Leeds. The observatory was erected by Mr. Scriven Bolton, a well-known amateur astronomer who died in 1929. The telescope is clock-driven and is believed to be the largest private telescope in the country, and the third largest instrument of its kind in Great Britain.

SIR AUSTEN CHAMBERLAIN has received an offer from the chairman and directors of the Prudential Assurance Company to contribute £1,500 a year for a term of seven years to the funds of the London School of Hygiene and Tropical Medicine, of whose Court of Governors Sir Austen is chairman. The directors of the company are impressed by the importance of the teaching and research in all branches of preventive medicine in which the London School is engaged, and have suggested that the contribution shall be directly associated for the duration of the gift with the university chair of public health, held by the dean of the school as head of the Division of Public Health and Industrial Hygiene.

AN exhibit of testing apparatus and related equipment by the American Society for Testing Materials will be held at the Hotel Stevens in Chicago in 1933, in conjunction with the annual meeting of the society, during the week beginning June 26. Chief among the factors leading to this decision is reported to be the favorable reception accorded the first exhibit held in 1931, together with the fact that an exhibit will attract a large number of engineers who will be attending the various engineering society meetings being held during the week of the exhibit.

THE Fourteenth Exposition of Chemical Industries, according to *Industrial and Engineering Chemistry*, will be held in New York during the week of February 27 to March 4, 1933. The Grand Central Palace will again be the location and three entire floors will be devoted to the exhibits, showing the newest developments in raw materials, machinery and manufactured products. More than one hundred and seventy-nine companies have already reserved space. The exhibitors represent over forty American industries which are classified as chemical. Special groupings of exhibits are being made, such as general equipment; chemicals and chemical products; plastics, molded products, lacquers, etc.; laboratory equipment and supplies; instruments of precision; containers and packaging section and materials-handling equipment; raw materials, natural resources and industrial opportunities, and educational instructional exhibits. The last exposition, which was held in 1931, reported an attendance of 103,000, with a registration of 22,000. Admission to the Fourteenth Exposition will be without charge, and by invitation, or by registration only. An unprecedented attendance is anticipated, because of the timely value of the new products and processes which will be displayed. Exhibits of these new products developed by research will corroborate the findings of a survey conducted recently by the Division of Engineering and Industrial Research of the National Research Council. This survey was made to ascertain the present status of activities of leading industrial research laboratories. Returns from three hundred and fifty companies show that one half had invested more in research in 1931 than in 1929.

A NEW substation, known as the Clemson College Truck Experiment Station, has been established under the South Carolina Experiment Station in Charleston County for experimental work with vegetables. A tract of 67 acres, located seven miles south of Charleston, has been deeded to the county for the use of the substation, and the county has appropriated $10,000 for buildings and equipment. The main office and laboratory building is nearing completion at a cost of $5,000, and a deep well water supply with pressure system is being installed at a cost of about $800. Two projects in cooperation with the U. S. Department of Agriculture are being conducted, one with the Bureau of Plant Industry on bean diseases and the other with the Bureau of Entomology on truck crop insects.

A CORRESPONDENT of the *Journal* of the American Medical Association states that since the outbreak of hostilities between Japanese and Chinese soldiers in February, the Institute of Science at Shanghai has been closed, and rumor had it that it would sooner or later be removed in the near future. Dr. Yokote, the director, and all his assistants who had come back in Japan, are reported to have gone back to Shanghai in order to reopen the institute, as peace is restored.

DISCUSSION

NOTE ON PREMATURE FLOWERING IN GRAPEFRUIT FROM X-RAYED SEEDS

IN the course of experimental work now in progress in the Research Laboratory of the General Electric Company on the effect of x-radiation in the growth of citrus fruits, two seedling plants have shown characteristics sufficiently striking, it is thought, to be worthy of a note at the present time. It is hoped later to publish the results of this investigation in full.

The seeds concerned were part of a lot of grapefruit, lemon, lime, tangerine and orange seed most kindly sent us in March, 1932, by Mr. R. G. La Rue, superintendent of cultivations at the college of Agri-

culture of the University of California. They represented stock ordinarily yielding the most uniform seedbed.

The seeds had been dried previous to shipment. Before treatment, they were soaked in distilled water for fifteen minutes, then left in a completely moisture-saturated atmosphere for twelve hours. They were then dried on filter paper and exposed at once. They were treated on March 8, and planted on March 16 in seed flats, a mixture of one third sharp sand, and two thirds peat moss being used, the seeds being covered with pure sharp sand. The first sprout was seen on April 14.

Two plants showed flower buds in the last week of May. They matured rather slowly, and were not ready to open until the sixth of June, when, though diminutive, they proved to be quite normal in form. The plants still carried the first pair of leaves intact, as is usual with citrus seedlings of this age. One plant was normal in leaf and flower coloration, and the leaves were nearly normal in form, though somewhat elongate and diminutive. The other seedling, however, was extremely deficient in chlorophyl—an effect not uncommonly observed in citrus seedlings—and the flower was imperfectly pigmented, being of a yellowish white color similar to the leaves. The stamens, however, were golden. The green plant received a two-minute exposure, the white, an eight-minute treatment under the same conditions. Both showed buds at the age of a little over a month. The root system of both plants was very deficient.

The apparatus used in the work was a water-cooled tungsten-target Coolidge tube, operated at 30 milliamperes current and 200 kilovolts. The seeds were exposed at 50 centimeters focal distance. The seedlings were propagated in the electrically heated greenhouse of the Research Laboratory.

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NECROBIOTIC RAYS

THE protective action of ultra-violet rays on the protoplasm of human red blood corpuscles and plant cells described in the author's recently published papers[1] could be explained by a synthetic action of ultra-violet rays on the products of a decomposition produced by poisons and hypotony in protoplasm. Thus, according to the well-known equivalence law of photochemical reactions one could expect ultra-violet rays to be produced in the decomposition of the principal compounds of protoplasm in the process of death.

Indeed, the production of ultra-violet rays was observed by the author in all investigated cases of cell death. It seems, however, that some of these rays have a smaller wave-length than any ultra-violet rays known at present. It would therefore seem expedient to call all the rays produced by dying cells necrobiotic rays in general.

These rays were observed by means of silver bromide, which is decomposed by them. In first experiments suspensions of unicellular organisms or pieces of multicellular organisms which have a large surface (yeast cells, Elodea leaves, flower petals, etc.) in water were mixed with potassium bromide and silver nitrate in an absolutely dark room, killed by ether, and exposed to diffuse sunlight. The suspensions in which the cells had been killed after the formation of silver bromide showed a quicker darkening than the suspension in which the cells had been killed before the formation of silver bromide.

In other experiments the cells were killed by heating, and after the addition of potassium bromide, silver nitrate and ether these suspensions always showed a slower darkening than living suspensions to which the same substances had been added. If, after the addition of the substances mentioned, the suspensions were filtered, the liquid obtained showed a pinkish color without being exposed to light if the cells were killed after the formation of silver bromide, but remained colorless if the cells were killed before this formation. The color was considerably increased after the addition of a developer.

That the rays which had decomposed the silver bromide in the above experiments have a rather short wave-length is seen from the fact that they do not affect ordinary photographic plates which had been protected from the liquid by quartz plates sealed with wax. The rays affected, however, a dilute suspension of silver bromide which had been introduced in quartz tubes closed with glass stoppers into a suspension of yeast, which was then killed by different poisons.

It is evident that ultra-violet rays can be emitted also in very energetic physiological processes which are accompanied by the decomposition of the principal compounds of living matter. It is therefore not surprising that living cells and tissues may emit them in such a very small amount that they may not be detected by silver bromide, but in an amount sufficient to produce an acceleration of certain processes in the cell, as, for instance, cell division. This is the reason why we may venture to say that the so-called mitogenetic rays are really necrobiotic rays.

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[1] W. W. Lepeschkin, SCIENCE, 73, 568, 1931; *Protoplasma*, 14, 11, 1931; *Amer. Jour. of Botany*, July issue, 1932.