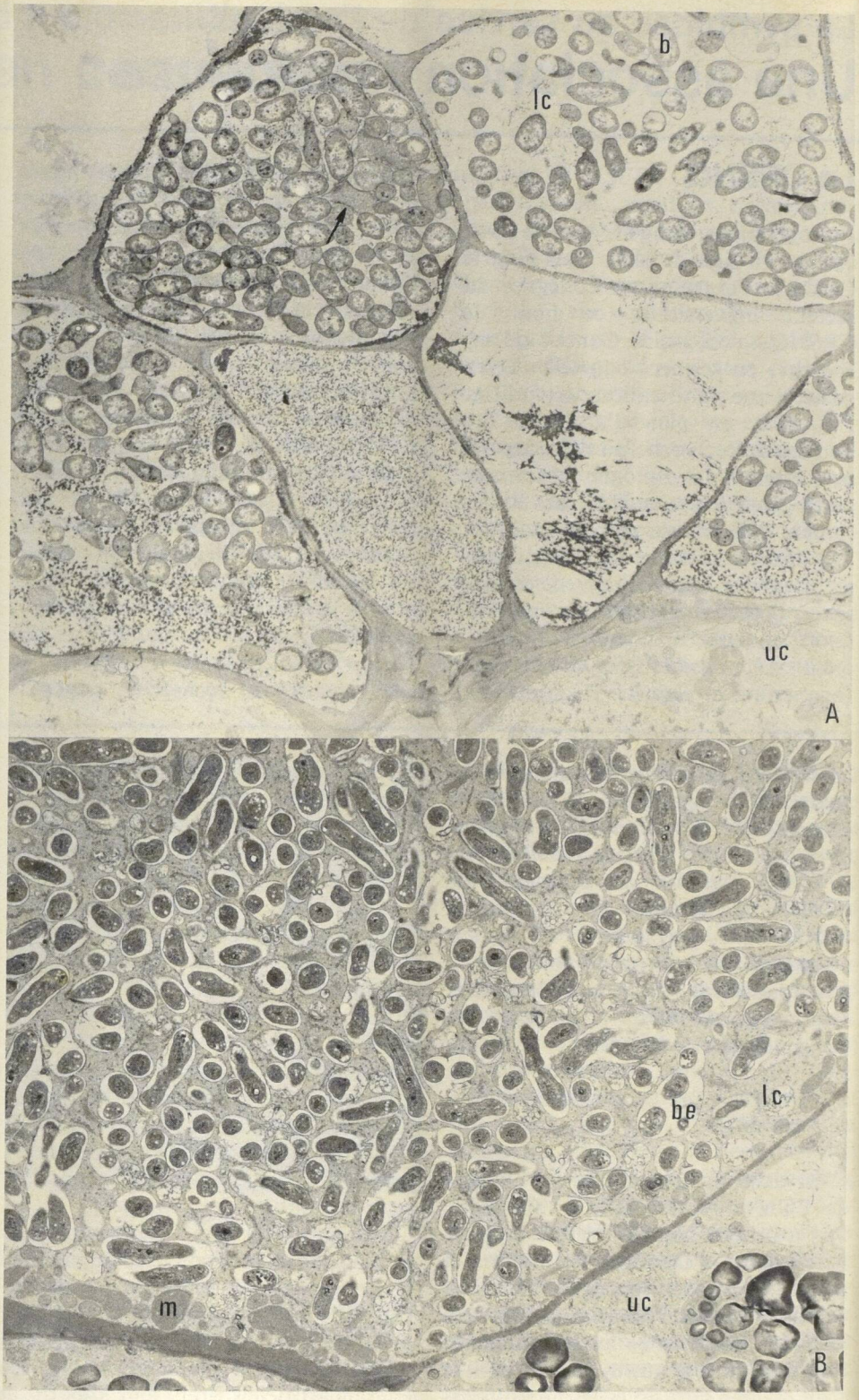
the soil while others live with and in plants so that together both achieve what neither could do alone. Of this latter group, by far the most important for mankind, and the best known, are bacteria of the genus *Rhizobium*, which inhabit nodules in the roots of legume plants.

When a bacterium known as *Rhizobium japonicum* infects a cell in the root of a soybean plant — the specific legume with which this microorganism has evolved a symbiotic association — it divides, multiplies and becomes subtly altered until there are as many as 2,000 so-called bactroids inside a single cell. Though grossly swollen, the cell is not damaged. Shake the dirt off the roots of an infected soybean and you will see the clusters of whitish nodules, each about the size of a ball-bearing, formed from these bacteria-packed cells. After infection the plant does not sicken; on the contrary, it puts on a spurt of growth. For what in the Haber process requires brute force (temperatures in the hundreds of degrees, and pressures hundreds of times greater than that at sea level), bacteria achieve at ordinary temperatures and pressures, powered by solar energy; they draw atmospheric nitrogen from pores in the soil, convert it into ammonium, and give it to the bean plant.

From the nitrogen fixed by its symbiotic partner, the plant makes amino acids. These in turn are assembled into the proteins from which, when we eat bean curd, tofu or other soybean food products, we build our bodies. But soybeans, peanuts, chickpeas and other legumes currently play a minor role in feeding the people of the world. Can the fertile partnership between legumes and nitrogen-fixing bacteria somehow be transferred to the plants which play major roles in our diets — to corn, rice or wheat? To answer such a question, a host of fundamental facts about the intricate molecular mechanisms involved in this strange symbiosis must be discovered, and it is for his research in this vital area that Desh Pal Verma has been honored with a Steacie Fellowship.

Desh Verma grew up in the small village of Tikri in the north of India. "Even when I was young," he recalls, "I had something of the scientist in me. I was fascinated with how things work. When I was 13, for instance, I built my first radio from basic components, a skill which allows me to fix laboratory equipment in emergencies."



Legume cells infected by Rhizobial bacteria (the small, potato-like dark globs) magnified 4,800 dia. by an electron microscope. Above: Parasitism. The granulation visible between the bacteria indicate that these pea shoot cells are being destroyed. Below: Symbiosis. A soybean cell, greatly swollen by bacteria (only a portion of the cell can be seen) remains in perfect condition. To the experienced eye, all the cell's vital machinery, such as mitrochondria and other organelles, are visibly intact. *(Dr. Desh Verma)*

Cellules de légumineuses (petits globules de couleur foncée) infectées par la bactérie rhizobiale et grossies 4 800 fois au microscope électronique à balayage. Ci-dessus: Le parasitisme. Les granulations que l'on voit entre les bactéries indiquent que ces cellules de pousse de pois sont attaquées par les micro-organismes. Ci-dessous: La symbiose. Bien que la pénétration bactérienne l'ait fait considérablement enfler, cette cellule de soja demeure en parfait état (seulement une partie de la cellule est visible). Pour l'oeil averti il est facile de reconnaître que tous les éléments vitaux de la cellule comme, par exemple, les mitochondries et d'autres organites ne sont pas endommagés. *(Dr Desh Verma)*