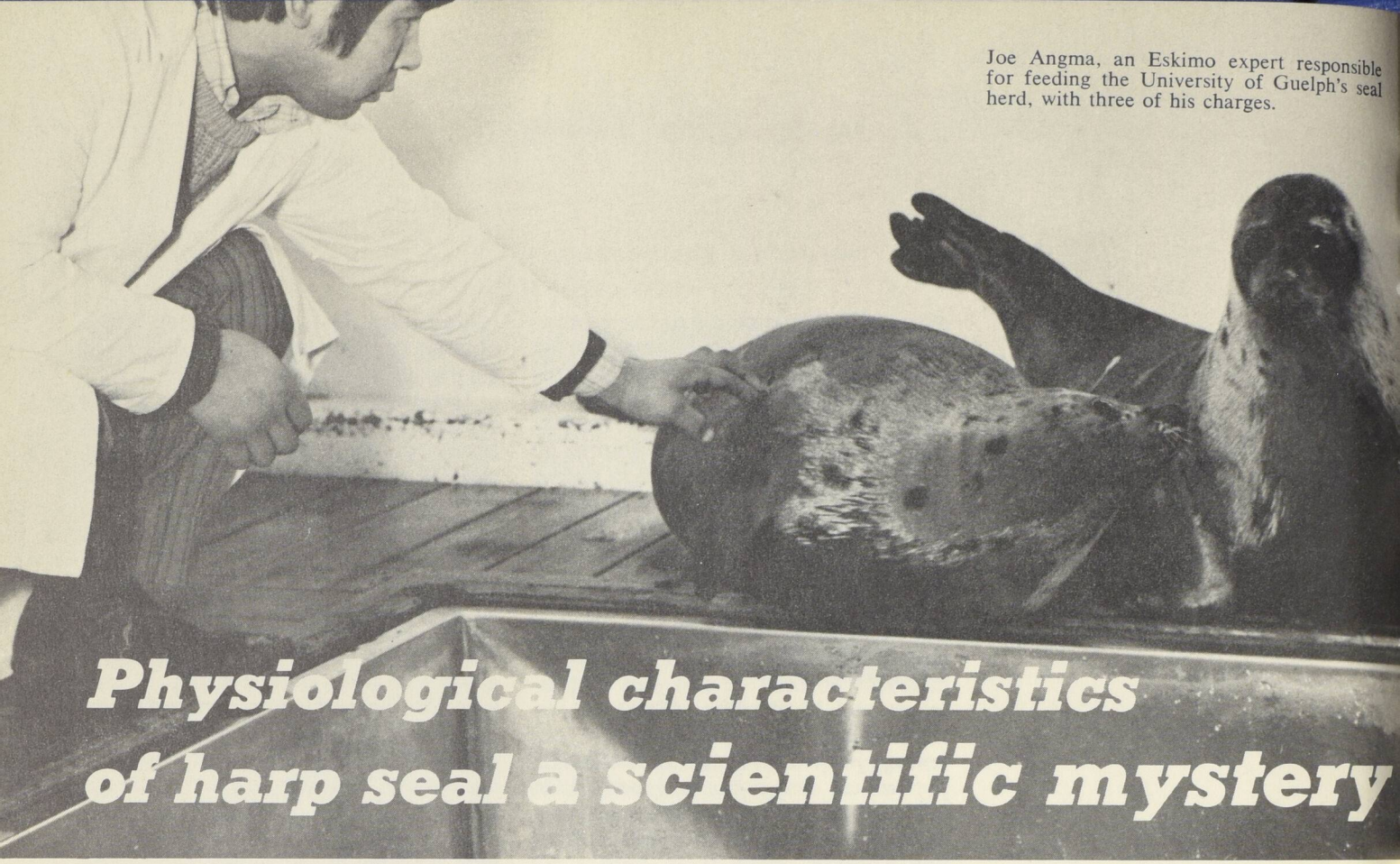

Joe Angma, an Eskimo expert responsible for feeding the University of Guelph's seal herd, with three of his charges.

Physiological characteristics of harp seal a scientific mystery

Despite all the publicity, public interest and headlines, the harp seal *Pagophilus groenlandicus* still remains somewhat of a scientific mystery. Everyone knows what seals look like, but not much else. How do they hunt for food? What do they hear? Do they communicate with each other? How well do they see? How can they stay submerged for long periods? How have they adapted to the marine environment? How does their anatomy differ from terrestrial mammals?

These and other questions are being studied by a team of zoologists at the University of Guelph, Guelph, Ontario, under the direction of Dr. Keith Ronald, Chairman of the Department of Zoology. The scientists have launched experimental work that should solve much of the mystery of this marine mammal. For the last five years, this work has been supported with grants of some $325,000 from the National Research Council of Canada.

Dr. Ronald first worked with the harp seal in 1954 as a parasitologist. But the seal itself proved far more attractive and interesting to him than the parasites. His enthusiasm spread; more than 30 people throughout the world now have an interest in the project. Guelph's group of 15 scientists study everything from the seal's organs to its life cycle, using techniques as diverse as histology and stimulus/response experiments.

The harp seal presents a fertile area for scientific research because, says Dr. Ronald, "it is one of the common species in Canada and yet one we know little about. It is important economically both for its blubber and for its highly prized pelt. One of 32 kinds of seal or seal-like animals (Pinnpedia), it represents a type of mammal, especially adapted to the marine environment.

"We are envious of some things the seal can do, such as regulating its heart beat and blood circulation," says Dr. Ronald. "How the seal is able to do this could have application to open heart surgery and to humans as they move under our oceans."

Each year before the controversial hunt, baby seals for the Guelph project are lifted off the Gulf of St. Laurence ice by helicopter. Their snow-lined crates are flown to Toronto by commercial airlines, then trucked to Guelph. The seals, once at Guelph, swim contentedly in temperature-controlled indoor or outdoor tanks and feast daily on herring and various supplements.

Keeping seals in captivity involves a score of problems, among them duplicating the natural diet of a variety of fish and invertebrates. Blood samples, taken every two weeks, provide a continual monitor of the seals' health. Biochemical parameters such as concentration of salts, proteins, sugar, haemoglobin, vitamins and fat indicate any health problems before they become serious. Vitamin deficiencies caused by the necessarily restricted "captivity" diet are compensated for by vitamin supplements. Through these blood samples, scientists can determine nutritional needs and can compare the seal's dietary needs with those of a terrestrial mammal.

Because the seal and man are both mammals, they exhibit many similar features. But seals seem to defy the mammals' need for a constant supply of oxygen to the tissues. A human can stay submerged in water for at most three minutes, and cannot go too deep before feeling the effects of pressure. A seal can stay submerged for as long as 30 minutes and can dive as deep as 200 metres. How can the seal keep its brain supplied with oxygen during this period? How can the seal's body adjust to the tremendous pressure?

The blood accounts for at least some of this ability. Because of a high concentration of haemoglobin, the blood can carry large quantities of oxygen. In addition, the seal has one third more blood than a human of comparable weight. The amount of haemoglobin increases with age in the seal, indicat-