their absorption and secondary emission by solid substances. He showed that secondary emission of X-rays was of two varieties. In one of these the X-rays are scattered, without change of quality. The scattered rays were shown by examining tertiary emission to be polarized, and this was a fundamental result for the classification of X-rays with ordinary radiation, at that time doubtful. Professor Barkla's other kind of secondary emission is characteristic of the secondary radiator, and is accompanied by selective absorption of the primary rays. He showed that each chemical element emitted more than one definite kind of secondary fluorescent radiation. Concentrating attention on, say, the less penetrating kind, it was found to vary in quality by definite steps with the atomic weight of the secondary radiator.

REPORT OF THE YEAR'S WORK AT THE U. S. NAVAL OBSERVATORY

In his annual report to the Bureau of Navigation, Rear Admiral Howard, United States Navy, retired, superintendent of the Naval Observatory, says in part:

The time signals were sent out twice daily during the year, at noon and 10 P.M., seventy-fifth meridian time, both by land lines and by radio, through the operating relay at Radio, Va. The improvements mentioned in the last annual report have been completed and put in operation. The accuracy of the radio time signals, which can be picked up anywhere in the north Atlantic, has made it possible to reduce to one the allowance of chronometers for vessels of the Navy operating along the Atlantic coast.

The Naval Observatory has continued the policy of encouraging suggestions and developments of methods and instruments for navigation, particularly for submarines and aircraft.

The nautical-instrument repair shop has continued to prove economical in time and expense as compared with the previous system of having this work done by contract.

Owing to the great increase in ships of the Navy and the lack of receipt of materials and nautical instruments from abroad and the shortage of skilled labor in this country, especially in the manufacture of instruments and chronometers, the question of supply of instruments for navigation, especially chronometers, is becoming a matter of very serious proportions. The increased demand for the gyro-compass and the instruments attached to it is taxing the capacity of the only factory in this country which is able to manufacture this instrument.

Congress did not provide any addition to the clerical force, and it is earnestly recommended that the additional clerks which will be requested in the estimates to be submitted by the superintendent for the next fiscal year be approved and Congress urged to allow the same.

The scientific personnel has met twice each month, except during the summer, for the discussion of current astronomical topics and reading of papers by its members and scientists.

The astronomical work of this institution is now even more important than usual, owing to the European observatories losing many skilled observers due to the war.

Under the head of Aviation instruments and equipment, the report says:

As noted in the last annual report, the year started without any instruments or equipment for aviation, under the cognizance of the Bureau of Navigation, having been standardized.

Sets of clothing as used in the British and French aviation services were inspected at the observatory and at the aeronautic station at Pensacola, as well as sets manufactured by American firms. A board was appointed at Pensacola to specify a standard equipment and their report has been approved. The Bureau of Supplies and Accounts now has specifications for standard articles of clothing and personal equipment.

THE ENLISTMENT IN ENGINEER RESERVE CORPS OF TECHNICAL STUDENTS PENDING COMPLETION OF STUDIES

With the approval of the Secretary of War, Major General W. M. Black, chief of engineers, has promulgated regulations governing the creation of an Engineer Enlisted Reserve Corps, in which may be enrolled, pending completion of their studies, students of recognized technical schools. The announcement reads:

Under such regulations as the Chief of Engineers may prescribe a proportion of the students, as named by the school faculty, pursuing an engineering course in one of the approved technical engineering schools listed in the War Department, may enlist in the Enlisted Reserve Corps of the Engineer Department, and thereafter, upon presentation by the registrant to his local board of a certificate of enlistment, such certificate shall be filed with the questionnaire and the registrant shall be