

the contracted point at D, or the outer protecting bulb being filled with mercury instead of spirit does not succeed in preserving the inner bulb from pressure, or both these causes may be combined. That the outer mercurial bulb does not protect the instrument in all cases from pressure appears to be almost certain, as a reference to the table shows that the results given by No. 77 at depths of 2775 and 2530 fathoms are higher than at 700 fathoms, and No. 30 gives higher readings at 1500 fathoms than at less depths. These results could only be obtained if the thermometer bulb were influenced by pressure. Nos. 18 and 152 appear to be affected both from pressure on the bulb and from pressure closing the contracted part of the tube, as at depths less than 400 fathoms they agree fairly well with the protected Six instrument, but at depths over 400 fathoms their indications are very erratic."

Since the return of the Challenger, Messrs. Negretti & Zambra have made an important modification in the form of this thermometer. The new instrument is not double-limbed, and instead of requiring to describe a complete revolution in order to register the temperature, it requires only to describe half a turn. The construction of the thermometer will be understood by reference to fig. 30. The bulb is cylindrical, and mercury is the thermometric fluid. The neck of the bulb is contracted at A, and upon the shape and fineness of this contraction the success of the instrument depends. Beyond A the tube is bent, and a small reservoir is formed at B. At the end of the tube a small receptacle C is provided. When the bulb is downward it contains sufficient mercury to fill the tube, and a part of the reservoir C, if the temperature be high, leaving sufficient space for the expansion of the mercury. In this position no scale would be possible, as the apparent movement of the mercury would be confined to the space C. When the thermometer is held bulb upward, the mercury breaks off at A, and by its own weight flows down the tube, filling C and a portion of the tube above. The scale accordingly is made to read upwards from C. To set the thermometer for observation it is only necessary to place it bulb downward, then the mercury registers the temperature like an ordinary thermometer. Whenever the existing temperature is required, all that has to be done is to turn the thermometer bulb upward, and keep it in this position until read off. The reading may be taken any time after.

The reversing apparatus at first used with this thermometer was somewhat clumsy and unsatisfactory. It has been replaced by a very elegant instrument, designed by Captain

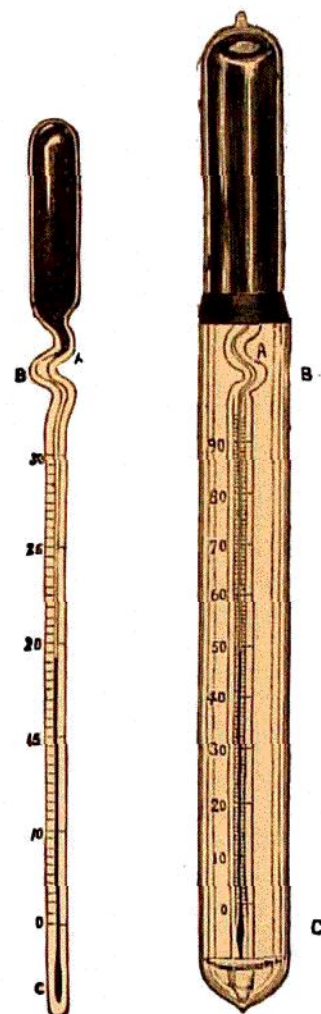


FIG. 30. — Negretti & Zambra's Improved Standard Deep-Sea Thermometer.