but few individuals of the leeches *Erpobdella octoculata* (L.) and *Glossiphonia complanata* (L.) survive to 3 years[5].

Those invertebrates with the longest life-span are found among the Coelenterata. The sea anemone *Cereus pedunculatus* (Pennant) is known to have lived in captivity in Edinburgh for more than 78 years[6]. Also long-lived is the anthozoan genus *Cerianthus* and an individual of *C. viridis* Torelli lived 43 years in the Naples aquarium[7]. In June 1938 the late Mr. F. J. Lambert collected larvæ of *C. lloydii* Gosse in the plankton at Southend[8] and from them raised an individual to the adult state. In 1958 he showed me the specimen alive; it died in the summer of the following year during a period of exceptionally hot weather, at the age of 21 years.

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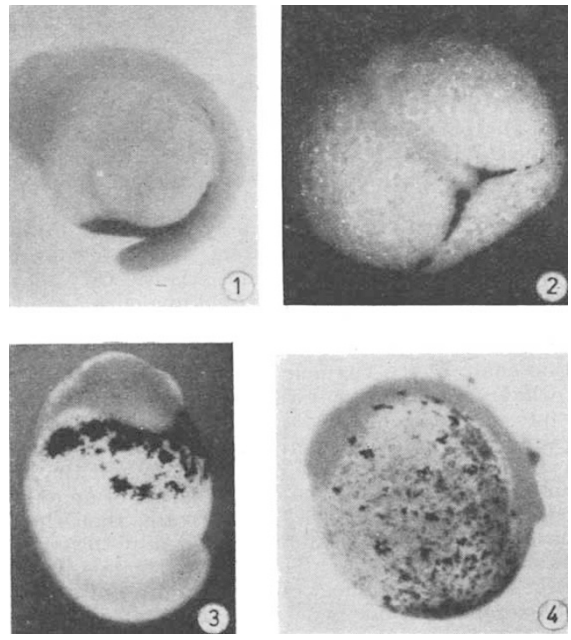
Blood Anlage in Teleostei

The mode of origin of blood in Teleosts is considered to represent an exception in the development of Vertebrates. Since the observations of Swaen and Brachet[1] the intermediate cell mass of Oellacher is considered to be the earliest primordium of blood and blood-vessels. From its primitive situation between the somites and the lateral plate this mass will be pushed by the ventral mesoderm into the space which is limited on the dorsal side by the chorda and scleromyotomes, and by the entoderm on the ventral side.

In order to visualize the blood anlage, living Teleost eggs were treated with benzidine and hydrogen peroxide according to the technique of Wu-Hsien[2], before heart pulsations had appeared. In *Brachydanio rerio* (Cypriniformes), *Gasterosteus aculeatus* and *Pungitius pungitius* (Gasterosteiformes), the blood appeared in the expected area, and only there, which is in the ventral part of the embryo in the middle somitic region. In *Gobius niger* and *G. paganellus* (Perciformes) the pseudo-peroxidase technique did not enable me to localize the primitive hæmopoietic area, the blood-corpuscles having been carried away from it by the heart pulsations before formation of hæmoglobin could be visualized. However, in *Lepadogaster candollii*, *Betta splendens*, *Blennius gattorugine* (Perciformes) and *Lebistes reticulatus* (Cyprinodontiformes) completely unexpected locations of embryonic hæmopoiesis were observed.

(1) In *Lepadogaster candollii* the benzidine reaction becomes positive at the 11-somite stage, in a ring-shaped area situated under and behind the end bud. Rapidly the reaction also becomes positive within the ring. 24 h after the first hæmoglobin has been elaborated, the blood island is constituted by a large mass of cells, which on the ventral side of the embryo is lying on the yolk from the region of the 11th somite up to behind the root of trunk and tail bud (Fig. 1).

(2) In *Lebistes reticulatus* hæmoglobin appears at the 6-somite stage in the ventral border of the blastodisk, the latter reaching to the equator of the egg. Along this border it rapidly extends dorsally towards the posterior extremity of the embryo. A blood-forming rudiment now appears in the midline on the ventral side of the embryo. At the 13-somite stage it takes the shape of an inverted Y the long limb of which is localized ventrally in the midline of the posterior somitic region, the two branches of the Y taking their origin in the posterior part of the extra-embryonic hæmopoietic tissue (Fig. 2).



Figs. 1–4. Eggs treated *in toto* by benzidine and hydrogen peroxide according to the Wu-Hsien technique

(1) *Lepadogaster candollii* egg some hours before the first heart-beats. The thin black rim visible dorsally to the blood anlage does not belong to the blood-forming area but represents a cord of pigment cells

(2) *Lebistes reticulatus* egg at the 13-somite stage. Only the extra-embryonic part of the blood anlage is visible

(3) *Betta splendens* egg, 2 h before the first heart-beats (14–17 somite stage)

(4) *Blennius gattorugine* egg at the 11-somite stage. The star-shaped pitchy black cells are pigment cells. The red blood cells appear in this figure as lighter dots and are located in a deeper level

(3) *Betta splendens* eggs present a positive benzidine reaction at the 11-somite stage. The blood anlage is completely extra-embryonic. It covers the surface of the yolk surrounding the head (Fig. 3). Microscopic examination reveals a continuity of the heart primordium and the blood island in front of the primitive pericardial cavities.

(4) In artificially fertilized eggs of *Blennius gattorugine* hæmopoiesis appears at the eighth day, in embryos with 11 pairs of somites. The hæmoglobin-containing area is also completely extra-embryonic, but is situated around the terminal bud. The same day the blood-cell differentiation extends lateral to the embryo in an anteriorly directed movement upon the surface of the vitelline mass up to the level of the second somite. A benzidine-negative rim separates the embryo from the blood. Star-shaped pigment cells are visible during their migration over the surface of the yolk and over the blood-cells (Fig. 4).

From these observations it appears that the problem of the blood anlage in bony fishes has only been partially solved by Swaen and Brachet, and that blood-cells in all Teleosts do not necessarily differentiate in the intermediate cell mass of Oellacher. A better knowledge of the origin of those blood-cells might enable us to establish a connexion between the classical 'dorsal' origin of blood in the fish and its 'ventral' origin in other vertebrates.

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