

DISCUSSION

The origin of the external carotid artery, the external carotid rete, is sharply recurrent in both *Bufo bufo* and *Leiopelma hochstetteri*. In the six labyrinths from three specimens of *Bufo bufo* I have been unable to confirm Chowdhary's claim, also based on the study of serial sections but without reconstruction, that the external carotid in this species does not arise recurrently. My findings in *Bufo bufo* are very similar to those described for *B. vulgaris* (Ishida, 1954) and *B. marinus* (Rogers, 1966).

Leiopelma shows the recurrent nature of the external carotid artery very strikingly. Because the long axes of all the principal channels were approximately parallel in the example reconstructed, a reasonably accurate measurement of the total cross-sectional areas of these passages was possible. The combined cross-sectional area of the internal and external carotid retia is nine times that of the common carotid, and of the external and internal carotid arteries 1.4 times. These measurements allow an approximate estimate of the flow rates and velocities in the various parts of the organ.

If the velocities in two vessels are equal then the flows are proportional to their cross-sectional areas. Unless there is a significant difference in the resistances of the capillary beds fed by the external and internal carotids, the blood velocity in the internal carotid is unlikely to appreciably exceed that in the external carotid, as the fall of pressure through the deep and complex internal carotid rete is almost certainly greater than that in the external carotid rete. Thus, using the areas of the internal and external carotids as a guide, it is reasonable to suggest that the flow in the internal carotid artery is most unlikely to exceed 40% of the flow in the common carotid. As the cross-section of the internal carotid rete is some six times as great as that of the common carotid artery, the velocity in the rete may well be as low as 1/15th or less of that in the common carotid. The significance of this profound slowing of the blood flow in the internal carotid rete deserves careful consideration.

Attention has been drawn to the similarity between the labyrinths in *Leiopelma* and the urodeles (Carman, 1964; Wislang, 1964) and these and other aspects of the form and function of the amphibian carotid labyrinth have been fully reviewed in a recent paper in this Journal (Carman, 1967).

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