

Observations on British Zoophytes. By T. STRETHILL.
WURD, M.D. &c.

Description of Plates.

PLATE VIII.

- Fig. 1. *Clavata thross*, poles *Turris neglecta*.
2. *Hydra tuba* (*Strobila*) in various stages. 3. Corallum of same.
4. *Himeris vestita*; a, single tentacle, the clothed portion studded with parasitic Algae.
5. *Clavata thross*.
6. *Coryne complexa*. 7. Thread cells of do.

PLATE IX.

- Fig. 1. *Chondroeca mirabilis*. 2. Thread-cells of do.
3. Marginal tubercle with its two tentacles.
4. Young of *Cydippe*.
5. *Kandelarium arbuscula*, stalked cluster of double spermatie sacs.
6. Section of double spermatie sac; a, tubercle containing, c, barbed thread-cells.
7. *Pachastrea phacelia*.

1. *On the Reproduction of Turris neglecta.**

The only observations that we have as to the reproduction of the gymnophthalmatous Medusæ are those of Mr Gosse with regard to *Turris neglecta*. He is the pioneer who first actually witnessed, or rather caught a glimpse of, the reproduction of a hydroid zoophyte from a recognised species of Medusa. In September 1852, he saw the oval purple gemmules of *Turris neglecta* escaping from the walls of the ovaries, and dropping down to the bottom of the vessel in which they were confined, where they moved slowly about by means of their vibratile cilia. He placed a number of these gemmules in a properly-constructed cell, and, by watching them, ascertained the following facts:—"The gemmule (says he) having adhered to the glass, grows out into a lengthened form, variously knotted and swollen, and frequently dividing into two branches, the whole adhering closely to the glass. After a day or two's growth in this manner, a perpendicular stem begins to shoot from some point of this creeping root, and soon separates into four straight, slender, slightly divergent

* Communicated to the Royal Physical Society, 24th November 1858.

tentacles, which shoot to a considerable length. The little creature is now a polyp of four tentacles." At this stage they all died, and he never succeeded in repeating his observations. In August last, I picked up at Queensferry a specimen of *Turris neglecta* laden with dark crimson ova. This prize I accommodated with a commodious apartment in which it might exercise the duties of maternity. After a weary delay of nearly a fortnight, the young made their appearance as dark crimson ciliated larvæ. These underwent the changes so well described by Mr Gosse; but instead of being destroyed by starvation in their infancy, the four-armed polyps underwent a further development into a zoophyte resembling *Clava repens* (fig. 1, Plate VIII.). The young of *Turris neglecta*, which I now place on the table, and to which I have given the name of *Clavula Gossii*, may be described as follows:—

Clavula Gossii (Proles *Turris neglectæ*). Polypary creeping, sheathed in a chitinous polypidom. Polyps minute, seated on short stalks, spindle-shaped, furnished with about twelve tentacles; upper row of tentacles long, filiform, four in number, erect; rest of tentacles scattered, shorter, inclined upwards; colour crimson.

2. *On the Development of Hippocrene (Bougainvillea) Britannica from Atractylis (Eudendrium) ramosa.**

This paper appeared as a note to Dr Wright's paper on *Atractylis* in the Number of this Journal for January 1859.

3. *On the Development of Hydra tuba (Strobila) from Chrysaora.†*

In September last, I extracted a larger number of young from the reproductive sacs of *Chrysaora*. The young in their first stage are (as has been repeatedly observed) swimming ciliated larvæ. The greater part of these attached themselves to the surface of the water, and hung downwards as globular sacs seated on long thin pedicles or stalks (Plate VIII., fig. 2). The pedicles were surrounded by a thick and very transparent gelatinous case, corallum, or polypidom. The globular sac acquired a mouth, and afterwards four, eight,

* Read to the Royal Physical Society, Nov. 24, 1858.

† Ibid.

sixteen tentacles successively. As the Hydra grew, it produced additional attachments from its body. The bases of these attachments in the fully-developed Hydra appeared as a number of closely-aggregated circles (fig. 3), in which the four tissues, colletoderm (*a*), corallum (*b*), ectoderm (*c*), and endoderm (*d*), could be distinctly made out in those specimens attached to surfaces of glass. It appears, from the above observations, that the *Hydra tuba* is not a naked polyp, as hitherto described.

4. *Coryne implexa* (Alder).*

Under the title of *Tubularia implexa*, my friend Mr Alder has described a zoophyte discovered by Mr R. Howse in 40 fathoms water, 30 miles from Holy Island. Mr Alder's description of it is as follows:—“*Tubularia implexa*.—Tubes small, very slender, generally more or less contorted below, smooth, wrinkled or regularly annulated beneath a smooth transparent epidermis; slightly and subunilaterally branched; the branches going off nearly at right angles to the stem, and a little constricted at their base; gregarious, forming a densely-tangled mass of half to three-quarters of an inch in height.

The polyp of this zoophyte had not been observed, for which reason Mr Alder considered that its claim to a place in the genus *Tubularia* could not be fixed very decidedly. Its most remarkable feature is the structure of the corallum or polypidom, which is divided into two coats, as in Plate VIII., fig. 6; a structure hitherto observed only in one other species, the *Campanularia caliculata* of Hincks. Mr Alder kindly sent me a specimen of his *Tubularia implexa*, which, after a careful examination I concluded to be, not a *Tubularia*, but a *Coryne*; and I wrote to Mr Alder to that effect. Fortunately, although the specimen was destitute of polyps, portions of the polypary or coenosarc still remained, and I found in its tissues two kinds of thread-cells, the one oval, and containing a barbed dart (fig. 7, *a*), the other cylindrical, with almost truncated extremities, in which the thread was not conspicuous. (*b*), The first of these resembled very closely the oval, barbed thread-cells of *Coryne*

* Read to the Royal Physical Society, 26th January 1858.

decipiens; while the second, although much larger, evidently corresponded to the long, slender thread-cells found on the body within the corallum, and especially in the tips of the growing shoots of the last named zoophyte.

The internal layer of the corallum is brown and of horny texture; the external coat colourless and membranous. The first is frequently annulated; the second not so, but is occasionally gathered in longitudinal folds. I am disposed to think that this coat is the "colletoderm," or glutinous covering of the corallum (in this species highly developed and indurated), separated from the inner coat by the action of the spirit in which the specimen was immersed. In all the Corynes I have examined, this "colletoderm" forms a thick layer over the corallum, especially in the neighbourhood of the polyp.

In September last, I found on Inch Garvie the beautiful large Coryne which I place on the table this evening; one of the polyps being shown at Plate VIII., fig. 6.

Coryne (margarica, mihi) implexa (Alder).

Corallum branched or creeping; composed of two coats, the inner coat horny, annulated at intervals; the outer coat membranous, smooth, longitudinally folded near the polyps. Body of the polyp cylindrical, much elongated; summit truncated, very transparent, of a pearly white colour; mouth surrounded by a dense white ring. Tentacles small and slender, very numerous. Thread-cells on tentacles oval, barbed; on the body of polyp, long, cylindrical. Both kinds of thread-cells within the corallum.

This zoophyte, as to its polypary, bears a close resemblance to the *Tubularia implexa* of Alder, and I have little doubt is identical with it; in which case *Tubularia implexa* is, as I suspected, a Coryne. It has the same double structure in the tube of the corallum, and the thread-cells, both in form and size, are identical. The polyp of the species is distinguished from all others of its genus which have come under my notice by the extreme transparency of its tissues, and the small size of its tentacles; in which last particular it resembles the *Coryne pelagica* of Alder, and even approaches *Myriothela artica*. The thread-cells on the tip of the capitate tentacle are of very small size, as in *Myriothela*, with the exception of one, or

sometimes two, of the large cells which are found in the same situation in other species of Coryne.

5. *Bimeria vestita*.* (Plate VII., fig. 4.)

Polypary minute, very slender, branched, smooth, or wrinkled near the division of the branches, inclosed in a transparent horny corallum; polyps vase-shaped, destitute of proboscis; tentacles slender, alternate, as in Eudendrium; corallum, body, mouth, and lower half of each of tentacles of polyp clothed in an opaque brown membrane; thread-cells inconspicuous.

This remarkable zoophyte first occurred to me on the Bimer Rock, near North Queensferry, in August last, and afterwards to Dr M'Bain and myself on Inch Garvie. It differs from all zoophytes hitherto described in being completely clothed—as the corallum, the bodies of its polyps, and part of their tentacles—in a thick, soft membrane, which appears to be formed of the glutinous “colletoderm” thickened by fine mud. The tentacles were frequently united together in pairs by the same substance. The unclothed half only of the tentacles was furnished with thread-cells. The bodies and clothed part of the tentacles were frequently studded with minute crimson Algæ (fig. 4, *a*), which in some cases almost concealed the polyps, but did not seem to exercise any deleterious influence on their health.

The male reproductive apparatus consisted of an ovate pedicled ectodermal sac (fig. 4, *b*), inclosing a linear unbranched process of the endoderm, as in Hydractinia, the whole inclosed by the horny corallum with its muddy covering. The female reproductive system was not discovered.

6. *Garveia nutans*. (Plate VIII., fig. 5.)†

Polypary inclosed in smooth or slightly-wrinkled corallum, creeping or forming a stem of many agglutinated tubes from which the polyp stems diverge as branches; polyps not retractile within the corallum, decumbent when contracted; tentacles about ten, thick, in a single row, not alternate; mouth not trumpet-shaped; colour of polyp vermilion and yellow; thread-cells inconspicuous.

This zoophyte, which occurs on Inch Garvie, is conspicuous

* Read to the Royal Physical Society, 26th January 1859.

† Ibid.

for the singular colour of its polyps; the ectoderm being of a fine transparent yellow, the endoderm vermilion. Consequently the tentacles are yellow, while the body of the polyp is red. When irritated, as by being removed from the water and re-immersed, the zoophyte bends all its polyps downwards, like flowers drooping on their stalks.

The reproductive capsules (female), which I have only seen in a specimen after immersion in spirits, arise from the creeping polypary or the compound stem, and resemble in their external characters the female capsule of *Eudendrium rameum*.

This zoophyte was at first mistaken by me for an *Eudendrium*, but it differs from the latter genus in the following particulars:—In *Garveia* the body of the polyp is fusiform; in *Eudendrium* globular, with a trumpet-shaped expansible proboscis. In *Garveia* the tentacles are arranged in a single row; in *Eudendrium* also in a single row, but each alternate tentacle is elevated or depressed, so that they appear to be disposed in two rows. In *Eudendrium* the body of the polyp is studded by very large thread-cells; in *Garveia* these thread-cells are absent.

7. *Goodsirea mirabilis*, an undescribed *Gymnophthalmatous Medusa*.*

Three specimens of this medusa (Plate IX., fig. 1) were taken in the Firth, near Queensferry, in September last, one of which I placed on the table this evening. In general form it resembled the *Planca gracilis* of Forbes; but it differs from that animal in the structure of its smaller tentacles, the absence of eye-specks, and the presence of auditory organs. The disc is hemispherical, depressed, in some specimens elevated in the centre, and about an inch in diameter. Its margin is furnished with two large colourless tentacles, which are capable of being produced to the length of about two and a-half inches. For about one-third of their length they are hollow, and permeated by the circulating fluid of the lateral canals. The proximal portion of the large tentacles is covered with long, narrow, curved thread-cells, arranged in clusters or cones, like the

* Communicated to the Royal Physical Society on the 23d March 1859.

piled muskets of a regiment of soldiers (fig. 2, *a*, *b*). These, towards the distal ends, became mixed with large scattered thread-cells of an ovate or rather almond shape (fig. 2, *c*), in the interior of which a long, loosely coiled smooth thread is very distinctly visible. The tips of the large tentacles are almost entirely furnished with the last kind of thread-cell. In addition to the large tentacles, the margin of the disc bears ninety-six small tubercles, each of which is connected with two exceedingly minute and delicate tentacles, of very complicated structure. The tubercles themselves (fig. 3 *a*), are covered with the long, narrow thread-cells above mentioned. The proximal ends of the smaller tentacles, for about one-third their length, are destitute of thread-cells, but are furnished with very thick, short palpcils. This portion of the tentacle terminates in a knob or swelling, *b*, which is covered with exceedingly minute thread-cells; then succeeds a portion formed of nucleated cells, joined end to end in a single row, which portion terminates in a long ovate head, *c*, "closely set with the large almond-shaped thread-cells, which were found on the tips of the larger tentacles. All these tubercles and their tentacles are destitute of ocelli. Eight otolithic sacs are attached to the exterior of circular canal, each containing about four otoliths. The sub-umbrella is formed by four lateral canals, with their connecting membrane. Its upper part dips downward so as to form a funnel, from the end of which the peduncle or alimentary polyp is suspended. The peduncle, about an inch and a half in length, is very extensile, and of a greenish white colour. It is terminated by a quadrangular campanulate mouth. The peduncle in the female is rendered quadrangular by the four band-like ovaries, which passed along its whole length, and contained countless eggs. In the male it is cylindrical, and includes a mass of spermatozoa between its ectodermal and endodermal layers. The whole of the lateral and circular canals are powdered, as it were, with very minute dark purple pigment granules. When floating in the sea, or jerking itself along by the rapid strokes of its disc, this medusa is only rendered visible by the snake-line motions of its peduncle and tentacles. All the rest of its body is as transparent as glass. In a well-lighted jar of sea-water, the outer

surface of the umbrella glows with tints of blue, purple, and amber, reflected from the thin ectodermal membrane, which covers the gelatinous umbrella. With regard to this gelatinous structure, I have come to the conclusion that it is not the homologue of the ectoderm of the polyp, but rather a true corallum homologous with the horny plate of *Velella* and the corallum of *Hydractinia*. Did it consist of ectodermal tissue, it would be rendered opaque by alcohol, which is not the case, as may be seen in the specimen on the table. In captivity these animals float near the bottom of the jar in which they are confined, supporting themselves on their tentacles and peduncle, with which they are constantly searching the bottom, as if for food. One of the females discharged a large number of ova, which were carefully preserved in a proper vivarium, and watched, but no farther development took place in them. I had denominated this animal *Goodsirea*, after Professor John Goodsir the distinguished anatomist.

8. *Note on the Young of Cydippe, Beröe, and Alcinöe.**

Vast shoals of animals belonging to the above genera congregated about Queensferry in August last, and amongst the adults were found numerous young. The young of *Cydippe* (a species tinged as to the roots of their tentacular cirri with chestnut pigment) resembled in shape an unripe acorn (Pl. IX., fig. 4), about $\frac{1}{20}$ th of an inch in length. The stomach was as yet external to the gelatinous mass of the body. It consisted of a muscular, laterally-compressed, and somewhat conical sac (*a*), opening at its apex by a very distensible mouth, and communicating below by a small orifice with a large cavity (*b*) in the gelatinous body. This cavity represents the water vascular system of canals in the adult. It was divided into two lateral chambers (*b*, *b*) by the large sacs (*c*) for the reception of the tentacles. A single very large otolithic sac (*d*) protruded from the body between the bases of the tentacular sacs. The ciliary bands were four in number. The very long tentacles were furnished with one or two cirri only.

* Communicated to the Royal Physical Society, April 27, 1859.

The young of *Alcinöe* resembled in shape a *Beröe*, being destitute of swimming lobes. Ciliary bands four. The tentacles, microscopic in the adult, were capable in the young of being extended to twice the length of the body. They, as are those of the adult, were covered with globular thread-cells, from which was projected a fine straight thread.

The ovate eggs of *Beröe fulgens* were obtained from the parent. They were hatched in about four days. The young resembled in shape the adult. Ciliary bands four. I was not able to make out the internal structure in the young of either *Beröe* or *Alcinöe*.

9. *Eudendrium arbuscula* (mihl.)

Polypary branched, forming a bushy tree of adnate stems. Branches ringed near their insertions. Polyp white, terminal on very slender and transparent branches, with trumpet-shaped proboscis and numerous alternate tentacles. Base of body surrounded by ring of large thread-cells. Reproductive capsules (male) moniliform, double, borne in clusters on short stems springing at right angles from branches. Summit of double capsule with a tubercle containing barbed thread-cells.

One specimen of this zoophyte was found at Queensferry in September last; it was about two inches high, and thickly clothed with snowy polyps. The bunches of sperm-capsules (Pl. IX., fig. 5) resembled those of *E. capillare* of Alder, and *Sertolara racemosa* of Cavolini. The summit of the distal sac of each sperm-capsule (Pl. IX., fig. 6) was crowned with a curious tubercle (*a*) containing numerous large thread-cells (*b*), the thread armed with four barbs. These differed in shape from the large unbarbed thread-cells found in the body of the polyps.

10. *Psuchastes** *glacialis* (mihl.) (Pl. IX., fig. 7.)

Under this title I have noted and figured a minute Alcyonian zoophyte which I have twice obtained attached to stones in the Firth of Forth. The first specimen consisted of two polyps, the second only of one. The polyp is about $\frac{1}{8}$ th of an inch in length, and furnished with eight short pectinated tentacles. It is attached by a spreading base to the rock. The whole of

* From ψύχαστης, one who cools himself.

the coverings of the body and tentacles are thickly crowded with ragged calcareous spiculæ, from which the animal derives a curiously rough and crystalline aspect.

While noting this zoophyte, I would also draw attention to a gigantic concatenated Alcyonian zoophyte, covered with long, spindle-shaped, calcareous spiculæ, now in the Anatomical Museum of Edinburgh, labelled as a Zoanthus.

PROCEEDINGS OF SOCIETIES.

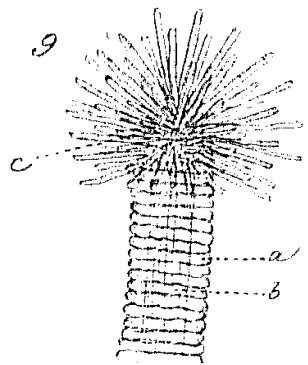
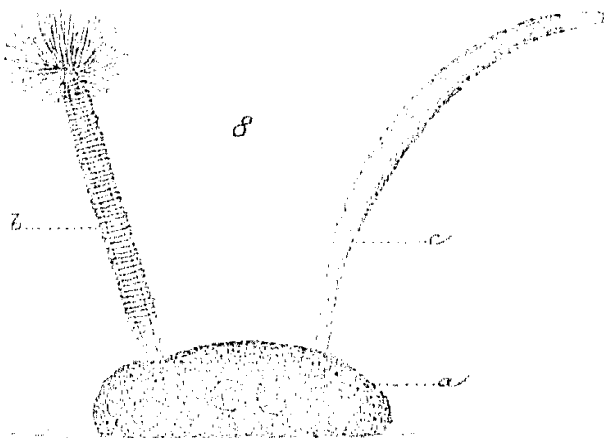
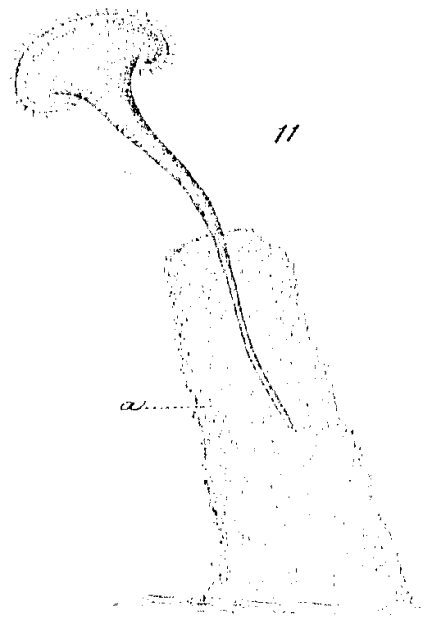
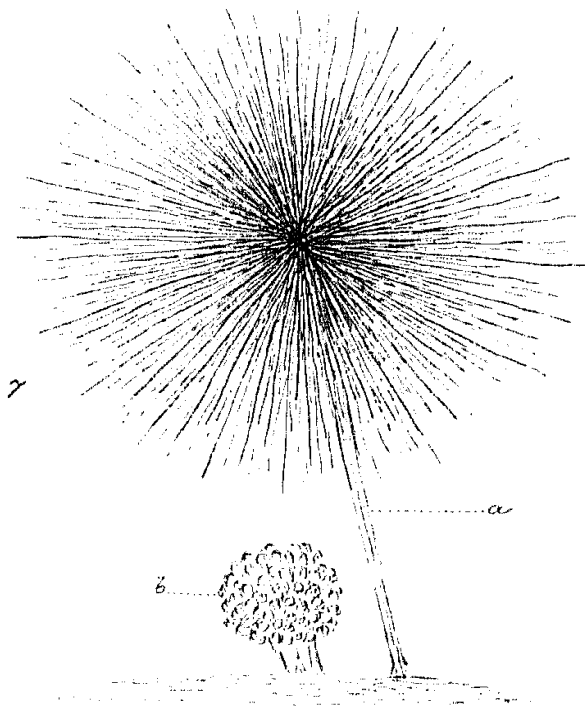
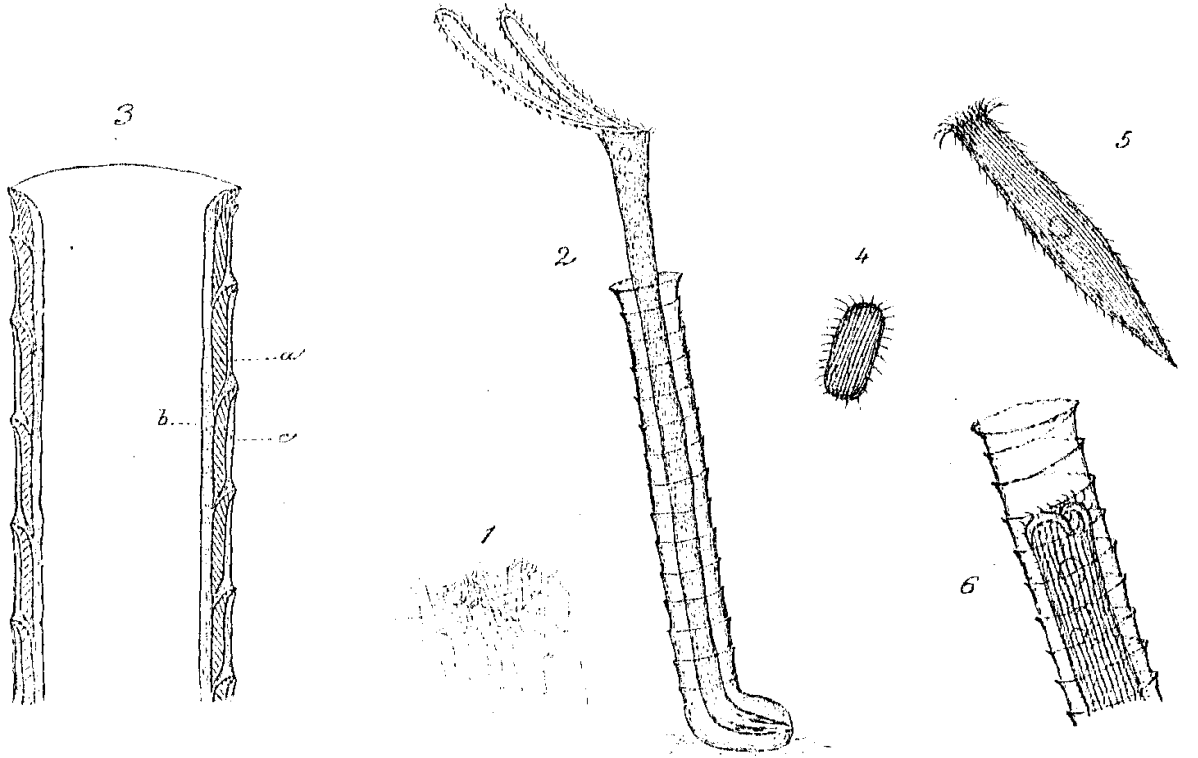
Royal Society of Edinburgh.

Monday, 3d January 1859.—PROFESSOR KELLAND, V.P.,
in the Chair.

The following Communications were read:—

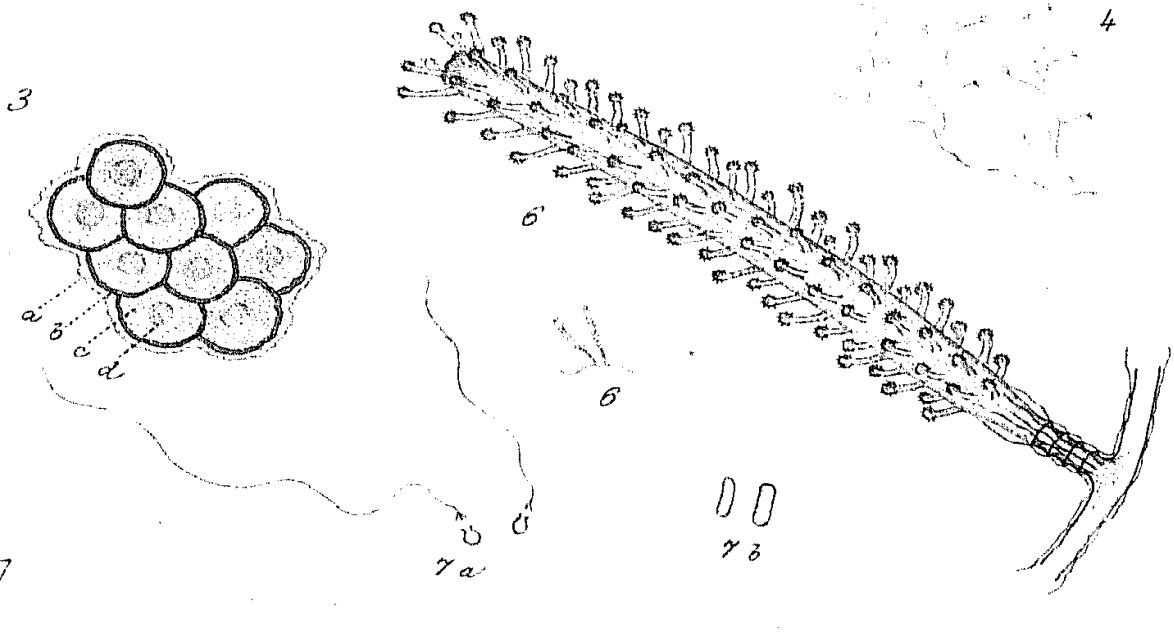
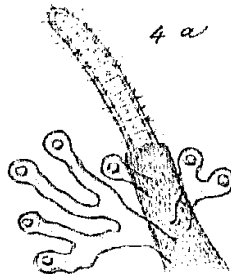
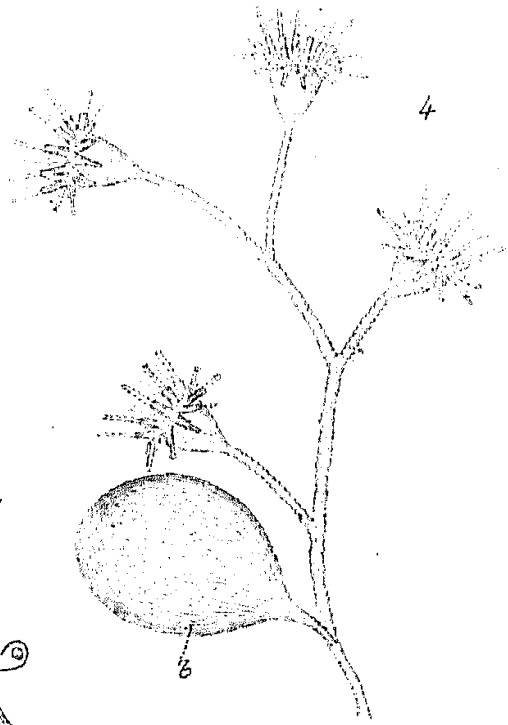
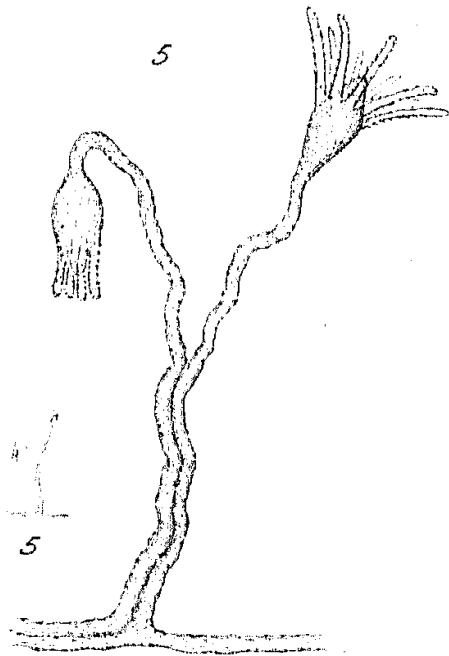
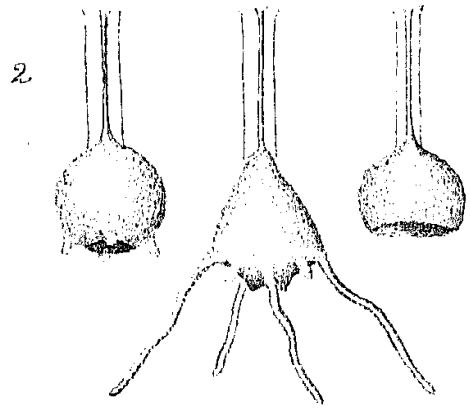
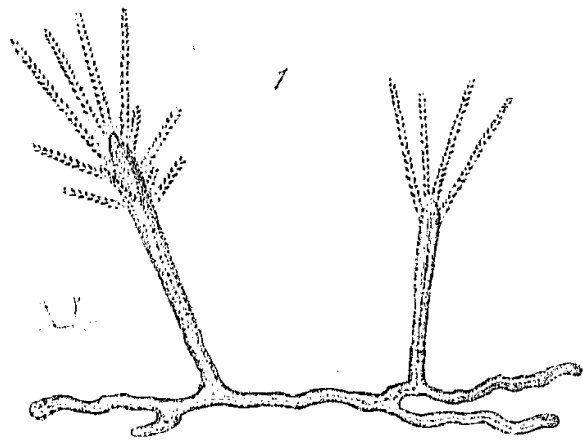
1. Note on certain Vibrations produced by Electricity. By
Professor Forbes.

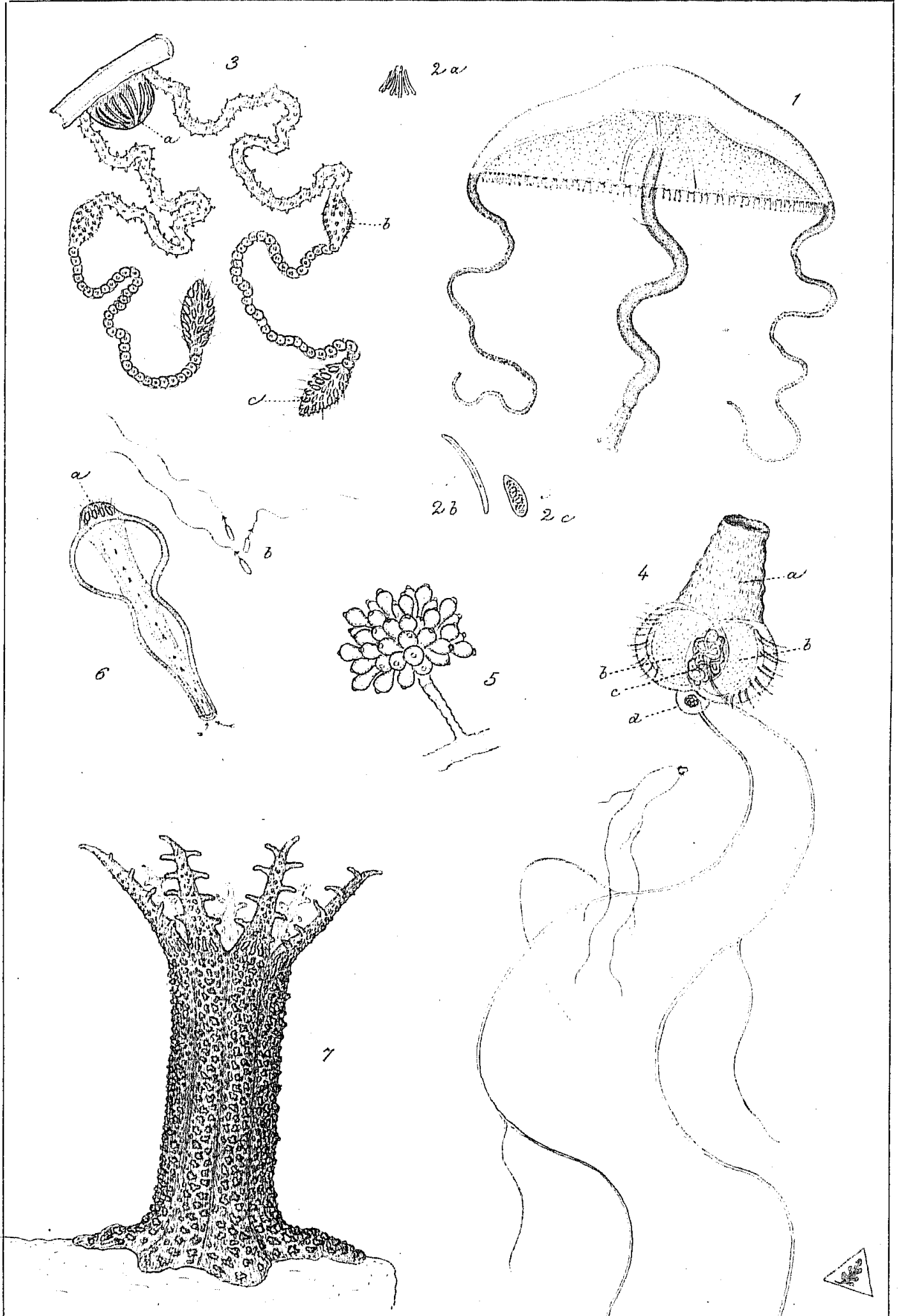
“In the course of last summer (1858) I became acquainted with a phenomenon described by Mr Gore in the *Philosophical Magazine* for June (Supplement, p. 519), of the following nature:—A metal cylinder, supported on two metallic rods or rails, the latter being in connection respectively with the poles of a battery, revolves in either direction, at will, under the action of an electric current copious in quantity. Also continuous rotation of a light copper ball, supported on two circular metallic rails, takes place in either direction at pleasure, depending on the first impulse. It appeared to me very probable that this interesting fact might be applied to explain what is still obscure in the experiment on heated metals, generally known as the “Trevelyan Experiment,” described by Mr Trevelyan, in the “*Edinburgh Transactions*,” vol. xii., where there is also a paper by myself on the same subject. With a view to elucidate the experiment, I had Mr Gore’s circular railway and ball constructed some months since by Mr Kemp. I had not an opportunity of seeing it tried until 19th October, when I found it to answer well, with four Bunsen’s pairs connected for quantity. The same day, in Mr Kemp’s laboratory, I laid a brass “Trevelyan” bar or rocker on the edge of the brass plate, forming the outer rail of Mr Gore’s machine, and connecting the rail with one pole of the same battery, and the bar (by means of a globule of mercury inserted in a cavity in its upper surface) with the other, energetic vibrations commenced quite



T. Stretchill Wright, etched on stone.

W. H. M. Parlant, Lith. Edin.





T. Stretbill Wright etched on stone.

W.H.M. Farlane lith Edin'.