Europe, yet some useful information can be drawn from the experiments. The vortex rings of smoke and air fired from the special tubes designed by Steiger and Suschnig at Windisch-Feistritz in southern Styria are very beautiful examples of hydrodynamic phenomena. When the vortex rings are shot vertically upward they, of course, enlarge their diameter and dimensions, while the velocity diminishes, falling to about one-half at the end of the first second, or at an altitude of about 60 or 70 meters, and they finally come to rest at an altitude whose extreme limit is about 350 meters, or 1000 feet, for the largest cannon and the heaviest charge (180 grams) of gunpowder. As the hail falls from much higher elevations than this, we see at once that the smoke vortex can not have a direct action upon it, either mechanical or physical, and we certainly ought not to invoke any mysterious acoustic action following in the line of the ancient myths to the effect that the ringing of bells and the noise of brass bands dissipates lightning and hail.

Dr. E. Vidal proposed to substitute for cannon a form of skyrocket which is guaranteed to reach 500 meters where a charge of 100 grams of powder can be exploded. These cost much less than the cannon, are simpler and less dangerous. If the cannon do any good, these should do better. They are employed only in some portions of France. In general, Angot shows that a more complete investigation of thunderstorms in all their details must be made in order to demonstrate that cannonading or noises have even the slightest effect. A vote was taken by the members of the conference at Graz, concerning which he says that in this vote the vineyardists were generally in favor of shooting as a means of protection, while the scientific men stood out in a very heavy majority against it. At the close of the conference the members visited Windisch-Feistritz and witnessed the cannonading, but, notwithstanding the ardent conviction with which Mr. Steiger explained his ideas, this exposition was far from producing a favorable effect upon the majority of those present. One could not fail to be impressed with the extreme disproportion between the power of the thunderstorm and the weakness of the means employed to combat it.

After some years of infatuation, the question of cannonading against hail seems now to have arrived at a period of calm and rational discussion. The doubt and scepticism that scientists have shown since the beginning have not diminished, but, on the other hand, have increased among the practical farmers and planters.

PASSAGE OF SOUND THROUGH THE ATMOSPHERE.

Under the above title, Prof. C. V. Boys delivered an instructive lecture before the Royal Meteorological Society on March 18, 1903, and we quote the following from the Quarterly Journal for July:

> In consequence of the gradual decrease of density in the atmosphere upward, light does not travel in a straight horizontal line, but is usually curved to the extent of about one-sixth of the curvature of the earth; in other words, it describes a curve in a vertical plane of about 24,000 miles radius. Thus it is that when the sun and moon have just set geometrically they appear just above the horizon. * * * If the ground is very cold and the temperature increases rapidly upward, a diminution of density becomes intensified and light travels in a still more curved path. * * * When the conditions are reversed, and cold air is resting on warm ground, it sometimes happens that the change of density is sufficiently rapid to cause the beam of light to gradually curve the other way and a mirage results. * * * Unlike light, the velocity of sound is not affected by the density of the air, but it is by the temperature. As, therefore, the temperature usually falls with increasing altitude, the usual condition is that sound travels more quickly near the ground than higher up. This will especially be the case on a warm, quiet, sunny day. If, therefore, on such an occasion it were to happen that the air were uniformly stratified in layers of decreasing temperature, sound would not travel in straight lines, but in curved lines, with the concavity upward. One person, therefore, could not be heard well by another at a distance. * * * On the other hand a quiet night, with the ground colder than the air, tends to reverse the curvature of the sound waves, so that the ground does not form an obstruction and sound is heard well. Above all, a gentle wind, imperceptible on the ground, but increasing gradually upward, adds its velocity to the sound velocity one way and subtracts it to the other, and so *up* the wind, the resultant velocity becomes less upward, and sound rays are strongly bent so as to be concave upward and the ground intercepts all the sound. *Down* the wind, on the other hand, the velocity is greater upward, and rays starting possibly at a number of different inclinations from a source of sound may, after some miles, all converge on a listener, and so he may observe acoustical looming to the amazing extent that we sometimes experience.

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and VI.

The mean monthly pressure was highest over the Ohio Valley and Tennessee, east Gulf States, and the southern portion of the South Atlantic States, where the values ranged from 30.05 to 30.09 inches. Over the middle and southern Plateau regions the mean pressure was less than 29.90 inches, with a minimum mean of 29.75 inches at Yuma, Ariz.

The mean pressure for the month was above the normal in the Atlantic and Gulf States, Ohio Valley and Tennessee, lower Lake region, southern portion of the upper Lake region, the upper Mississippi and lower Missouri valleys, southern North Dakota, and the middle and southern slope, and southern portion of the northern slope regions, with the maximum departures ranging from + .05 to + .08 inch over southeastern Florida, the extreme southern portions of Alabama, Mississippi, and Louisiana, southeastern Texas, southern Missouri, northeastern Arkansas, the northern portions of Mississippi and Alabama, western Tennessee, southwestern Virginia, and West Virginia.

Over the Pacific and Plateau regions and the northern portion of North Dakota the mean pressure was below the normal, with the greatest departure over southeastern and northwestern Montana, northern Idaho, eastern and central Washington, north-central California, and north-central Utah, where the departures averaged from — .05 to — .06 inch.

The mean pressure increased over that of June, 1904, in the districts to the southward of a line drawn from the mouth of Chesapeake Bay northwestward to central North Dakota, thence southward to New Mexico, and thence westward to the Pacific Ocean just to the northward of San Francisco. To the northward of this line the mean pressure diminished from that of the preceding month.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart V.

The mean temperature for the month was slightly above the normal on the Massachusetts coast, and in northwestern Montana, northern Idaho, and Washington, except along the coast and in the extreme southeastern portion. In all other sections the mean temperature was below the normal, the greatest changes occurring generally over the central districts, and the southern Plateau, with maximum departures of —4.0° in north-central Nebraska, and —4.1° in central North Dakota.

Maximum temperatures of 90°, or higher, occurred except in portions of New England, North Dakota, the immediate Pacific coast, and the mountain regions; of 100°, or higher, in the central portions of South Carolina, Georgia, Alabama, and Mississippi, Oklahoma, north-central and portions of the Rio