

been carried out at this height and it was found that the beam itself could be detected up to 40 kilometers, or about 24.8 miles.

In outline the searchlight experiment is simple. The beam of a great searchlight was directed upward and made to flicker (modulate) about ten times a second by an automatic Venetian blind type of shutter.

Some three and a half miles away was placed a large mirror, containing at its focus a photoelectric cell. This mirror pivoted upward and caught light scattered from the beam in the sky. The photoelectric current generated by this scattered light was amplified in a special radio amplifier developed by Mr. Johnson, which is so sensitive that it can detect currents of only .000,000,000,000,000,032 amperes. From the geometry of the searchlight and the receiving mirror the altitudes at which the beam is studied can be calculated.

The modulated, flickering nature of the light makes it possible to differentiate it from the general background light of the night sky. Even so, it was necessary to work only on clear nights without moonlight and at times when there was little haze at low altitudes.

The experiments indicate that with a 60-inch searchlight and a 60-inch mirror as a receiver, the study of the upper atmosphere could be pushed to 90 kilometers, or nearly 56 miles.

A particularly useful problem which ought first be carried out, Mr. Johnson indicated, is to study the ozone found in the atmosphere. "Since ozone has a strong absorption band from 2,500 to 3,300 Angstrom units of wavelength," he said, "it would be possible to study the scattering from this region with the scattering from that above 3,400 Angstroms. This can be done by the use of

two receivers using sodium and potassium photocells respectively."

Three other research problems, all vital for meteorology, appear to be feasible with the new type of equipment, Mr. Johnson explained.

1. The density and temperatures of the atmosphere at great heights can be determined, which should tie in with present studies deduced from the length, brilliance and heights of the flaming tails of meteors.

2. The ozone distribution in the air (which helps shield the earth from the sun's ultraviolet light rays) can be determined in the region below its maximum concentration around 12 to 15 miles altitude. There is some indication that this ozone is carried by the polar air currents, so that a knowledge of its concentration, eventually, might lead to a better knowledge of polar air currents which are known to influence world weather.

3. The method might also be used to disclose the presence of water vapor above 12 kilometers (7.4 miles). If appreciable water is present there it would provide a mechanism for the re-radiation of solar rays and hence be useful knowledge in meteorology.

Dr. E. O. Hulbert of the Naval Research Laboratory has made measurements in the region of the upper atmosphere studied by C.I.W.'s Department of Terrestrial Magnetism scientists who, besides Mr. Johnson, were R. C. Meyer, R. E. Hopkins and W. H. Mock.

Dr. Hulbert photographed the scattered light from the setting and rising sun at altitudes up to 20 kilometers (12.4 miles) and was able to detect scattering as high as 56 kilometers (35 miles). The new experiments by the searchlight beam extend actual measurements up to 32 kilometers (19.8 miles).

Science News Letter, December 2, 1939



Versatile Rhus

ISN'T IT ODD, what divergences of qualities can be displayed by different species within a single plant genus!

Take the sumac family, for instance; the group of plant species which botanists know collectively as *Rhus*.

We are all familiar with the common smooth sumac, whose thickets along roadsides and on waste lands make splashes of gorgeous red as autumn days grow shorter. With its close relative the low sumac, which never grows more than about a third of its height, it is a favorite with planners of native shrub plantings in parks and on home grounds. It also offers shelter and food to many kinds of birds.

Choosing swampy lowlands instead of rather dry uplands is another close botanical cousin, the staghorn sumac. It looks very much like the ordinary sumac, except that its upper branches are covered with a thick, sooty-black fuzz, like the "velvet" on the immature antlers of a deer. This sumac is perhaps even more planted for horticultural purposes than its smooth-stemmed relative.

Looking very much like these harmless and desirable sumacs is one of the black sheep of the family, poison sumac. Its bark is smooth, but paler than that of the smooth sumac, but its fruits appear as drooping clusters of small, pallid white berries instead of the erect bunches of dark purple-brown "seeds" that mark the other sumacs. Fortunately for most of us, it grows only in boggy areas, so that if you want a "dose" of sumac poisoning you will most likely have to wet your feet to get it.

Not so inaccessible, alas, are those evil three-leaved twins of the sumac cousinship, poison ivy of the eastern half of the country and poison oak of the western mountains. They do not look like

For CHRISTMAS

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sumacs at all, except to botanists who have the hardihood to examine their flowers and fruits carefully—but it is by these, and not by leaves, that botanical kinships are established.

Even less like the conventional notion of what a sumac should be are the single-leaved bush sumacs found abundantly

on the Pacific slope, and represented also by other species in some parts of the interior. Some of these are so sour in leaves and fruit that they have earned the name "lemonade bush"—possibly from the use of their fruits by pioneers in making an acidulated beverage when lemons were an unobtainable luxury.

Science News Letter, December 2, 1939

PSYCHOLOGY

Propaganda Need Not Lie; May Succeed With Part Truths

This timely article is another of the series being released by the Society for the Psychological Study of Social Issues through Science Service. The SPSSI is a group of psychologists specializing in the field of social problems.

PROPAGANDA does not have to lie. Its success may depend not upon violation of the truth but upon failure to refer to facts pertinent to an opponent's case.

If an English, German, or domestic propagandist merely suppresses some of the facts in a situation, he will tend to make people agree with his point of view without distorting the facts he does present.

During the time of the first Japanese incursions into Manchukuo, an investigation which was planned by W. K. C. Chen at Columbia University was carried out at seven American universities.

Classroom instructors, while making no attempt to veil the character of the propaganda they were employing, slowly and emphatically recounted facts relative to the situation in Asia.

Some student groups were presented with authentic facts which had been organized by a Japanese publicist. In other classes facts had been organized by a Chinese publicist.

Each publicist had emphasized the sacrifices and investments his own country had made in Manchukuo. All of the facts were "true," but neither publicist mentioned the facts of his opponent.

Even though these student groups were well aware of the importance and effects of propaganda, it was shown that the mass of evidence from one side which had been presented to them affected their attitudes toward the role of Japan and China in Manchukuo.

Students hearing only the Japanese side moved very strongly and clearly in the pro-Japanese direction. Those hearing the Chinese summary of the

facts became more pro-Chinese. After the experiment the student groups were shown on the blackboard how tremendously they had been influenced by this type of propaganda and general implications were discussed.

In this investigation it was also revealed that groups which were not subjected either to Japanese or Chinese propaganda did not change their attitudes, a finding which suggests that the groups whose attitudes shifted must have been affected by the presentation of the one-sided facts. Even a summary of the Manchukuo situation by an impartial source caused another group of students to revise their judgments.

This is one of a series of investigations which indicate clearly that awareness of the danger of propaganda does not prevent individuals from being affected when the simple device of leaving out half of the picture is utilized.

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PALEONTOLOGY

Fossil Found in Colorado 50 Million Years Old

FOSSIL remains of a hitherto unknown mammal that lived in Colorado 50 million years ago, and that looked like nothing now living on earth, have been brought back to the Field Museum of National History by an expedition under the leadership of Bryan Patterson.

The animal, found in a stratum of paleocene date, stood about three feet high, was six feet long, had thick legs and a generally heavy build. Its teeth indicate that it was a plant-eater. The group to which it belonged, long extinct, is known to paleontologists as the pantodonts.

Science News Letter, December 2, 1939

China is one of the largest wheat-growing nations.

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