fresh portion, which can only take place when the water freely communicates with the atmosphere; and if this renewal be by any means prevented, the water is no longer capable of sustaining life. Fishes are killed in a very few hours, if confined in a limited portion of water, which has no access to fresh air. When many fishes are enclosed in a narrow vessel, they all struggle for the uppermost place, (where the atmospheric air is first absorbed,) like the unfortunate men imprisoned in the black-hole at Calcutta. When a small fish pond is frozen over, the fishes soon perish, unless holes be broken in the ice, in order to admit air: they may be seen flocking towards these holes, in order to receive the benefit of the fresh air as it is absorbed by the water; and so great is their eagerness on these occassions, that they often allow themselves to be caught by the hand. Water from which all air has been extracted, either by the air-pump, or by boiling, is to fishes what a vacuum is to a breathing terrestrial animal. Humboldt and Provençal made a series of experiments on the quantities of air which fishes require for their respiration. They found that river-water generally contains about one-36th of its bulk of air, of which quantity one-third consists of oxygen, being about one per cent., of the whole volume. A tench is able to breathe when the quantity of oxygen is reduced to the 5000th part of the bulk of the water, but soon becomes exceedingly feeble by the privation of this necessary element. The fact, however, shows the admirable perfection of the organs of this fish, which can extract so minute a quantity of air from water to which that air adheres with great tenacity.*

* The swimming bladder of fishes is regarded by many of the German naturalists as having some relations to the respiratory function, and as being the rudiment of the pulmonary cavity of land animals; the passage of communication with the œsophagus being conceived to represent the trachea. The air contained in the swimming bladder of fishes has been examined by many chemists, but although it is generally found to be a mixture of oxygen and nitrogen, the proportion in which these gases exist is observed to vary considerably. Biot concluded from his experiments, that in the air-