talked about good will and cooperation, yet these qualities grew and flourished under his leadership. Most important of all was his faith in the value of fundamental research. When he asked me to join the laboratory I hesitated, telling him that I had never done anything practical in my life and mistrusted my ability to do so. "Don't worry about the practical part," he said, "that is my job. You go ahead and work on whatever you want to, and leave the rest to me." He lived up to his word. He himself tells the story of how he had to defend Langmuir, who had been working four years with no visible results. "Leave Langmuir alone," he said, "he is getting valuable data." The next year Langmuir brought out the gas-filled lamp, the following year the law of space-charge and the radio tube.

The laboratory that has grown up under his leadership is still small, scarcely 300 men. Its influence for public welfare is not so much *their* contributions to science and industry, as *his* contribution, as a pioneer in industrial research, in demonstrating what was by no means obvious, that pure research can be successfully carried on in an industrial laboratory, with profit and untold benefit to mankind.

For this eminence in the application of science to public welfare I commend to you Dr. Willis Rodney Whitney, pioneer of industrial research.

A. W. HULL

RESPONSE BY THE MEDALIST

I HIGHLY appreciate the honor you bestow in presenting to me this Marcellus Hartley Public Welfare Medal.

I am encouraged first to express a personal thought. I always lacked somewhat general civic virtue. I never wanted to be a mayor or a major. I usually quieted my critical conscience so as to concentrate selfishly on my attractive industrial job. Therefore, I greatly appreciate those plain words, "public service." Every one at heart wants to be of public service and all industries must hope to be. But nothing nicer could happen to an employee of an industry than such a reward from such a source.

Actually, however, I have been only a part of a machine or assembly line to which the reward more properly belongs. However, as representing a living active group of research men, I gratefully accept this token.

But I want to extend the explanations much further, back to one who did so much to encourage the use of new scientific truth in public service. While Bloody Queen Mary and Queen Elizabeth were burning at the stake countless persistent leaders of good and pure thought (Mary, the Protestants, and Elizabeth, the Catholics), Francis Bacon was devoting a long and useful life to advancing clearer conceptions of truth. It occurred to him that to learn with certainty how many angels could stand on the point of a pin, careful experiments and observations were necessary. Mary, Elizabeth and Bacon were each righteously and terribly in earnest, but their techniques greatly differed. Bacon advocated experiment, for there had accumulated an infinite ignorance about the truly infinite creation. He was so logical, so sincerely inquisitive and so persistent that societies for research and academies of science quite displaced the old Inquisitions. Bacon made it very plain that perpetual improvement in public welfare was only obtainable through honest, industrious interrogation of nature. We call that research.

In our particular research-group our duty is to help counteract the effects of obsolescence of electrical products and prevent interruption of employment of large groups by actively aiming at new electrical unknowns.

In such work we also found, somewhat as a by-product, that our research men could contribute to growing science by publishing their results. They have now published about one thousand scientific articles. These, I like to feel, are contributing thus to general knowledge and public welfare.

W. R. WHITNEY

ABSTRACTS OF PAPERS

Distribution of galaxies in the anti-center region: HARLOW SHAPLEY.

Solar corona photography: IRVINE C. GARDNER (introduced by W. W. Coblentz). The lenses of extremely long focal length (60 to 100 feet) and small relative aperture (1/80 to 1/200) that have been commonly employed for corona photography have two fundamental disadvantages; the image is larger than is necessary in order to insure that all resolved detail shall be recorded by the photographic emulsion; and the lens works too slowly to permit the outer portions of the corona to be photographed during an eclipse of short duration. A lens for eclipse photography has been specially designed and constructed at the National Bureau of Standards from optical glass made at the bureau's own glass plant. The lens is composed of four components, widely separated, has a clear aperture of nine inches and is corrected for all the third order aberrations over a large field, a feature impossible with the two-component (or three-component apochromat) telescope objective commonly used for eclipse photography. The equivalent focal length is approximately 19 feet and, as a by-product of the design, the lens has telephoto properties so that the overall length of the camera is only 14 feet. The camera is designed to permit focusing in the laboratory and a precise reproduction of the laboratory adjustment without further focusing at the eclipse station. The mount is designed to give extreme portability and to enable the camera to be rapidly erected by a small group of men. Consequently the use of the instrument does not require the occupation of the