various organisms—present in the sea-water—which give rise to the unpleasant smell. The principal organisms concerned would appear to be the well-known anaerobic bacteria which produce hydrogen sulphide.

The cause of chambering among oysters on beds in high estuarine situations can therefore be stated to be the reduction in bulk of the body, which occurs at the shell-growing period in these situations from a variety of causes, of which the decrease of bulk due to breeding and salinity variations are the most important.

It may be noted, however, that chambering is rare on what are regarded as good oyster beds, and there is good reason to believe that the salinity variations over such beds range between about 30 and 34 per mille.

Chambering has also been observed in some deep-sea oysters, and, it may be presumed, from the operations of the same causes as in high estuarine situations. The conditions on deep-sea oyster beds are very different from those in high estuarine situations, but the breeding phenomena on the former beds are not known. It seems probable that breeding may not occur at all in some years in deep-sea beds, or that there is only a short breeding period (see Orton, Journ. Mar. Biol. Assn. vol. 12, p. 343), but that on the other hand growth is probably continuous over the greater part of the year. Since salinity variations would not be great on deep-sea beds it would appear that the reduction in bulk of the body due to breeding coincident with extensive shell-growth (see Hoek, Report on the Causes of the Deterioration in Quality of the Zealand Oyster, p. 90, s'Gravenhage, 1902) is the main cause of chambering in deep-sea oysters.

The view given above on the cause of chambering in oysters could readily be put to the test of experiment, but it would be preferable to carry out experiments on a large scale, beginning with thousands of young oysters. The economic importance of oysters is sufficiently great for the matter to be taken up by such large oyster-planters as are troubled with chambering. It will readily be seen from the argument given above that chambering is a minor pathological phenomenon, and that there is nothing to prevent the growth of a good well-fished oyster in a chambered shell, and, as a fact, excellent oysters do occur in chambered shells.

EDITH WORSNOP.
J. H. ORTON.

Marine Biological Laboratory,
Plymouth, December 4.

The Hardness of Vitreous Silica.

THE hypothesis proposed by Sir George Beilby to account for the hardening of metals by cold-working, and accepted by most metallurgists in this country, assumes the production of a vitreous phase of the metal by the breaking down of the crystalline structure during extensive deformation. It requires that the vitreous modification of a substance should be harder than the crystalline. Direct evidence on this point has rarely been obtained. Silica, however, suggests itself as a suitable substance for such a test, both the crystalline forms and the under-cooled glass being readily obtained in a form suitable for mechanical tests. The hardness of silica was carefully studied by Auerbach, who found a surface of vitreous silica to be less hard than either of the principal faces of quartz. Most commercial silica glass is, however, so weakened by the presence of numerous gas bubbles that any grinding test is likely to give low results for the hardness.

We have recently had the opportunity of examining a specimen of silica of unusual hardness. This was obtained by throwing a quantity of pure quartz sand on to the slag in an open-hearth steel furnace when the slag surface was at an exceptionally high temperature (1800° C. by the optical pyrometer). The sand melted, and formed a lenticular mass, which only mixed with the slag at its margin. On removing the product, a colourless, translucent mass of glassy silica was obtained, passing sharply into the dark slag. Analysis of the colourless mass gave 97·7 per cent. silica, 2·0 per cent. lime, and a trace of iron. A thin section between crossed Nicols was isotropic, with only a few scattered inclusions of minute crystals and some spherical bubbles.

Tests with a sclerometer, using a diamond point under a load of 400 grams, gave a broader scratch on a prism face of quartz than on a polished surface of the vitreous silica, but on account of the splintery nature of both scratches little reliance could be placed on the actual measurements. A fractured edge of the fused product distinctly scratched the prism faces of quartz, while natural angles of the latter failed to scratch the vitreous surface. Further tests were made with the scleroscope, an instrument in which the rebound of a diamond-pointed hammer falling from a height is measured. The following figures were obtained, all the specimens being embedded in pitch in the cast-iron cup provided with the instrument:

Polished vitreous silica	94
Quartz, prism face	91
Commercial vitreous silica . . .	82

The experiments are not conclusive, and a higher accuracy will be attempted, but it would appear that silica thoroughly fused at a high temperature is distinctly harder than crystalline quartz, and to this extent the experiments support Beilby's hypothesis.

COSMO JOHNS.
CECIL H. DESCH.

Sheffield, December 2.

Distribution of the Organ-Pipe Diatom, *Bacillaria paradoxa*.

IN the Notes in NATURE for September 29, 1921 (vol. 108, p. 163), it is mentioned that Mr. J. W. Williams and Mr. H. Weaver have found the curious organ-pipe diatom, *Bacillaria paradoxa*, in canals and pools in Staffordshire and Worcestershire. It may be of further interest to note that while leading a party of field naturalists on a seaside expedition to Altona Bay, near Melbourne, some years ago (*Victorian Naturalist*, vol. xxxiv., June 1917, p. 16), we found this same diatom very abundantly both in the sea and up the Kororoit Creek for a good distance, where the water was only slightly brackish. On examining the finds at home I was struck with the fact that, whereas the marine form was very active in its peculiar sliding movement, the brackish form was sluggish in contrast. It would be interesting to know whether other observers have found the fresh water to act as an agent for "slowing down." Probably the saline conditions of the water assisted the osmotic pressure which may induce the movement.

F. CHAPMAN.

National Museum, Melbourne,
October 24.

Speculation concerning the Positive Electron.

SIR OLIVER LODGE'S interesting speculation, in NATURE of November 25, p. 696, as to the possible similarity of positive and negative electrons suggests an inquiry into the relative abundance of the lighter