

metal cube without any base; it is intended to cover tightly the lower cube to which the photographic plates are fastened. On the left the apparatus is seen closed, with the cubes suspended at the top of the frame, the smaller one inside the larger. In this position the apparatus is lowered into the water. A small messenger is sent down the line and releases the inner cube, which drops to the bottom of the frame (see the middle figure). The plates are thus exposed. After a certain time a larger messenger is sent down, releasing the large cube, which falls like a shutter over the plates, as seen in the figure on the right. The apparatus is then ready for hauling up, and the cubes are taken out of the frame into the dark-room for development and change of plates.

In all previous photometric apparatus for use in the sea the plates were hermetically closed behind a strong glass pane, in order to shield them against the great pressure, but in the photometer here described a totally different principle was applied. The gelatine-film was covered with a glass plate and inserted into a small envelope of thin caoutchouc, with a square opening in front through which the light is admitted. The envelope with the plate was then placed on one of the sides of the inner cube, and the corresponding brass frame was screwed on tightly. The water could penetrate both outside and inside the cube, so that there was the same pressure on both sides of the film and the glass cover. The rubber envelope would be pressed tightly on to the glass plate, so that no water could enter and spoil the film. By this arrangement the apparatus might be exposed to any pressure without any special protection, and it was used at various depths down to 1700 metres without a single plate being cracked or spoiled by water.

Highly sensitive pan-chromatic plates (4×4 cm.) were employed in the experiments—the windows being, as mentioned above, 2×2 cm. In several experiments a gelatine colour filter was inserted between the photographic plate and the glass cover. Wratten and Wainwright's three-colour filters (red, green, and blue) admit respectively only a certain portion of the spectrum. This made it possible to study the rays present within the separate fields of the spectrum, as well as the total intensity of the rays. These investigations were carried out in the southern stretch of the cruise, and though time and weather did not allow of many experiments, those that were made gave interesting results.

Some of the plates exposed are represented in Fig. 172. In