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INFRA-RED SPECTROSCOPY¹

SIR WILLIAM HERSCHEL is generally credited with having first demonstrated the presence of an infra-red spectrum. His experimental procedure, as reported under the date of April 24, 1800, in the Philosophical Transactions of the Royal Society, was simple and effective. A prism resolved a beam of sunlight passing through a slit in a shutter into a spectrum which fell upon a table. By placing in the region beyond the red end of the spectrum the blackened bulb of a thermometer, he found that it registered a rise in temperature: an even greater rise in temperature than occurred when the bulb was inserted in the red band of the spectrum. As the bulb was moved outward from the red end of the spectrum, this effect was found to reach a maximum and then to diminish rapidly to zero. Since the thermometer also registered a rise in temperature when placed in any one of the seven colored bands into which Newton had divided the spectrum, the question arose as to whether the visible spectrum consisted of a single radiation which produced both illumination and heat, when received upon solid surfaces, or of two distinct agencies, one resulting in illumination and one in heat effects. His statement of the problem is so admirable that I quote it in its entirety:

... if we call light, those rays which illuminate objects, and radiant heat, those which heat bodies, it may be inquired, whether light be essentially different from radiant heat? In answer to which I would suggest, that we are not allowed, by the rules of philosophizing, to admit two different causes to explain certain effects, if they may be accounted for by one. A beam of radiant heat, emanating from the sun, consists of rays that are differently refrangible. The range of their extent, when dispersed by a prism, begins at violet-colored light, where they are most refracted, and have the least efficacy. We have traced these calorific rays throughout the whole extent of the prismatic spectrum: and found their power increasing, while their refrangibility was lessened, as far as to the confines of red-colored light. But their diminishing refrangibility, and increasing power, did not stop here: for we have pursued them a considerable way beyond the prismatic spectrum, into an invisible state, still exerting their increasing energy, with a decrease of refrangibility up to the maximum of their power: and have also traced them to that state

¹ Address of the Vice-president and Chairman of Section B, Physics, American Association for the Advancement of Science, Philadelphia, 1926.

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