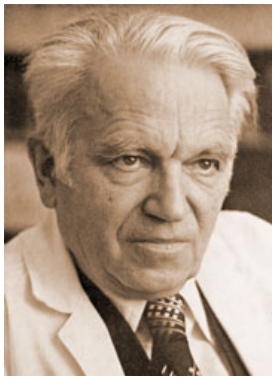
Gerhard Herzberg



Hamburg, Germany, 25 Dec. 1904 - Ottawa, Canada, 3 Mar. 1999

Title Distinguished Research Scientist, National Research Council Canada, Ottawa, Canada. Nobel laureate in Chemistry, 1971

Nomination 24 Sep. 1964

Commemoration – Dr. Herzberg was born in Germany and during his doctoral and post-doctoral studies in Germany he was associated with such eminent scientists as Max Born and James Franck. His early interests were in astronomy and later in atomic and molecular physics. In spite of his extraordinary accomplishments at a young age, Dr. Herzberg had to leave Germany and move to North America in 1935. He went to Canada where he wrote his classic books on spectroscopy, and later moved to the Yerkes Laboratory at the University of Chicago. After a brief stay in Chicago he went back to the National Research Council of Canada with which he was identified for the rest of his career.

Dr. Herzberg was clearly the father of modern molecular spectroscopy. The entire world of spectroscopy considered him its champion and statesman. Even spectroscopists who did not know him personally considered him their teacher because of his classic papers and books, which had a great impact. His contributions to molecular spectroscopy, in particular to the spectroscopy of molecules of astronomical interest, were truly outstanding.

Dr. Herzberg received many honours and was a member of several Academies including the Royal Society and the US National Academy of Sciences. He was awarded the Nobel prize in chemistry in 1971.

C.N.R. Rao

Summary of scientific research

My main interest is in atomic and molecular spectroscopy. The Lamb shift on the ground states of H and He atoms was determined for the first time. However, most of the work was in molecular spectroscopy, that is, of the spectra of many diatomic and polyatomic molecules. Much effort was spent on the determination of the structure of free radicals on the basis of their spectra. The most important among these were CH2, CH3 and H3. The last named was discovered in 1979. It is a radical that is stable only in the Rydberg states but unstable in its ground state.

Another of my interests was the study of forbidden transitions in diatomic and polyatomic molecules. The first important result was the discovery in 1931 of what are now known as the Herzberg bands of O2 in the near ultraviolet, which proved to be important for the production of ozone in the upper atmosphere; they are also prominent in the light of the night sky. Another forbidden transition is the infrared atmospheric oxygen bands which I assigned to a 1delta upper state in accordance with the prediction of Mulliken. This state is now much discussed as an energy carrier in chemistry, biology and medicine. Another series of studies dealt with the determination of dissociation energies of diatomic molecules, especially O2, H2, N2, P2 and others.

Early work on the structure of polyatomic molecules showed that the C-C single bond is shortened when adjacent to a triple bond and it was followed by a great deal of further work on such problems and is continuing in many other laboratories.

More recently I turned my attention more and more to the application of molecular spectroscopy in astrophysics, that is, in planetary atmospheres, in comets, in stellar atmospheres and in the interstellar medium. The first observation of the quadrupole spectrum of H2 led to the identification of molecular hydrogen in the atmospheres

of the outer planets and quite recently to the identification of shock waves in the interstellar medium. The discovery of the CH^+ ion and its identification in interstellar space and the identification of the H_2O^+ ion in the tails of comets were further interesting results of work in this field.