ALFRED MARSHALL MAYER.

In our last issue we gave a biographical notice of the physicist, Dr. Alfred Marshall Mayer, and now through the courtesy of Mr. Joseph Wetzler we are enabled to present a portrait of him. The principal facts connected with his life were mentioned last week, so we will now only refer to some of his important discoveries. Early in his career, Prof. Mayer determined to devote himself to the problems of acoustics, and his researches led him to the solution of many of the questions in acoustics that have baffled other investigators. He discovered the auditory apparatus in the mosquito, and also many physical characteristics and peculiarities of the human ear for the reception of sound. His scientific researches since 1872 have been principally published in the American Journal of Science, under the title of "Researches in Acoustics." These include a method of detecting the phases of vibration in the air surrounding a sounding body; mode of measuring the wave lengths and velocity of sound in gases, resulting in the invention of an acoustic pyrometer; the determination of relative intensities of sound; five new methods of sonorous analysis for the decomposition of a compound sound into its elementary tones, and several other important discoveries in the field of acoustics. He was one of the associated editors of the American Journal of Science. One of Prof. Mayer's most important contributions to physics was a paper on "The Determination of the Law Connecting the Pitch of a Sound with the Duration of its Residual Sensation." Other treatises were: "On the Effects of Magnetization in Changing the Dimensions of Iron and Steel Bars," "Experiments with Floating Magnets," and "On Measures of Absolute Radiation." Prof. Mayer was of a strong mechanical turn of mind, and invented a number of machines and apparatus used in the laboratory of the physicist.

He was a many-sided man, and one subject in which he took the utmost interest was archæology, and in his studies of this particular topic he showed unusual acumen. In a chapter entitled "The Prehistoric Hunter," written by Prof. Mayer for the handsome volume entitled "Sport with the Rod and Gun," which he edited, he shows how thoroughly he had mastered the subject and how his comprehension of the hunting of to-day helped him in the better understanding of the chase of the past.

When Prof. Mayer was in France some years ago, in Dordogne and Abbeville he made some remarkable finds of prehistoric handiwork, almost in the identical places where Boucher de Perthes carried on his earliest researches, some sixty-odd years ago. It is more, however, as a physicist than as an archæologist that Prof. Mayer will be missed.

PROF. MAYER.

How and Why We Should Watch the Clouds Drift.

One of the most important elements in weather prediction is the direction of the wind, and by this is meant not the local currents near the surface, but the great and more steady ones high in the air. The surest way to get the trend of these is to watch the clouds that drift along with them. It would seem an easy matter to tell in what direction the clouds are moving, but M. J. R. Plumadon, the French meteorologist of the Puy-de-Dome observatory, tells us that it is by no means what it seems. The Literary Digest translates what he says on the subject in an article in Les Science Populaires, Paris. "The direction followed by the clouds in their passage across the sky constitutes, with the height of the barometer and the temperature of the air, the three principal elements by whose aid we foretell the weather by purely local observations. The clouds do not move haphazard; they obey the general atmospheric movements, and their motion is regulated [by the law of Buys-Ballot; that is, they so move that atmospheric pressure is always less on the right than on the left of the cloudy current. This is a consequence of the earth's rotation and of the solar action in displacing the air from the equator toward the poles. When the clouds come from the south they indicate that a minimum of pressure exists in the west; when they move from the north, that proves that there is a center of low pressure toward the east, and so on. The observation of the clouds thus enables us to know: 1, the approach of centers of disturbance; 2, the relative position that we occupy in the region where these centers may cause atmospheric perturbations.

"By combining these data with the indications of the barometer and taking account of the season of the year, we may, after judicious experimentation, be able to foretell the morrow's weather with great probability of exactness. . . .

"It is, then, a matter of great interest to determine the movement of clouds exactly. The determination is effected easily and quickly when one is accustomed to it. But for persons who are not used to the process, it is troublesome and almost always somewhat inexact because of certain illusions that one must know how to avoid.

"The first condition to fulfill is to know the orientation of the place of observation. That presents no difficulty for localities where we live or with which we are familiar; for others it is necessary to use a small compass, taking care to remember that the geographical north does not coincide exactly with the magnetic north. . . .

"To know exactly the direction of motion of the clouds, it is indispensable that the observer's head should remain immovable; it is a good thing to furnish it with something to lean against. We must also have a fixed point of view situated in the direction of the visual ray, that is, directed toward the cloud to be observed; the corner of a house, the branches of a tree, the sash of a window can serve for this purpose.

"The observatories commonly employ for current observation of the clouds a special apparatus known as the 'nephoscope;' it is a mirror of black glass on which have been traced with a diamond concentric circles and also diameters 45° apart. The mirror can be turned in its own plane about its center by the aid of a proper mounting. A vertical strip divided into millimeters is fixed on the edge. It moves with the mirror and can be raised and lowered. The observer looks at the instrument so as to see the image of a cloud reflected at its center, and at the same time, by combining the motions of the mirror and the vertical strip, the end of the latter is brought into such a position that it also is projected on the center, on the image of the cloud. If the cloud is motionless, its image will remain at the center. If the cloud moves, its reflection will leave the center and the radius that it follows will indicate the direction of motion.

"The height of the end of the vertical strip above the mirror and the number of seconds taken by the image to move from the center to one of the concentric circles, enable us to determine the angular velocity of the observed cloud. To obtain the actual velocity—that is, the distance moved over in a given time—we must know the height of the cloud above the mirror. In using the nephoscope, a fixed position for the observer is obtained by the necessity of looking at the end of the strip in such a way that it is always in line with the center of the mirror. . . .

"The price of the instrument is quite high; so we advise meteorologic stations and individuals who do not wish to obtain it, but who desire to determine with precision the directions of clouds, to use the following arrangement, which is both good and cheap:

"On four posts three to four yards high, fixed in the ground so as to form a square whose diagonals are respectively north and south and east and west, are fastened the four angles of a wooden frame on which wires are stretched parallel to the diagonals. The posts serve as resting places for the observer's head, and he can thus very easily determine the direction followed by the clouds by watching them and the wires at the same time.

"As much as possible he should observe the regions of the sky that are not too far from the zenith, and choose for observation clouds that are very distinct and not too large. It is important, in fine, to prove that the whole cloud is moving in the same direction, which it is not always easy to do when the cloud is of vast dimensions. By limiting the observation to the displacement of one of the edges or of a part of the cloud, large errors may be introduced, especially in the case where the mass of the cloud has only a slight velocity. For, if the cloud is increasing in size, it may happen that the eastern edge may appear to move east, the southern edge south, etc.

"If we have to do with long cirrus clouds, we should look at the axial region, which is also the whitest, the clearest, and keeps its shape longest.

"There is one illusion that must be carefully guarded against. It is generally produced when one is looking at the same time at very high and very low clouds. . . . The first seem to move slowly, because they are far away, while the second appear to move rapidly, because they are nearer. So, even when the two are following a common direction, the higher will appear to be moving in the opposite direction to the lower. . . .

"A good point of view, and, above all, a nephoscope or the system of wires described above, prevent this illusion, which is very common, and which affects many persons, even when they think they can avoid it."

Submarine Photography.

The most recent developments in this branch of photography are thus summarized in the Photographic Times (November) by Lieut. Albert Gleaves, following an article by Captain Boiteux, of the Brazilian navy, in the Boletino do Club Naval. Says Lieutenant Gleaves: "This application of photography is not new, but previous attempts have been barren of practical results. Once realized, however, the hydraulic engineer will have a sure method of estimating for any kind of submarine work. It will be useful alike to the navy and merchant marine in the inspection of under-water bottoms when docking is not possible, and in the examination of sunken wrecks. By this means the floor of the sea may be investigated, and the flora and fauna of the ocean depths photographed and studied. In naval warfare the submarine camera will establish the location of booms, torpedoes, and mines. Two essentials are requisite for the satisfactory working of the apparatus: there must be sufficient light and the camera must be absolutely watertight. Captain Boiteux obtains his light from an incandescent lamp of the Bernstein system, 50 volts and 5 amperes, which is secured in a box on the top of the diver's helmet. The light is projected in a cone to a reflector placed in the rear part of the box, and then passes through a glass in the front part. The lamp may be fed by a dynamo or accumulator in a steam launch. The photographic apparatus consists of a detective camera (short focus) in a hermetically sealed metallic case. The case has glass windows corresponding to the objective and view finder, and is carried in a box attached to the diving suit. The lens is operated by a screw passing through the watertight case. The results of experiments with these instruments are reported to be excellent. Objects at a distance of three meters (nearly ten feet) could be seen as plainly as by daylight and were readily photographed."

Hunting for Andree.

A dispatch from Tromsöe says that British and Russian steamers are going to search the Siberian coast for Prof. Andree, who, on July 11, started from Dane's Island in a balloon to attempt to cross the north pole area. Nansen reached the neighborhood of the New Siberian Islands on August 18 of last year, and Nordenskiold was not able to skirt the entire Siberian coast in one season, and was frozen in for the winter off the northeast coast. So it is possible that though a steamer might cross the Kara Sea to the mouth of the Obi or the Yenesei in northwest Siberia, it would not advance much further, unless it expected to winter in Arctic waters.

ENGLAND has sent an expedition to explore the river Jub, boundary between the Italian and English spheres of influence in Somaliland. It is under the command of Major McDonald, who made the survey of Mombasa to Lake Victoria.