Chairman of the foundation's board is Gustav O. Lienhard, a retired chairman of the Johnson & Johnson board and president and treasurer of the foundation until Rogers took over as president.

Rogers says he found the members of his board extremely knowledgeable about hospital and medical center operations and also about universities, since most have substantial experience serving on college and university boards. He notes that they bring their corporate backgrounds and university board experience into play as trustees. When Rogers suggested, for example, that the foundation be set up organizationally on the lines of a university administration, the board members made it clear that, based on their observations, "they were not terribly impressed with the suggestion. They took the argument and hit me over the head with it."

Outsiders say the board is likely to be expanded, with new members selected to help with the foundation's broadened program, but that the trustees are, and will likely continue to be, a pragmatic and hardheaded group.

It will no doubt be several years before the Johnson Foundation defines its style and establishes its effectiveness, but, even considering the dimensions of health care problems today, the Johnson Foundation has the resources to do more, metaphorically, then apply a Band-Aid.—JOHN WALSH

RECENT DEATHS

Charles F. Angell, 52; professor of engineering, Wentworth Institute; 15 November.

Edward F. Barta, 82; professor emeritus of pathology, Medical College of Wisconsin; 5 November.

Harry A. Charipper, 71; professor emeritus of biology, New York University; 17 November.

Edwin A. Christ, 54; professor of sociology and anthropology, Westminster College, 15 October.

M. Raymond Collings, 75; former professor of anatomy, Wayne State University; 19 October.

Conrad G. Collins, 64; professor of obstetrics and gynecology, Tulane University; 14 December.

Robert A. Davis, 71; former professor of educational psychology and research, George Peabody College for Teachers; 31 October.

J. W. Egiazaroff, 78; hydroelectric engineer and mathematician, Armenian Academy of Sciences; 10 June.

Emmanuel Fauré-Fremiet, 88; cytologist, electron microscopist, protozoologist and professor emeritus, Collège de France; 6 November.

Irving W. Finberg, 60; professor of engineering, Miami-Dade Junior College; 3 October.

Leonard D. Garren, 43; professor of medicine, University of California, San Diego; 31 October.

RESEARCH NEWS

Nuclear Explosion Seismology: Improvements in Detection

Nuclear explosion seismology has come a long way since 1958 when a committee of experts met in Geneva to consider the best means of detecting violations of a comprehensive test ban treaty. At that time not much was known about seismic signals generated by underground nuclear explosions—only one shot had been detonated. Now several dozen shots have been analyzed in detail, and the original ideas of how to detect and distinguish the seismic signals of explosions from those of earthquakes have been superseded.

Some experts now believe that explosions in hard rock with yields as small as 2 kilotons could be identified on a global scale with no more than a dozen high-quality seismograph stations. But in 1958 there seemed to be little prospect, according to some seismologists, of identifying shots with yields smaller than 50 kilotons at distances greater than 2500 kilometers from the center of the blast. On the basis of these more pessimistic assumptions, 180 stations would have been needed to police the globe.

The negotiations for a comprehensive test ban treaty reached an impasse when the United States and the U.S.S.R. could not agree on the importance of on-site inspections. The United States negotiators felt that on-site inspections were necessary when seismic data could not distinguish the origin of a suspicious signal. The Russians would not acquiesce. Each government has maintained this posture for over a decade.

When the partial test ban treaty was signed in 1963, it covered nuclear tests in the atmosphere, in space, and in the oceans, but there was no agreement on underground explosions because of the differences about on-site inspection. With the improvements in theory and instrumentation during the past decade, some observers now believe that the position of the United States could be changed without any fear of deception. According to Robert Nield, former director of the Stockholm International Peace Research Institute (SIPRI), weapons tests with yields lower than 10 kilotons would be of little advantage to a nuclear country, and any larger underground explosions would surely be identified—either remotely by seismic signals or by spy satellites or locally by old-fashioned espionage.

There are four basic elastic waves of use in the problem of identifying underground explosions—two kinds of body waves and two corresponding surface waves. On a conventional seismograph the first signal is usually due to a fast-moving body wave known as a P wave—for primary. The P waves are acoustic waves; the displacement of the particles in the ground is along the waves' direction of travel. The P waves provide the signals used to determine the direction of the first motion from an earthquake.

The other type of body waves are shear waves; they are called S waves—for secondary. The velocity of S waves is lower than that for P waves, and the direction of the ground motion is perpendicular to the direction of travel. A liquid material cannot maintain S waves because it has no restoring force. Explosions should produce weak S waves because all of the energy initially goes