the total kinetic energy, the process of exchange by radiation is, on the whole, slow. Were, however, the translatory motion the direct cause of radiation, the exchanges between diathermous bodies must apparently be nearly instantaneous.

(To be continued.)

OYSTER-CULTURE IN HOLLAND.

THE first of a series of papers on the European oyster and oyster industry of the Eastern Schelde[1] has just been published by Mr. P. P. C. Hoek, secretary of the commission of the zoölogical station of the zoölogical society of Holland. It is to be followed by a series of papers gotten up in similar style by eminent specialists: 1°. On the embryology of the European oyster; 2°. On its food, parasites, and commensals; 3°. A review of the fauna of the Eastern Schelde; 4°. A report on the physical conditions presented by the Eastern Schelde; 5°. A report on experiments made to determine the conditions under which the fixation of the larval oyster occurs.

In this report the author devotes a short chapter to a discussion of the classical allusions to the animal, from the Homeric period to the time of Oppian. Then comes a chapter on the references to the oyster found in Conrad Gesner's *Historia animalium*, lib. iv., edition of 1620; followed by an exhaustive bibliography of ninety pages, in which the works of upwards of two hundred and seventy-five authors are mentioned, covering the period from 1685 to 1883, or nearly two hundred years.

Then follows a paper on the organs of generation of the oyster, by Mr. Hoek, accompanied by an excellent series of lithographic plates representing microscopic transverse sections of the European oyster. The text of this is in Dutch and French on alternate pages. A chapter is devoted to a historical *résumé* of our knowledge of the anatomy of the generative organs, and is succeeded by an account of the author's investigations.

A second part is devoted to the physiology of reproduction, and is preceded by an historical sketch of this part of the subject, from the time of Leeuenhoek to the present. The author gives a summary of his results, both anatomical and physiological, as follows: the genital gland is not a compact organ: it lies on the surface of the body of the animal under a thin layer of connective tissue (mantle), below which branched ducts spread out over the reproductive organ, connected on the inner side with the reproductive follicles, which have a generally vertical direction to the surface of the visceral mass, and which anastomose with each other. The generative products develop on the walls of the follicles, the ova and spermatozoa being formed side by side. The author inclines to the belief that the generative products are developed from the ectoderm. The ova are developed from single epithelial cells adherent to the wall of the parent follicle, while the mother-cells of the characteristic masses of spermatozoa are only portions of such cells. The organ of Bojanus does not have a compact structure as in other lamellibranchs, but is composed of a mass of ducts and blind sacs, which forms a thin flat plate of considerable extent. Contrary to what may be noted of the reproductive glands, the organ of Bojanus extends somewhat into the mantle. The ducts and cavities of the organ of Bojanus pour their contents into a longitudinal cavity, — the urinary chamber, — the walls of which are also excretory in function, and open outwardly by way of a short urinary canal. The external orifice of the renal organ opens into the same cleft as the genital duct, a little behind the latter, but they do not actually join. These genito-urinary sinuses lie below the adductor on either side of the ventral process of the body-mass. A reno-pericardiac canal connects the urinary chamber with the pericardiac cavity. It is probable that the auricles of the heart also exercise an excretory function.

An oyster which has fry in the branchiae is the parent of the same. At the moment of emission from the ovaries, not only have the ova been fertilized, but they have also passed through the first stages of segmentation. The sperm necessary for fecundation does not come from the same parent. The water which flows over other oysters in the vicinity charged with sperm, which they have set free, is carried into the mantle-cavity of egg-bearing individuals, and into their genital ducts and their branches. The oysters of the Eastern Schelde are two years old before they have brood; they are most prolific at the age of four or five years. There are more sperm-bearing oysters in the Eastern Schelde than egg-bearing ones. All of the mature eggs are laid at once; the production of sperm is probably continued for a longer time. In every instance that was investigated, the production and emission of ova is followed by a period during which no sperm is produced. A large proportion of the spat found fixed on the banks in the Eastern Schelde was probably not derived from the oysters inhabiting the cultivated beds. Culture appears to act injuriously upon the reproductive powers of the animal. In old oysters the liver is much more developed than in younger ones. This greater development of the liver is dependent upon the less marked development of the reproductive organs.

J. A. RYDER.

[1] *Verslag omtrent onderzoekingen op de oester en de oestercultuur betrekking hebbende. Aflevering i.* (With title in French: *Rapport sur les recherches concernant l'huître et l'ostréiculture. Livraison i.*) Leiden, *E. J. Brill*, 1883. 253 p., 5 lithographic plates. 8°.

GALTON'S HUMAN FACULTY.

Inquiries into human faculty and its development. By FRANCIS GALTON, F.R.S. New York, *Macmillan*, 1883. 12 + 380 p., 6 pl. 8°.

MR. GALTON'S researches have for a good while attracted the attention of English and American students of psychology and anthropology. As they are here brought together,