PHYSIOLOGY

Distance Flattens Terrain

At 13 miles, the lowest cliff that can be seen rising from landscape is 100 feet high. Limitations of vision may settle geomorphologists' controversy.

➤ AT THIRTEEN miles away, the lowest cliff that can be seen rising from the surrounding landscape is 100 feet. Anything lower could not be seen at that distance as an elevation or rise in ground.

These findings, which seem to settle a half-century-old controversy among geomorphologists, are reported by Miss Elizabeth W. Olmsted, geology professor at Smith College, and her physician sister-in-law, Dr. Elizabeth P. Olmsted, of Buffalo, N. Y. (SCIENCE, Feb. 16).

The figures for distances and height are for persons of normal, that is 20-20, eyesight with good conditions for visibility. Reduced illumination, haze and subtility of contour each may affect the height of the cliff that could be seen at 13 miles.

The structure of the retina of the human eye sets a definite limit to the magnitude of relief, or unevenness in the landscape, that can be perceived. In order to produce a minimal image, an object must subtend a visual angle of one minute with the retina, it has been found. The Snellen test for determining acuteness of vision is based on this.

Following the same principles, the Olmsteds worked out their 100 feet at 13 miles formula. A cliff 100 feet high at a distance of 13 miles (13.06 miles is the exact figure) will subtend an angle of five minutes. This is the same as the angle subtended by the letter of the Snellen 20-20 line viewed at its standard distance of 20 feet.

The physiographer must use map analysis rather than rely on his eyes alone to check observations of topographic form, the Olmsteds point out, since his eyes will not always be able to perceive small differences in contour.

Back in the 1890's geomorphologists divided into two schools of thought on the appearance and nature of upland regions. One school, relying on eye observation and refusing to admit a factor of "optical deception," considered the successive hilltops of the New England and Appalachian regions "the dissected remnants of a once even and continuous surface, beneath which the valleys of today have been eroded."

Scientists of the other school, in contrast, have been convinced that the identical mountain areas consist of a number of planed surfaces separated by small vertical intervals. The followers of this school have stressed the need of checking field observations with map study by means of "projected" and "zonal" profiles.

Science News Letter, February 24, 1951

ASTRONOMY

Four Comets in Sky

➤ FOUR recently formed comets are now racing across the sky, reports Dr. Harlow Shapley, director of Harvard College Observatory. Two of these were spotted in one night. All are too faint to be seen without the aid of a telescope.

Of these four comets, one was discovered by a woman astronomer in a mountain observatory in Czechoslovakia, (See p. 114), another was found by two Belgians. (*See SNL,* Feb. 17). Two are periodic comets, rediscovered the same night by Dr. Leland E. Cunningham of the University of California, America's leading authority on the orbits of comets.

Dr. Cunningham used the 60-inch telescope of the Mount Wilson and Palomar Observatories to photograph the two periodic comets. Comet Pons-Winnecke and Tempel No. 2 are of the 20th magnitude, too faint to be picked up by many observatories and a million times fainter than the faintest star visible to the naked eye.

Both of these periodic comets move in an elliptical path around the sun and are visible for only a few months each cycle. Comet Pons-Winnecke was observed previously many years ago, but has not been seen again until now. Comet Tempel No. 2, reported once before, has not been observed recently.

Science News Letter, February 24, 1951

ENGINEERING

Speedy X-Ray Inspection Through Use of Crystals

➤ HIGH-SPEED, automatic X-ray inspection of thousands of industrial products is promised by General Electric X-ray Corporation with the use of laboratory-grown crystals which can amplify the X-ray energy a million times. The crystals are made of cadmium sulfide.

The crystal, a semi-conductor because it passes electricity in one direction only, is tiny in size and can be grown from a fraction of a millimeter to several millimeters in cubic size. When excited with X-radiation, it acts as an amplifier tube, releasing torrents of electrons that can be used to operate various types of mechanisms.

These crystals were developed in the G.E. Coolidge Laboratory by Dr. John E. Jacobs, of the laboratory staff, with Dr. Rudolf Frerichs, of Northwestern University, serving as a consultant. Dr. Frerichs is a German scientist who came to this country in 1947.

On a area-for-area basis, these crystals are over 1,000,000 times more sensitive to X-rays than are ionization chambers which are commonly used to measure X-radiation. They are said to be over 1,000 times more sensitive than photo-electric cells, such as those used in "electric-eye" applications. They will do the work that ordinarily requires a much more complex system of vacuum tubes and amplifiers, while at the same time allowing the use of low-intensity X-rays.

While there are many applications for the X-ray with the crystal amplifier, one is in the inspection of canned food to determine a partly-filled can or foreign matter in contents. In the operation, cans pass between the X-ray machine and the crystal. A simple control box and a relay are used to reject the faulty ones.

Science News Letter, February 24, 1951

"CRYSTAL EYE"—Dr. John E. Jacobs, GE X-Ray Corp. research engineer (left), is holding a partly filled can of baby food which has been spotted by a new testing apparatus. Heart of the apparatus is the little crystal holder facing the cans from the left. Dr. Jacobs and Dr. Rudolf Frerichs, physicist of Northwestern University (right), developed the crystal.