

*Monday, 3d February 1851.*

Sir T. M. BRISBANE, Bart., President, in the Chair.

The following Communications were read :—

1. On some new Marine Animals, discovered during a cruise among the Hebrides with Robert Macandrew, Esq., of Liverpool, in 1850. By Professors Edward Forbes and J. Goodsir. Communicated by Professor Goodsir.

The animals either wholly new, or new to Britain, described in this communication, were taken during a yachting cruise with Mr Macandrew, of Liverpool, among the Hebrides, in the month of August 1850. During this voyage, which lasted three weeks, a series of observations were conducted by means of the dredge and towing-net. Not a single new testaceous Mollusk was procured; but several remarkable Ascidians and Radiata were discovered, some of them so curious in themselves, and so important in their zoological bearings, that the authors of this paper thought it desirable to lay an account of them before the Royal Society of Edinburgh.

The most remarkable of these is the longest compound Ascidian yet discovered in the Atlantic. Its nearest described ally is the genus *Diazona* of Savigny, between which animal and *Clavellina* it forms a link. The authors of this paper propose to designate this animal *Syntethys Hebridia*, having found it necessary to establish a genus for its reception. The authors have also dredged up the *Holothuria intestinalis* of Ascanius and Rathke, which is the second species of *Holothuria* proper discovered in the British seas; the first having being discovered by Mr Peach under the name of “Nigger,” given to it by the Cornish fishermen.

A new species of the curious genus *Sarcodictyon*, distinguished by the polype cells being grouped in assemblages of from three to five, was described under the designation of *S. agglomeratum*.

The *Arachnactis albida* of Sars was found in the Minch. Portions of an animal found by Professor Balfour in the same locality in 1841, have now been recognised as belonging to this curious Actinea.

The other animals described in this communication were, a species of naked-eyed Medusa, for the reception of which the authors found it necessary to establish a new genus, *Plancia* (*Plancia gracilis*.) Seven new species of Medusæ, referable to the genera *Oceanea*, *Slabberia*, *Hippocrene*, and *Thaumantias*, were also described.

The communication was illustrated by coloured drawings.

2. Account of Experiments on the Thermotic Effect of the Compression of Air, with some practical applications. By Professor C. Piazzì Smyth.

3. Theoretical investigations into the same by W. Petrie, Esq. Communicated by Professor C. Piazzì Smyth.

Having brought before this Society in April 1849, a plan for cooling the air of rooms in tropical climates, the author was anxious to determine by actual experiment on a very large scale the practicability of the principle involved, viz., the thermotic effect of the compression of air. He had had a small apparatus made in 1844, which, though not sufficiently large to give exact numerical data, at least showed that the plan was in the bounds of possibility.

But in December 1849, Mr Wilson, of the Kinniel Ironworks, having kindly allowed him to experiment on the compressed air in the reservoir tubes of the furnaces, Professor P. S. proceeded there in company with Mr Stirling, C.E., and Capt. Gosset, R.E., with an apparatus which was exhibited on the table.

Thirty-four different experiments were made, in as varied a way as possible to insure accuracy, and the mean result was, that the air being at 63° Fahr., and the barometer at 30 inches, and the pressure guage indicating 7·2 inches of mercury, the rise of temperature of the air on being made to enter the compression-chest, was 28°·9, and the fall on escaping therefrom was 26°·9.

Professor W. Thomson, from Carnot's theory of heat, and Mr Macquorn Rankine from his own, deduced nearly the same quantity, but with some uncertainty, as the specific heat of air was involved.

Mr Petrie, however, without taking up any theory of heat, but merely the mechanical nature of a compressible fluid, and the well known quantity of the expansion of air from heat, deduced a formula which represented the above observations as well as could be expected. And pursuing his formula to its ultimate consequences, he