We are simply going in and examine the children dentally and fluorinate the water just as soon as we can get the necessary machinery.

DR. AST: May I ask Dr. Jay if that study in Michigan had the blessing of the United States Public Health Service?

DR. JAY: Yes, sir. It is a study by the Michigan Department of Health in cooperation with the University of Michigan and the United States Public Health Service.

DR. ARNOLD: Not quite that.

DR. JAY: That is they are going to observe it; we are going to do it.

DR. ARNOLD: Yes.

DR. CAFFEY: How do you expect to pick up toxic effects if you do not make physical examinations or are you just not anticipating any?

DR. JAY: We are not anticipating any because we have not seen any in any of these other areas where there is fluorine in the water supply naturally in larger concentrations than we anticipate using. If you have worked in the Panhandle of Texas and seen those chaps who have been brought up on that water, I don't think you would expect to find any effect on the growth curve either unless it makes them taller. They are awfully husky people.

DR. CAFFEY: I think both Dr. Pomeran² and I agree that the roentgenologic findings will undoubtedly be negative, but if this Committee was set up to provide reasonable tests for possible toxicity I don't see how we can escape doing some of these things.

DR. JAY: I can see that. This is an admirable study, if it can be done.

DR. ROGERS: It seems to me that it has really got to be

done some time. This fluorination idea is threatening to take the country by storm, so I think there is a certain responsibility for one group and possibly two groups to do a thoroughgoing piece of work to determine its efficacy or lack of efficacy. Perhaps the obstacles are maddening rather than difficult, but if the thing is going to be widely used, as now seems apparent, it is my opinion that a basic study of this kind ought to be done somewhere for the record. That does not mean that Michigan should do it, or the Canadian community that is about to fluorinate its water supply should do it. We have sort of taken it unto ourselves to do a thorough job, and I don't see where we are relieved of any of that job by anything that Jay has said.

DR. JAY: I think it should be done if it does not endanger the experiment.

CHAIRMAN HODGE: I think that's the point. The essentials of this are to put some fluorine in the drinking water and to find out if there is a decrease in caries and anything else that happens in the mouth. That is the meat of it, isn't it, and we can dress that up with as much as we can afford to?

DR. LEVINE: I would not take that position, Dr. Hodge.

DR. CAFFEY: Nor I.

CHAIRMAN HODGE: From the standpoint of a good experiment

we should have as much information on an adequate control series as on our experimental series. I don't think there is any way we can get around that, and if we omit these control figures I dare say we will regret it indefinitely. On the other hand, I feel with Dr. Jay that we should not insist that so many safeguard tests be run as to make the fluorination experiment impossible.

DR. LEVINE: My position would be this: If there was evidence available to indicate that there were no toxic effects on growing infants prior to permanent dentition, your point is well taken; but since I am informed by everybody here that no studies have ever been done to indicate whether or not there are toxic effects -- and potentially there are in higher concentrations -- cataract formation (something I did not know about until the last meeting) and the effect on the nails, and since we do not know whether those effects are present in lower concentration in infants than in adults, then it seems to me we must take the position that we have got to safeguard those infants. That to me is as important a position as the effect on the local situation in the mouth and teeth. In other words, if you can assure me that there will not be any toxic effects in infants during the rapidly growing period from birth to the

second year of life and in the pre-school period, then I would accept what you say unequivocally.

DR. ROGERS: There may be even beneficial effects.

DR. LEVINE: Yes.

DR. ROGERS: Other than on the teeth.

DR. LEVINE: Yes, an article just appeared last week in which a man says he relieves otosclerosis and deafness by giving fluorine. Well, if that is so, it would be nice to know it.

DR. JAY: If there are no ill effects at fourteen, can't we assume there were not any during infancy that were important?

DR. BAIN: No.

DR. LEVINE: That is a good question. I don't know.

DR. BAIN: How do you know if they are still alive? How do you know they are still here?

DR. JAY: And what is the importance of knowing if they are still here?

DR. BAIN: How do you know they are not dead?

DR. CAFFEY: That could be answered by finding out if there was a higher infant mortality rate in the communities using fluorine in the drinking water.

DR. JAY: Yes, if there is a difference in the mortality rates and the areas using fluorinated water had a higher mortality

rate, that would be the subject of special study; otherwise if there was no difference it would not be necessary to go into that.

DR. AST: If we took a community like Colorado Springs, where there are 2.5 parts per million of fluorine in the normal drinking water, and found out the infancy mortality rate there, and did the same thing with other communities where there are naturally higher concentrations of fluorine in the water supply than we are contemplating using, and compared them with other communities where there is none, we could learn very quickly whether they had a high infant mortality rate in such communities or not, and if they did we would have to determine further whether or not that was due to some other cause than the fluorine

DR. BAIN: It would seem to me a well controlled study like this can do more to encourage the fluorination of water supplies than anything else because we do not have that data available now, and until we do we will not know whether we should go ahead or not. Until such data as we contemplate getting here is secured, everybody is going to be in the position of not knowing just how far to go on this.

DR. LEVINE: At the last meeting Dr. Dean, who apparently is very enthusiastic about this subject, was opposed to this study because I gathered he was afraid of potentially toxic effects.

Was that the reason or was there some other reason? I did not quite understand what it was. His reaction unconsciously tempered my feeling and made me sure we ought to have added safeguards, as many as possible; if an expert in the field was opposed to a study like this because he does not think that a study like this is ready for mass distribution, then I would think that if we are going to do it we must protect ourselves.

DR. ROGERS: Could we ask Dr. Arnold to expand on the attitude of the Public Health Service in apparently blessing the Michigan study and refusing to give its blessing to the New York study?

DR. ARNOLD: I think we had better straighten out a little bit the statement of what Dr. Dean's stand was when he was here and how that might be different now. After all since he was last here we have had some results of two or three different experiments, being run principally by Dr. McClure. I think the main one has to do with a study relative to feeding fluoride waters, that is synthetic sodium fluoride waters, at 1.8 parts per million and also natural waters containing that. In the studies on humans where they studied all the excreta from the body, they can show no difference in the amount of fluorine excreted between those two waters. In regard to studies on the

cumulative effects of fluorine, Dr. McClure has been unable to show any evidence, especially in the lower concentrations that we are speaking of here of 1 and 2 parts per million, where fluorine is not being excreted as fast as it is being taken in, so that puts a little different light on our findings in Texas entirely. If you go in, and you are unable to demonstrate where there is any storage at these levels, and also you go in and demonstrate that a synthetic sodium fluoride water is acting the same from the standpoint of excretion, in sweat, saliva, and urine, the same way as in a naturally occurring fluoride water, that is, being excreted the same, then you are on much safer ground when you put fluorine in the water supply, because we do have examples of mass numbers of people using fluoride waters in much higher concentration than we are talking about here, of course in natural occurring fluoride waters.

DR. ROGERS: What were the age groups of those populations?

DR. ARNOLD: The study on excretion was from a group out in Illinois of conscientious objectors. They were in the 21 to 28 age group.

DR. ROGERS: But you have not made any studies as to the possible cumulative effect of fluorine on the perivascular system of aging individuals?

DR. ARNOLD: The only evidence we have along that line is that he has made studies on the excretion of fluorine in the urine, sweat and saliva down into the high school age group, and he can show no evidence of any storage, because if you are drinking water with 1 to 2 parts of fluorine in it per million you will be excreting 1 to 2 parts.

DR. ROGERS: I was particularly interested in the age group where you expect certain renal ischemia, or arteriosclerotic changes, or other metabolic changes from aging, which was one problem we discussed the last time, and where there is a large gap of information, and where the cataract problem probably assumes its greatest significance, the older age people.

DR. ARNOLD: We have not made any further studies in regard to that, although the plans are to carry those studies out. It is a question of personnel, etc., in carrying those studies through, but they will be done in fluoride areas of higher concentration than 1 part per million for the simple reason that your chance of demonstrating the effect of fluoride certainly must be greater if we are working with 2, or 3, or 5 parts per million, than with 1 part and less per million.

DR. ROGERS: You are going ahead with that?

DR. ARNOLD: Yes.

DR. ROGERS: And they will include all age groups?

DR. ARNOLD: We are planning studies now to do that.

CHAIRMAN HODGE: I think that is a reassuring statement.

About our discussion for the past few minutes, I wonder if this is the sense of it: that if we find someone who is willing to put in enough money to cover the examinations of the groups as described both in Newburgh and Kingston we will. It will be fixed for the numbers of people examined with as many measurements as have been listed here. I think any one of us could sit down and double this list in the course of a half hour. I bet I could do it in fifteen minutes. There are fourteen things set down as to what the general physical examination will consist of, and I bet I could write another eighteen in fifteen minutes that we could measure on population groups that might be related to fluoride action. Fluoride is a most extraordinary substance. It gets into all sorts of things.

DR. LEVINE: I could cut this list of fourteen items by saying a general physical examination and not list these at all. I don't think that is necessary; as a matter of fact, I was not in favor of listing the type of examination, because this is what an examination consists of, and it is not necessary to itemize the things that ought to be looked for. When you do an

examination, you inspect the nose, throat, mouth and pharynx. Therefore, I would eliminate all of this if you think it is too formidable. However, from a practical point of view, Dr. Hodge, I think if you are going to approach a private foundation for support, you are much more likely to be listened to sympathetically if you present a control study than if you present a service study.

DR. BAIN: That is right.

DR. LEVINE: If you cut this too much your chances of getting money from a private foundation I think are much less than if you show them you are trying to do a well controlled study.

CHAIRMAN HODGE: It will be good to have this information on both the control and the experimental groups. I assure you that when this thing is completed, and the ten-year report is written, there will immediately be available to us at least these many more things we should do on the next study, so I think the way we should feel about this is that these are desirable, we need to have some sort of safeguards, but we are also faced with the necessity of keeping the numbers and types of examinations to a group that can be done. Therefore, for the purpose of the moment, would we be willing to do our examinations

only on the Newburgh group if it is that or nothing?

DR. LEVINE: May I word that a little differently: that under ideal conditions control examinations ought to be done periodically in the Newburgh and Kingston groups; less favorable but almost as ideal the examinations in the Newburgh group alone with a primarily examination on a similar series in the Kingston group; then under less ideal conditions no examinations but registration of the Kingston group and the serial examinations on the Newburgh group? Is that what you had in mind?

CHAIRMAN HODGE: I think that really covers the ground.

DR. ROGERS: Then the Committee in its judgment would allow us to move down that scale according to the necessities but would approve even the third if need be?

DR. LEVINE: I, personally, would. I don't know how Dr. Bain feels about it.

DR. BAIN: I don't know. I got lost a little bit in those various ones, but I think I probably would go along with that.

DR. ROGERS: There were three points.

DR. BAIN: It is desirable to do the complete thing with the control group as well. That is the most desirable.

DR. ROGERS: Yes. The second was the complete Newburgh

with selected examinations in the control group in Kingston, is that correct?

DR. LEVINE: Yes, or to restate it, the examinations in the Newburgh group alone with a primarily examination on a similar series in the Kingston group, with a registration of the Kingston group.

DR. ROGERS: Right.

DR. BAIN: Yes, I would go along with that.

DR. LEVINE: The third was the registration alone with selected examination on special indication only.

DR. LEVINE: Right.

DR. BAIN: Yes, it is all right.

DR. LEVINE: Is that all right with you?

DR. BAIN: Yes, that is all right with me.

CHAIRMAN HODGE: That certainly gives the people who are to run this thing all the latitude in the world I should say. I don't know what other advice we could give. If we had all the money available that was required, we would know better what to say.

DR. ROGERS: I will tell you what you can do to help: assign a pediatrician to the study full-time.

CHAIRMAN HODGE: These days it is more personnel than money.

DR. JAY: Off the record.

(At this point Dr. Jay spoke off the record.)

CHAIRMAN HODGE: I believe that takes care of the general plan. There are some special tests that Dr. Ast would like to mention.

DR. AST: In regard to the blood studies, is it essential that bone marrow smears be taken? It must be considered that working with a community group, outside of an institution, presents certain difficulties which are not encountered in an institution. It may not be possible to get the consent of parents for procedures which may be considered routine in an institution. What is the possible danger of doing this test outside of the hospital? It is also well to consider that anemias have not been observed in cases of fluorine intoxication, except in the severest types of osteosclerosis; also osteosclerosis results only after long continued ingestion of fluorine. Therefore, are we justified in making this examination on infants and young children? If, however, there are any changes from the normal in the routine blood analyses, and if these changes persist in repeated examinations, it may then be possible to induce the parents to permit the taking of a bone marrow specimen for examination.

CHAIRMAN HODGE: Comment?

DR. LEVINE: I think that is a reasonable point of view. However, specifically certainly in the experience of thousands of cases there are no dangers to it if done skillfully inside or outside of an institution. Again the question arises whether any studies have ever been done on infants with prolonged fluoride ingestion with relation to anemia because you get degrees of anemia which are not visible except by examination. I think your point about restricting bone marrow studies to those children who show anemia by routine studies is well taken, and I see no objection to modifying the present arrangement from routine bone marrow smears to those done when indicated. How do you feel about that?

DR. BAIN: I am no hematologist, but as far as my knowledge goes I would certainly agree with that.

CHAIRMAN HODGE: That sounds reasonable. Is there any further comment?

DR. GARDINER: Is it a practical thing to do a study like this on school children? You know people who work in hospitals take the attitude usually that anything that is done in a hospital you can do anywhere, and there will be the same reaction to it on the part of the patients and the family. Well, that is not the

case, and in work like this done outside of the hospital I foresee quite a little difficulty.

DR. LEVINE: That may be true, but presuming that you do get anemias shown up in infants by routine studies, and you want to determine definitely whether fluorine plays a role, or whether you ought to stop the study because of the anemia, would you on that basis not go ahead and do bone marrow smears rather than stop the study, or would you stop the study rather than try to get the bone marrow smears?

DR. GARDINER: You can try to, but outside of an institution I can foresee difficulty.

DR. BAIN: If you got an anemia from the routine studies, you are going to see that that child is sent to his own physician for treatment, and it might be you could get the cooperation of that private physician to get a bone marrow smear.

CHAIRMAN HODGE: How do you do a bone marrow smear on an infant?

DR. LEVINE: It is a very simple procedure. You take a small needle -- I don't know the exact gauge -- oh, about a quarter of an inch long, and you merely insert it in the sternum just below the second space, and you get a small amount of blood, and put it on a slide. It is done routinely in most institutions.

DR. ROGERS: Do you have to use a local anesthetic?

DR. LEVINE: Not in an infant or a young child.

DR. BAIN: They are beginning to give a lot of transfusions.

DR. LEVINE: They are giving bone marrow transfusions almost routinely.

CHAIRMAN HODGE: That does not sound as though that would be too rigorous.

DR. BAIN: It's just the idea that troubles most parents.

CHAIRMAN HODGE: But the parent of an anemic child would be willing to go a long way I believe to secure treatment for such a child.

DR. LEVINE: Right.

CHAIRMAN HODGE: What is your next point?

DR. AST: In regard to urine analyses for fluorine, we are advised that this is a most difficult laboratory procedure, to be made only by specially trained, highly skilled chemists. We are advised that in our State laboratory, where adequate facilities and skilled personnel are available, this test has presented difficulties which have not yet been overcome. We are also advised that this skilled personnel cannot be used for this fluorine study because of the pressure of other more, vital laboratory needs. The possibility of getting additional

well trained personnel is very doubtful. How important is it to know the fluorine content of the urine?

That point is brought up especially since if we are to know really anything of value from this urine analysis we should know what the fluorine intake is in food and drink and the fluorine output in urine, feces, and sweat. If we are just going to take the urine analysis, is it going to give us any worthwhile information?

DR. ROGERS: It seems to me Dr. Arnold's contribution has altered our minds in that regard to some extent. If the study in a significant number is very acceptable, in which you have shown there is no accumulation of fluorine in the normal metabolism where the concentration went up as high as 2 to 8 parts per million --

DR. ARNOLD: They went up to four or five parts per million in some areas. That was on selectees.

CHAIRMAN HODGE: It might be pointed out that Largent has done the study on himself in which he did a very careful intake and total output study at a level of 6 milligrams a day for a prolonged period, broken by periods of non-ingestion, and if I remember the picture correctly he started out on 6 milligrams in contrast to the one milligram that we allocate to a normal

diet, plus or minus, but not over that probably. He first stored 50 per cent of his intake, and that rapidly dropped off so in a few weeks he was excreting 70 to 90 per cent, a variation from day to day in the range of 70 to 90 per cent of the intake, so you could practically say that after a rather limited period apparently we sort of saturate our ability to store fluorine and thereafter excrete most of what we take in. Would that fit in with your observations?

DR. ARNOLD: That is right.

DR. CAFFEY: Are you assuming that a drug is toxic because it is excreted? That does not prove the toxicity of a drug.

CHAIRMAN HODGE: No, that just indicates that fluorine analysis on the urine after a person had been taking water with 1 part of fluorine in it per million for a year probably would rather accurately reflect his intake, so about all we could get by fluorine analysis of the urine would be what has already been gathered by McClure and Largent and several other people, namely, it is there, and it is approximately equal to the intake.

DR. AST: In answer to your question, Dr. Caffey, Dr. Largent has been taking this fluorine for a period of two years as I have seen it in the literature in periods of twenty weeks, and then there is a lapse of I think four to six weeks, and then

twenty weeks again. He has been experimenting with sodium fluoride and calcium fluoride and trying to determine the intake and output. While one case does not by any means prove very much, he has had himself examined very carefully physically and radiographically without any sign of ill effect, and he has been taking 6 milligrams daily.

DR. CAFFEY: Well, I have an infant that weighs only 2800 grams who has been taking 10 milligrams of sodium fluoride for about six months. There are very clear cut changes in the bones. The child has thrived, with no anemia and no evidence of renal irritation, and that is a much larger amount than indicated here, but the bones are showing sclerosis of course.

DR. AST: This is an adult I cited.

DR. JAY: That child will probably have mottled enamel.

DR. CAFFEY: We cannot tell for some time, but it is about six months old now.

CHAIRMAN HODGE: Did you say he weighs 2800 grams?

DR. BAIN: Not now, when it was born.

DR. CAFFEY: No, now.

DR. LEVINE: How did it get the 10 milligrams of sodium fluoride?

DR. CAFFEY: One-tenth of a 1 per cent solution in 1 cc.

DR. LEVINE: You mean that was in the hospital?

DR. CAFFEY: Yes, we are treating it therapeutically with it, but it does affect the bones very distinctly in that dosage. Of course that is considerably more than any infant will get under this study, but as this is toxic material I think we ought to watch these infants for signs of toxemia despite the Michigan plan to pour it into the water supply without physical examinations first.

CHAIRMAN HODGE: Let me get this straight: This infant has gotten 10 milligrams of sodium fluoride per day?

DR. CAFFEY: Yes, for six months, and has thrived.

DR. JAY: That is over ten times the amount you contemplate using in Newburgh.

DR. CAFFEY: Yes.

CHAIRMAN HODGE: Is it possible to get a basal on this baby?

DR. CAFFEY: You can get them, but they are hard to obtain.

CHAIRMAN HODGE: Can you do a basal on that baby? That is extremely interesting.

DR. CAFFEY: It is an abnormal child. It is not normal.

CHAIRMAN HODGE: There is some indication that fluorine cuts down the basal metabolic rate. What about fluorine in

urine? Dr. Ast has pointed out that unless a chemist falls off a tree like manna from heaven it is not going to be done anyhow (laughter), so if there is no objection let us let it ride that way. If Dr. McClure, or Dr. Largent, or someone could get interested, and collect a few hundred samples, and analyze them, that would be wonderful. You might be able to sell Mac on that.

DR. ARNOLD: I think he has enough to do.

CHAIRMAN HODGE: Continue, Dr. Ast.

DR. AST: In so far as the Addis counts are concerned, we are faced with the difficulty of getting 12-hour specimens from the young children. There is also some question as to the value of the Addis counts when there are such wide variations in normal subjects that it may be difficult to determine the close division between normal and abnormal.

DR. LEVINE: The first part of that statement I would agree to, and the second part I would not. I think there is a very sharp differentiation in children or a fairly sharp one in distinguishing between normal and abnormal because there are certain standards that are pretty well fixed. There again I think the policy should be the same as in relation to the bone marrow smears: that if routine examinations of the urine are entirely normal, there is no indication for doing Addis counts,

but where the children definitely show an albuminuria and gross pathological findings in the sediment, Addis counts should be done if possible.

CHAIRMAN HODGE: Would you mind describing what the Addis count is?

DR. LEVINE: All individuals excrete a certain amount of blood cells, white blood cells, red blood cells, and casts in the urine. To secure Addis counts requires the collection of a concentrated urine sample for twelve hours during the night and examining the sediment on a counting chamber for red cells, white cells and casts. You can distinguish low degrees of nephritis much more readily by the Addis count than by casual examination of routine specimens of urine in the morning. It is a more effective method.

MR. GILCREAS: Is it a differential count?

DR. LEVINE: It is a differential count, and there are standards for each. It is interesting to note that all babies under normal conditions excrete in a twelve-hour specimen in the neighborhood of about 600,000 white cells and a million red cells.

MR. GILCREAS: Per milliliter, per cubic centimeter in other words?

DR. LEVINE: That is right.

CHAIRMAN HODGE: This as now amended would require that Addis counts be obtained on individuals who have albumin or casts on routine examination. Now the next point!

DR. AST: In regard to the x-ray studies, is it essential to x-ray the under two years of age group every three months? Is it going to be possible to get the mothers to bring their children in for this examination at such frequent intervals? Is it reasonable to expect that bone changes will be observable at such short intervals, and if so, will there be any serious harm in waiting six months to detect these changes?

DR. CAFFEY: What brought that up?

DR. AST: Dr. Caffey went over this at the last meeting.

DR. CAFFEY: Right, and this is an arbitrary figure. You can say three, or four, or two; I have no brief for three months. It depends upon the care with which you want to do this. You could even say that the x-ray changes or sclerosis is a late change, and that you are not going to pick up any early changes by x-ray.

As far as your question about mothers bringing them in, it is done. Children are brought in every three months and x-rayed in many places of the country, so I don't think the frequency

would make it ineffective or be a difficulty, but I think you should question the value of examinations that frequently unless you have facilities to do it.

DR. AST: I had another thought in mind on that. I wondered whether or not we would be raising a question in the minds of the people of Newburgh regarding the safety of the project if we insist on x-rays every three months. That in itself is apt to raise some question as to the safety of the project.

DR. CAFFEY: It is a question as to what policy you want to follow. If you want to do it the ideal way they should be examined frequently.

DR. AST: Would you object to having the x-ray examinations every six months?

DR. CAFFEY: No. We were setting up an ideal before.

DR. BAIN: They are a little harder to get in if you get the period too long in between.

DR. CAFFEY: This should be combined with the pediatric examination. It should parallel the pediatric examination.

DR. BAIN: And x-ray examination is one that they will bring them in for. They like to have the babies' pictures taken.

DR. CAFFEY: To settle the policy about Kingston in this regard, I think it would be a shame to waste all the x-rays on

normal children in Kingston. You are going to be met with the problem of putting up a \$6000 roentgen equipment to take films of normal children, and I don't know whether Dr. Levine meant to include that in his scheme of things, but I should think that could be largely left out, the taking of films of these normal children in Kingston.

DR. AST: May we say in regard to x-rays for the under two years of age group, every three months if possible, and if not then every six months. By "if possible" we mean if personnel is available.

DR. CAFFEY: I think that is quite all right.

DR. AST: Then the last question we have is with regard to the psychometric tests. This raises a point of special significance in this proposed study, that is, how important is it. The difficulty in getting qualified personnel and the expense involved should be considered in relation to the value of this data as it concerns our particular problem.

DR. LEVINE: I don't know how that can be answered. I would say that if fluorine does have an effect on bone, since everything that affects the skull may affect the brain it would be desirable to do psychometric examinations certainly on the younger age group or in a selected number of the younger age group.

If in the serial examinations you found that their I.Q. in a dozen cases, let us say, remained the same proportionately at six years of age as it was at two years of age, then I think it would be all right to discontinue it after that; but if you found on the other hand that there was a depreciation of the original intelligence level in a certain number, then I think it would be important to follow through on a large number of them. I would not like to see us eliminate psychometric examinations on the whole group until we had further information.

DR. ROGERS: Do you think that would occur independent of x-ray changes or blood changes?

DR. LEVINE: It conceivably might very readily. I don't know. I cannot answer the question categorically, but I think it is possible.

DR. ROGERS: It is a matter of calcium metabolism and circulation of the brain largely?

DR. LEVINE: Yes. Otosclerosis is not a common complication of toxic manifestations of fluorine poisoning, is it?

CHAIRMAN HODGE: I am sorry I did not get that.

DR. LEVINE: Otosclerosis, is that a common manifestation of fluorine toxicity?

CHAIRMAN HODGE: I have never seen it described as such.

DR. LEVINE: Wasn't that mentioned at the last meeting?

CHAIRMAN HODGE: Unless you do it, you always have the business of the carefully pointed examinations not having been made, and we are all in the dark.

DR. AST: Spira did something on that, which I will give you in just a minute.

CHAIRMAN HODGE: On the otosclerosis phase?

DR. AST: Yes.

DR. ROGERS: Didn't he claim it was beneficial?

DR. AST: This was in a paper published in April 1943 on "The Aetiology of Otosclerosis," in the Journal of Laryngology and Otology, Volume 58, No. 4, page 151:

"The suggestion has been made that signs and symptoms characteristic of fluorosis are produced by fluorine indirectly, namely, through its interfering with the normal function of the parathyroids of experimental animals exposed to toxic amounts of fluorine revealed, however, inconclusive results. Further investigation will be needed before deciding whether the disturbance in the concentration of calcium in blood and tissues is brought about by fluorine in a direct manner, or secondarily through an alteration in the parathyroid glands. Whatever the mechanism of chronic poisoning, in its ultimate effect, the action of fluorine consists in its ability to precipitate calcium salts stored in the body as a material indispensable for sustaining the vitality of most of the organic functions, and to substitute sodium or potassium for the calcium which has been removed. This results in a lowering of the level of the serum-calcium.

"Osteosclerosis, osteoporosis, exostoses and fragility of the bones are well recognized signs of chronic fluorine poisoning. Its other characteristic signs are various dystrophies of organs known to be likewise regulated by the parathyroid glands, namely, the skin and its appendages, the teeth, nails and hair."

This is supposed to be on otosclerosis, but I have not seen much on it so far. Here it is in the summary:

"The appearances of otosclerotic foci are closely similar to the appearances of mottled teeth and mottled nails, lesions known to be produced by the protracted action of fluorine. In addition, several signs and symptoms accompanying otosclerosis are identical with those constituting the disease picture of chronic fluorine poisoning. It is suggested that otosclerosis is a manifestation of fluorosis, and that it can, therefore, be prevented."

DR. LEVINE: Is that osteoclerosis or otosclerosis?

DR. AST: Otosclerosis, that was by Spira. We have had a paper recently, which I sent to all the members of the Committee, a paper by Louie, ^{7. LOEWY} in which he found an improved condition in the hearing of a group in an endemic fluorosis area.

DR. ROGERS: I feel some explanation is due the Committee and the members of the Sub-Committee particularly who have given a great deal of thought to the recommendations that we have today shot at.

The attitude of the Department is certainly not one of lack of appreciation of their considerations and their recommenda-

tions. I want to make that very clear. We are as anxious to do as thorough a study as possible, and I think we have pointed out that we will do just as thorough a study as is possible, but there are certain administrative obstacles that raise a serious question as to the possible collapse of the whole thing if we try to do too perfect a job, and therefore, we have to be prepared to compromise a little bit here and there, and we have welcomed your willingness to follow that line of thought.

Moreover, we have to go through a rather peculiar experience, which I hope none of you will ever have to go through. After we get our appropriation from the foundation, or whatever it is, we have to appear before a lay board, a budgetary group, who are the watch dogs of state funds. All money, regardless of the source from which it is received, is considered as state money, subject to strict supervision by the state fiscal authorities, and before that body of lay people we have to sweat this thing out oftentimes in as much detail as we have done it today, so that this stenographic record of this meeting with the support of this group for our requests for an allocation for this and that purpose is indispensable to us for we really do have to go through quite a difficult time with some of these budget groups. Dr. Bain knows what I am talking about.

CHAIRMAN HODGE: We have gone through this point by point as Dr. Ast has led us covering "Outline of Method," and "Examinations," and now on page three the description begins of the schedule for adult examinations. Are there any questions about these?

DR. BAIN: When I read this the only question I raised is I could not find the allocation of funds to do those examinations in the budget. Maybe I just cannot find what item it is under.

DR. AST: I probably left it out. I probably got scared of the figures as I was going along. (Laughter)

DR. BAIN: You just could not put down anything more. (Laughter)

DR. ROGERS: I think we are going to have to make further adjustments in this budget. It is kind of difficult to visualize the size of a study of this kind until you actually get into it. We do have a large district organization, and a few enthusiasts who are here controlling that district organization at the two communities primarily concerned, but as Dr. Van Volkenburgh has just whispered in my ear we are expecting far too much of them. I expect he is right, and I think we will probably have to add at least in the budget a definite full-time staff probably headed

by a pediatrician or an internist, or possibly both I don't know, and possibly a nurse, and possibly one or two field agents to help bring people in and to watch people and to get specimens and all that kind of thing. I think unquestionably we will have to add \$10,000 or more to this for the employment of such people. Maybe we can employ them, and maybe we cannot. That is the real problem. I think it is going to be easier to get the money than it is to get the personnel. If that is true, I don't know what your recommendation will be. We will have to do the best we can until the war lets up and then pick the thing up in the thorough manner we all would like. Perhaps we can do that. Perhaps we can start at level number three for the time being, and move to level number one later on. After all, these observations are going to accumulate more significance with time.

DR. LEVINE: The converse is also true: It may be that after two or three years you may find a lot of these things are unnecessary and you can drop three-quarters of them, and then it might become a very simple procedure.

CHAIRMAN HODGE: Right, or other tests might be put in for a period of a year or two.

DR. VAN VOLKENBURGH: While it would be very valuable to have the original observations before the fluorine is introduced

as extensive as possible, in fact, it would almost appear to be necessary, if you are going to get any value out of this study, it might be necessary to drop it after a time and then pick it up again.

DR. LEVINE: I would feel very definitely they ought to start out as ideally as possible.

DR. ROGERS: Have you any research fellows you would like to farm out?

DR. LEVINE: No, not at the moment.

DR. VAN VOLKENBURGH: In regard to assistance in this study from the District Health Officers, I did want to state that our field staff is spread so thin, and we have still just the same obligations to the public, and in many instances there are more falling on our shoulders, that it would be an impossibility for them to help as much as would be needed as indicated by this study. Definitely, I think you would agree with me, Dr. Chant, on that?

DR. CHANT: Yes.

DR. VAN VOLKENBURGH: And you also, Dr. Mattison, you would agree with me that this would be an impossibility from your standpoint?

DR. MATTISON: Yes.

DR. VAN VOLKENBURGH: Working as hard as they can, it is almost impossible to accomplish what must be done, without adding various duties connected with this study to the increasing load.

DR. ROGERS: We do not suggest removing this thing from their local control however.

DR. VAN VOLKENBURGH: Right, but when it comes to being responsible for the routine connected with this study, it just cannot be done by them, and there is nothing in the budget for administration.

MR. GILCREAS: Might I ask some information about the extent of the food analyses we should make on this thing? I am interested in that angle because it will probably be handed up to New Scotland Avenue, and at the moment I view it with horror. What should be the extent of the food examination, how frequently, and what types of food? Dr. Ast has it in here on one of the earlier pages, "Analyses of common foods for fluorine content are also to be made." What is "common foods"?

CHAIRMAN HODGE: I wonder if it would not be reasonable to get together at least by letter and perhaps in person with the men who have done the good food analyses: Wally Armonstrong, McClendon, Frank McClure, Largent, and Crowley from the Aluminum Company of America -- there are only about half a dozen people

in the country who have ever done any that are worth a darn.

MR. GILCREAS: The Aluminum Company very kindly gave me their methods, so I have the methods which they have used for the ingestion, ashing, and then the actual determination of the fluorine content of various products, including the blood and the urine.

CHAIRMAN HODGE: Largent is using just a minor modification of that Crowley method, that Crowley-Churchill-Ferry procedure.

MR. GILCREAS: The problem I am interested in primarily is what would the volume be of the work, how many samples do you think will be required, and how often.

CHAIRMAN HODGE: That is an awful difficult question to answer.

MR. GILCREAS: But a very pertinent one from our point of view, because if we have not the staff, but must look for some money to do it with, we will have to include some money in there for some staff and possibly some equipment to augment our present analytical equipment, chopping devices and so forth, and methods of mascerating foods, which we don't happen to have at the moment. All that sort of thing has to be taken into consideration if we are going to do that type of work, and then there is the problem

of how much, whether it will be enough to supply us with a full-time analyst, or a half time analyst, or only a little bit of work involved that could be sandwiched in and done at convenient times, especially in the winter time when we do not have to rush around on ordinary sanitary examinations so much.

CHAIRMAN HODGE: I should think if you would list the principles of this demonstration in a letter with about ten or fifteen specific questions just like these you have been asking and send it to Armstrong, and Largent, and McClure, and these other people, they will give us not only a yes or a no answer but they will write you and tell you what you are up against. The variation from batch to batch can be terrifically large.

MR. GILCREAS: That is the point. That brings up the question of sampling. If we do it on potatoes, how many potatoes are you going to do it on.

DR. GARDINER: Furthermore, I should imagine the soil in which the potatoes are grown would have something to do with it too. Potatoes from Long Island would differ from potatoes from Idaho, for instance.

MR. GILCREAS: Yes, that is another angle, where does the food come from, to be considered.

DR. AST: May I offer a piece of information that has

just come in? This is the current issue of the Journal of the American Dental Association. I just got it yesterday, and the first article that struck my attention was McClure's article on "An Analysis of Foods in Deaf Smith County, Texas, and Other Areas." If you will recall in the lay periodicals and also in scientific journals not long ago there was an article about Deaf Smith County, Texas, and the very low incidence of dental caries there, and the thought advanced was that the reason for the low incidence of caries was the high calcium and phosphorus content of the foods down there, incidentally in addition to the 3 parts per million of fluorine which was in the water supply, but the main emphasis was on the calcium and phosphorus in the home grown vegetables and in the soil. McClure has done a very interesting study on that, and his summary is that the assumption that unusually large quantities of calcium and phosphorus are present in certain Deaf Smith County produce is not supported by comparisons which may be made with analytic data for similar produce grown in other parts of the country. In previous work, I think in the official Bulletin 172 of the United States Public Health Service, McClure has made the statement that in his opinion the fluorine content of food plays very little, if any, part at all in the action of fluorine

on teeth.

MR. GILCREAS: Then how important is it to do it?

DR. AST: That is the question I wanted you to ask.

CHAIRMAN HODGE: I think the thing to do is to talk to the experts on it.

MR. GILCREAS: That is probably a good suggestion.

DR. ROGERS: Isn't it important to know whether or not we are loading this population with an excessive amount of fluorine as a result of a high food intake plus adding it to the water? For example, this Pablum situation comes up in that connection. I understand Mead Johnson is adding sodium fluoride to one of its Pablum preparations. You might know more about that than I do, Dr. Bain?

DR. BAIN: Not any more. The Food & Drug Administration got after them.

DR. AST: Just recently?

DR. BAIN: That is what I understand.

DR. ROGERS: That is the type of problem illustrative of what we are up against in that connection. What are the supplementary sources of fluorine that might throw us out of this 1 part per million to 4 or 5 parts per million, as is possible, and beyond that I don't think we have any interest.

If there is no reasonable variation in food that could do that, I should think very few examinations would be required.

MR. GILCREAS: That is my reaction. Probably a survey is all that is necessary.

DR. LEVINE: May I raise one other question? Is it possible that local dentists in the City of Kingston may be applying fluorine topically to some of their population, and if so isn't it important in a study like this to be sure at least to get records of the youngsters who are being treated locally or topically with fluorine preparations?

DR. AST: That has been taken up with the dental groups in both Newburgh and Kingston, and we have asked them to notify us of any case to which they are applying sodium fluoride topically. We have asked them to cooperate with us by not using it, but if they are going to use it to please notify us, and I think we can count on their cooperation in that respect.

CHAIRMAN HODGE: Personally I would as soon stick out my neck in the presence of my betters, and I see no reason why a dentist if a patient has rampant caries should not apply sodium fluoride topically to see if it will do some good.

DR. LEVINE: Providing we know about it.

CHAIRMAN HODGE: I think we ought to look at the health

of the mouth first. I would not agree with Dr. Ast that we should ask dentists not to use it topically in all cases. I do not think we should ask dentists not to use it if they would like to, but we should certainly know about it.

DR. AST: I don't think the local dentists are going to agree with me either, but they did not say they would not use it. They did say however that they would let us know where they decided to apply it topically.

DR. JAY: I think Dr. Levine raised a very important question there. I think they should be discouraged if possible from using it.

DR. LEVINE: It may complicate the analysis of the results.

DR. AST: I don't think it is going to be very serious as far as our data are concerned because there are so few children now getting to the dentist for private treatment.

DR. JAY: And it is probably equal in the two towns too.

DR. ROGERS: That will be taken care of by Miss Sheerar in the statistical compilation.

DR. LEVINE: A further question: In the budget are you contemplating the possibility of having a full-time director?

DR. ROGERS: I think we will have to have a full-time

person in the field, a medical person. Now probably the administration of it would not be a full-time job but would be handled by Dr. Agt and by myself I presume.

CHAIRMAN HODGE: Are there other suggestions or comments on the budget on page 5?

DR. BAIN: Only the omission of statistical clerks. Are you expecting to use your setup in the central office for that?

DR. AST: Yes.

CHAIRMAN HODGE: I think that should be indicated.

DR. BAIN: It is one of the questions your foundation will raise as to the analysis of this material.

DR. ROGERS: That is an excellent suggestion.

DR. JAY: How about that item, "dry chemical feeder, \$300"? Will that cover it?

MR. COX: Yes, we could have gotten one for nothing. That is a compromise on an average price they gave us. Also that \$7.75 is a quotation. Again we could get that for nothing from the General Chemical Company, but we don't want to do that.

DR. JAY: Foss estimated that the delivered cost of each feeder would be \$1,000.

MR. COX: I will tell you what we are using if you want to talk to him about it in the future. We are using an

instrument that was developed to feed ingredients into flour. It is very accurate, in fact more accurate than the average chemical feeder, and has small capacity. It has a capacity down to a fraction of a pound an hour, which we need here for you see when one filter bed is in use the amount of water being treated is one-fourth of the maximum, so we needed a unit which would have a capacity down to about four-tenths of a pound an hour. This unit does have that, and the list price is about \$350.

CHAIRMAN HODGE: I would like to introduce a statement of regret from Dr. Gies that he could not be here. As an illustration of the sort of thing I meant when I said we all could write down lots of other things to look for, Dr. Gies out of his own personal experience suggests we might study people having arthritis to see if it would be beneficial or otherwise to arthritics, and he also asks about the hearing, he himself having had a little trouble recently in that direction, and he mentions arteriosclerosis. He also makes the suggestion that recent appropriations by Congress might be looked over to see if there was not some place where this might fit into them. I am sure we are sorry that Dr. Gies is not with us this afternoon, and we appreciate his writing us.

Now I would like to return for just a moment to a matter discussed earlier today. Has anyone any suggestions as to foundations or persons who might be contacted for support? If so, I suggest either they be named now or that you see Dr. Rogers or Dr. Ast after the meeting.

If there are no suggestions, I want to remind you that the findings about the eye still belong to Dr. Dean, and that we should respect his having presented us with that special information, and that we still are not at liberty to discuss it outside of this group. I suppose that which you reported today falls under the same category of confidential information not to be disclosed outside of this group?

DR. ARNOLD: That is entirely unreported and unpublished and should be regarded as confidential.

CHAIRMAN HODGE: Very well. Remember we should respect Dr. Arnold's confidence in the same manner.

DR. LEVINE: Is it fair though to incorporate in the minutes a statement to the effect that Dr. Dean's objection to this project is less strong now than it was at our first meeting?

DR. ARNOLD: Under the circumstances I think what I said may be incorporated in answer to what Dr. Rogers asked as to whether we had supposedly changed our stand on it.

CHAIRMAN HODGE: I wonder how many of you have seen this little publication that was put out following the symposium of the A.A.A.S. called "Fluorine and Dental Health." This is a very interesting kind of collection of reviews because in it is put down a good deal of first hand material. It does not purport to be a complete coverage of the field of fluorine, but it has many interesting papers written on the relation of fluorine to mottled enamel and to dental caries.

DR. JAY: That is practically outdated because at the A.A.A.S. meeting next month they are having another symposium on fluorine and will publish a monograph on that one and bring this up to date.

CHAIRMAN HODGE: But this one has the advantage of having mottled enamel in it.

DR. ARNOLD: The next one is caries.

DR. JAY: In this fluorine problem that is almost a year old so it is outdated now. It has historical value however. I would like to make something clear on that Michigan study. It is not a Health Service study. Dr. Dean has not instigated that study. I don't want to put him in the position of having expressed his disfavor at one study here and approval of another study in Michigan. We have taken the stand of proceeding with

that study and inviting their cooperation as observers, and they will run the same tests in Grand Rapids that they have applied to other populations using fluoride waters. But I think though it can be said that Dr. Dean seems more kindly disposed to the whole project now than he did before McClure's studies were completed, isn't that right?

DR. ARNOLD: Dead right.

CHAIRMAN HODGE: Are there any further comments?

DR. LEVINE: Merely a matter of information: The statements that were made were not in the form of motions or recommendations. That is unnecessary is it not? In other words, it is understood that the Advisory Committee recommends these procedures?

CHAIRMAN HODGE: Does that seem fair to you?

DR. AST: Does the Advisory Committee take that stand?

CHAIRMAN HODGE: Does the Advisory Committee want to act by parliamentary procedure passing motions and being proper about it, or do you like this informal discussion business?

DR. JAY: I think it would be a good idea not to make motions. I think we have given the staff here quite a bit to think about today, and they ought to consider it and perhaps issue a report later.

CHAIRMAN HODGE: It is the spirit that is incorporated in the minutes, whether we make it in the form of a motion or not. Unless someone insists that we do cast this in the form of a motion, I would like to leave it as it is.

I certainly want to express my own appreciation of the friendly and kindly conversations that have gone on around the table this afternoon, and we are looking forward to the next steps. Are we going to have another meeting this year or shall that be left up to you for later decision?

DR. AST: I think in all probability we will have another meeting this year.

CHAIRMAN HODGE: Some time later in the fall perhaps?

DR. AST: Yes, in the fall or early winter.

CHAIRMAN HODGE: Then perhaps some time in the fall or early winter we will meet again, and if there is no further business to transact at this time I will declare the meeting adjourned.

... The meeting adjourned at 4:45 o'clock ...
