Part II. Six screws of reference can be chosen, such that each screw is reciprocal to all the rest; the group is said to consist of *coreciprocal screws*. The analogy between the convenience obtained by referring the twist coordinates of a rigid body to a group of coreciprocal screws, and the convenience obtained by referring the coordinates of a point to rectangular axes, is pointed out. The important theorem that one screw can be found which is reciprocal to five given screws is discussed.

Part III. The *sexiant* is a function of six screws, which can be expressed as a determinant. The property possessed by six screws when their sexiant vanishes may be enunciated in several different ways; *e. g.*, wrenches of appropriate magnitudes equilibrate when applied about the six screws to a free rigid body. If seven twist velocities about seven screws neutralize, then each twist velocity must be proportional to the sexiant of the six remaining screws.

Part IV. If a quiescent rigid body receive an *impulsive wrench*, then the body commences to twist about an *instantaneous screw*. It is shown that if four impulsive screws lie on a cylindroid, the four instantaneous screws lie on a cylindroid, and also the four impulsive reactions caused by the constraints. The anharmonic ratios of each of these groups of four are all equal. Several special properties of impulsive and instantaneous screws are also considered.

Part V. When a body has k degrees of freedom, it is shown that k *principal screws of kinetic energy* can be determined. When an impulsive wrench is imparted about a principal screw of kinetic energy, the body commences to twist about the same screw. These principles are illustrated by detailed examination of the cases of two and three degrees of freedom.

Part VI. Miscellaneous propositions. The principal questions discussed are:—the *locus plane* of a point for twists about the screws on a cylindroid; the equilibrium of a body under the action of gravity for the different cases of freedom; remarks on Professor Sylvester's theory of lines in involution; generalization of a theorem due to M. Chasles.

VIII. "On the Fossil Mammals of Australia. Family Macropodidæ. Genera *Macropus, Pachysiagon, Leptosiagon, Procoptodon,* and *Palorchestes*.—Part IX." By Prof. Owen, F.R.S. Received April 19, 1873.

(Abstract.)

In this Part the author concludes his descriptions of the fossils on hand relating to the family of Kangaroos (Macropodidæ). He gives additional evidence of the characters of *Macropus Titan*, evidence of a larger species of *Macropus* proper (*M. Ferragus*), and of two subgeneric modifications of that type (*Pachysiagon* and *Leptosiagon*). The characters of

a well-marked genus or subfamily of Macropodidæ are illustrated by fossils, on which are founded a genus *Procoptodon*, and the species *Proc. Pusio*, *Proc. Goliah*, and *Proc. Rapha*. The paper concludes with the description of a considerable part of a fossil cranium indicative of the largest form of kangaroo hitherto found; for the subgenus and species so indicated the author proposes the name *Palorchestes Azael*.

The illustrations of the paper form the subjects of nine 4to Plates.

IX. "Observations on the Currents and Undercurrents of the Dardanelles and Bosphorus, made by Commander J. L. Wharton, of H.M. Surveying-Ship 'Shearwater,' between the months of June and October, 1872." From a Report of that Officer to the Hydrographer of the Admiralty. Communicated by Admiral Richards, C.B., V.P.R.S. Received May 7, 1873.

There is a general flow of the Black-Sea water through the Bosphorus, Marmara, and Dardanelles to the Mediterranean, probably caused by the combination of three things:—first, the prevalence of N.E. winds in the Black Sea; secondly, the excess of water received from the large rivers over the amount lost by temperature at some seasons; and, thirdly, the difference of specific gravities in the two seas.

Of these, observation goes to prove that the wind has by far the greatest influence.

There is as general a countercurrent setting up under the surface-stream, in an opposite direction, from the Mediterranean to the Black Sea. This seems to be dependent on the surface-current; for when the latter is slack, the undercurrent is slack likewise.

Dardanelles.

From observations made from 14th June to 30th October 1872.

The ordinary direction of the surface-current in mid-stream is S.W., or "down" the straits, with the wind, which blows from the opposite quarter for three parts of the year; but when a S.W. wind has lasted a few days and forced its way through the straits from one end to another, the current will run in the opposite direction, but never so strongly as the S.W. current.

Wherever a point juts out into the straits, or a turn occurs, countercurrents run up strongly inshore on their lee sides, as might be expected; and, generally speaking, with the exception of those places where the straits are narrowed by two points opposite to one another, either slack water or a slight eddy exists, on either shore, for a short distance from the coast.