

they become more sensible if the animal be raised above the surface. I have often observed the same phenomenon in experimenting on frogs.

The torpedo moves the pectoral fins convulsively every time it emits a stroke; and this stroke is more or less painful, according as the immediate contact takes place by a greater or less surface. We observed that the gymnotus gives the strongest shocks without making any movement with the eyes, head, or fins.* Is this difference caused by the position of the electric organ, which is not double in the gymnoti? or does the movement of the pectoral fins of the torpedo directly prove that the fish restores the electrical equilibrium by its own skin, discharges itself by its own body, and that we generally feel only the effect of a lateral shock?

We cannot discharge at will either a torpedo or a gymnotus, as we discharge at will a Leyden jar or a Voltaic battery. A shock is not always felt, even on touching the electric fish with both hands. We must irritate it to make it give the shock. This action in the torpedos, as well as in the gymnoti, is a vital action; it depends on the will only of the animal, which perhaps does not always keep its electric organs charged, or does not always employ the action of its nerves to establish the chain between the positive and negative poles. It is certain that the torpedo gives a long series of shocks with astonishing celerity; whether it is that the plates or laminæ of its organs are not wholly exhausted, or that the fish recharges them instantaneously.

The electric stroke is felt, when the animal is disposed to give it, whether we touch with a single finger only one of the surfaces of the organs, or apply both hands to the two surfaces, the superior and inferior, at once. In either case it is altogether indifferent whether the person who touches the fish with one finger or both hands be insulated or not. All that has been said on the necessity of a communication with the damp ground to establish a circuit, is founded on inaccurate observations.

M. Gay-Lussac made the important observation that when an insulated person touches the torpedo with one

* The anal fin of the gymnoti only has a sensible motion when these fishes are excited under the belly, where the electric organ is placed.