

CHAPTER XXIV.

DOUBLE MONSTERS.

OF the evidence as to double and triple "monstrosity" and of the classification of the various forms no account can be given here. This may be found in any work on general teratology. In this chapter are put together a few notes on points respecting these formations of interest to the naturalist, and having relation to what has gone before.

It is now a matter of common knowledge that in animals [and plants] division may occur in such a way that two or more bodies may be formed from what is ostensibly one fertilized ovum (cp. multipolar cells). But by a similar division imperfectly effected, the resulting bodies instead of being complete twins or triplets may remain united together, frequently having a greater or less extent of body in common. In other words, speaking of simple cases in bilateral animals, the whole body, resulting from the development, may contain more than one bilaterally complete group of those parts which normally constitute the Primary Symmetry of an "individual."

If well developed, the component groups are most often united by homologous parts, so that there is a geometrical relation of images between the groups together, forming the compound structure, the whole being one system of Symmetry. Concerning the relations of the several parts of such a system to each other numerous questions of interest arise, but with these it is not now proposed to deal.

To those unacquainted with facts of this class it may be of use to point out in the fewest words the direction in which this importance lies. It arises, briefly, from the fact that in the resemblance between a pair of homologous twins, whether wholly or partially divided, there is once again an illustration of the phenomenon of Symmetry, and of the simultaneous Variation of structures related to each other as symmetrical counterparts.

The frequency of close resemblance between twins is a matter of common knowledge. If it be true that such twins may result from the development of one ovum—a fact that cannot be doubted in face of the complete series of stages intermediate between total and partial duality—the resemblance between these twins is then of the same nature as that subsisting between the two halves of any other bilaterally symmetrical system. A wide field of inquiry is thus opened up. For, as suggested in the Introduction (p. 36) if the very close resemblance of twins to each other is a phenomenon dependent on Symmetry of Division, the less close resemblance between members of families may be a phenomenon similar in kind.

It will be remembered that the resemblance between twins is a true case of similar and simultaneous Variation of counterparts. This is clearly proved by the fact that when distinct Meristic Variations are exhibited by one twin they are not rarely present in the other also. Cases of this simultaneous Variation are familiar to all who have studied this subject. A useful list of examples in completely separate twins is given by WINDLE¹. One of the best known cases in twins incompletely separated, is that of the Siamese Twins², who had each only eleven pairs of ribs (instead of twelve).

Reference must lastly be made to a particular corollary which may naturally be deduced from the fact that the bodies of incompletely separated twins are grouped as a single system of Symmetry. If the whole common body were bilaterally symmetrical, one twin must be the optical image of the other. But if the organs of one twin be normally disposed, the organs of the other must be *transposed* in completion of the Symmetry. This theoretical expectation is in part borne out by the facts. With a view to this question EICHWALD³ examined the evidence as to thoracopagous double monsters (including xiphopagi, &c.), and found that in almost every case one of the bodies shewed some transposition of viscera, though to a varying extent⁴.

There are nevertheless a few cases even of thoracopagi where neither body exhibits any transposition⁵. Moreover, contrary to natural expectation, it does not appear that in ordinary cases of completely separate twins either twin has its viscera transposed; and conversely, of 152 cases of transposition collected by KÜCHENMEISTER only one could be shewn to have been a twin⁶. It seems therefore that the frequency of transposition in double monstrosity depends in some way upon the maintenance of the connexion between the twins; and that if the separation be completed early, as it must be supposed to be in cases of homologous twins born separate, then both bodies as a rule develop upon the normal plan, like the bodies of multiple births of other animals. But as the evidence now stands there is no reason to suppose that individuals with transposition of viscera, born as single births, have ever had a counterpart *any more than individuals whose viscera are normally placed*, tempting as it is to imagine that both may have had some counterpart which in the ordinary course does not develop.

For the present we need not go beyond the fact that between complete duality resulting in "homologous twins," and the least forms of axial duality, consisting in a doubling of either extremity of the longitudinal axis almost all possible degrees have been seen⁷. By persons unfamiliar with abnormalities it

¹ WINDLE, B. C., *Jour. Anat. Phys.*, xxvi, p. 295.

² For full abstracts of all evidence relating to this case, see KÜCHENMEISTER, *Die angeb. Verlagerung d. Eingeweide d. Menschen*, Leipzig, 1883, p. 204.

³ EICHWALD, *Pet. med. Ztschr.*, 1870, No. 2, quoted from abstr. *Virch. u. Hirsch. Jahressb.*, 1871, p. 167.

⁴ Eichwald supports the view that in these cases it is the *right* twin which shews the transposition. As KÜCHENMEISTER (*l. c.*) points out, this cannot by the nature of the case be a universal rule; for the relative position of xiphopagous twins may result simply from the way in which they happen to be laid by the mother or the midwife. Of the Siamese Twins, besides, it was Chang, the left twin, in whose body there were indications of transposition. The twins may also remain face to face. The expression "right twin" must always need further definition, and it should be qualified as the right when the livers are adjacent, or when the hearts are adjacent, as the case may be. Whether the rule is wholly or partially true for either of these positions seems to be very doubtful.

⁵ For example, BÖTTCHER, *Dorpater med. Ztschr.*, II. p. 105, quoted from *V. u. H. Jahressb.*, *l. c.* In the specimen *Terat. Cat. Coll. Surg. Mus.*, 1872, No. 114, there is no transposition, but here the hearts were not separate.

⁶ *l. c.*, p. 268. One, however, was a child of a mother who had before borne twins, *l. c.*, p. 313.

⁷ The fact that some of the degrees are much more common than others has an obvious bearing on the question of Discontinuity, which might with profit be pursued. A statistical examination as to the angles at which the bodies are most frequently inclined to each other would also probably lead to an interesting result.

is sometimes supposed that axial duplicity is a phenomenon more or less peculiar to Man and to domesticated animals [and plants], and the occurrence is looked on as a part of that Meristic instability which is ascribed to absence of the control of a strict and Natural Selection. This view is far from sound. Such phenomena have on the contrary been found in many classes of animals, vertebrate and invertebrate, and the unquestionable frequency in domesticated animals may in great measure be fairly attributed to the comparative ease with which the births of these creatures can be observed. As considerations of this kind have weight with many it has seemed worth while to give references to examples taken from a variety of different groups, shewing not only that such compound bodies may be produced in wild animals, but also that they may sometimes be able to carry on the business of life without artificial help.

In Mammals and Birds I do not know an authentic case of a double monster that had *grown up* in the wild state.

*865. In Reptiles many such cases are known and are referred to by most of the older writers. Of Snakes having complete or partial duplicity, nearly always of the head, some twenty cases are recorded. Several of these were animals of good size, and must have had an independent existence for some considerable time.

Some of the cases have special points of interest, but into these it is not now proposed to enter. As bearing on the question of the frequency of Meristic Variation in families and strains attention is called to the circumstance that MITCHILL's three specimens were all found in one brood of 120 which were taken with the mother. The following is a list of records of snakes having the head wholly or partially double.

Coluber constrictor. WYMAN, J., *Proc. Bost. N. H. S.*, 1862, ix. p. 193, *fig.*

Coluber constrictor. MITCHILL, S. L., *Amer. Jour. of Sci.*, x. 1826, p. 48, *Pl.* (3 specimens).

Ophibolus getulus. YARROW, *Amer. Nat.*, 1878, xii. p. 470.

Pityophis. *ibid.*, p. 264.

Pelamis bicolor. [Remarkable case¹: the duplicity appearing only in the fact that there were 4 nasal plates instead of 2, each with a nostril] BOETTGER, O., *Ber. üb. d. Senck. nat. Ges. in Frankf. a. M.*, 1890, p. LXXII.

In the remainder the species is not clear. REDI, *Osserv. int. agili anim. viventi*, &c., 1778, p. 2, Tav. I. [very good account]; LACÉPÈDE, *Hist. nat. des Serpens*, II. 1789, p. 482; BANCROFT, *Nat. Hist. of Guiana*, 1769, p. 214, *Pl.*; LANZONI, *Miscell. curios.*, 1690, Obs. CLXXI. p. 318, *Fig.* 36; *Boston Soc. Med. Imp., Catal. of Mus.*, No. 856, quoted from WYMAN, *l. c.*; EDWARDS, *Nat. Hist. of Birds, &c.*, Pt. IV. 1751, p. 207, *Pl.*; DORNER, *Zool. Gart.*, 1873, xiv. p. 407; *Coll. Surg. Mus., Terat. Cat.*, 1872, Nos. 24—27.

¹ Compare with Mitchell's two last cases, and also with a case in **Alytes obstetricans**. HÉRON-ROYER, *Bull. Soc. Zool. France*, 1884, ix. p. 164.

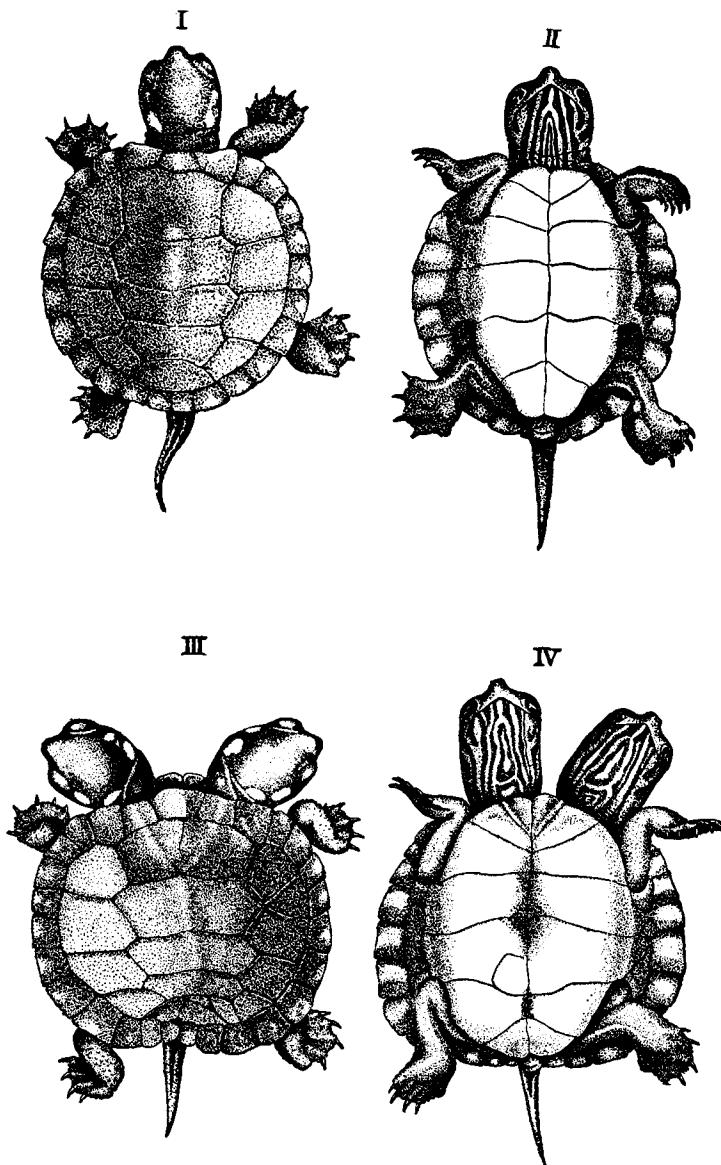


FIG. 207. *Chrysemys picta*, 2 or 3 days old. I, II, normal. III and IV, two-headed specimen. In the latter the nuchal and two pygal plates are normal. Between them are 12 plates on each side, 11 being the most usual number. Among the costals an extra plate is wedged in on the rt. First vertebral divided by suture; fifth is made up of 4 irregular plates. In the plastron there is a doubling of the gular plate. The rt. femoral has a suture. (From Barbour.)

See also, GEOFFROY ST. HILAIRE, *Hist. des Anom.*, ed. 1838, II. p. 197; DUMÉRIL et BIBRON, *Erpét. générale*, 1884, VI. p. 209.

866. Duplicity of the head is less common in Lizards, but several examples are known. See GEOFFROY ST. HILAIRE, *l. c.*, p. 195; *Cosmos*, Paris, 1869, S. 3, v. p. 136, &c.
- *867. In Chelonia also are several such instances. See EDWARDS, *Nat. Hist. of Birds*, &c., Pt. IV. 1751, p. 206; MITCHILL, *l. c.*; BARBOUR, E. H., *Amer. Jour. of Sci.*, 1888, S. 3, xxxvi. p. 227, Pl. V. The last is a particularly interesting case from the circumstance that the behaviour during life was observed to some extent, though only a popular account is given. The two heads seemed to act independently, and it is said that there was no concerted action between the feet of the two sides. BARBOUR's figures are reproduced in Fig. 207.

In fish-hatching establishments double monstrosity is of frequent occurrence among young Salmon and Trout. A two-headed embryo of a Shark is preserved in Coll. Surg. Mus. (*Terat. Cat.* 1872, No. 22).

The following cases relate to invertebrates.

Chætopoda. Duplicity in this Class has been often seen, but that any of the cases are truly congenital cannot be stated. There is evidence that in many Annelids regeneration¹ both of head or tail may freely occur, and it is quite possible that the second head or second tail may have grown out from an injured place, though of this there is no actual proof. In cases of posterior bifurcation each tail generally contains all the parts proper to the normal, but in No. 871 one of the tails was without the terminal cirri usual in the species. So far as can be gathered from the evidence it does not appear that the two continuations of the body have always the *same* number of segments, which might perhaps be expected were both the result of a natural division of the developing body. On the other hand, they do seem generally to have a *nearly* equal development, and are almost always (in cases of double tails, at least) fairly equal in length, which would not be anticipated if one only were a new growth. Moreover, if the double tail is in some way due to regeneration one would expect to find such duplicity in its minor conditions much more commonly.

Into the details of the structure it is not now proposed to enter, and indeed of most of the cases there is little to be told. The evidence is mentioned here simply in further proof of the power of these individuals, thus greatly departing from the normal of their species, to maintain themselves with no apparent difficulty. It will be noticed that the species concerned are most various, and include not only Errantia, but two cases also in Serpulidae.

The literature of the subject was collected by COLLIN², and a list of the references was independently collected and published with abstracts by ANDREWS³. This list, with a few additions, was republished by FRIEND⁴. Though many of the accounts are imperfect they are referred

¹ The evidence on this point does not come within the scope of this work. References to it may be obtained from ANDREWS, ZEPPELIN, &c. (*v. infra*).

² COLLIN, A., *Naturw. Wochens.*, 1891, No. 12, p. 113.

³ ANDREWS, E. A., *Amer. Nat.*, 1892, xxvi. p. 729.

⁴ FRIEND, H., *Nature*, 1893 (1), p. 397.

to below, in evidence that the total number of cases is considerable. There are only two certain cases of double head (see *Typosyllis*, No. 868, and *Allolobophora*, No. 873).

POLYCHÆTA.

- *868. ***Typosyllis variegata***: individual having two small heads, as shewn in Fig. 208. Heads of unequal size, that on the left having 4 segments behind the eyes, while that on the right had two. The

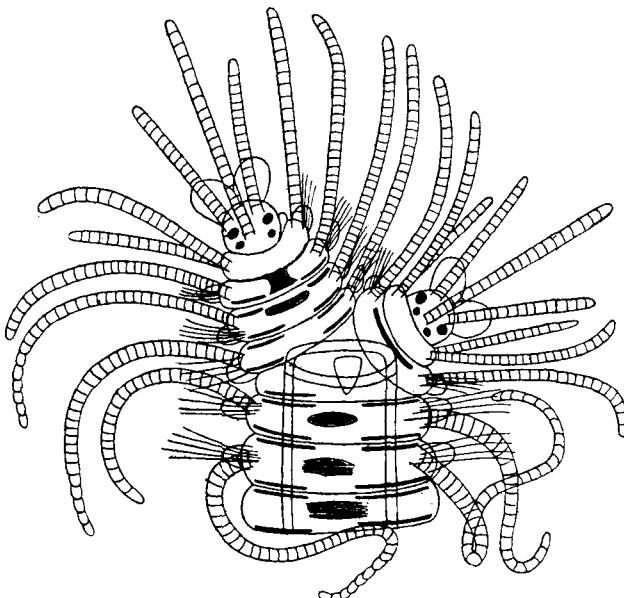


FIG. 208. *Typosyllis variegata*, No. 868, having two small heads.
(After LANGERHANS.)

appearance suggested that the original head had been broken off and that two new ones had grown in its place. LANGERHANS, P., *Nova Acta Ac. C. L. C.*, XLII. p. 102, Pl.

869. ***Nereis pelagica***: bifid posteriorly. BELL, F. JEFFREY, *Proc. Zool. Soc.*, 1886, p. 3.
870. ***Salmacina incrustans*** (Serpulidae): posterior end double. [Two tails shewn in figure as of equal length and in the same straight line, at right angles to the body. The arrangement of the segmentation at the junction is not clearly shewn.] CLAPARÈDE, *Mém. soc. phys. et d'hist. nat. Genève*, xx. 1869—70, p. 177, Pl. xxx. fig. 5 f.
871. ***Procerata tardigrada*** (Syllidae): tail double; two specimens. In one of these the tails were nearly equal, but one had no anal cirri. ANDREWS, E. A., *Proc. U. S. Nat. Mus.*, 1891; xiv. p. 283, and *Amer. Nat.*, 1892, xxvi. p. 729, Pl. xxi.
872. ***Branchiomma* sp.** (Sabellidae): two posterior ends, *one being rudimentary*. BRUNETTE, *Trav. Stat. Zool. de Cetee*, 1888, p. 8 [quoted from ANDREWS, l. c.]
[With these conditions compare *Syllis ramosa*, a form found by the Challenger in two localities, inhabiting a Hexactinellid Sponge. The body of this creature consisted of vast numbers of branches, about as thick as thread, passing off at right angles, coiling upon each other and forming inextricable masses. In some specimens no head was found, but a single head was afterwards discovered. It seemed likely that large tracts of the body have no head, but there was no evidence to shew how many heads occur in the colony. Many female buds were found, and a single complete male. MCINTOSH, *Chall. Rep.*, xii. p. 198, Pl. xxxi.]

OLIGOCHÆTA.

- *873. **Allolobophora longa**: specimen represented as bearing a second head on the right side of the first segment behind the peristomium. The second head is represented with prostomium, peristomium and one more segment which rests on the peristomium of the normal body. FRIEND, H., *Science-Gossip*, 1892, July, p. 161, *fig.*
874. **Ctenodrilus monostylos**: double tail; in many hundreds examined, three cases seen, ZEPPELIN, *Z. f. w. Z.*, 1883, xxxix. p. 621, Pl. 36, figs. 18 and 19.
875. **Lumbriculus variegatus**: similar cases. VON BÜLOW, *Arch. f. Naturg.*, 1883, xl ix. p. 94.
876. **Acanthodrilus** sp.: case of two tails arising from a much thicker anterior portion. Such worms were believed or alleged to be common in a particular district in New Zealand. KIRK, T. W., *Trans. N. Zeal. Inst.*, xix. p. 64, *Pl.*
877. EARTHWORMS generally, belonging to genera **Lumbricus**, or **Allolobophora**: cases of double tail recorded, as follows: ROBERTSON, C., *Q. J. M. S.*, 1867, p. 157, *fig.*; HORST, *Notes Leyd. Mus.*, vii. p. 42; THOMPSON, W., *Zool.*, xi. p. 4001; BELL, F. JEFFREY (2 cases), *Ann. & Mag. N. H.*, 1885 (2), p. 475, *fig.*; FRIEND, H., *Sci.-Gossip*, 1892, p. 108, *figs.*; MARSH, C. D., *Amer. Nat.*, xxiv. 1890, p. 373; FITCH, A., *Eighth Rep. upon Insects of State of N. Y.*, Append., 1865, p. 204 [from ANDREWS, *t.c.*]; *Terat. Cat. Mus. Coll. Surg.*, 1872, No. 20. BREESE, *West Kent N. H. S.*, 1871; BROOME, *Trans. N. H. S. Glasgow*, 1888, p. 203; FOSTER, *Hull. Sci. Club*, 1891; [the last three quoted from FRIEND, *Nature*, 1893 (1), p. 397]; COLLIN, A., *Naturw. Wochens.*, 1891, No. 12, *figs.* I have also a specimen with two nearly symmetrical tails kindly sent by Mr W. B. BENHAM.

ARTHROPODA.

Three cases.

- *878. **Chironomus** (Gnat): larva with two heads, duplicity beginning from the 5th segment behind the head [important details given, *q. v.*]. WEYENBERGH, H., *Stet. ent. Ztg.*, 1873, xxxiv. p. 452, *fig.*
879. **Euscorpius germanicus** (Scorpion): tail double from 4th praæ-abdominal segment [figure represents each abdomen with *one segment too few*, presumably an error]. PAVESI, P., *Rend. R. Ist. Lomb.*, S. II., xiv. 1881, p. 329, *fig.*
880. [**Scorpio africanus**]: specimen with two tails. SEBA, *Rerum Naturalium Thesaurus*, 1734, i. p. 112, Pl. lxx. *fig. 3*. This example was kindly sent me by Mr R. I. Pocock, who tells me that the figure shews the animal to be of the species named.

CESTODA.

Conditions, perhaps akin to duplicity, have been seen to occur under three forms.

881. **Tænia cœnurus**: specimen whose head had 6 suckers instead of 4, and 32 hooks instead of 28. Proglottides were 3-sided prisms, in section triangular. Longitudinal vessels 6 instead of 4, two being in each angle. Absolute size of head greater than normal. This abnormal

form is known to occur in many kinds of Tapeworms, and especially in Cysticerci. LEUCKART, *Parasiten d. Menschen*, pp. 501—2, cp. p. 577. [Case with five suckers mentioned, *ibid.*, p. 578.]

In another form of abnormality the chain of segments has three longitudinal flanges, formed, as it were, by the union of two chains of proglottides having one edge in common. Head not found, but several cases known. Genital openings in one case all upon the common edge. LEUCKART, *ibid.*, p. 574. Cp. COBBOLD, *Trans. Path. Soc.*, xvii. p. 438; LEVACHER, *Comptes rendus*, 1841, xiii. p. 661.

882. *Bifurcated* chains of proglottides have also been seen, *e.g.* specimen of **Tænia (cysticerci) tenuicollis**, which bifurcated several times in terminal portion, though normal in front of this. MONIEZ, *Bull. Sci. du Nord*, x. p. 201. See also **Tænia saginata?** LEUCKART, *l. c.*, p. 573.

BRACHIOPODA.

883. **Acanthothyris spinosa** (Rhynchonellidæ): case of duplicity

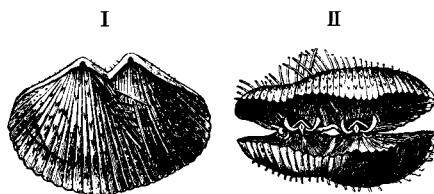


FIG. 209. *Acanthothyris spinosa*, No. 883. Case of duplicity. (From P. FISCHER.)
I. Seen from ventral valve. II. Looking between the valves.

as shewn in Fig. 209. FISCHER, P., *Jour. de Conchyl.* S. 3, xix. p. 343, Pl. XIII. figs 4—7.

HOLOTHURIOIDEA.

884. **Cucumaria acicula**: specimen made up of two individuals cohering laterally at posterior ends. SCHMELTZ, *Verh. d. Ver. f. naturw. Unterhaltung*, Hamb., 1877, IV. p. xv.
885. **Cucumaria planci**: case of second mouth and ring of tentacles borne on a lateral bud-like projection. LUDWIG, H., *Z. f. w. Z.*, LIII. *Supp.* p. 21, Pl. v.

886. COELENTERATA. Forms which are commonly simple, such as *Actinia* or *Sagartia*, are rarely found with two discs seemingly due to incomplete division, which in these forms may take place longitudinally [?] as well as by ordinary budding. GOSSE, P. H., *Sea-Anemones*, p. xxi., &c. See also GUYON, *Zoologist*, p. 7026, fig.

Similar occurrences, not distinguishable from budding, have been seen in Medusæ, *e.g.*, *Phialidium variabile*, DAVIDOFF, *Zool. Anz.*, iv. p. 620, fig.; *Gastroblasta raffaeli*, LANG, A., *Jen. Ztschr.*, xix. p. 735. An interesting case of this kind * was seen in **Cordylophora lacustris**. Several polystomatous specimens were found on a particular mass of *Cordylophora*, but were not found on all colonies gathered with this mass and had not been seen previously in specimens from the same locality. [Further particulars.] PRICE, H., *Q. J. M. S.*, 1876, p. 23, figs.

PROTOZOA. Double and triple monstrosity has been seen in several Foraminifera, see *e.g.*, DAWSON, *Canad. Nat.*, 1870, p. 177, figs.; BALKWILL and WRIGHT, *Trans. R. Irish Ac.*, 1885, xxviii. p. 317, Pl. XIV., &c. [As to cases in *Stentor*, see BALBIANI, *J. de l'anat.*, 1891, No. 3, but these are doubtless examples of regeneration and duplicity following injury.]