Monday, 15th December 1862.

PROFESSOR CHRISTISON, V.P., in the Chair.

The following Communications were read :—

1. On the Representative Relationships of the Fixed and Free Tunicata, regarded as two sub-classes of equivalent value ; with some general remarks on their morphology. By John Denis Macdonald, Esq., R.N., F.R.S., Surgeon H.M.S. "Icarus." Communicated by Professor MacLagan.

In this paper the author maintains the proposition, that the class Tunicata may be conveniently divided into two sub-classes, viz., the Fixed or Stationary, and the Free or Locomotive, of at least nearly equal value in a zoological point of view, in opposition to the opinion commonly entertained, that the so-called Pelagic Tunicata compose a group only commensurate with the groups of the Compound, the Social and the Simple, into which the Fixed Tunicata have been divided by Milne-Edwards and others.

After some general remarks on the morphology of the class Tunicata, the author proposes the classification, of which the following are the leading subdivisions, and under which he groups and classifies the various genera of Tunicata.

TUNICATA.

Sub-class 1st.—Animals fixed or stationary.

I. Branchial membrane closely adherent, or more or less perfectly sac-like ; simply areolated or distinctly retiform, the meshes disposed in many transverse series without non-ciliated supporting bars.

1. Gemmæ springing directly from the parent, with a temporary bond of union—Simple Tunicata.
2. Gemmæ springing separately from a definite "ascidiarium" (Hux.), and communicating indirectly through a central common vascular system—Social Tunicata.
3. Gemmæ arising separately from the parent with or without vascular intercommunication, but always immersed in a common test or "ascidiarium"—Compound Tunicata.

Sub-class 2d.—Animals free, locomotive.—Pelagic Tunicata.

II. Branchial membrane sac-like, with transverse slits in single longitudinal series, strengthened by longitudinal non-ciliated rods, apertures terminal or sub-terminal.

III. Respiring by an upper and a lower gill-band, connected with each other laterally, and with the walls of the atrium; having branchial slits, but no supporting longitudinal rods; apertures terminal.

IV. Respiring by a central and inferior gill-band, with free borders and transverse ciliated stripes, but without slits or rods; apertures terminal or sub-terminal.

V. Pharynx ciliated below, without a distinct gill-band; branchial slits reduced to two ciliated openings on the sides of the rectum.

The author concludes his paper with remarks on several of the genera, in reference to the position assigned to them in his classification, and with some details as to the anatomy of *Orthocala*—the *Salpa pinnata* of authors.

2. On the great Refractor at Elchies, and its powers in Sidereal Observation. By Professor C. Piazzzi Smyth, Astronomer-Royal for Scotland.

The telescope here referred to is the largest and best ever erected in Scotland, for exact sidereal observation; and the author having paid a visit last September to its liberal and hospitable owner, J. W. Grant, Esq., of Elchies, Morayshire, had an opportunity of trying its powers on double stars, and describes the results of the trial in his paper.

Out of a list of twenty-nine double stars, there were six cases where one or more new small stars were discovered; and the observations of position and distance on the older members of each group were so trustworthy, as to add valuable information towards elucidating both the proper motion of some *optical* double stars, and the orbital motion of several *binary* ones. In addition to which, several unexpected results were arrived at with reference to cosmical changes in the magnitudes and colours of certain stars.