

lateral parts of the proximal surface of the internal carotid rete are one or two rootlets which lead away recurrently (ventrally), caudal to the rostral roots and, turning rostrally, enter the caudal wall of the external carotid artery. Blood entering these roots from the main chamber must pass through the most proximal parts of the internal carotid rete. The *external carotid artery* is formed by the fusion of the main channels of the external carotid rete in the proximal pole of the labyrinth; it has a bore of about  $120\mu$ .

The *internal carotid rete* occupies the distal (dorsal) half of the labyrinth. It comprises, primarily, a mass of short anastomosing capillary-sized channels which are drained peripherally by a series of progressively enlarging vessels. These large channels unite in the distal pole to form the *internal carotid artery*, which has a bore of about  $180\mu$ .

The three carotid arteries have a typical musculo-elastic media and a substantial fibrous adventitia. The main chamber and the channels of the external carotid rete have thinner musculo-elastic walls containing considerable collagenous tissue. The trabeculae of the capillary portion of the internal carotid rete comprise delicate collagenous tissue containing numerous cells, many of which appear to be modified smooth muscle cells. The peripheral wall of this part of the rete and the walls of the larger channels in its distal part are collagenous. The internal carotid artery has a surprisingly thin musculo-elastic media and a substantial fibrous adventitia.

### *Leiopelma hochstetteri*

The carotid labyrinth in *Leiopelma* (Fig. 2), when fixed, is about  $700\mu$  long and the greatest diameter of its oval cross-section is about  $500\mu$ . The long axis of the organ is directed laterally and somewhat dorsally. The *common carotid artery*, which has a bore of about  $110\mu$ , enters the caudal half of the proximal (medial) pole of the labyrinth and enlarges very slightly to form an inconspicuous *main chamber*, which is drained at its distal pole through four large openings leading directly to the *internal carotid rete*. This rete comprises a complex of intercommunicating capillary-sized vessels which occupies the distal half of the organ, and, at the distal pole, a number of very short larger vessels uniting to form the *internal carotid artery*, which has a bore of about  $90\mu$ . The *external carotid rete* arises from the proximal aspect of the internal carotid rete, where it surrounds the main chamber, by some 20 channels, ranging from  $10\mu$  to  $40\mu$  across. These unite to form an annular channel encircling the termination of the common carotid artery in the proximal pole of the labyrinth. From the rostral part of this annular channel the external carotid artery, with a bore of about  $100\mu$ , passes medially, parallel to the terminal part of the common carotid artery, with which it shares a common wall for a distance of  $400\mu$  or more, before turning rostrally into the floor of the mouth. The blood flow in the common carotid is, of course, directed *laterally* towards the labyrinth, whereas the flow in the external carotid rete and artery is directed *medially* and *recurrently* away from the organ. Allowing for the more delicate nature of the connective tissues associated with the small size of the organ in this animal, the labyrinth in *Leiopelma* is histologically similar to that in other species.

In the case of *Leiopelma* it is possible to measure with reasonable accuracy the cross-sectional area of the parts of the labyrinth. Taking the area of the common carotid ( $0.0095\text{ mm}^2$ ) as one unit, the area of the openings leaving the main chamber is about 4 units ( $0.0385\text{ mm}^2$ ), of the internal carotid rete 6 units ( $0.0563\text{ mm}^2$ ) and of the external carotid rete 3.5 units ( $0.0345\text{ mm}^2$ ), giving a maximum section of 9.5 units, and of the internal carotid 0.6 units ( $0.0064\text{ mm}^2$ ) and of the external carotid 0.8 units ( $0.0076\text{ mm}^2$ ), a total of 1.4 units.