Considerable light is thrown upon the phenomena of cohesion and adhesion by this method of investigation; and especially on *the undifferentiated state of organs when in congenital union*. This, if thoroughly understood, completely clears up the difficulties surrounding the interpretation of the "receptacular tube" and the "inferior ovary."

The investigation into the character and distribution of the vascular cords reveals the true nature of the axile and free central placentations; in the former case, it shows that with scarcely any exception the axis takes no part in the structure, all "carpophores," "stylopods," &c., being simply the coherent and hypertrophied margins of the carpels.

Similarly the free-central placenta of *Primulaceæ* received its interpretation as being coherent and ovuliferous bases of five carpels which have the upper parts of their margins cohering in a parietal manner and without ovules.

The illustrations are of about sixty genera, and nearly twenty orders.

The author proposes continuing his observations.

III. "The early Stages in the Development of *Antedon rosacea*." By H. Bury, B.A., F.L.S., Scholar of Trinity College, Cambridge. Communicated by P. Herbert Carpenter, D.Sc., F.R.S., F.L.S. Received December 7, 1887.

(Abstract.)

The materials for this study were obtained from Naples in the winter of 1886–87. In the orientation of the larva, J. Barrois' suggestion ('Comptes Rendus,' November 9th, 1886) has been adopted, viz., that the stalk of the pentacrinoid represents the præoral lobe of other Echinoderm larvæ.

Development.

External Form.—Segmentation is regular, and a gastrula is formed by invagination. The blastopore closes early and the larva gradually elongates. Ciliation is at first uniform, but soon an anterior tuft of cilia and five ciliated bands become visible, and the intermediate cilia disappear. The anterior ciliated band is incomplete ventrally, and is either absent in the British form or escaped Wyville Thomson's notice. Two ciliated depressions also appear on the ventral surface. The anterior one ("pseudoproct" of W. Thomson) may be called the "præoral pit;" and the posterior one ("pseudostome") the "larval mouth." The "yellow cells" (green by transmitted light) appear

before the rupture of the vitelline membrane, and are absent from the ciliated areas.

The free larva swims with the terminal tuft of cilia directed forwards. A white patch on its left side between the third and fourth ciliated bands marks the position of the "water-pore."

Internal Anatomy.—The gastrula has at first no mesoderm, but this soon becomes budded off from the archenteron. The blastopore closes near the posterior end, but whether ventrally or dorsally could not be determined. The archenteron, which only occupies the posterior half of the larva, soon divides into two parts; the posterior of these (enterocele) assumes the form of a dumb-bell, round the constricted part of which the anterior half (mesenteron) grows till it forms a complete ring. The two swellings of the dumb-bell soon separate to form the right and left body-cavities respectively. From the anterior part of the mesenteron are budded off the hydrocele (left and ventral), and an unpaired anterior body-cavity.

By a change in position of the right and left body-cavities (incorrected described by Götte), the left body-cavity becomes posterior and ventral, while the right becomes anterior and dorsal: the latter sends a five-chambered prolongation into the præoral lobe, to form the rudiment of the "chambered organ." The hydrocele forms a ring, incomplete towards the left, on the ventral side of the mesenteron, and soon forms five ventral pouches. Shortly before fixation, the anterior body-cavity, which extends far into the præoral lobe, opens to the exterior on the left side by the "water-pore."

Underneath the anterior tuft of cilia and the præoral pit, and down the sides of the larval mouth, run fine fibres, which appear to be parts of a larval nervous system which disappears when the larva loses its freedom.

Fixation and Subsequent Changes.

After swimming freely for about twenty-four hours, the larva fixes itself by means of the præoral pit, which forms the disk of attachment. The ciliated bands then disappear, and the larval mouth invaginates to form the vestibule, which is rotated to the posterior end, as described by Barrois ('Comptes Rendus,' May 24th, 1886). At the same time all the tissues undergo histolysis, and the mesenteron becomes filled with cells budded in from the centre of the hydrocele ring.

The right and left body-cavities, which are now both dorsal, grow rapidly round to the original ventral side, being separated by a transverse mesentery, and each forms a longitudinal mesentery near the original ventral radius. The free end of the larva may be called the oral end, since the mouth now appears as a depression in the floor of the vestibule.

The anterior body-cavity is now small and lies near the oral end in the body-wall. Into it opens the water-tube or stone-canal, which runs from the water-vascular ring in the oral longitudinal mesentery, and is distinguishable from the anterior body-cavity by its higher epithelium. It is not, therefore, in direct continuity with the water-pore. The anus opens externally in the same interradius as the water-pore.

The Skeleton remains to be described. Shortly after the orals and basals have appeared, three small plates are developed at the posterior end of the stem, which resemble the basals in form but are not derived from them. They are so arranged that the most dorsal, which is smaller than the other two, lies on the right side opposite the interradius of the water-pore. These three plates are the undoubted homologues of the under-basals of the dicyclic Crinoids (*Poteriocrinus*, *Encrinus*, *&c.*). Shortly after the fixation of the larva they fuse with one another and with the top stem-joint, so as to form a large plate which has hitherto been mistaken for a simple centrodorsal. The five radial angles of this plate belong to the under-basals, and it is only at a much later period that these angles are hidden by the growth of the true centrodorsal (= top stem-joint), the angles of which become interradial when its cirri appear.

IV. "Heat Dilatation of Metals from low Temperatures." By Thomas Andrews, F.R.S.E. Communicated by Professor G. G. Stokes, P.R.S. Received November 30, 1887.

It is understood that the coefficients of heat dilatation increase with rise of temperature; but Professor P. G. Tait, in his recent work on 'Heat,' p. 87, remarks that "we are not aware of any experiments made with a view of deciding whether, as is probable, these coefficients become gradually less as the temperature is lowered below zero" (0° C.).

The following experiments were made to investigate the subject in relation to metals of the iron and steel series. The varieties of modern steels manufactured by recent processes manifest properties sufficiently diverse as almost to constitute them distinct groups of metals, although for practical purposes they are conveniently grouped under the generic name of steel. Some of these modern metals have recently been so largely used for constructive purposes that the author considered it desirable to obtain an approximate quantitative estimation of their dilatation by heat through varied ranges of temperature. The rolled metals under observation in the experiments consisted of round polished bars, 3 inches diameter, and 13 inches long, planed perfectly square at each end; they were care-