

UBC REPORTS

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UBC REPORTS CAMPUS EDITION

TRIUMF Leaps Forward

The critical path schedule for construction of the TRIUMF cyclotron has taken a large step toward the day when the first beam of subatomic particles is to be guided through the machine at the University of B.C.

The leap forward occurred Tuesday when the Board of Governors awarded a \$1.94-million contract to Davie Shipbuilding Ltd. of Lauzon, Quebec, to fabricate the cyclotron's 4,000-ton magnet, the largest and probably the most important component of the project.

If the machine goes on stream on schedule in March, 1973, Canada will be the first country in the world with a third-generation cyclotron. This new generation of machines will pioneer a field of science using subatomic particles called mesons. The TRIUMF cyclotron will be the first of the meson factories.

TWO OTHER CYCLOTRONS

Canada's two other cyclotrons at the University of Manitoba and McGill University are relatively inexpensive machines which are used in studying the nucleus of atoms. The McGill machine belongs to an earlier generation of cyclotrons, while the Manitoba machine operates on much the same principles as TRIUMF.

Later cyclotrons were designed to answer questions about subatomic particles which go beyond nuclear physics. These machines for particle physics are so expensive to build and operate that only the wealthiest of nations can afford them.

Third-generation machines like TRIUMF will be used for experiments within the nucleus, with particular interest in mesons, particles which are involved in the transfer of forces which hold the nucleus together. Though more expensive than first-generation machines, advances in magnet design and other innovations put such projects within the means of smaller countries.

Switzerland is planning a meson cyclotron near Zurich at a cost of \$25 million. Russia is going to shut down an existing machine at Dubna in 1972 and convert it to a meson factory. A \$56-million meson linear accelerator 1800 feet long is being built at Los Alamos, New Mexico.

Design, manufacture and transportation of the TRIUMF magnet is probably an unprecedented industrial feat for applied physics in Canada.

EIGHT MAJOR MODELS

During three years of work UBC engineering physics graduate Dr. Ed Auld, a native of Chilliwack, B.C., leader of the TRIUMF design group, made eight major models and dozens of minor modifications to them before freezing the magnet design. Dilworth, Secord, Meagher and Associates (Vancouver, Toronto) has been responsible for the structural design of the magnet. The final shape of the magnet is unique.

Cyclotrons accelerate subatomic particles up to speeds where their energies are so high that

*Please turn to page four
see TRIUMF*

Photo by Extension Graphic Arts



HEAD of the Department of Civil Engineering, Dr. W.D. Liam Finn, has been appointed Dean of the Faculty of Applied Science by UBC's Board of

Governors. He hopes to develop a Pollution Engineering Center and develop work in the field of ocean engineering. For details, see story below.

NEW DEAN APPOINTED

Professor W.D. Liam Finn, head of the Department of Civil Engineering, was appointed Dean of the University of British Columbia's Faculty of Applied Science at a meeting of the University's Board of Governors on Tuesday (Feb. 3).

Prof. Finn, at 35 the youngest dean at UBC and possibly the youngest of any Applied Science Faculty in Canada, has been acting dean since the death of Dr. Frank Noakes in August, 1969.

Prof. Finn brings with him new projects and ideas aimed at increasing the engineer's ability to deal with contemporary problems facing British Columbia and Canada. They include new areas of engineering endeavour and curriculum changes which will broaden the awareness of engineers of the effect of their work on society.

High on the list of priorities is an expansion of teaching and research in water resources and pollution engineering.

POLLUTION CONTROL

"I hope the programs in Chemical and Civil Engineering can be merged to establish a Pollution Engineering Center in the Faculty which can graduate the personnel needed to implement the provincial and federal plans for the improvement and control of the quality of the living environment."

Another important area requiring development is ocean engineering. A graduate program in ocean engineering is planned within the Faculty if sufficient federal funds are made available.

"Canada must develop its own offshore resources; it must respond in a positive way to the ever-increasing penetration of northern waters by American companies by developing the technology and educating the personnel to exploit the mineral and food resources of our offshore environment. Development of the technology must be primarily a task of industry but UBC is in a unique position to educate future engineers for exciting careers."

One of the more important developments may be the creation of a new engineering curriculum. Sharing the mood of the students for a broader curriculum to prepare graduates for the challenges of the post-industrial society, the Faculty has instructed a special committee to study the problem.

SOCIAL OBLIGATIONS

Preliminary indications from the study are that the engineering curriculum will change to stress more strongly the social obligations of the engineer and to provide a greater exposure to liberal studies.

Prof. Finn's major research interests are in the field of earthquake engineering and soil mechanics, and he will continue to head the soil mechanics program in the Department of Civil Engineering. The soils group has developed some of the most sophisticated equipment in the world for measuring the reactions of soils to earthquakes.

"This is extremely important for construction in earthquake zones such as Vancouver. Some of our recent work will lead to a major reduction in the cost of nuclear reactor installations. Every nuclear power station in North America is designed to resist earthquakes and our work shows that the effect of the earthquakes on the foundation soils of those stations has often been over-estimated by 200 per cent or 300 per cent," Prof. Finn said.

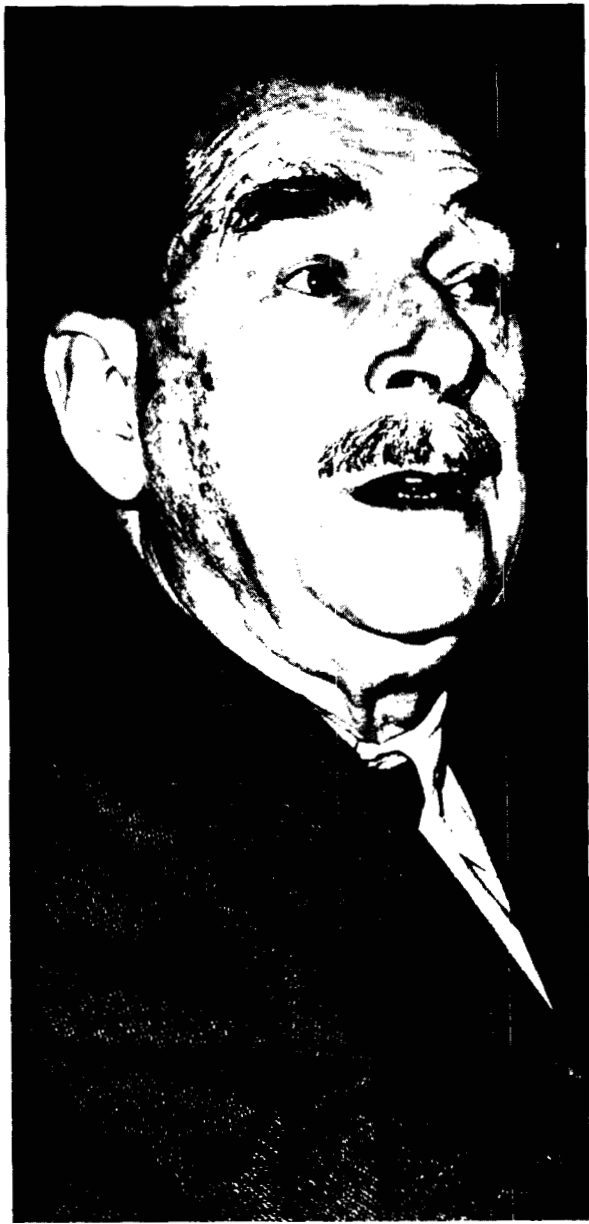
BORN IN IRELAND

Prof. Finn was born in County Cork, Ireland. He graduated in first place at the National University of Ireland in 1954.

He received the master of science and doctor of philosophy degrees at the University of Washington where he was an instructor in Civil Engineering before joining UBC in 1961. He was Visiting Scientist to the Soviet Academy of Sciences in 1967-68. Currently he is President of the UBC Faculty Association.



DR. IAN ROSS



DR. ROY DANIELLS

TWO FACULTY OF ARTS COM

Two committees in the Faculty of Arts are investigating ways of improving teaching at the University. UBC Reports asked the chairmen, Prof. Roy Daniells, University Professor of English Language and Literature, and Dr. Ian Ross, coordinator of the Arts One Program, to discuss the work of each committee. What follows is an edited version of their tape recorded conversation.

UBC REPORTS: I wonder if each of you would briefly describe the reasons for the establishment of the committees you chair, and the aims of each.

DR. IAN ROSS: My committee is a stepchild of Prof. Daniells' Committee, and our function is to look at ideas about teaching and get people in the Faculty of Arts to reassess their present practice in the interest of us all having a better understanding of the teaching role.

We've had five meetings of the committee and we've held two conferences. The meetings have dealt with such things as incentives to teachers, assessment of teaching and, in part, methods of teaching.

The first conference dealt with the teaching of existing first year courses. We had spokesmen from psychology, linguistics, English, and economics talking about how they teach first year courses. The second conference dealt with new programs now being offered by the Faculty of Arts. We discussed the aims of the new programs and some of the problems of teaching them.

Both conferences generated quite a bit of discussion and a lively exchange of ideas to the extent that people were talking about what they did in classrooms and what might be done.

COMMITTEE AIMS

UBC REPORTS: Prof. Daniells, you chair the committee on the improvement of instruction. Could you describe for us what it is you're discussing and aim to do.

PROF. ROY DANIELLS: The terms of reference of the committee were extremely narrow, for obvious reasons. We were told to pay no attention to curriculum, to the appointment of staff or to finance. Last year we met a good many times and canvassed a large variety of subjects, and did not, on the face of it accomplish a great deal. I think, however, in actuality, we travelled a long way. In the first place, we achieved a consensus within the committee which was initially difficult and in fact could have been regarded as improbable. There is now a very harmonious relationship among the various people, who began by differing widely because of temperament, background and political orientation.

Now, we looked into, to take one representative example, the question of teaching assistants — under what conditions do they teach, how good is their teaching, who finds out how good it is, what is done when this is found out — and discovered that there is virtually no correlation among departments. For example, the Department of English has a very large and loosely structured system of coping with its teaching assistants which goes back a long way into the history of the department. Incidentally, the information we got suggested that the teaching assistants in the English department, in spite of their diversity and frequently their lack of training, have been very effective.

On the other hand, the German department is a smallish structure, very tightly organized, very carefully supervised with its aims and objectives thought through, stated, almost finalized. These differing ways of dealing with teaching assistants led

us to bring forward a recommendation that a committee should be set up to exchange information on how their departments dealt with teaching assistants. On the face of it, of course, this is impossible — there are too many departments — but assuming that there could be some groupings, with perhaps the languages each sending one person, we did conceive this as being possible. A second recommendation brought forward was the idea that an ongoing program should be established to ensure that a stream of new ideas regarding teaching be kept flowing. This was put to the faculty and accepted, and the result was the group chaired by Dr. Ross.

OPPOSED VIEWS

UBC REPORTS: When you said earlier that your committee had reached a consensus did you mean on certain basic principles with regard to teaching?

PROF. DANIELLS: No, it is more a case of resolving paradoxes. Let me give you an example. There are clearly two opposed views of how you go about remedying bad situations in teaching. Let's say a given instructor is found to be extremely inefficient. Now, one set of people will take a view that he is protected by tenure and the concepts of academic freedom, nobody must tell him what to do, nobody must visit his class unless invited, nobody must in any way impinge upon him. He will, in due course it is supposed, manage to establish, with the help of his students and colleagues, a better rapport.

Now, at the other extreme is the view that a bad instructor should be got rid of, the head of the department or the dean should take action by presenting him with a deadline. Our committee, which contained within itself both polar opposites, is steadily moving towards not so much a compromise as a set of arrangements which would recognize both of these, to some degree, valid points of view.

UBC REPORTS: Dr. Ross, it appears from what Dr. Daniells has just said that his committee is concerned with an overall view, while your group seems to be concerned with specifics for improving instruction in the classroom. Specifically, how do those who have taken part in your meetings see instruction being improved in the University?

DR. ROSS: Well, we have talked about methods, and I'll come to that. But before we got to methods, we talked about incentives. We believe that the climate of opinion in the University should be such that teaching is respected and that people who are good teachers are given some kind of reward for their teaching. This means working at various levels to ensure that teaching is a factor in decisions about individuals, and some of us feel quite strongly on this point.

As for specific teaching methods, we talked about the problems of teaching large classes and seminars, teaching first year students, teaching students in major programs, teaching students who had committed themselves to some area of academic specialty, as opposed to teaching students who might simply want to explore a field. There are difficult problems connected with these various kinds of teaching. As to audio-visual aids, Mr. George Rosenberg, of the Fine Arts Department, who is on our committee, has suggested that we explore teaching possibilities there by holding demonstration lectures, asking people who can use slides, films and tapes effectively to do so.

UBC REPORTS: Prof. Daniells, do you have anything to add to what Dr. Ross has said?

MITTEES TAKE A HARD LOOK AT TEACHING

PROF. DANIELLS: Well, I warmly approve of the Master Teacher Awards, which the generosity of Mr. Walter Koerner permitted, as one of the incentives of which Ian has spoken. I think, too, that anti-calendars can be very important. The anti-calendar got off to a bad start here. It was done by students and in some areas very badly. There were vicious attacks upon individuals. I myself went over a batch of reports upon an individual, compared the reports with the published result, and found the discrepancy ludicrous. Now, the fact that an anti-calendar can be used viciously and badly doesn't interfere with the fact that it is, at bottom, one of the most useful and promising devices that can be conceived. If you look at copies of the beautifully edited and bound volumes issued by some American universities, you see how carefully, scrupulously, dispassionately and with what completeness they have managed to collect opinion and report it so that any instructor can look up his own name, his own course, and go down the whole list of questions and see what the consensus is.

Now, there are problems in getting this implemented here. It would have to be on a University-wide basis and the quite-nicely-handled subjects in applied science and chemistry would have to be brought in. But I'm convinced that the University, with the full and official conjunction of student-elected authority should undertake something which isn't called an anti-calendar but an annual review.

In the meantime, I think we can encourage departments in the Faculty of Arts to provide their own small, controlled anti-calendars, perhaps kept within the department, perhaps sent to the individual instructor.

DR. ROSS: We had a discussion along similar lines, and we looked at the science anti-calendar, the *Black and Blue Review*, also we discussed the kinds of questionnaires that are used in the Department of Economics and Faculty of Applied Science. We also got some information about procedures at the University of Texas, where student administrators distribute forms, collect them, and have them evaluated by an objective body. It was felt there is a value in getting student responses to teaching as long as the conditions are pretty clearly laid down. But we think an anti-calendar should go along with peer judgments.

UBC REPORTS: When you say peer judgments, do you mean judgments by colleagues in the same department?

EMPHASIS SWINGS

DR. ROSS: Yes. Our committee took the view that we teach each other, in a sense, and that we should, through faculty seminars and working together in courses and programs like Arts One, build up a knowledge of each other as teachers. We often teach in each other's presence, and this is very valuable for assessing a person's capacity or potential as a teacher.

UBC REPORTS: The impression one gets is that where perhaps 20 years ago emphasis seemed to lie on research and publishing, there has now been a swing back in the direction of teaching.

DR. ROSS: Well, I've been at UBC nine years, and my impression coming here was that teaching was highly regarded. But I think there's a very powerful influence coming from sciences which has made

publication records crucial in connection with the assessment of careers. I think this has had an impact on the humanities. I believe that scholarship is needed in teaching, that you've got to have scholarly qualifications and that there is a carry-over from what you do in connection with your research or your own independent thinking and reading into your classroom. I don't like to see a deep dichotomy between those who publish and those who teach.

PROF. DANIELLS: There is a new factor, I believe, that has to be added to this problem. Fifty years ago a man doing research on, say, Robert Browning would be engaged in an over-view of his work, with an emotional response to the body of his work. The kind of thing he was doing for publication could be brought right into his classroom and would stimulate an interest in the students. Today, they're using computers to analyse Browning's vocabulary. This is good too, but it's unassimilable in its present form. I think the fact is that research has become a razor blade, whereas it used to be an axe for chopping wood and making fire. As a result, teaching does not necessarily coexist with research the way it used to.

GENERATE IDEAS

UBC REPORTS: Do you think there's a place in universities for the professor who is exclusively devoted to research, and conversely that there is a place in the university for the professor whose interests lie primarily in the field of teaching?

DR. ROSS: Well, I would think you could have in the modern university those who are engaged primarily in research, whose contribution to its intellectual life is to generate ideas or methods in their particular field, and that there will be a transfer effect from what they do and write; conversely, there are probably individuals whose function is one of pursuing critical enquiry with students and colleagues, and whose role is primarily that of a teacher. I would regard the latter as making as great a contribution to the quality of intellectual life as the former.

PROF. DANIELLS: I think a number of extraneous elements enter here. A small college, remote from large centres, with a high proportion of students to staff can scarcely afford the luxury of a chemist who devotes all his time to research. It's in the big universities that these diversities can chiefly occur.

UBC REPORTS: It's been said that teaching is like sex; everybody knows that everybody else is doing it, but nobody knows how the other man is performing. Is that a valid statement?

PROF. DANIELLS: No, it isn't. Heads of departments often do, and always should know how people are performing. I could name many who do. A great deal is known, and even I could tell you about the performance of certain people in physics and mathematics from having listened to them in various contexts and having talked to their students.

DR. ROSS: Well, even in the area of sex, that isn't a corporate activity yet, for all our permissiveness, but teaching is. I think we are a corporate body, we do work together as teachers, and I think we do know what the other does. Certainly in a large, complex department there are areas of darkness where nothing is known, but where people do teach in joint programs, or where they share seminars, or where there are invitations to individuals

to come into a course to give a lecture, a person's ability as a teacher is known.

UBC REPORTS: Something that has been widely discussed at UBC in recent years is instruction in pedagogical techniques for new faculty members, who may, in the years just before they start teaching, have been almost totally involved in research. Do you regard this as a good move to contemplate and have either of your committees discussed the possibility of doing this in the university?

INSTRUCTION BOARD

DR. ROSS: Yes, our committee did and we also discussed the idea of a board of instruction set up by the University. On the whole, we are cool to these bureaucratic attempts to deal by fiat with teaching and the initiation into teaching. A board suggests licences and the revoking of licences, and I have some feeling of horror about that.

As for courses on pedagogical method, unless conducted by highly sensitive individuals, they're liable to result in a great deal of boredom.

PROF. DANIELLS: It's very easy to learn how to teach fairly well, if you wish to, because colleagues will allow you to come into their classroom, your friends will come into your classes on invitation, you can go and listen to innumerable people who are performing at a very high level, higher than you'll ever reach yourself. The great block is the arrogance of large numbers of beginners. And not beginners only, but some with grey hairs who refuse to regard any kind of instruction in method as anything but totally beneath their dignity.

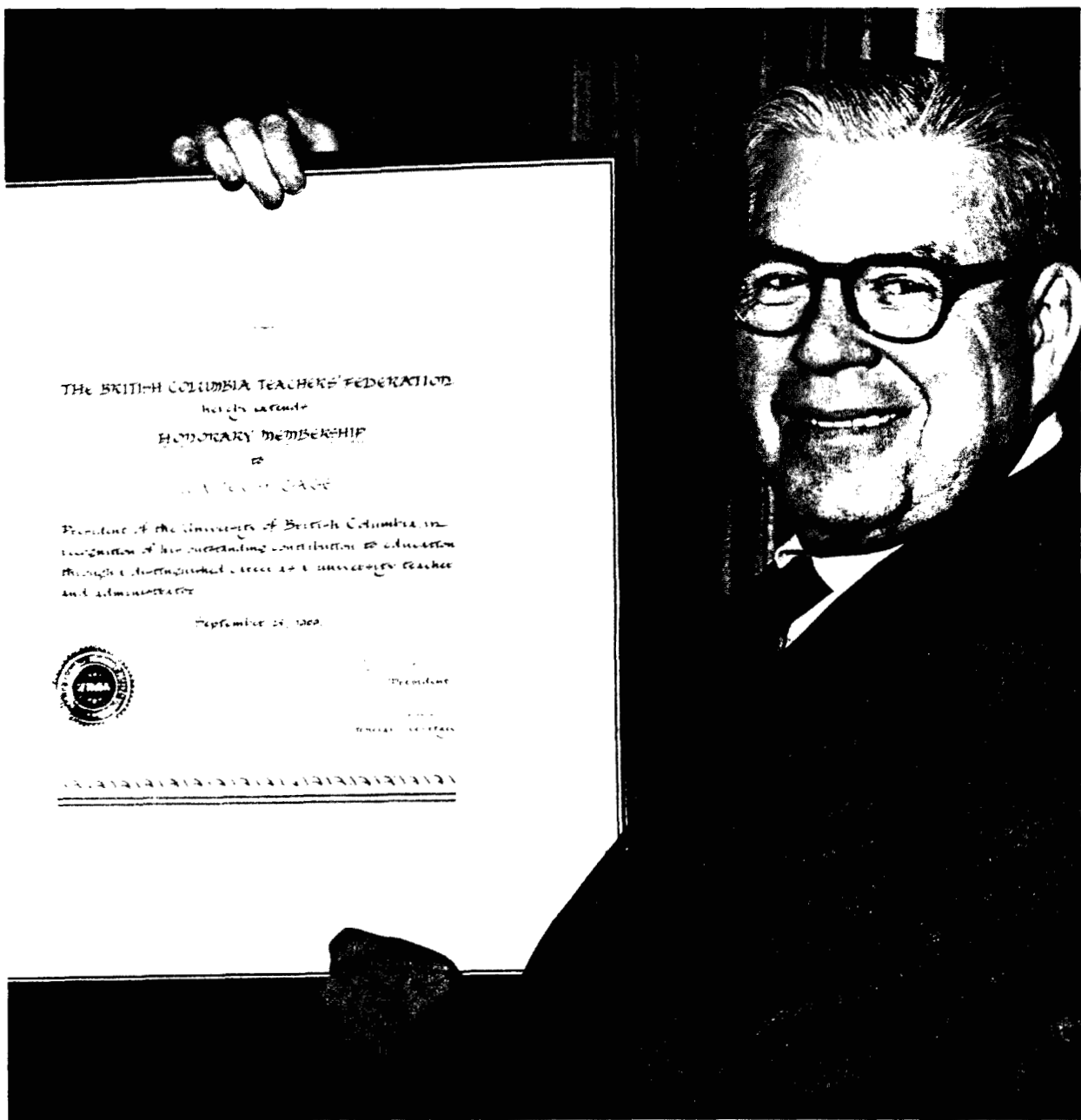
How you hold a piece of chalk, how large you write on the board, how much pressure you put on it, what you do with the window blinds, how you quell noise outside, how you ensure texts will be there, how you manage to finish within the hour what you started to do, and how you elicit conversation — all these things are easily grasped and understood. But people don't want to do so, and I could again give you the names of a set of arrogant people who, thank God, have mostly left UBC, to whom nothing could be conveyed in the way of teaching.

LACK HUMILITY

On the other hand you have those who, over a period of 20 years, will get better and better and better. Twenty years ago, again one could give names, there were people I despaired of, and this year students have come to me absolutely glowing and saying, "You know, I had the most marvellous hour with 'X'." Well, this is self-generating self-improvement, which is extremely admirable, but all this has to come from within. And I think this reinforces Ian's point that a board does nothing.

DR. ROSS: If I could just add something. Professor Kenji Ogawa of Asian Studies is a member of our committee, and he's a wise man. He told us one day: "What I do is reflect systematically, after I have given a class, on what has happened, and I learn from that." I thought that was a very wise view to take, that he went over in his mind how things had gone, what he'd prepared, how successful it was, and he had tried to learn from that experience.

PROF. DANIELLS: What most of us lack, you see, is precisely that sort of humility which says, "I need to go over it." And one can make the most awful mistakes.



PRESIDENT Walter Gage holds a framed scroll which confers on him honorary membership in the B.C. Teachers' Federation "in recognition of his outstanding contribution to education through a distinguished career as a university teacher and administrator."

President Gage was also recently made an honorary life member of the Canadian Mathematical Congress.

Photo by Extension Graphic Arts

CRUCIAL SENATE DEBATE

Four of the most controversial recommendations in the report of the Senate Committee on Long-Range Objectives will be debated at a special meeting of Senate Saturday.

The three-hour meeting will begin at 9 a.m. in the Board and Senate room of the Main Mall North Administration Building. Tickets for the 30-person spectator's gallery may be obtained by applying to the Registrar's Office in the General Services Administration Building.

The recommendations to be debated deal with UBC's admissions policy and proposals to amend UBC's existing academic structure or alter it radically to create a system of federated colleges.

The admissions policy recommendations (Numbers 1 to 3 in the committee's report) ask that undergraduate enrolment be limited to 22,000, that the annual rate of graduate enrolment be limited to 15 per cent and that graduate enrolment be limited to 5,000.

In addition, the report recommends that entrance requirements for B.C. students be raised to the equivalent of 65 per cent and that in the fall of 1970 enrolment be restricted for a five-year period in the first two years of programs leading to the bachelor of arts, agricultural sciences, education, physical education and recreation, and science programs and in the first year of the bachelor of commerce program.

Senators will have to consider a majority and a minority recommendation bearing on the UBC's future academic structure.

The majority recommendation calls for support of the concept that greater efforts be made to create a more personalized environment for faculty and students and asks that an ad hoc committee of Senate be created to consider and recommend possible changes in the grouping of faculties, schools and departments.

The majority recommendation also advocates that the present type of structure of faculties, departments and schools be retained, with modifications to make the system more responsive to changing conditions but without the adoption in principle of a Federated Colleges scheme.

The minority recommendation asks Senate to adopt in principle the federated colleges system and request the President and the Board to implement such a system as soon as possible.

Amendments to recommendations will be considered at the meeting but alternative motions will have to be presented as notice of motion for debate at another meeting.

TRIUMF *Continued from page one*

fundamental changes occur when they collide with other particles in experimental areas outside the cyclotron. Normally, cyclotron magnets are two huge, coin-shaped pieces of metal lying flat, one suspended over the other so that there is a small gap between them. Subatomic particles released in the centre of the magnet spin outwards gathering speed until they are extracted at the edge.

TRIUMF designers have taken the usual coin-shaped discs and divided each into six spiral sections joined in the center like the petals of a flower. The individual sectors and the space between them provide a stronger focusing force on the spiralling particles than conventional magnet design would allow. This reduces the possibility of particles going off course and penetrating into the cyclotron itself, causing radioactive contamination.

The TRIUMF magnet will be made of low-carbon steel plates three, five and 10 inches in thickness and from one foot to more than 31 feet in length. TRIUMF will buy the three-inch plate from the Steel Company of Canada at Hamilton, Ont., for about \$400,000. The Lukens Steel Company's Coatsville, Pa., plant — largest in the world — will supply the five and 10-inch plates for approximately \$600,000.

TRANSPORTATION PROBLEM

After Davie has cut, machined and assembled the plates, it will be confronted with the major transportation problem of getting the components from the St. Lawrence River to the UBC peninsula on the Pacific. Davie may rail the steel to Vancouver for erection at the TRIUMF site or send it by sea via the Panama Canal. Transportation costs are expected to be about \$200,000.

As part of the contract, TRIUMF will also get about 255 tons of steel cut into one-or two-foot squares from the scrap steel plate. The steel will be used as part of the shielding around the cyclotron vault which will be located 30 feet beneath the existing grade on the South Campus.

Construction of the main building assembly and erection of the cyclotron will be under the supervision of TRIUMF's own Project Management 4/UBC Reports/February 5, 1970

Office. TRIUMF will award a series of individual contracts for the various parts of the work.

The Board of Governors also approved an excavation contract Tuesday for \$195,600 to Monssen Construction Ltd. Earth moving for the cyclotron vault will begin this spring and end this summer. While excavation is going on, G.E. Crippen and Associates of North Vancouver will be completing the detailed drawings for the main building shell which will go to tender this spring.

The building will be 400 feet long, 100 wide and 60 high. It will be used as an assembly shop during its first year of use so that the magnet and other cyclotron components can be put together. Earth fill from the excavation will be pushed up against the 16-foot-thick concrete walls of the vault so that the final grade around the cyclotron will be 10 feet higher than it is now.

CONCRETE BEAM SPANS

When the cyclotron is in place, gantry cranes in the building above the vault will place concrete beam spans 100 feet long and weighing 90 tons each on top of the vault for a thickness of 16 feet.

Participating in the project are the University of Alberta, the University of Victoria, Simon Fraser University and UBC. The University of Alberta is contributing \$250,000 a year to TRIUMF for the next five years. The three B.C. universities will provide the \$4.4 million necessary to construct the buildings.

The federal government will cover the \$23.3 million for the cyclotron, ancillary equipment, beam transport system and experimental facilities and will supply the \$4 million a year needed to operate the facility.

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Nominations Called

Nominations have been called for the \$1,000 Professor Jacob Biely Faculty Research Prize, awarded annually to a UBC faculty member for distinguished research.

To be eligible for the prize candidates must hold the rank of assistant professor or above and have been a UBC faculty member for at least three years. The research which is submitted for assessment must have been accomplished and published in the past three years.

The closing date for nominations is April 1. Details regarding submissions are available from the office of the Faculty of Graduate Studies.

The Prize was established in 1969 by Mr. and Mrs. George Biely to honour Prof. Biely, a distinguished agriculturalist and former head of the UBC poultry science department. Mr. Biely is president of Biely Construction Co. and the brother of Prof. Biely.

The first winner of the prize was Prof. Myer Bloom of the Department of Physics.