

DISCUSSION.

Dr. Cecil H. Desch (*communicated*): An examination of the details of the cases quoted by the author and by the staff of the U.S. Bureau of Standards, and a comparison with actual instances in this country, lead to the conclusion that in the matter of resistance to destruction by sea-water everything depends on the quality of the concrete. It is not possible to make concrete absolutely impervious, but there is an enormous difference between concrete made with a carefully graded aggregate and a sufficient proportion of mortar, and a mixture in which a high proportion of voids remains. I do not think that it is merely national bias which leads me to the opinion that a higher standard of workmanship is reached on the average in this country than in the United States in reinforced concrete work. Certainly, such rapid destruction as is recorded in recent papers in the *Engineering News-Record* is quite exceptional in this country. Given a well mixed concrete, of very low permeability, the reinforcement is so well protected that sea-water should have very little effect. The outer layers of the concrete react with the

salts contained in the water, but the products are dense, and the action should not penetrate further. Painting the reinforcement is not likely to do more than delay corrosion slightly, whilst it may have a bad influence in lessening the adhesion of concrete to steel. Professor Creighton's suggestion as to the use of the Schoop process is interesting, and experiments on this point would be of value. Once corrosion has started, the expansive force exerted by the rust is so great that destruction is bound to occur, and the only adequate protection to the steel is afforded by an impervious concrete, the production of which should be the chief aim of the engineer.