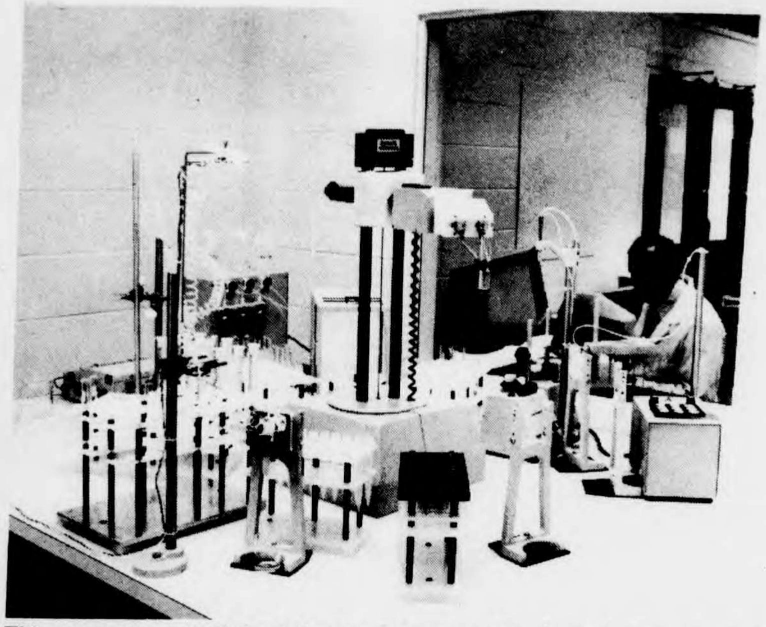

This computer-controlled robot arm measures and analyzes the ingredients in drugs. Here, it is being used to test birth control pills in Ortho Pharmaceuticals Ltd.'s Don Mills, Ontario, laboratory. (Photo: Ortho Pharmaceuticals Ltd.)

Imaging device 'sees' acid rain and insect damage to forests

An Ontario high-technology firm has been called in to help diagnose what is ailing West Germany's Black Forest.

Damage to the Black Forest is so serious that in some areas two out of three trees are diseased.

The Ontario company, Moniteq Inc. of Toronto, makes one of the world's most sensitive devices for detecting damage to forests from insects and acid rain.

The device, called an imaging spectrometer or "imager", takes readings of the forest from an aircraft as it flies overhead.

Five electronic cameras mounted in the aircraft take the light reflected from a forest and break it down into 288 colours. This information is eventually translated by computer into an image which can be interpreted by scientists looking for tree damage.

Moniteq was invited to participate in the Black Forest study because its imager is the most sensitive device of its kind for detecting light patterns reflected from forests.

To date, only one imager has been built, for the federal Department of Fisheries and Oceans. The imager is also capable of measuring subtle colour changes in water and has been used by the government to chart areas with good fishing potential.

The instrument has also been used by the Ontario Centre for Remote Sensing to study acid rain pollution in the Muskoka Lakes region.

Moniteq's managers hope that the Black Forest study will interest other governments in the imager.

(Canadian Science News)

New development in the field of opthamology

York professor part of a team that discovered an unknown nerve in the human eye

By LORRAINE BROWN

A psychologist at York University and an anatomist at Queen's University have discovered a set of specialized nerve endings, in one of the eye muscles, that tell the brain where the eyes are pointing.

These nerve endings were known to exist in animals, but not in humans. Their discovery in humans may lead to improvements in treatment of some eye disorders.

Professor Martin Steinbach, of York University's Psychology Department, was studying patients at the Hospital for Sick Children who had undergone eye surgery for strabismus (cross-eye or walleye). He noticed that children who have had repeated eye surgery often cannot point to an object without first looking at their hand. Those who have had eye surgery only once are less likely to suffer from this problem.

Dr. Steinbach hypothesized that repeated eye surgery must be damaging to some part of the eye's nerves that sends messages to the brain **about the eyes' orientation. He asked Dr. Frances Richmond, an anato**mist at Queen's University in Kingston, to try to locate the nerve. By dissecting an eye muscle under the microscope, Dr. Richmond found a group of tiny nerve endings about one to two thousandths of a millimetre thick.

"The nerve endings look like tiny threads, about the width of a spider's web," says Dr. Richmond. "They are located in the eye muscle right where it joins a tendon which attaches the muscle to the skull. When the eye moves, the muscle contracts and the tendon stretches. As the tendon stretches, the tiny nerve endings are stretched too. This causes them to fire, sending information to the brain about the eye's orientation within the socket."

Humans have similar structures, called tendon organs, throughout the muscles of the body. Because they send information to the brain about the force being exerted by a muscle, they let the brain know what the muscles are doing. The nerve endings **that Dr. Richmond found are similar to the organs of a fetus. "They seem** to be a more primitive or original form of the tendon organ," she says.

Because they cannot work on a living human eye, the scientists cannot prove that these endings are responsible for telling the brain about the eyes' position. But they can be fairly certain, because of similar studies on animals, and also because of Dr. Steinbach's discovery that children who have undergone repeated surgery exhibit a loss of information about eye position.

When children have surgery for strabismus, the eye muscle is cut right where it joins the tendon. This is the best place to cut the muscle so as not to weaken it, but unfortunately is also the site of the newly-discovered nerve endings. Dr. Richmond expects that, as the news of the discovery reaches eye surgeons, some attempt will be made to alter the operation for strabismus, so that the nerve endings will not be injured.

Dr. Steinbach hopes their discov**ery could be useful to the field of opthamology. "A surgeon never** knows how strabismus surgery will turn out," he says. "The discovery of the nerve endings may give a better understanding of this disease and its treatment."

Dr. Steinbach is also involved in studies on one-eyed children at the Hospital for Sick Children. He and Dr. Hiroshi Ono, a psychologist at the Hospital, have received a grant from the U.S. National Institutes of Health (NIH) in Bethesda, Maryland, to study the children. Most of the children lost an eye through retinoblastoma, an eye cancer which afflicts young children.

"The children offer us a unique opportunity to study the development of visual function," Dr. Steinbach said. "The Hospital for Sick Children is famous for its research into retinoblastoma, and the NIH saw a special opportunity here."

The research includes depth perception, visual acuity, and how one **eye develops an increased number of nerve fibres to the brain when com**petition from the lost eye disappears.

Drs. Richmond and Steinbach's research into nerve endings was supported by the Medical Research Council.

(Canadian Science News)