

## On the Variation of *Haliclystus octoradiatus*.

By

**Edward T. Browne, B.A.,**  
University College, London.

---

With Plate 1.

---

A NORMAL specimen of *Haliclystus octoradiatus*, Clark, has eight adradial groups of tentacles; eight adradial genital bands; eight colieto-cystophors, one midway between every two groups of tentacles; and four internal, interradial septa.

The variation in number, shape, and symmetry of these organs forms the subject of this paper. The specimens were collected by the officials of the Marine Biological Association at Plymouth during November, 1892, and the spring of 1893.

I examined 154 specimens, and found 120 specimens perfectly normal and 34 specimens abnormal. Some of the abnormal forms are beyond doubt good cases of congenital variation, and others are cases of an imperfect regeneration of organs damaged or completely destroyed by injury. Congenital variation is usually shown by an increase or decrease in the number of organs, which may either vary together or separately.

Only three specimens show a numerical variation in all the organs. One has six groups of tentacles, six colieto-cystophors, six genital bands, and three internal septa. Two specimens have twelve groups of tentacles, twelve colieto-cystophors, twelve genital bands, and six internal septa. In the last two specimens the increase in the number of organs is not followed by a corresponding increase in the amount of tissue. Each

organ is below the average in size, and the tentacles in each group are also below the normal number. I have noticed among the Ephyræ of *Aurelia aurita*, that when a great increase in the number of arms occurs, the arms are below the average in size.

Another specimen has seven groups of tentacles, seven collemo-cystophors, seven genital bands and five septa, an increase in the number of septa, but a decrease in the other organs.

A numerical variation of the septa only occurs in seven specimens (about  $4\frac{1}{2}$  per cent.); four of these are given above, and the others, which have only three septa, will be described in another part of this paper. I think in all cases the numerical variation of the septa may be safely considered to be congenital. The septa run nearly the whole length of the body, and are not likely to be affected by an external injury. In the majority of abnormal specimens the septa have their normal number, and the groups of tentacles, collemo-cystophors, and genital bands show variation. Usually each set of organs shows an independent variation, either in number, shape, or position. One specimen, however, with the normal number of septa, has seven groups of tentacles, seven collemo-cystophors, and genital bands, all of which are symmetrically arranged. It is now probably the simplest plan to describe the variation in each set of organs separately, and to commence with the collemo-cystophors.

**The Variation of the Collemo-cystophors.**—In the five specimens already described the collemo-cystophors vary in number along with the groups of tentacles, and occupy their normal position on the margin of the umbrella. But many specimens show that the collemo-cystophors vary independently of the other organs.

Four specimens with eight groups of tentacles have nine collemo-cystophors. In two of these (figs. 2, 4, and 5) the increase is produced by the twinning of one of the collemo-cystophors. The other two specimens have the additional collemo-cystophor in an abnormal position. One is on the

margin of the umbrella, very near to a group of tentacles (fig. 1); the other is adradial and on the aboral side of a group of tentacles, a little way from the margin (fig. 3).

Five specimens have fewer colieto-cystophors than groups of tentacles; in each case one is missing. It is difficult to say whether the decrease is due to congenital variation or to the result of an injury.

One specimen (fig. 6) with seven groups of tentacles has eight colieto-cystophors. An examination of the specimen shows that two groups of tentacles are united into one group. The colieto-cystophor, which has been shut from its normal position by the union of the two groups, is situated close to, and on one side of, the double group.

Five other specimens show a similar union of groups of tentacles, but the colieto-cystophors correspond in number to the groups of tentacles.

Mr. Hornell (1) has examined many large specimens of *Haliclystus octoradiatus* taken at Jersey. He states that 33 per cent. show a variation either in the number of colieto-cystophors or in the groups of tentacles. More than half of these are cases in which a colieto-cystophor is absent from its proper position.

Only five of the Plymouth specimens have fewer colieto-cystophors than groups of tentacles (about 3 per cent.).

Mr. Hornell also examined 118 specimens taken at Jersey, and found 78 specimens (66 per cent.) with a capitate tentacle upon the apex of the colieto-cystophor. Some specimens have only a slight swelling at the apex with a few nematocysts, and others show various gradations up to a perfect capitate tentacle, just like an ordinary tentacle. The following table taken from Mr. Hornell's paper gives the number of colieto-cystophors with a capitate tentacle in each specimen.

14 specimens with 1 colleto-cystophor with a capitate tentacle.				
15	"	2	"	"
15	"	3	"	"
9	"	4	"	"
8	"	5	"	"
5	"	6	"	"
4	"	7	"	"
8	"	8	"	"

I searched all the Plymouth specimens to see if a similar variation existed, and only found one doubtful case. This specimen (figs. 7 and 8) has seven groups of tentacles in the normal position and one group a little way inside the oral surface of the umbrella. The proper position of this group is occupied by a capitate tentacle with a swollen base, which may or may not be an abnormal colleto-cystophor. The specimen possesses the usual eight colleto-cystophors, normal in shape and position.

Two specimens have capitate tentacles on the margin of the umbrella in an abnormal position. One has three tentacles just above a double colleto-cystophor (figs. 4 and 5), and the other has three tentacles close to a colleto-cystophor (fig. 10).

I think the Jersey specimens give an excellent illustration of local variation of a species.

**The Variation of the Genital Bands.**—In a normal specimen there are eight adradial genital bands, separated into four distinct pairs by the interradsial septa. Some specimens show a variation upon this arrangement. One specimen (fig. 9) has six adradial and two interradsial genital bands. The change in position occurs through the union of two adjacent adradial groups of tentacles into one interradsial group. This union has reduced the number of groups of tentacles and colleto-cystophors to seven, but the genital bands remain normal in number. The change in position of the two genital bands is also well shown by their being separated by an interradsial septum occupying its normal position. I think this may be regarded as a good case of congenital variation.

Another specimen (fig. 6) has six adradial and two perradsial genital bands. There are seven groups of tentacles. One

group is larger than the others, and has two genital bands running towards it. This large group is perradial, and represents the union of two adjacent adradial groups. Two other specimens show a similar variation. A slight alteration in this arrangement may take place by the union of two adjacent genital bands into one broad band (fig. 18). The genital bands usually start some distance down the body of the medusa and extend across the umbrella. Two specimens show an exception by having short bands commencing near the margin of the umbrella (figs. 19 and 20).

**The Variation in the Position of the Groups of Tentacles.**—In most cases the change in position of the groups of tentacles is due to a decrease in number, and usually affects the symmetry of the umbrella. The decrease is sometimes brought about by the union of two adjacent adradial groups of tentacles into an interrarial (fig. 9) or a perradial group (figs. 6 and 18).

In a few cases the position occupied by a group is exceptionally abnormal. Two specimens have a group of tentacles on the oral side of the umbrella, some distance from the margin. One of these (figs. 7 and 8) has seven normal groups of tentacles, but the eighth group is a little way inside the margin, which projects beyond the group and has a tentacle-like collemo-cystophore in the position which is under normal conditions occupied by the eighth group of tentacles. The other specimen (figs. 12 and 15) has three septa, six collemo-cystophores, and five normal groups of tentacles. But there is also an abnormal group of tentacles upon a short stalk, which rises above the oral surface of the umbrella, and occupies a position about half-way between the centre and the margin of umbrella. Opposite this group of tentacles, upon the margin of the umbrella, there are two other sets of tentacles, close together, with the tentacles arranged in nearly a single row.

An unique case amongst the abnormal forms is that of a specimen (figs. 11 and 13) with eight groups of tentacles and collemo-cystophores in the normal position. One of these groups of tentacles is smaller than the others, and has, on its outer

side, a lateral outgrowth of the umbrella. This outgrowth contains two collemo-cystophors and two groups of tentacles, one behind the other. The specimen has altogether ten groups of tentacles and ten collemo-cystophors.

The Regeneration of Injured or Lost Organs.— It is evident from the mutilated condition of some specimens that a considerable amount of injury may happen to the umbrella without causing death to the medusa. The damaged or lost organs may be replaced by new ones, which may or may not resemble the old ones. A new symmetry may even arise through a decrease in the number of organs, which in some cases might be mistaken for congenital variation. The simplest case is the loss of one group of tentacles, well illustrated by a specimen (fig. 21) which has all its organs perfectly normal except that one group of tentacles is missing. The prolongation of the umbrella and the genital band suddenly terminates, as if the tentacles had been cut off with a knife. Another specimen (fig. 22) shows a similar abrupt termination of the genital band, but a few short tentacles are present which may be reasonably regarded as a new growth. The destruction and regrowth of tentacles are also well shown in a specimen (fig. 16) with five normal groups and with two groups having only a few short tentacles. A genital band and a short prolongation of the umbrella marks the position of the eighth group which is missing.

Two specimens show both congenital variation and an abnormality due to regeneration. One of these (fig. 14) has three septa, five genital bands (the sixth is absent, but its position is faintly marked), and six collemo-cystophors; but there are only four normal groups of tentacles present. The other two groups have evidently been destroyed and are again budding out afresh. The other specimen (fig. 17) has three septa, seven genital bands, six collemo-cystophors, and only four normal groups of tentacles. One half of the umbrella, containing these groups of tentacles, is normal in shape, but the other half has apparently been destroyed, and three new groups of tentacles are in the process of development.

## REFERENCE.

1. HORNELL, J., 1893.—“Abnormalities in *Haliclystus octoradiatus*,”  
‘Natural Science,’ vol. iii, p. xxxiii.
- 

## DESCRIPTION OF PLATE 1,

Illustrating Mr. E. T. Browne’s paper on “The Variation of *Haliclystus octoradiatus*.”

## PLATE 1.

FIG. 1.—A portion of the umbrella showing a colieto-cystophor in an abnormal position. Aboral side.  $\times 10$ .

FIG. 2.—A portion of the umbrella showing the twinning of a colieto-cystophor. Aboral side.  $\times 10$ .

FIG. 3.—Half of the umbrella showing a colieto-cystophor in an abnormal position. Aboral side.  $\times 10$ .

FIG. 4.—Oral view of a specimen with a genital band in an abnormal position, and a double colieto-cystophor.  $\times 9$ .

FIG. 5.—Double colieto-cystophor (Fig. 4) with tentacles on the margin of the umbrella. Aboral side.  $\times 18$ .

FIG. 6.—Oral view of a specimen showing the union of two groups of tentacles.  $\times 6$ .

FIG. 7.—Oral view of a specimen showing a group of tentacles inside the umbrella, and a tentacle-like colieto-cystophor.

FIG. 8.—Lateral view of the abnormal group of tentacles described in Fig. 7.  $\times 10$ .

FIG. 9.—Oral view of a specimen showing the union of two groups of tentacles, and the double genital band separated by an interradial septum.  $\times 6$ .

FIG. 10.—A portion of the umbrella with tentacles on the margin in an abnormal position. Oral side.  $\times 10$ .

FIG. 11.—Oral view of a specimen with a lateral outgrowth of the umbrella.  $\times 6$ .

FIG. 12.—Oral view of a specimen with a group of tentacles inside the umbrella.  $\times 6$ .

FIG. 13.—Lateral view of the outgrowth of the umbrella (Fig. 11).  $\times 8$ .

FIG. 14.—Oral view of a specimen showing congenital variation (three septa) and the new growth of tentacles.  $\times 6$ .

FIG. 15.—Lateral view of the group of tentacles inside the umbrella (Fig. 12).  $\times 6$ .

FIG. 16.—Oral view of a specimen showing the loss of tentacles by injury and the growth of new ones.  $\times 6$ .

FIG. 17.—Oral view of a specimen showing the new growth of tentacles on the half of the umbrella which has been injured.  $\times 6$ .

FIG. 18.—Oral view of a specimen showing the union of two groups of tentacles and two genital bands.  $\times 6$ .

FIGS. 19 and 20.—Oral view of specimens showing the commencement of genital bands near the margin.  $\times 6$ .

FIG. 21.—Oral view of a specimen showing the loss of a group of tentacles by injury.  $\times 5$ .

FIG. 22.—Oral view of a specimen showing the fresh growth of tentacles.  $\times 6$ .

