

## Ancestral cells of endothelium in the open vascular system of ascidians

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The vertebrates have closed vascular system with an endothelial lining whereas the invertebrates have open vascular system without the lining. In the vertebrates, endothelial cells play principal roles in constructing blood vessels during development. Therefore it is a mystery how the invertebrates' blood vessels are formed without the participation of endothelial cells. We supposed that there are ancestral cells of endothelium in the open vascular system, and tried to study the blood vessels of ascidians.

### Blood vessel wall cells of *Halocynthia roretzi*

In the ascidian *Halocynthia roretzi*, the blood vessels of branchial sac are simple tubes within the matrix of connective tissue. Fortunately we found a particular type of cells on the inner surface of the blood vessels. These cells have following conspicuous characters. They are found sparsely on the inner surface of blood vessels, not forming a continuous lining. Electron microscopic studies showed that these cells adhere closely to matrix. In these cells there are a few but very large electron-dense granules. In addition they constantly have well developed rER.

### Blood vessel wall cells of other ascidians

Other ascidians also have similar cells on the inner surface of the blood vessels of branchial sac. Among solitary ascidians, we found blood vessel wall cells in *Styela clava* and *Styela plicata*, but not found in *Ciona intestinalis* (Table). All compound ascidians we have studied have no blood vessel wall cells.

### Conclusion

The function of the blood vessel wall cells of ascidians is not known, however, they are supposed to be an evolutionary antecedent to the endothelial cells of the vertebrates.

Ascidians with blood vessel wall cells

Species	Blood vessel wall cells	Vessel wall matrix
<i>Styela clava</i>	+	+
<i>Styela plicata</i>	+	+
<i>Ciona intestinalis</i>	—	—
Compound ascidians	—	—