On the Luminous Appearance of the Ocean. By LIEUT. THOMAS R. INGALLS, U. S. Army. Read before the Albany Institute, March 26, 1828.

THIS beautiful phenomenon, which once bore the poetical title of "phosphorescence of the ocean," has more recently, I believe, rested between two solutions: that it is caused by animalculæ, or by the ovula of fishes. A writer in a recent foreign periodical, inclines to the former opinion—viz. that the luminous appearance of the ocean is caused by animalculæ. As I have been for some time inclined to the opposite view of this subject, I am induced to submit an account of some observations made a few years since in the humble pursuit of science.

In the practice of sea bathing at night, in a southern latitude, I had of course noticed and admired the beautiful sparkling of the water when agitated or resisted—but the myriads of bodies of whatsoever sort which emitted these corruscations, were alike invisible and impalpable. On one occasion, however, I struck my arm against a small, soft, mass, which immediately emitted a flash of two or three inches in diameter. But the mass eluded my attempts to secure it, as it was invisible the moment it parted from its accidental contact with my arm. This occurred several times afterwards, and I began to think I perceived a sensation of warmth whenever I struck one of these bodies, though aware how liable I was to be deceived by the almost irresistible association of light and heat, in the mind. A very large one ultimately convinced me I was not deceived; the sensation being, on this occasion, perfectly distinct—grateful—and continuing for a minute or two after the touch.

The masses of marine ovula, left by the tide to heat and hatch on the beach, I had long before observed through the whole process of vivification. First, a transparent mass of jelly—next marked by a white opaque speck, a little distant from the centre—third, this spot fringed with a red border, of the colour of arterial blood, next, a kind of irregular pulsation, accompanied by the development of certain white contractile fibres, and the extension of several large red lines, in radial directions from the focal opaque speck—the appearance of a black speck, ultimately a defined head—and finally, I have seen the rising tide shake out from the mass, the perfect animal, apparently in the full possession of life; certainly exercising the important function of apprehension of danger.

The identity of this ovulum, with the luminous bodies I encountered in the water, appear probable, from their size, consistency, and their abounding in the same regions. It was soon after ascertained: for on a night when the sea was somewhat agitated, I observed the same corruscations in the waves breaking on the beach, and succeeded in obtaining several of the illuminating bodies; by the light of their own flashes. They appeared, as I expected, identical.

When examined by candle-light, to overcome the glare of their

brilliancy, and at the same time to observe their action more clearly, the power of illumination appeared to reside in a similar focal point, to that described as the place of the first phenomena of vivification; and the flashes which could be procured by irritating the mass with the end of a pencil, diverged from this point, in lines similar in magnitude and direction, to the large red ones mentioned in that process. I regret that it did not occur to me, to electrically insulate one of these bodies, and endeavour to obtain shocks; but I was too much occupied with the question above stated, to avail myself of the means in my hands, of making some interesting experiments on the theory of life.

The existence of those large corruscating bodies in the ocean has been before recorded, and there is, I believe, a paper on this subject, by Dr. Mitchell, published ten or twelve years ago; but it is thought some parts of the observations are not on record, and they are now submitted in the hope of being, in some small degree, useful—or pardoned, if superfluous.

The conclusions I formed on this subject, were, that in this instance a luminous appearance in the ocean was produced by marine ovula; and by a rule of philosophizing, all such appearances not proved to proceed from another source, and not inconsistent with this cause, are fairly assignable to the same origin.

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On the Combination of a Practical with a Liberal course of Education.

By W. R. JOHNSON, Principal of the High School of the Franklin Institute.

No. III.

THE course of study, given in the preceding number, is not offered as a complete exemplification of practical and liberal education, united. The combination might, however, be easily extended to the courses pursued at our colleges and universities. No good reason can be assigned why the higher branches of mathematics, logic, ethics, or metaphysics, should not be pursued simultaneously with those sciences and arts, which pertain to the active duties of life.

By referring to the course already delineated, the reader will perceive that it consists of four important classes of studies, each of which has generally been confined to a separate school. The first class includes *English* branches; the second, *classical* studies; the third, *modern languages*, and the fourth, *mathematics* and the *practical sciences*.

Whatever be the destination of the student, whether for active life, or for a literary and professional career; whether he shall finish his studies in this institution, or be removed to a university, the importance of his *English* course will, under every contingency, remain the same. A correct elocution, a degree of facility both in oral and written composition, a knowledge of the great outlines of