and statistically significant increase in ChE activity from the visual, through the somesthetic, to the motor area. The spatial animals do not show this consistent pattering. Even more striking are the differences in *level* of ChE activity. Group I shows significantly higher ChE activity than group II in both sensory areas but not in the control motor area. The greatest difference is found when the ChE activities in the two sensory areas are averaged, (V + S)/2. All 9 of the spatial animals score *above* 57.1 (the mean for all 19 animals) and 8 of the 10 visual animals score *below* 57.1.

At present we would entertain two kinds of theoretical explanations to account for our data. The first would relate hypothesis-preference to ChE dominance of one of the sensory areas. The second theory would posit a general "power" factor—high ChE activity in the sensory ("cognitive"?) areas makes for a more generally adaptive animal (more "intelligent"?). We have begun research to test both the sensory-area dominance theory and the general "power" theory.

Most of the animals were drawn from Tryon's (*6*) three strains—maze-bright animals, maze-dull animals, and a cross between the two (labeled "B," "D," and "C," respectively in Table 1). Behaviorally, the B's are spatial, the D's visual, and the C's are found in both groups. Chemically, the B's tend to be high on the (V + S)/2 measure, the D's low, and the C's show a range that overlaps those of the other two strains. We have initiated a selective breeding experiment to test the suggestion that ACh metabolism in the cortex may be genetically determined and that this, in turn, determines hypothesis-preference (*8*).

References and Notes

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Preliminary Studies of the Intensity of Light Scattered by Water Fogs and Ice Fogs

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This study (*1*) was initiated to investigate photometrically the angular variation of the intensity of light scattered by artificially produced water and ice aerosols and to evaluate the usefulness of photometric techniques for the study of Alaskan ice fogs (*2*) and supercooled water fogs.

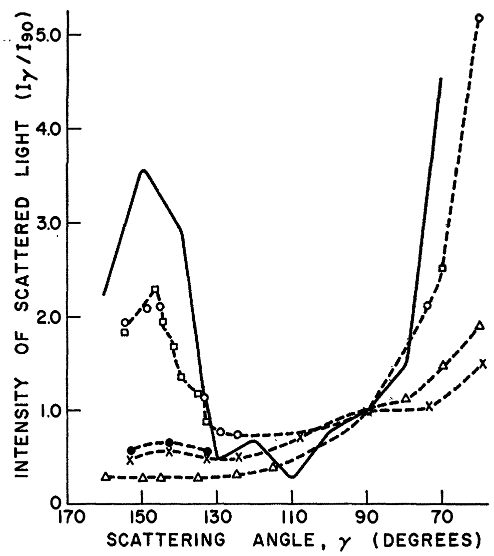

Fig. 1. Angular variation of intensity of light scattered in a horizontal plane by water fogs and ice aerosols. Interpretation of symbols: ○ water fog, −17°C; □ water fog, −12°C; ● ice aerosol, −16°C, Dry-Ice seeded; × ice aerosol, −10°C, AgI seeded; △ ice aerosol, −12°C, AgI seeded; —— theoretical curve for droplets of 3.5-μ radius (Gumprecht *et al.*).

Atmospheric optical phenomena caused by the scattering of light by water or ice particles (*3*) suggest that characteristic curves for the angular variation of scattered light would be different for ice and water fogs when observed photometrically. The fogbow seen on a sheet of water droplets at an angle between 140 and 143 deg to the incident rays of the sun and halos seen at an angular radius of 22 or 46 deg around the light source when looking through a suspension of ice crystals in the atmosphere are examples of these phenomena. Rainbows and halos are treated theoretically by Bucerius (*4*) and Ramachandran (*5*), respectively. Sinclair (*6*) has summarized investigations of the scattering of light by aerosols consisting of particles with a radius of 1.0 μ or less. In contrast, ice fog particles are most frequently 5 to 10 μ in radius (*2*), and water fog droplets have an average radius of about 20 μ and a minimum radius of about 2 μ (*7*).

The experiments reported here were carried out in a home freezer. Fogs were generated continuously by controlled heating of a beaker of water and were converted to ice form by seeding with either Dry Ice or silver iodide. The freezer contained a microphotometer (*8*) adapted to record the ratio of the intensity of scattered light to the intensity of the incident beam in a horizontal plane. The beam had a wavelength of 5460 A. Angles observed were from 0 to 160 deg. A second detector monitored the light scattered vertically at 90 deg to the incident beam to provide a continuous check on 90-deg scattering and on the symmetry of the scattering in the vertical and horizontal planes. Corresponding readings of the horizontal and vertical detectors were obtained on recorders with matched chart speeds.

Readings of the horizontal detector were corrected to represent scattering intensity for the volume of the beam seen at 90 deg. To simplify comparisons between fogs of different or varying density, the intensity of scattered light was recorded as the ratio of the readings at each angle to a horizontal reading obtained at 90 deg after each angular setting. In the notation used, direct transmission is 0-deg scattering, whereas light scattered directly back toward the source would be 180-deg scattering.

Characteristic curves obtained for the angular variation of the intensity of light scattered in a horizontal plane by the water and ice aerosols and a theoretical curve for monodisperse water droplets are shown in Fig. 1.

All tests of unseeded water fogs showed high scattering intensities at low scattering angles, decreasing scattering to about 125 deg, and a maximum in high-angle scattering in the region of 147 deg. Unseeded fogs did not scintillate.

The theoretical curve was obtained from computed values published by Gumprecht and others (*9*) for the angular distribution of light at 5460 A scattered by water droplets 3.5μ in radius. At 150 deg, it shows a maximum scattering of 3.6 times the 90-deg values. In experimental water fogs, the maximum occurred at 147 deg and was consistently greater than twice the 90-deg value. The occurrence of maximum scattering at an angle intermediate between that shown in the theoretical curve and that found for the fogbow (140 to 143 deg) suggests a particle radius intermediate between 3.5 and 30 μ for the fogs used in these studies and indicates the possibility that the position of maximum scattering might be used as a measure of average particle size in atmospheric fogs.

All tests of seeded fogs showed high scattering intensities at low angles, decreasing to very low intensities at angles greater than 125 deg. Scintillations were observed a few seconds after seeding. In the region of 147 deg, the scattering of an ice aerosol was one-fifth or less than that of a water aerosol having the same scattering at 90 deg. A slight inflection in some ice aerosol curves in the region of 147 deg probably indicates the presence of some water droplets or ice spheres. The ratio of the scattering intensity in the horizontal plane at the maximum in the region of 147 deg to the scattering intensity at 90 deg appears to provide a measure of the relative proportion of spherical water or ice particles to crystalline ice particles in an aerosol.

Conversion of a water aerosol into ice form led to an increase of the 90-deg horizontal scattering at the expense of the 90-deg vertical scattering by as much as 40 percent. It is suggested that this effect is caused by, and provides a measure of, the orientation of the ice crystals in an ice aerosol.

Further studies of the photometry of ice and water aerosols are being evaluated and will be reported later.

References and Notes

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Identity of Sweat Glands Stimulated by Heat, Epinephrine, and Acetylcholine

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It has been clearly demonstrated that both epinephrine and acetylcholine activate sweat glands (*1, 2*). This study (*3*) was undertaken to determine whether acetylcholine and epinephrine stimulate the same sweat glands, or separate groups of glands, and to correlate the response to these stimuli with that evoked reflexly by heat.

On the forearm of each of two subjects an area of skin approximately 0.5 cm in diameter was identified by two small moles. At weekly intervals, after the hairs were clipped short, the test areas were painted with tincture of iodine and then coated with a 50-percent emulsion of starch in castor oil, as described by Wada (*2*). When spontaneous sweating occurred at room temperature, the subject's back was heated with an infrared lamp until he felt a generalized diaphoresis. When on the cool days no spontaneous sweating occurred, the starch emulsion was gently removed with cold water, iodine was reapplied, 0.05 ml of either acetylcholine chloride (1:10,000) or epinephrine hydrochloride (1 : 10,000), each in 0.9-percent NaCl, was injected into the test area intradermally, and the starch emulsion was reapplied. Before application of the starch in each case the moles were marked with a fine spot of India ink.

When the sweating response was clearly represented by isolated black spots a photograph of the test area was taken at a uniform magnification, using an instantaneous flash of light to avoid heating the arm. In each case after the drug injections, the complete absence of spontaneous sweating was verified by inspection of areas of skin similarly prepared but at a short distance from the injection site.

From the original negatives, transparent positives