particles is effected by the lattice-work of the ctenidia or gill-plates.

The heart of Anodon consists of a median ventricle embracing the rectum (fig. 143, A), and giving off an anterior and a posterior artery, and of two auricles which open into the ventricle by orifices protected by valves.

The blood is colourless, and has colourless amœboid corpuscles floating in it. In two Lamellibranchs, *Solen* (*Ceratisolen*) *legumen* and *Arca Noæ*, the blood is crimson, owing to the presence of corpuscles impregnated with hæmoglobin (Lankester, **31**). In Anodon the blood is driven by the ventricle through the arteries into vessel-like spaces, which soon become irregular lacunæ surrounding the viscera, but in parts—*e.g.*, the labial tentacles and walls of the gut—very fine vessels with endothelial cell-lining are found. The blood makes its way by large veins to a venous sinus which lies in the middle line below the heart, having the paired renal organs (nephridia) placed between it and that organ. Hence it passes through the vessels of the glandular walls of the nephridia right and left into the gill-lamellæ, whence it returns through many openings into the widely-stretched auricles. A great deal more precision has been given to accounts of the structure of arteries, veins, and capillaries in Anodon than the facts warrant. The course of the blood-stream can only be somewhat vaguely inferred except in its largest outlines. Distinct arterial and venous channels cannot be distinguished in the gill-lamellæ, in spite of what Langer (**52**) has written on the subject, though it is highly probable that there is some kind of circulation in the gills. In the filaments of the gill of Mytilus the tubular cavity is divided by a more or less complete fibrous septum into two chan'ls, presumably for an ascending and a descending blood-current. The ventricle and auricles of Anodon lie in a pericardium which is clothed with a pavement endothelium (*d*, fig. 143). Veins are said by Keber and others to open anteriorly into it, but this appears to be an error. It does not contain blood or communicate directly with the blood-system; this isolation of the pericardium we have noted already in Gastropods and Cephalopods. A good case for the examination of the question as to whether blood enters the pericardium of Lamellibranchs, or escapes from the foot, or by the renal organs when the animal suddenly contracts, is furnished by the *Solen legumen*, which has red blood-corpuscles. According to observations made by Penrose (**53**) on an uninjured *Solen legumen*, no red corpuscles are to be seen in the pericardial space, although the heart is filled with them, and no such corpuscles are ever discharged by the animal when it is irritated.

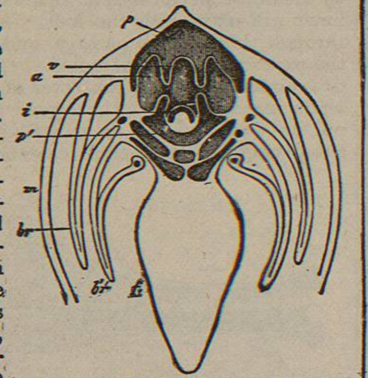

FIG. 142.—Vertical section through an Anodonta, about the mid-region of the foot. *m*, mantle-flap; *br*, outer, *b'r'*, inner gill-plate—each composed of two lamellæ; *f*, foot; *v*, ventricle of the heart; *a*, auricle; *p*, *p'*, pericardial cavity; *i*, intestine.

The pair of nephridia of Anodon, called in Lamellibranchs the organ of Bojanus, lie below the membranous floor of the pericardium, and open into it by two well-marked apertures (*e* and *f* in fig. 143). Each nephridium, after being bent upon itself as shown in fig. 143, C, D, opens to the exterior by a pore placed at the point marked *x* in fig. 124, (5), (6). It is no doubt possible, as in the Gastropoda and Cephalopoda, for water to enter from the exterior by the nephridia into the pericardium, but that it ever does so is as yet not proved. What is certain from the set of the ciliary currents is that liquid generally passes out of the pericardium by the nephridia. One half of each nephridium is of a dark-green colour and glandular (*h* in fig. 143). This opens into the reflected portion which overlies it as shown in the diagram fig. 143, D, *i*; the latter has non-glandular walls, and opens by the pore *k* to the exterior. The nephridia may be more ramified in other Lamellibranchs than they are in Anodon. In some they are difficult to discover. That of the common oyster has recently (1882) been detected by Hoek (**54**). Each nephridium in the oyster is a pyriform sac, which communicates by a narrow canal with the urino-genital groove placed to the front of the great adductor muscle; by a second narrow canal it communicates with the pericardium. From all parts of the pyriform sac narrow stalk-like tubes are given off, ending in abundant widely-spread branching glandular cæca, which form the essential renal secreting apparatus. The genital duct opens by a pore into the urino-genital groove of the oyster (the same arrangement being repeated on each side of the body) close to but distinct from the aperture of the nephridial canal. Hence, except for the formation of a urino-genital groove, the apertures are placed as they are in Anodon. Previously to Hoek's discovery a brown-coloured investment of the auricles of the heart of the oyster had been supposed to represent the nephridia in a rudimentary state. This investment, which occurs also in Mytilus but not in Anodon, may possibly consist of secreting cells, and may be comparable to the pericardial accessory glandular growths of Cephalopoda.

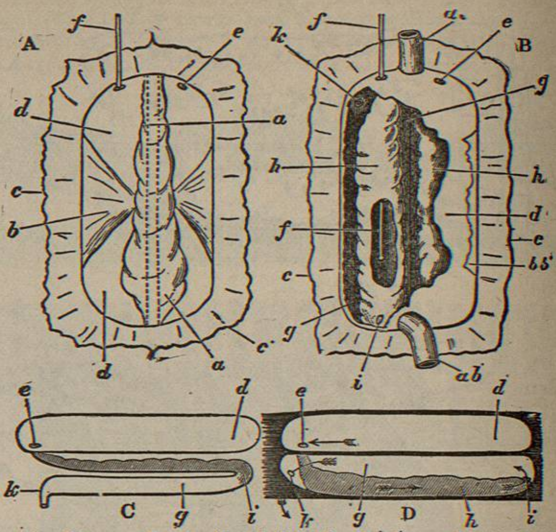

FIG. 143.—Diagrams showing the relations of pericardium and nephridia in a Lamellibranch such as Anodon. A. Pericardium opened dorsally so as to expose the heart and the floor of the pericardial chamber *d*. B. Heart removed and floor of the pericardium cut away on the left side so as to open the non-glandular sac of the nephridium, exposing the glandular sac *b*, which is also cut into so as to show the probe *f*. C. Ideal pericardium and nephridium viewed laterally. D. Lateral view showing the actual relation of the glandular and non-glandular sacs of the nephridium. The arrows indicate the course of fluid from the pericardium outwards. *a*, ventricle of the heart; *b*, auricle; *bb*, cut remnant of the auricle; *c*, dorsal wall of the pericardium cut and reflected; *e*, reno-pericardial orifice; *f*, probe introduced into the left reno-pericardial orifice; *g*, non-glandular sac of the left nephridium; *h*, glandular sac of the left nephridium; *i*, pore leading from the glandular into the non-glandular sac of the left nephridium; *k*, pore leading from the non-glandular sac to the exterior; *ac*, anterior, *ab*, posterior, cut remnants of the intestine and ventricle.

Nervous System and Sense-organs.—In Anodon there are three well-developed pairs of nerve-ganglia (fig. 144, B and fig. 124, (6)). An anterior pair lying one on each side of the

mouth (fig. 144, B, *a*) and connected in front of it by a commissure, are the representatives of the cerebral, pleural, and visceral ganglia of the typical Mollusc, which are not here differentiated as they are in Gastropods (compare, however, fig. 67). A pair placed close together in the foot (fig. 144, B, *b*, and fig. 124, (6), *ax*) are the typical pedal ganglia; they are joined to the cerebro-pleuro-visceral ganglia by connectives.

Posteriorly beneath the posterior adductors, and covered only by a thin layer of elongated epidermal cells, are the olfactory ganglia, their epidermal clothing constituting the pair of osphradia, which are thus seen in Lamellibranchs to occupy their typical position and to have the typical innervation,—the nerve to each osphradium being given off by the visceral ganglion—that is to say, by the undifferentiated cerebro-pleuro-visceral ganglion of its proper side. This identification of the posterior ganglion-pair of Lamellibranchs is due to Spengel (**11**). Other anatomists have considered this ganglion-pair as corresponding to either the pleural or the visceral of Gastropoda, or to both, and very usually it is termed "the parieto-splanchnic" (Huxley).

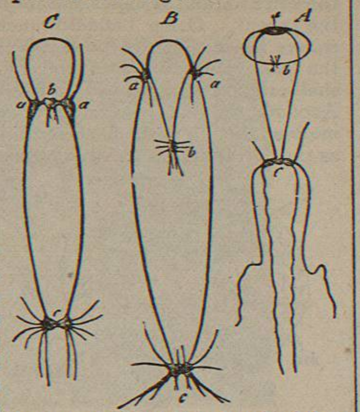

FIG. 144.—Nerve-ganglia and cords of three Lamellibranchs (from Gegenbaur): *A*, of Teredo; *B*, of Anodonta; *C*, of Pecten. *a*, cerebral ganglion-pair (=cerebro-pleuro-visceral); *b*, pedal ganglion-pair; *c*, olfactory (osphradial) ganglion-pair.

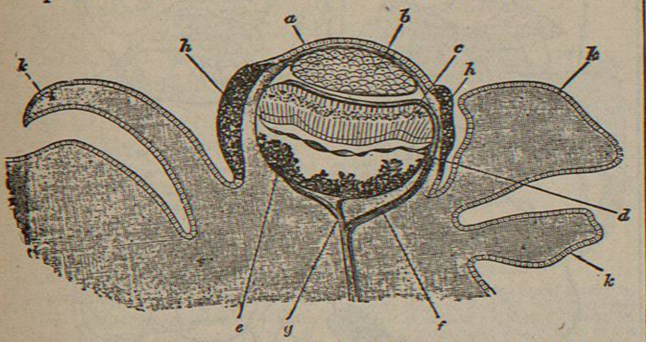

FIG. 145.—Pallial eye of Spondylus (from Hickson). *a*, præ-corneal epithelium; *b*, cellular lens; *c*, retinal body; *d*, tapetum; *e*, pigment; *f*, retinal nerve; *g*, complementary nerve; *h*, epithelial cells filled with pigment; *k*, tentacle

The sense-organs of Anodon other than the osphradia consist of a pair of otocysts attached to the pedal ganglia (fig. 124, (6), *ay*). The otocysts of Cyclas are peculiarly favourable for study on account of the transparency of the small foot in which they lie, and may be taken as typical of those of Lamellibranchs generally. The structure of one is exhibited in fig. 146. A single otolith is present as in the veliger embryos of Opisthobranchia. In adult Gastropoda there are frequently a large number of rod-like otoliths instead of one.

Anodon has no eyes of any sort, and the tentacles on the mantle edge are limited to its posterior border. This deficiency is very usual in the class; at the same time, many Lamellibranchs have tentacles on the edge of the mantle supplied by a pair of large well-developed nerves, which are given off from the cerebro-pleuro-visceral ganglion-pair, and very frequently some of these tentacles have undergone a special metamorphosis converting them into highly-organized eyes. Such eyes on the mantle-edge are found in Pecten, Spondylus, Lima, Ostrea (?), Pinna; Pectunculus, Modiola, Mytilus (?), Cardium, Tellina, Mactra, Venus, Solen, Pholas, and Galeomma. They are totally distinct from the cephalic eyes of typical Mollusca, and have a different structure and historical development. They have not originated as pits but as tentacles. They agree with the dorsal eyes of Onchidium (Pulmonata) in the curious fact that the optic nerve penetrates the capsule of the eye and passes in front of the retinal body (fig. 145), so that its fibres join the anterior faces of the nerve-end cells as in Vertebrates, instead of their posterior faces as in the cephalic eyes of Mollusca and Arthropoda; moreover, the lens is not a cuticular product but a cellular structure, which, again, is a feature of agreement with the Vertebrate eye. It must, however, be distinctly borne in mind that there is a fundamental difference between the eye of Vertebrates and of all other groups in the fact that in the Vertebrata the retinal body is itself a part of the central nervous system, and not a separate modification of the epidermis—myelonic as opposed to epidermic. The structure of the reputed eyes of several of the above-named genera has not been carefully examined. In Pecten and Spondylus, however, they have been fully studied (see fig. 145, and explanation).

FIG. 146.—Otocyst of Cyclas (from Gegenbaur). *c*, capsule; *e*, ciliated cells lining the same; *o*, otolith.

The gonads of Anodon are placed in distinct male and female individuals. In some Lamellibranchs—for instance, the European Oyster and the *Pisidium pusillum*—the sexes are united in the same individual; but here, as in most hermaphrodite animals, the two sexual elements are not ripe in the same individual at the same moment. It has been conclusively shown that the *Ostrea edulis* does not fertilize itself. The American Oyster (*O. virginiana*) and the Portuguese Oyster (*O. angulata*) have the sexes separate, and fertilization is effected in the open water after the discharge of the ova and the spermatozoa from the females and males respectively. In the *Ostrea edulis* fertilization of the eggs is effected at the moment of their escape from the uro-genital groove, or even before, by means of spermatozoa drawn into the sub-pallial chamber by the incurrent ciliary stream, and the embryos pass through the early stages of development whilst entangled between the gill-lamellæ of the female parent (fig. 6). In Anodon the eggs pass into the space between the two lamellæ of the outer gill-plate, and are there fertilized, and advance whilst still in this position to the glochidium phase of development (fig. 147). They may be found here in thousands in the summer and autumn months. The gonads themselves are extremely simple arborescent glands which open to the exterior by two simple ducts, one right and one

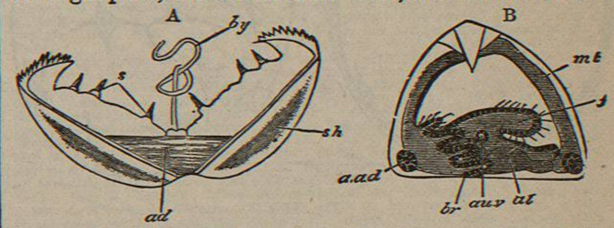

FIG. 147.—Two stages in the development of Anodonta (from Balfour). Both figures represent the glochidium stage. A, when free swimming, shows the two dentigerous valves widely open. B, a later stage, after fixture to the fin of a fish. *sh*, shell; *ad*, adductor muscle; *s*, teeth of the shell; *by*, byssus; *a.ad*, anterior adductor; *p.ad*, posterior adductor; *mt*, mantle-flap; *f*, foot; *br*, branchial filaments; *au.v*, otocyst; *al*, alimentary canal.

left, continuous with the wall of the tubular branches of the gland (fig. 124, (5), (6), *y*). In no Lamellibranch is there a divergence from this structure, excepting that in some (Ostrea) the contiguous nephridial and the genital aperture are sunk in a urino-genital groove, which in other cases (Spondylus?) may partially close up so as to constitute a single pore for the nephridial and genital ducts. No accessory genital glands are present.

The development of Anodon is remarkable for the curious larval form known as Glochidium (fig. 147). The Glochidium

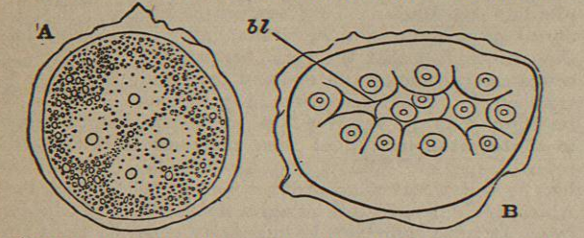

Fig. 148.—Embryos of *Pisidium pusillum* (after Lankester). A. Only four embryonic cells are present, still enclosed in the egg envelope. B. The cells have multiplied and commenced to invaginate, forming a blastopore or orifice of invagination, *bl*.

quits the gill-pouch of its parent and swims by alternate opening and shutting of the valves of its shell, as do adult Pecten and Lima, trailing at the same time a long

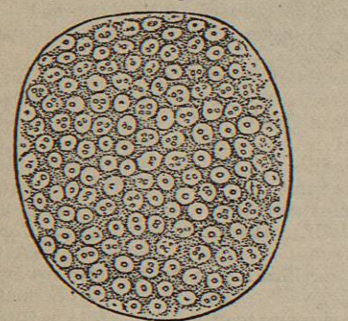

Fig. 149.

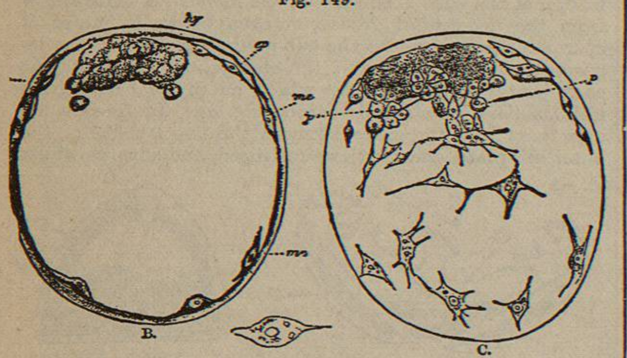

Fig. 150.

Fig. 149.—Embryo of *Pisidium pusillum* in the diblastula stage, surface view (after Lankester). The embryo has increased in size by accumulation of liquid between the outer and the invaginated cells. The blastopore has closed.

Fig. 150.—B. Same embryo as fig. 149, in optical median section, showing the invaginated cells *hy* which form the arch-enteron, and the mesoblastic cells *me* which are budded off from the surface of the mass *hy*, and apply themselves to the inner surface of the deric or epiblastic cell-layer *ep*. C. The same embryo focused so as to show the mesoblastic cells which immediately underlie the outer cell-layer.

byssus thread. By this it is brought into contact with the fin of a fish, such as Perch, Stickleback, or others, and effects a hold thereon by means of the toothed edge of its shells. Here it becomes encysted, and is nourished by the exudations of the fish. A distinct development of its internal organs has been traced by the late Professor Balfour, but no one has followed it to the moment at which it drops from the fish's fin and assumes the form of shell characteristic of the parent. Other Lamellibranchs exhibit either a trochosphere larva which becomes a Veliger, differing only from the Gastropod's and Pteropod's Veliger in having bilateral shell-calcifications instead of a single central one; or, like Anodon, they may develop within the gill-plates of the mother, though without presenting such a specialized larva as the Glochidium. An example of the former is seen in the

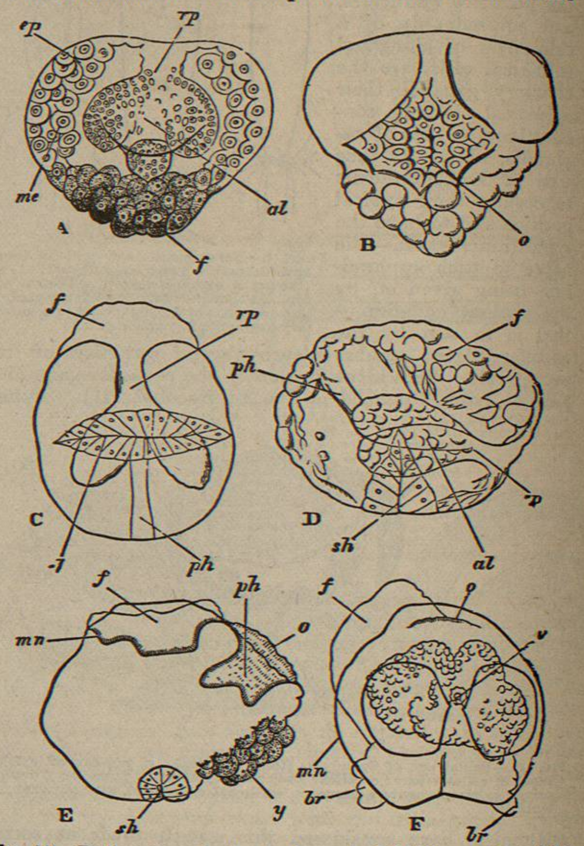

Fig. 151.—Further stages in the development of *Pisidium pusillum* (after Lankester). A. Optical section of an embryo in which the foot has begun to develop. B. The same embryo focused to its surface plane to show the mouth *o*. C. Later embryo, showing the shell-gland *sh*. D. Lateral view of the same embryo. E. Later stage, with rudiments of the mantle-flap, lateral view. F. Still later stage, with shell-valves and branchial filaments. *ep*, epiblast; *me*, mesoblast; *al*, met-enteron; *rp*, rectal peduncle or pedicle of invagination connecting the met-enteron with the cicatrix of the blastopore; *o*, mouth; *ph*, pharynx; *sh*, shell-gland; *mn*, mantle-flap; *br*, branchial filaments; *y*, granular cells of doubtful significance; *v*, vesicular structure of unknown significance.

development of the European Oyster, to the figure of which and its explanation the reader is specially referred (fig. 6). An example of the latter is seen in a common little fresh-water bivalve, the *Pisidium pusillum*, which has been studied by Lankester (12). The successive stages of the development of this Lamellibranch are illustrated in the woodcuts figs. 148 to 153 inclusive. These should be compared with the figures of Gastropod development (figs. 3, 4, 5, 7, and 72***). Fig. 148 shows the cleavage of the egg-cell into four (A), and at a later stage the tucking in of some of the cells to form an invaginated series (B).

The embryonic cells continue to divide, and form an oval vesicle containing liquid (fig. 149); within this, at one pole, is seen the mass of invaginated cells (fig. 150, *hy*). These invaginated cells are the arch-enteron; they proliferate and give off branching cells, which apply themselves (fig. 150, C) to the inner face of the vesicle, thus forming the mesoblast or cœlomic outgrowths. The outer single layer of cells which constitutes the surface of the vesicle (fig. 147) is the ectoderm or epiblast or deric cell-layer. The little mass of hypoblast or enteric cell-mass now enlarges, but remains connected with the cicatrix of the blastopore or orifice of invagination by a stalk, the rectal peduncle (fig. 151, A, *rp*). The enteron itself becomes bilobed and is joined by a new invagination, that of the mouth and stomodæum, *ph*. Fig. 151, B shows the origin of the mouth *o*, being a deeper view of the same specimen in the same position which is drawn in fig. 151, A. The mesoblast multiplies its cells, which become partly muscular and partly skeleto-trophic. Centro-dorsally now appears the embryonic shell-gland (fig. 151, C, *sh*). The pharynx or stomodæum is still small, the foot not yet prominent. A later stage is seen in fig. 152, where the pharynx is widely open and the foot prominent. No ciliated velum or præ-oral (cephalic) lobe ever develops. The shell-gland disappears, the mantle-skirt is raised as a ridge (fig. 151, E, *mn*), the paired shell-valves are secreted, the anus opens by a proctodæal ingrowth into the rectal peduncle, and the rudiments of the gills (*br*) and of the nephridia (B) appear (figs. 151, F, and 153, dorsal and lateral views of same stage), and thus the chief organs and general form of the adult are acquired. Later changes, not drawn here, consist in the growth of the shell-valves over the whole area of the mantle-flaps, and in the multiplication of the gill-filaments and their consolidation to form gill-plates. It is important to note that the gill-filaments are formed one by one *posteriorly*. The labial tentacles are formed late. In the allied genus Cyclas, a byssus gland is formed in the foot and subsequently disappears, but no such gland occurs in Pisidium. The nerve-ganglia and the otocysts probably form from thickenings of the epiblast, but detailed observation on this and other points of histogenesis in the Lamellibranchia is still wanting.

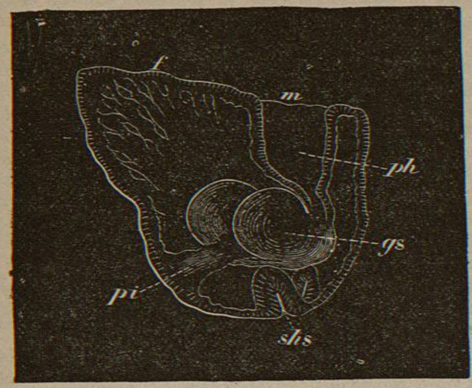

Fig. 152.—Diagram of embryo of Pisidium in the same stage as E in fig. 151. *m*, mouth; *f*, foot; *ph*, pharynx; *gs*, met-enteron; *pi*, rectal peduncle or pedicle of invagination; *shs*. shell-gland. (From Lankester.)

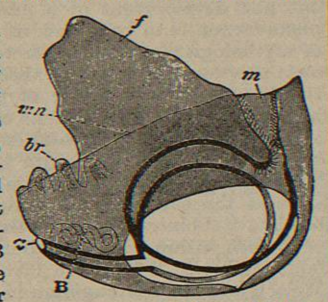

Fig. 153.—Diagram of embryo of Pisidium, in same stage as F in fig. 151 (after Lankester). *m*, mouth; *x*, anus; *f*, foot; *br*, branchial filaments; *mn*, margin of the mantle-skirt; *B*, organ of Bojanus (nephridium). The unshaded area gives the position of the shell-valve.

List of Memoirs, &c., referred to by numbers in the preceding article.—(1) G. Cuvier, *Mémoires pour servir à l'histoire et à l'anatomie des Mollusques*, Paris, 1816. (2) J. Poli, *Testacea utriusque Siciliæ, eorumque historia et anatome, tabulis aeneis 49 illustrata*, vols. i.-iii., fol., Parma, 1791-1795 and 1826-1827. (3) St delle Chiaje, *Memorie sulla storia e notomia degli animali senza vertebre del regno di Napoli*, Naples, 1823-1829; new edit. with 172 plates, fol., 1843. (4) J. Vaughan Thompson, *Zoological Researches*, Cork, 1830; memoir iv., "On the Cirripedes or Barnacles, demonstrating their deceptive character." (5) A. Kowalewsky, "Entwickelungsgeschichte der einfachen Ascidien," in *Mém. de l'Acad. des Sciences de St Pétersbourg*, 1866, and "Entwickelungsgeschichte des *Amphioxus lanceolatus*," *ibid.*, 1867 (6) J. Vaughan Thompson, *Zoological Researches*, Cork, 1830; memoir v., "Polyzoa, a new animal discovered as an inhabitant of some Zoophytes." (7) C. G. Ehrenberg, *Die Korallenthiere des Rothen Meeres*, Berlin, 1834 (*Abhand. d. k. Akad. d. Wissenschaften in Berlin*, 1832). (8) H. Milne-Edwards, *Recherches anatomiques physiologiques et zoologiques sur les Polypiers de France*, Paris, 1841-1844. (9) W. H. Caldwell, "On the development of Phoronis," *Proc. Roy. Soc.*, 1882. (10) Richard Owen, *Memoir on the Pearly Nautilus*, London, 1832. (11) T. H. Huxley, "On the morphology of the cephalous Mollusca," *Phil. Trans.*, 1853. (12) E. Ray Lankester, "Contributions to the developmental history of the Mollusca," *Phil. Trans.*, 1875. (13) E. Ray Lankester, "Notes on Embryology and Classification," *Quart. Journ. Microsc. Sc.*, 1877. (14) J. Carrière, "Das Wassergefäss-System d. Lamellibranchiaten u. Gastropoden," *Zoolog. Anzeiger*, 1881, No. 90. (15) E. Ray Lankester, "Development of the Pond-Snail," *Quart. Journ. Microsc. Sc.*, 1874, and "Shell-gland of Cyclas and Planula of Limnæus," *ibid.*, 1876. (16) R. Horst, "Development of the European Oyster," *Quart. Journ. Microsc. Sc.*, 1882, p. 341. (17) E. Ray Lankester, "Coincidence of the blastopore and anus in Paludina," *Quart. Journ. Microsc. Sc.*, 1876. (18) Id., "Zoological Observations made at Naples," *Annals and Mag. Nat. Hist.*, February, 1873. (19) W. K. Brooks, "Development of the American Oyster," *Report of the Commissioners of Fisheries of Maryland*, 1880. (20) Henri Milne-Edwards, Papers in the *Annales des Sciences Naturelles*, 1841-1860. (21) H. de Lacaze Duthiers, Papers in the *Annales des Sciences Naturelles, e.g.*, "Anomia" (1854), "Mytilus" (1856), "Dentalium" (1856, 1857), "Purpura" (1859), "Haliotis" (1859), "Vermetus" (1860). (22) A. Kölliker, *Entwickelungsgeschichte der Cephalopoden*, Zurich, 1844. (23) C. Gegenbaur, *Untersuchungen über Pteropoden und Heteropoden*, Leipsic, 1855. (24) J. W. Spengel, "Die Geruchsorgane und das Nervensystem der Mollusken," *Zeitschr. f. wiss. Zool.*, 1881. (25) A. A. W. Hubrecht, "On *Proneomenia Sluiteri* nov. gen. et sp., with remarks upon the anatomy and histology of the Amphineura," *Niederländisches Archiv für Zoologie*, supplement volume, 1881. (26) Adam Sedgwick, "On certain points in the anatomy of Chiton," *Proc. Roy. Soc. Lond.*, 1881. (27) E. Ray Lankester, "On some undescribed points in the anatomy of the Limpet," *Annals and Mag. Nat. History*, 1867; J. T. Cunningham, "The Renal Organs of Patella," *Quart. Journ. Microsc. Sc.*, 1883. (28) P. Fraisse, "Ueber Molluskenaugen mit embryonalem Typus," *Zeitschr. f. wiss. Zool.*, 1881. (29) L. v. Graff, "Ueber *Rhodope Veranii*, Köll.," *Morpholog. Jahrb.*, vol. viii. (30) H. Simroth, "Das Fussnervensystem der *Paludina vivipara*," *Zeitschr. f. wiss. Zool.*, 1881. (31) E. Ray Lankester, "A contribution to the knowledge of Hæmoglobin," *Proc. Roy. Soc. Lond.*, 1873. (32) H. de Lacaze Duthiers, "Du système nerveux des Mollusques Gasteropodes Pulmonés aquatiques et d'un nouvel organe d'innervation," *Arch. de Zoologie expérimentale*, vol. i. (33) C. Semper, *Animal Life* (for eye of Onchidium, p. 371), International Scientific series, 1881. (34) Same as number 18. (35) E. Ray Lankester, "Observations on the development of the Cephalopoda," *Quart. Journ. Microsc. Sc.*, 1875. (36) J. van der Hoeven, "Bijdrage tot de outleedkundige kennis aangaaende *Nautilus pompilius*," *Verhandl. d. K. Akad. v. Wet. Naturk.*, Amsterdam, 1856. (37) E. Ray Lankester and A. G. Bourne, "On the existence of Spengel's olfactory organ and of paired genital ducts in the Pearly Nautilus," *Quart. Journ. Microsc. Sc.*, 1883. (38) J. W. Vigelius, "Ueber das Excretions-System der Cephalopoden," *Niederländisches Archiv für Zoologie*, bd. v., 1880. (39) Albany Hancock, "On the nervous system of *Ommastrephes todarus*," *Annals and Mag. Nat. Hist.*, 1852. (40) J. D. Macdonald, "On the anatomy of *Nautilus umbilicatus*," *Phil. Trans. of Roy. Soc. Lond.*, 1855. (41) V. Hensen, "Ueber das Auge einiger Cephalopoden," *Zeitschr. f. wiss. Zool.*, 1865. (42) A. d'Orbigny, *Mollusques vivants et fossiles*, t. i. (Cephalopodes acétabulifères), Paris, 1845 (with 36 plates). (43) Bobretzky, "On the development of the Cephalopoda," *Trans. of Soc. of Friends of Nat. Hist. of Moscow*, vol. xxiv. (Russian). (44) T. H. Huxley, "Oviducts of the Smelt," *Proc. Zool. Soc. Lond.*, 1883. (45) Same as 35. (46) F. M. Balfour, *Comparative Embryology*, vols. i. and ii., London, 1881-1882. (47) H. Griesbach, "Ueber das Gefäss-System und die Wasseraufnahme bei den Najaden und Mytiliden," *Zeitschr. f. wiss. Zool.*, 1883. (48) Same as 14. (49) Same as 13. (50) R. Holman Peck, "The structure of the Lamellibranchiate gill," *Quart. Journ. of Microsc. Sc.*, 1876. (51) K. Mitsukuri, "Structure and significance of some aberrant forms of Lamellibranchiate gills," *Quart. Journ. Microsc. Sc.*, 1881. (52) K. Langer, "Das Gefäss-System der Teichmussel," *Denk. kais. Akad. d. Wissensch.*, Vienna, 1855-1856. (53) J. Penrose, in "Report of the Committee on the Zoological Station of Naples," *British Assoc. Report*, 1882. (54) P. P. C. Hoek, "Les organes de la génération de l'huître," *Journ. de la Soc. Néerlandaise de Zool.*, 1883.

(E. R. L.)

MOLLUSCOIDS. See Brachiopoda and Polyzoa.

MOLOCH, or Molech—in Hebrew, with the doubtful exception of 1 Kings xi. 7, always הַמֹּלֶךְ with the article—is the name or title of the divinity which the men of Judah in the last ages of the kingdom were wont to propitiate by the sacrifice of their own children. The phrase employed in speaking of these sacrifices is "to make one's son or daughter pass through fire to the Moloch" (2 Kings xxiii.