UNB BIOLOGISTS CONDU

By CHRIS J. ALLEN

Over the centuries man and his technology have been slowly degarding the condition of the environment. The time has finally arrived when he must commence in earnest to clean up the foul water, impure air and scarred landscapes. Scientists, concerned citizens, and politicians of the world are clamouring for industries and municipalities to clean up after themselves and for governments to impose standards.

Before the present mess can be effectively eliminated and before acceptable standards can be set for the future much research must be done into the entire aspect of pollution. Scientists and students at many Canadian and American universities, as well as company researchers, are presently engaged in such activities.

In the Biology Department at UNB there are presently three projects underway in this field of research, all of them involving the St. John River system. Two of these projects concern the aquatic fungi in the river while the third is a study of the bacteria in the water.

Two faculty members and five students in the Biology Dept. are at present engaged in researching the effects of bacteria in the St. John River. Dr. M. Franklin, Dean of Science, heads up this project with Dr. W. Coulter as the other faculty member. The five students who are actively involved in this study are Marhorie Chalifour, Rosalind Geldart, Susan Lindley, Debbie Peacock, and Linda Powell. Dr. Maxine Franklin, a bacteriologist and wife of the Dean, is contributing invaluable part-time work to the study. Carole Dilworth, who is carrying out another project is assisting the research team in various aspects of their work.

Financial assistance for this project is coming from the Federal Department of the Environment and the National Research Council of Canada. Last year the Environment Dept. gave $14,000 to Franklin and Coulter. This year they have invested $18,000 for research by Drs. Franklin, Coulter and Whitney. The NRC has helped to buy special equipment for other experiments, which is being used extensively for this project as well.

The biologists objective is to discover what role the bacteria play in the total ecology of the river and how they behave throughout the different seasons. They are also looking at ways bacteria can grow without oxygen in the lower levels of the river because of the presence of electron acceptors, which permit some kind of bacteria to live where they would not normally be found. Another aim is to identify all the different species of bacteria, which is an "extremely difficult job" according to Dr. Franklin. To do this, computer taxonomy is being used as well as biological methods.

One more aim of the study is to find out how long the bacteria survive in the river under various conditions. Dr. Franklin said that they were surprised to find out how long some survived with little foodstuff available, especially in the winter months. In polluted waters, these micro-organisms live longer due to the amount of organic nutrients at hand.

At the beginning of their study, which has been going on for about a year now, the researchers had specific applied objectives. However, they soon discovered that there was no fundamental information in this field of study. This meant that they had to carry on basic, as well as their applied research, at the same time; the basic research supplying the information needed to study the specific problems.

The field work involved in taking water samples goes on year round, with samples being taken every week. This is a long-term study that will continue for a few years before the results are finalized.

According to Dean Franklin, in order to prevent pollution of the river we must understand more fully the processes, biological and chemical, that occur between the different organisms and chemicals in the system. If left entirely to nature a river will eventually clean itself, as it can cope with small amounts of pollutants. However if too much human and industrial effluent is present, the river cannot handle it naturally, resulting in the accelerated eutrophication of the river. In Canada, because the degradation of effluent in winter is slower than in summer, we must design treatment facilities that can handle these differences.

Water samples are being taken from three locations along the river. Samples are obtained from an area just below McCain's Foods Limited in Florenceville, from a short distance upstream and from a site about fifty miles downstream, near the Mactaquac Dam. According to Dean Franklin, the last two sites are relatively "unpolluted" meaning that there is "no gross pollution in the immediate area". Using samples from the Mactaquac Dam site, the bacterial flora is studied to determine the way in which normal bacterial populations of the river decompose various organic substances, particularly macromolecules of cellulose, starch and pectin. Chemical analytical techniques are employed to see how rapidly these substances are broken down and how the different seasons affect them.

With the effluent from McCain's, they are studying the various processes in decomposition and the role of bacteria there. This decomposition is dependent on micro-organisms of various kinds, not just bacteria. The biologists hope to determine the physiological factors that influence decomposition and then use this information, along with other data, to improve methods of waste treatment. Little is known of the mechanisms involved here and it is hoped that they will soon gain more knowledge of them. In doing this they want to determine just how bacteria fit into the local ecosystem, and the extent of their multiplication, which depletes the water of oxygen. Dean Franklin stated that a fact not generally recognized is that the bacteria themselves are quite an important factor in the nutrition of zooplankton (small animals) in an ecosystem.

When breaking down organic compounds, bacteria produce inorganic compounds which are utilized by algae and higher plants. High concentrations of inorganic compounds stimulates the growth of plant life such as algae, which in large quantities causes eutrophication in lakes and other slow-moving bodies of water. As of yet there are no significant algae blooms in the St. John, as the running water aerates the river.

Some of the samples are taken right from McCain's primary treatment facility. Dr. Franklin says that they should have tertiary treatment facilities installed but with the technology known at present they have done all that they can. If this studycomes up with any effective methods, they could well be applied at Mc-

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