ARTERIAL HEMOLYMPH SUPPLY IN THE BRANCHIAL HEARTS OF THE CUTTLEFISH *SEPIA OFFICINALIS* L. (CEPHALOPODA, DIBRANCHIATA)

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The circulatory system of dibranchiate cephalopods includes the systemic heart, the paired branchial hearts and autonomously contractile vessels (Fiedler & Schipp, 1987; Wells & Smith, 1987). In the respiratory part of the venous system mainly the branchial hearts are responsible for pumping the deoxygenated hemolymph into the gills. There, the oxygenation of the respiratory pigment hemocyanin takes place. In octopods the average oxygen content in the arterial hemolymph is 3.3 vol %, whereas in the dichotomous branching of the vena cava, which supplies the branchial hearts with hemolymph, the oxygen content is only 0.4 vol % (Johansen & Lenfant, 1966) and may approach zero during hypoxic excursions (Houlihan et al., 1982).
Concerning the moderate oxygen supply of the branchial heart Driedzic (1985) proposed that it primarily operates anaerobically. However, the demonstration of arterial vessels running to the muscular rind of the branchial heart of *Octopus* (Wells & Smith, 1987), and the comparable enzyme profile of systemic and branchial heart (Driedzic et al., 1990), indicate an independent oxygen supply of this organ.
For the further elucidation of the existence of an arterial vascularization in the branchial hearts of *Sepia officinalis* L., tracer experiments were carried out on semi-adult animals of both sexes caught in the Bassin d'Arcachon (France). After in-situ injection of 1 ml Indian Ink (0.1% in seawater) into one of the auricles, the capacious organ complex composed of systemic heart, auricles, gills, renal appendages, branchial hearts and branchial heart appendages was removed. Tissues were investigated by histological methods.
Marked vessels coming from the connective tissue at the base of the branchial hearts were mainly localized at the dorsal surface of the organs by macroscopical observations. They form a ramifying mesh directly beneath the epithelium; some of these vessels run through the muscular wall up to the branchial heart appendages. The light microscopical studies revealed that the vessels of the inner folded epithelium in the branchial heart appendages are also filled up with tracer particles. In the extended lumen of the branchial hearts no tracer was found. After control injection of the Indian Ink solution into the vena cephalica, tracer particles were detected in the lumen of the organs but not in the ramifying vessels mentioned above.
The presented morphological study verify that the branchial hearts and even their appendages are supplied with oxygenated hemolymph from the systemic heart via a well-developed arterial vascularization - similar to the coronary system as described for the heart of most vertebrates.

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