extended almost from horizon to horizon. At this instant the western half of the bow was very bright. Gradually this portion split into two fainter bows, while the eastern half increased in intensity until its light predominated. A slow, swirling movement was detected in the portion of the bow overhead as it drifted lazily southward. Fully fifteen minutes passed before the bow disappeared.

At 1:40 the upper arch across the northern horizon faded, while the lower one increased in intensity. It became extremely bright, rising to a height of fifteen degrees at its greatest altitude. Since the area beneath it was quite dark it appeared unusually brilliant by contrast. It was most irregular in outline, being shot through and through with streamers both dark and bright. Never before have I seen an arch which resembled so closely the pictures of aurorae as observed in polar regions. As I watched, bright arches suddenly formed at an altitude of twenty degrees above the north. Almost instantly they rose to a height of some thirty degrees, where they vanished. Arch after arch appeared, sped upward, and vanished. Their behavior was similar to that of the high-voltage coronal discharge between vertical, nearly parallel metallic bars, in which the flaming arc is carried upwards by convection currents arising from its own heat. At the same time bright areas flashed forth here and there all over the northern sky, giving the appearance of far-away lightning reflected from numerous clouds. This lively activity continued for five minutes and slowly subsided, leaving only the bright lower arch and several vertical streamers.

At 2:00 the northern arch was very bright. It extended some forty-five degrees across the horizon, and its central boundaries lay ten degrees and twenty degrees above the north point. Numerous brilliant, cloud-like areas were seen above it, interspaced by irregular dark streaks which gave the appearance of moonlight coming from behind clouds of varying density. (The weather map, prepared a few hours after these observations, showed no clouds within two hundred miles to the north of us.) Several wide and somewhat indefinite streamers rose almost to the zenith where they blended with the Milky Way.

At 3:15 both northern arches were very bright. They extended along the horizon forty-five degrees and sixty degrees respectively and rose to central altitudes of fifteen degrees and twenty-five degrees respectively. In the north-northeast a brilliant white shaft one and one half degrees wide extended fully sixty degrees above the horizon in spite of illumination now introduced by the crescent moon which was now well above the horizon. Ten minutes later the bright shaft had faded away. In its place was seen a dark streak fully five degrees wide which extended up through both arches. The lower arch then increased greatly in brightness. Simultaneously the upper arch dimmed and disappeared. At this time arcs began to rise again in a fashion similar to that noted at 1:40. For several minutes they swept upward, taking about one third of a second to reach the position formerly occupied by the upper arch. There they vanished instantly.

At 3:55 the two bright arches were seen again, and eleven sharp streamers about one degree in width could be followed to a height of forty-five degrees above the horizon where they faded off into the moon-lighted sky. They dimmed slowly until only two were left, one northeast and the other north-northeast. Each was about two degrees wide.

Finally at 4:25 the upper arch and the eastern half of the lower ones were lost in the light of the coming dawn. The western half of the lower arch was still very bright, and in the north one brilliant streamer two degrees wide could be followed upward as far as Polaris.

The display evidently began between 11:45 o'clock and midnight, and it probably continued for some time after the light of the rising sun obscured it from our view. Since, of course, most of my time during the night was devoted to tending the spectrograph and adjusting the telescope, I undoubtedly missed a large part of the phenomenon. However, the above account is probably a fair sample of what took place. When one recalls that the Perkins Observatory is located in latitude forty degrees north, it is evident that a magnificent sight must have been presented in the higher latitudes of North America on that night.

The following day I observed the sun with a small telescope and found on its disc three large groups of spots and several isolated spots of moderate size. The group containing the largest sun-spot of all occupied a position southwest of the center of the disc. The position of this spot was such as to indicate that it had passed near the center of the disc some twenty-four hours before the display was observed.

No recurrence of the phenomenon was noted during the following night, although the northern sky was scanned many times.

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PROGRESS IN THE CONTROL OF WHITE PINE BLISTER RUST

THE director of the Brooklyn Botanic Garden in a recent interesting article[1] on the scientific value of botanic gardens refers to several problems in forest pathology. Among the comments on white pine blister rust occurs this sentence: "The only way yet known

[1] C. Stuart Gager, SCIENCE, April 23, 1937.

to keep this disease in check is to destroy all the currant and gooseberry bushes within a radius of many miles of any white pine—a drastic and difficult procedure, and only partially possible."

We are glad to inform readers of SCIENCE that the blister-rust-control situation is much more encouraging than Dr. Gager's comment would indicate. A number of years ago it was found that the sporidia produced on the leaves of currant and gooseberry plants (*Ribes*) are very delicate and normally do not cause commercial damage to pine under average forest conditions to a distance of more than 900 feet from the *Ribes* plant. Therefore, local control of the disease is accomplished by destroying all *Ribes* within 900 feet of white pines and keeping the *Ribes* suppressed on such areas. In addition, the European or cultivated black currant is eliminated throughout white pine regions as a general control measure, because it is more susceptible to the disease than other *Ribes* species and is the chief agent in the long-distance spread and establishment of the rust in uninfected areas. This is not a native plant, has not escaped from cultivation to any extent, and accordingly can be located without serious difficulty and eradicated.

Control of blister rust is entirely practicable and economical. Individual pine stands can be protected by the removal of *Ribes* in their immediate vicinity, and this measure is successful in controlling the disease locally, regardless of the possible neglect of such work in surrounding stands or the presence of centers of infection nearby. The protection of valuable stands of five-leafed pine has gone forward at a rapid rate, particularly since 1933, when emergency relief labor and labor from CCC camps became available for this work. Excellent progress has been made in the protection of all three of the commercially valuable species of susceptible pines in the United States, the northern white pine, *Pinus strobus,* extending from the Lake States to Maine and southward along the Appalachian Range to northern Georgia; the western white pine, *P. monticola,* occurring chiefly in Idaho, eastern Washington and western Montana; and the sugar pine, *P. lambertiana,* extending along the Cascade and Sierra Nevada Mountains from southern Oregon to the vicinity of Sequoia National Park in California.

These three species occur in stands sufficiently dense to be of commercial value on about 15,000,000 acres of land. The 900-foot-border zones increase the acreage of the control areas from which the *Ribes* must be removed to something over 26,000,000 acres. By the end of 1936, an aggregate of over 18,000,000 acres of these control areas had been given one working and the *Ribes* removed. From 12,000 to 20,000 men, largely from relief rolls and from CCC camps, have been employed on the work during each of the last four summers. Prior to that time the work was conducted on a much smaller scale for several years in cooperation with the states, counties and private owners concerned.

Control of white pine blister rust is carried on under the leadership of the Bureau of Entomology and Plant Quarantine, which is cooperating with the Forest Service, the National Park Service, the Indian Service, the Works Progress Administration and other federal, state and private agencies owning or administering forest land. This project has been in progress long enough so that it is possible, by comparison of protected areas with unprotected areas, to be sure that the control methods used are proving entirely effective. There is some regeneration of *Ribes* after eradication, and portions of the control areas must be gone over again in from three to ten or more years, depending on local forest and *Ribes* conditions. Present indications are that pine stands can be protected, from the seedling stage to maturity, by working the areas for *Ribes* from one to three times. The destruction of *Ribes* promptly stops the increase of infection in pine stands, regardless of the amount of infection that may have occurred before the work was begun, although such trees as are already fatally infected do not recover. Not all infected trees die, branches with blister rust cankers occasionally being shaded out before the canker reaches the trunk, but the disease is fatal when, as is usually the case, either trunk cankers or very numerous branch infections are present.

The extent to which relief labor will continue to be available for conservation work of this kind and the possibility of continuing operations to cover remaining unprotected pine stands can not, of course, be determined at this time, but in any event the protection already given to millions of acres of valuable white pine helps to conserve a forest resource of great value to the public for timber, recreational and water-supply purposes that would otherwise have suffered the fate of the chestnut.

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DOES THE VIRUS OF INFLUENZA CAUSE NEUROLOGICAL MANIFESTATIONS[1]

THERE has been a great deal of discussion in regard to the possible relationship between influenza and encephalitis or encephalo-myelitis. In this paper for the sake of brevity, the term "encephalitis" will be used with the understanding that it may refer either to a pure encephalitis or to an encephalo-myelitis. In this brief report no attempt will be made to cover the details of the various arguments that have been advanced.

[1] Preliminary report.