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Seen by York's own satellite

The brand new northern lights

By Agnes Kruchio

Somewhere over the aurora borealis, a satellite called ISIS II is silently surveying the upper atmosphere. Aboard the satellite is an instrument designed by York scientist Gordon Shepherd.

With the aid of this instrument, a red line photometer, scientists at York's Centre for Research in Experimental Space Science (CRESS) were the first to locate and observe by satellite a red borealis - daytime northern lights - a phenomenon hitherto unknown in scientific circles.

"No one had been able to see the northern lights during the day because we had been used to thinking of it as a night-time phenomenon," explains professor Shepherd. Moreover, it seems that the red aurora borealis is about 10 to 12 degrees further north than the night-time northern lights.

The regular greenish northern lights are seen over Churchill, on Hudson's Bay, at a low altitude of about 100 km; the red aurora is approximately 1500 km north at a high altitude, and is much less visible to the naked eye. It can be seen only in areas where there is total darkness at noon during some parts of the year, north of the arctic circle.

The aurora borealis is caused by particles from the sun interacting with particles in the atmosphere releasing energy. The particles enter the earth's atmosphere through gaps in the planet's magnetic sphere, which is shaped like an onion around the globe.

Depending where the particles enter, they have more or less energy; in the former case, a red aurora is formed, in the latter, the regular northern lights result.

"The aurora borealis is a permanent source of energy on the upper inosphere," says Shepherd. "We have some reason to believe that it has some affect on the weather."

The energy represented by the aurora borealis is quite small, and whether it affects weather is a source of constant controversy between scientists studying the magnetosphere and meteorologists.

Gord Shepherd, who calls himself an "aeronomer" (someone who studies the upper atmosphere) says there is a relationship of some sort between the number of sunspots and phenomena as widespread as rainfall, the number of lightning bolts that hit the ground, and even the number of animal births and deaths.

Sunspots are areas of low temperature on the surface of the sun, which seem dark against the bright backdrop, regularly increasing or decreasing in number every 11 years. Scientists simply do not know the full extent of their effect on the earth's atmosphere and weather.

Because the aurora borealis is caused by particles from the sun, Shepherd believes it may also affect the weather.

According to Shepherd, being able to predict the climate on an 11-year basis, and possibly being able to maximize food production could be one social benefit of such research.

"But", Shepherd comments, "scientists work with two perspectives. Once they are into a project, they tend to forget about the longer-term effects of their work and concentrate on the task at hand."

Shepherd speaks softly of the phenomenon which has occupied him since 1966. He speaks in capital letters, of *the Aurora*, and it almost becomes personified.

"For me, it is an aesthetic experience. I like it", he says. He looks up at the night sky every time he goes outside, a habit picked up in his native Saskatoon where the northern lights are a frequent companion.

To study the aurora more closely, Dr. Shepherd has conducted three expeditions during the last four years, to Cape Perry on the Arctic



Professor Shepherd with his pet rocket.

Ocean. Rockets he designs and launches from the vicinity of a DEW station on Cape Perry, are sent over the latitudes where the aurora borealis can be found during the day, some 1500 km. north of Churchill.

The rockets intersect the aurora borealis and take measurements on the fluxes of electrons coming from the sun, the concentration of electrons and ions and their temperature in the ionosphere. Instruments stowed in the rockets also measure the electricity and magnetic field in the side of the aurora borealis.

Isis II may soon have company should the federal government approve a proposal now before it from about 70 space scientists from across the country. POLAIRE (Polar Orbiting Low Altitude Input Response Energetics), is a six-foot, wheel-like satellite with 14 instruments inside, which would be launched from the US space shuttle in 1983. Professor Shepherd was chairperson of the science planning group that designed the project.

A York - designed instrument

called a temperature and wind interferometer, would be among those carried into orbit in the satellite.

Long antennae 40 metres apart would measure the differences in the electric field which exist between the poles of the earth at night, wind speeds, and differences in light and energy intensity. Along with the satellite, the 10-year project includes 25 ground stations in the North West Territories which would study and report on the nature of the magnetic field on the ground. There will also be a computer system that would connect all 40 scientists involved in an information exchange. The price tag? \$70-million.

"Canada is in a very good position to study the aurora borealis," says professor Shepherd. Except for Greenland, there is no other place on earth where it could be studied. He feels Canadian scientists have an obligation to study the daytime aurora.

"If we don't, someone else will", he remarked. Already, scientists from Los Alamos, California have made trips to the DEW station at Cape Perry.

New Excalibur team out to get students

Excalibur editor-in-chief elect for 1978-79 Paul Stuart is out to get York students.

He wants them to work for the paper and to heighten public awareness of how Excalibur works. "I don't think the York community has fully realized that the nature of the newspaper is determined by the people who come out and do the work. I hope I'll be able to get that across to people in September with a combination of public relations and recruitment," says Stuart.

Stuart has set himself some other tasks, among them obtaining independent financing for Excalibur (as opposed to student council grants, the magnitude of which is in the hands of the council).

Independent funding would mean a direct levy skimmed off student fees — preferably "from the entire community and not just students," is the way the editor-elect puts it.

"I know that if we're going to get independent funding in the fall, I'll have to go out and make the case that it's worthwhile and encourage broader participation in the paper."

He sees another of his duties as being "a resource person, to help the staff members to get their work out in attractive form, to teach

people whatever skills I've picked up, and, above all, to make sure the Excalibur newsroom is a friendly environment to work in."

The editor-elect hopes Excalibur and CYSF won't be at each other's throats next year. "Right now I think (president) Dave Chodikoff and I have a reasonable working relationship. I certainly hope we'll be able to continue it for the whole year, although some controversy is inevitable."

The editor-in-chief is one of two paid full-time employees at the paper. The other is the managing editor, selected by the editor-in-chief and ratified by the staff.

Current sports editor Kim Llewellyn is Stuart's choice for the job. "She's by far the most qualified person on staff", he says.

"Her strongest point is her ability to work with people. I expect she'll have a special responsibility in maintaining the good work in the sports section and improving our college coverage."

Aside from the editor-in-chief having a heavier administrative workload, the two full-time editors are "working equals 98 percent of the time," according to Stuart.