Light Intensity of a Quartz Mercury Lamp.

DR. TSUNESABURO ASADA, of the Shiomi Institute of Physical and Chemical Research, Osaka, Japan, has sent us an interesting communication describing measurements he has made on the intensity of the light emitted by a quartz mercury lamp. The instantaneous values of the light intensity at several points of the luminous part of an alternating current quartz mercury lamp, the terminal voltage, and the current were all measured by the help of an

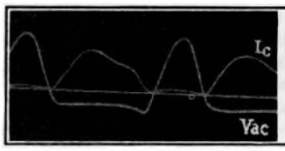

FIG. 1.

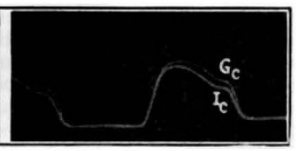

FIG. 2.

oscillograph. In carrying out the test, the image of the lamp was projected by means of a lens on to a screen.

The intensity of the light on each part of the image was found by a vacuum cæsium photoelectric tube. The photoelectric current was first amplified by a triode, which was found to give no deformation of the shape of the current wave.

In Fig. 1 an oscillogram is shown of the current I_c flowing in one of the anodes C and the terminal voltage V_{ac} across it. This oscillogram shows clearly that so long as there is an appreciable current through the electrode, its terminal voltage is practically constant.

Fig. 2 is an oscillogram of the current I_c and the intensity of the light G_c in the neighbourhood of the anode C. From these two oscillograms it is concluded that so long as the terminal voltage is constant the intensity of the light emitted is directly porportional to the current.

A special direct current mercury lamp was made of transparent fused quartz which could be used at various current densities. The light intensity of the lamp was measured by a monochrometer and a vacuum photoelectric tube. It was found that the relation between the intensity of the light G, the current I, and the potential difference V between the anode and the cathode could be expressed by a formula of the form

$$G = kI(V - V_0)^n$$

where k and V_0 are constants.

V_0 is the least potential difference between both the electrodes required to maintain the arc, and is a constant for a given lamp. For a given wave-length, the number n is constant.

It was found by plotting curves having log (G/I) as ordinates and log $(V - V_0)$ as abscissæ that, provided the potential difference was not very small, the resulting curve was a straight line. The formula is an experimental one. It shows that when the temperature of the mercury vapour is raised by increasing the terminal voltage, the radiations of longer wave-length increase much more rapidly than those of shorter wave-length. This radiation, therefore, follows quite a different law from black-body radiation.

Experiments with the alternating current mercury lamp show that the formula given above still holds, provided we take the mean value of the light intensity, the effective potential difference between one of the anodes and the cathode, and the effective value of the input current. The value of n, however, is different from that for the direct current mercury lamp.

Marine Biology in Madras and Ceylon.

THE Administrative Report for the year 1928–29 of the Madras Fisheries Department, by Dr. B. Sundara Raj, Director of Fisheries, Madras (Report No. 1 of 1930, *Madras Fisheries Bulletin*, vol. 24, 1930), embraces a large variety of subjects. Part 1 describes the activities of the Department, including marine and estuarine fisheries, inland food fishes, pearl and chank fisheries, biological specimen supply, anti-malarial and socio-economic work, and fish industries. Part 2 deals with finance, Part 3 with staff and equipment, with various appendices. The importance of investigation relating to food fish is emphasised as being the primary object of a scientific department of fisheries. It is evident that here great difficulties are encountered from lack of proper accommodation and staff; nevertheless, it is shown that progress is being made. Research on marine fisheries was undertaken by the trawler *Lady Goschen*, and on three shore stations at West Hill (Calicut), Krusadai Island, and Vizagapatam, the first two stations being provided with small laboratories; and at the Madras Aquarium laboratory work is being done on the early stages of the edible oyster. Survey of fishing banks and experimental trawling was carried on, including extensive cruises from Mangalore to Cape Comorin; fishes and certain invertebrates were identified and plankton collections made. So far only the otter trawl is used for fishing. The Danish seine could not be employed, as the motor boat originally intended for the purpose was condemned as too old for the open sea. Proposals have been made to the Government for the purchase of a small motor boat, and a drift net and long lines for surface fishing are ordered.

Investigations in the Collair Lake on the prawn *Peneopsis monoceros*, the "Chakku Royya", were continued, but still little is known about the breeding grounds of this commercially important crustacean. Again the absence of staff for this work is to be regretted. Deep-water tank fishing in the Mopad Reservoir was satisfactory, a backwater net from Ennore, drift nets, and long lines being used with good results. Fish breeding and stocking experiments appear to have been unsuccessful for various reasons. Pearl oysters still continue to make sudden appearances and disappearances. It is proposed to undertake extensive research connected with this subject when the Krusadai Biological Station is instituted; meanwhile regular inspection of the pearl banks goes on, and any spat-falls will be noted.

The Fisheries Training Institute, Calicut, provides courses of study in the elements of navigation and handling of sailing boats, with classes in fish-curing, and pupils are on the increase.

The Administration Report of the Marine Biologist of Ceylon for 1929 (Part 4—Education, Science, and Art (G). July 1930), by Dr. Joseph Pearson, contains information on the pearl fishery, Gulf of Manaar, the window-pane oyster fishery and chank fisheries, with fishery statistics, report of the second assistant marine biologist and of the marine superintendent.

The year 1929 was unfortunate for several reasons, and the absence of Dr. Pearson made it necessary to abandon the inspection of the new paar which was discovered in the region of Twynam's Paar, and which in the previous February and March was densely covered with oyster spat for a considerable part of its area of some 30 square miles. The usual survey of the Pedro and Wadge Banks was also abandoned.