with superconducting bolometers using small ribbons of columbium nitride mounted in cryostats, and employing circuits as described in the preceding reference. Following the discovery on December 2, 1946, of demodulation of broadcast waves at 1,090 kilocycles, we generated waves in the laboratory at frequencies ranging from 200 to 30,000 kilocycles, and found that demodulation occurred only in four bands centred approximately at 1, 3, 5 and 16 megacycles. We have found this demodulation to occur only within a narrow temperature zone corresponding to a part of the transition interval between the normal and the superconducting state. The temperature for maximum demodulation was not affected by changing the radio-frequency. Quality of reception was comparable with good standard radio reception. Although no tuned radio-frequency circuit or antenna was used, the signal generated was estimated to be of the order of ten to one hundred microvolts at the terminals of the ribbon. Demodulation could be reduced or eliminated by passing small direct currents through the superconductor.

Superconductors may be useful for generating or receiving waves in frequency ranges where the use of present methods is difficult, or for improving present methods.

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[1] *J. Opt. Soc. Amer.*, **36**, 518 (1946).

Determination of the Variation of Composition of Airborne Crystalline Materials with Particle Size

THE 'cascade impactor'[1] is a four-plate sampling instrument so designed that particles in successive size ranges are deposited in turn on the corresponding plate. While some overlapping of sizes occurs, the cut-off of the second, third and fourth plates is comparatively sharp (v. ref. 1), and this can be utilized in the following manner.

The microscope slides normally used in the instrument are covered on one side by a thin sheet of 'Cellophane' or aluminium foil, the foil being held in position on the slide by a small amount of cellulose acetate cement at either end. The foil is then coated with a thin film of Canada balsam in xylene. This must be done immediately prior to use, or alternatively the slides must be stored in xylene vapour. The slides are inserted in the usual way, and a sample much denser than for normal counting is taken. It is necessary to avoid continuing the sample to a point where the greater part of the sticky surface has been covered by dust. The slides are removed and a small amount of a thin solution of Canada balsam applied over the trace by means of a wire. The slides are located in their former position and re-exposed: in this manner a dense linear trace is built up. The slides are then removed and covered with a coverslip supported on a spacing ring. Should one plate become heavily coated compared with the other three, it is removed, and replaced by an ordinary slide made adhesive with balsam, and the sampling continued until the rest have reached the desired density.

Immediately after the dense sample has been taken, another sample for counting is obtained, and this enables the size range on each plate to be determined.

To obtain the X-ray diffraction pattern, the coverslip and glass slide are removed, and the linear trace on the foil treated by the usual powder methods.

This method would seem to have the following advantages over previous methods for determining the variation in composition with particle size:

(1) The sample undergoes no treatment before the diffraction pattern is obtained. Even low-temperature ashing of filter samples may alter the crystal structure, while the possibility of chemical reaction when aqueous media are used in size separations is always an uncertain factor. (2) Coagulæ are deposited in the range appropriate to their Stokes law size—in the same manner as they would be in the breathing passages. Elutriation methods of size separation redisperse coagulæ into their ultimate particles, thereby producing erroneous results. (3) The sample obtained is representative of the dust in a considerable volume of air (5 cu. ft. in the samples so far taken). (4) There is no question of selective coating of the sample placed in the diffraction camera. This is of importance when flaky materials such as micas are present.

This method compares favourably on a time per sample basis with elutriation methods, and seems suitable for the study of aerosols consisting of mixed silicates and silica.

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[1] May, K. R., *J. Sci. Instr.*, **22**, No. 10 (1945).

Response Curve of the Yellow Receptors of the Human Fovea

THE micro-stimulation apparatus[1] has been used recently for studying the shapes of the response curves of some of the receptors which take part in human foveal colour vision. It will be remembered that Granit found evidence for seven kinds of 'modulator' in the retinæ of such animals as frogs, snakes and rats, which had maximum responses at the following approximate wave-lengths: 6000, 5800, 5400, 5200, 5000, 4600 and 4400 angströms. All these had narrow response curves. In the cat, on the other hand, the response curves appeared to be wider, having legs which were farther apart. Particularly was this the case with the 'modulators' produced from 'dominators' after the retina had been exposed to red, to green, or to blue lights.

Now the three-colour theory of Thomas Young postulates three kinds of modulator in the human fovea: red, green and blue (or violet), and supposes, moreover, that these have very wide response curves indeed, which spread in each case over, roughly, half the visible spectrum. The question that arises, therefore, is: Does man resemble the frog, in having receptors with very sharp response curves? Or does he resemble the cat, in having receptors with somewhat broader response curves? Or, is he unique in possessing three types of receptor only, having exceptionally broad response curves?

I have found two methods of obtaining the response curve of one of the receptors of the human fovea, both depending on a study of the antichromatic responses.