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MORPHOLOGICAL AND HISTOLOGICAL STUDY FOR SOME SENSORY ORGANS IN COMMON CARP(*Cyprinus carpio* L.)

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ABSTRACT

A total of fifty specimens of common carp *Cyprinus carpo* L.were obtained to study the olfactory Organs, lateral line canal and the neuromasts .common carp has one pair of nostrils in each side of the head, Olfactory organ has an oval shape with 28 olfactory lamella arranged inside the nasal pouch and has a finger-like shaped. Every lamella contains sensory, supporting and basal cells. In addition to six cephalic canals in the lateral line at the head, there was a trunk canal that extends at the same line until the caudal peduncle, the trunk lateral line canal posses 35 scales .There are two types of neuromasts, the external neuromasts that aggregated around the eyes ,upper jaw and lower jaw. In addition to the external neuromasts there are pit organ, the neuromasts consists of two layers of cells, the supporting and the sensory cell layer. At the external neuromasts and pit organ there was the cupulae which absent at the neuromast of lateral line.

INTRODUCTION

The common carp is one of the wide distributed fishes in the world, they belong to the family cyprinidae and the order cypriniformes which belong to Osteicthyes.(lagler *et al*,1962).

The smell used to determined the food sites and fumble their path (Castro *et al*.1992). The smell were used in *Bathygobius sporator* for sexual differentiation (Tavolga,1956).

The olfactory mucosa contains olfactory sensory neurons lies at the floor of the olfactory chamber and composed of many folds to form the olfactory lamella (Hara,1975). The ventral surface in the olfactory epithelium of *Neogobius melanostomus* was thicker than dorsal surface (Belanger *et.al*.,2003).

The lateral line considered as a specific organs in the fishes and amphibiaus which have a special receptors used to determined the defects in their environment (Jorgensen,1985).

Gosline,1949 found that the cranial canal of the lateral line intermittent in *fundulusimilis* and *F. chysotus*, While (Jassim,1992) report that the *Neomachilus argyrogramma* scales were small and scattered and the lateral line canal lies under it, therefore every openings have a small canal opened outside.

The lateral line neuromasts composed of supporting, Sensory and Basal cells.the superficial neuromasts at the *Clupea harngues* lies at diamond-shape tissue and have a sensory vermicelii.

MATRIALS AND METHODS

A total of Fiftty specimens of common carp *Cyprinus carpio L* ranging in length from 70-200 mm and weigthing 12-87 gm were collected from Basrah University fish farm.

Length and weigth data were measured using a Vernier and electronic balance (Lagler,1956). The vital staining technique was obtained to study the lateral line, orifice and canal direction, the scales (Nori,1989), the alzarine red stain were used to study the cranial canal bones (Hollister, 1934).

The specimens from the olfactory organ and neuromasts were collected, fixed in 10% normal saline, dehydrate was progressively concentrations increasing of ethanol, infiltrated three times with xylene and embedded in paraffin. Five micrometers thick sections of paraffin embedded tissue specimens were mounted on glass slides and stained with haematoxyline and eosine. Sections were examined by mean of light microscope study according to (Luna,1968).

The same specimens were removed and immediately washed with cold normal saline, the content from each specimens were gently pressed out by cold 0.1 M phosphate buffer (pH 7.5).

Frozen sections were prepared by cryostate microtome and serial sections of 8 micrometers thickness were processed. Stained by harris haematoxylin and measured by Ocular micrometer (O'Connell,1963).

RESULTS

The olfactory organ composed of one pair of nasal pouches located on each sides of the head . Each chamber have two olfactory orifices separated from each another by a coetaneous flap (Fig 1).

The olfactory organ is oval in shape and contain 28 olfactory lamella having a melanocyte cells at their upper part.(Fig 2). The olfactory organs

lies at the olfactory chamber and their average length about 0.75 mm.

The olfactory lamella have a finger like shape and lined by ciliated columnar epithelial tissue, their average length about 69 micrometers and width 2.34 micrometers (Fig 3).

The olfactory epithelial tissue composed of a single layer of sensory, supporting and basal cells, the sensory cells are bipolar, spiral in shape and lies between the supporting cells and extends many dendrites into the epithelial surface to form the olfactory nerve fasciculi (Fig 4). Supporting cells are large, oval at the apex and narrow at the base and sustains microvilli, the cranial lamella contains connective tissue, blood vessels, collagen fibers and bundles of sensory cells axis.

The head posses six cephalic canals of the lateral line, the cephalic, supraorbital, postorbital, infraorbital preoperculomandibular and supratemporal canals (Fig 5,6) and the trunk canal that extended at the same line into the caudal peduncle. Trunk lateral line canal extend under the median muscular septum under the dorsal fin and posses 1+-35 scales (Fig 7).

Internal neuromasts founds at the roof of the canal that lined by cubiodal epithelial tissue and have two rows of sensory and supporting cells, the sensory cells are 13 in number located between the supporting cells (Fig 8). The average thickness of sensory layer about 0.01micrometer. External neuromasts founds at the head, around the eyes, upper and lower jaw. Cupulae was found in the external neuromasts and pit organ and abscet in the neuromasts of lateral line (Fig 9,10).

DISCUSSION

The olfactory organ in carp similar in their structure to that in *Tythlogarra widdowsoni* and *Noemachilus argyrogrmma*, while in *Periophthalmus waltoni* the lamella lies transversally at the main axis (Jassim,1992).

The oval shape of the olfactory organ in carp are more common that allows a wide distance for the olfactory tissue(Hara,1971). The olfactory lamella are 28 in number, while (Yamamota,1981) shows 31 lamella in the same species due to the length of the fish,the anterior nostril is narrow and wider toward the posterior and that in agreement with (Belauger, *et al*, 2003) in *Neogobius melanostoma.*

The average thickness of sensory layer in Carp 0.01 micrometer and that approximates with their thickness in *Serrasalmus natteri* and *Xiphophrus helleri* (Yamamota,1981, Zeiske, *et al*.,1976)

The carp possessed six cephalic canals of lateral line and that similar with studies done by (Jassim, 1992) in *Tythlogarra widdowsoni* while

(Illick,1956) found that the cephalic canal in carp uncompleted and intermittent in north America.

The neuromasts in carp similar with other species and differ by the absence of Cuplae in *Fundulus heteroclitus*, the Cupulae considered as a rudimental sensory cells (Denny,1937).

There are two types of neuromasts in carp and the *Mystus pelusius* has the same number (Jassim and Al-Daham,1996). Branson and Moore, (1962) found that the *Elassomo* have pit organs and the cupulae shows shrinken.

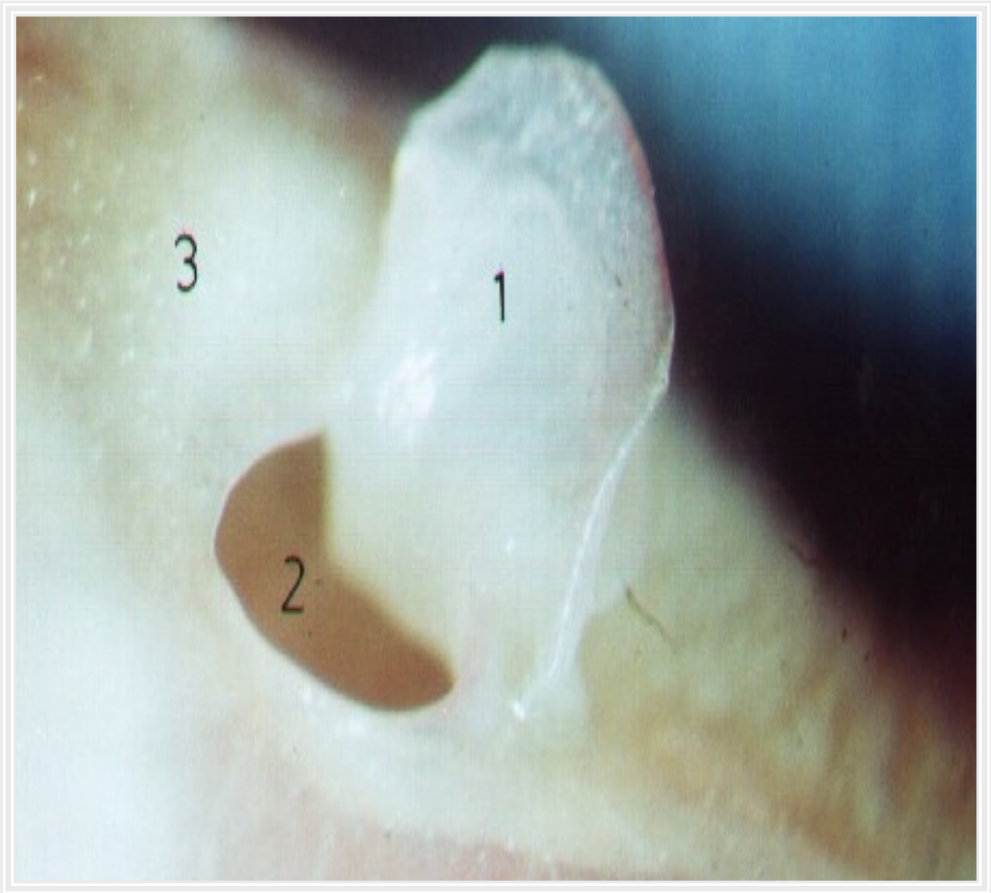

Fig 1 : Nasal pouch in common carp. 1- External flap
2-Posterior nostril. 159.9 X

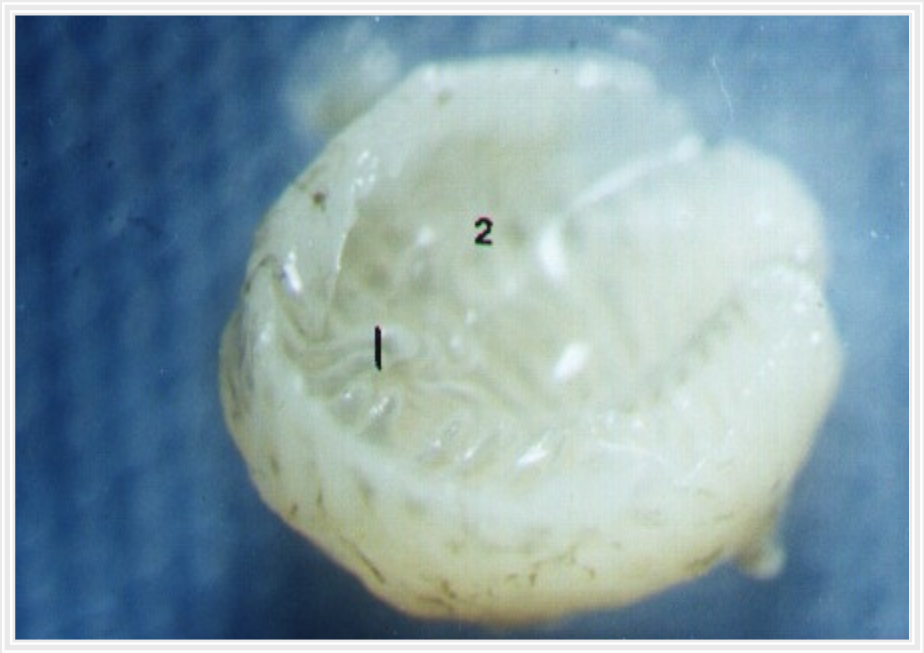

Fig 2 :Olfactory organ in common carp. 1 & 2 the olfactory lamella

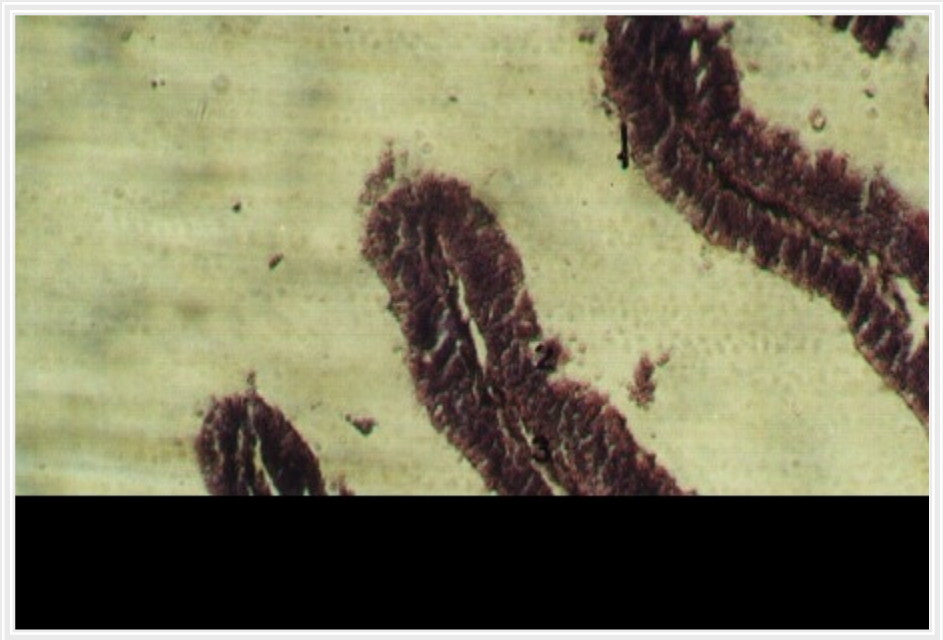

Fig 3: Cross section at the olfactory lamella

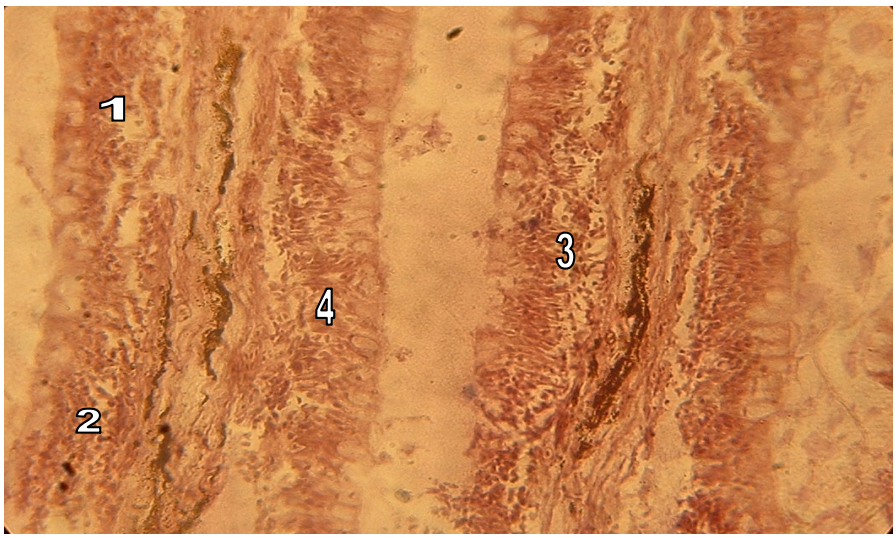

Fig 4: Cross section at olfactory lamella
1-columnar cells 2-Goblet cells 3-Basal cells
4-sensory cells nucleus H&E 400X

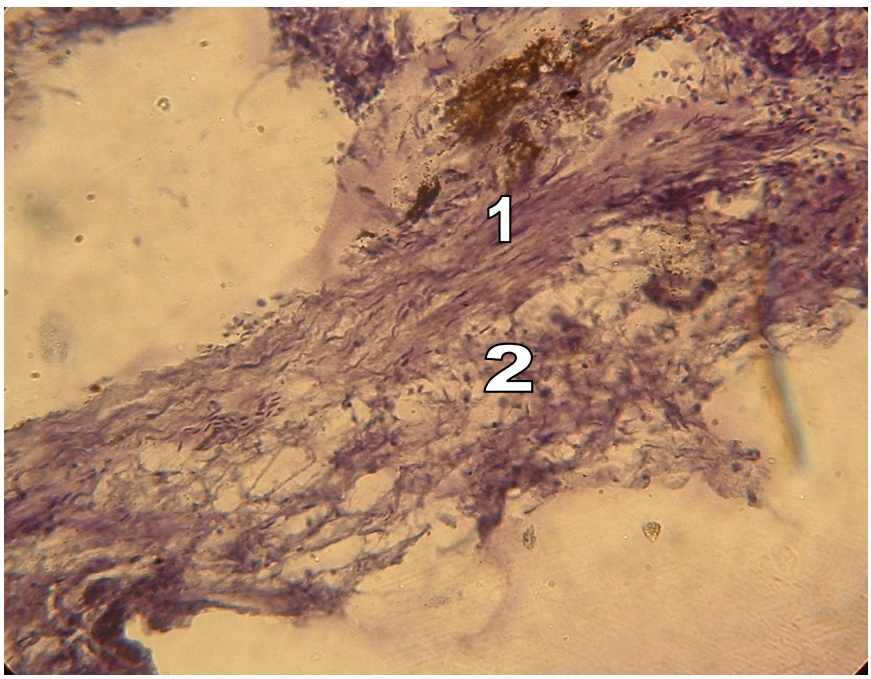

Fig 5: The main axis of olfactory tissue in common carp
1-Collagen fibers 2- Elastic fibers H&E 400X

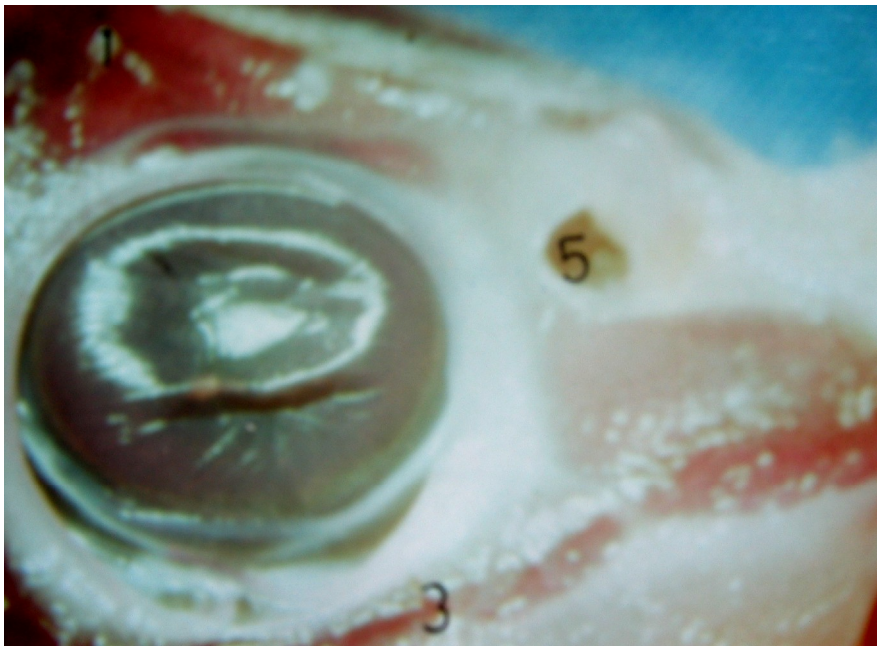

Fig 6: Cephalic canal in common carp
1-supraorbital canal 2-infraorbital canal 3-suborbital canal Alixarine red stain 527.9X

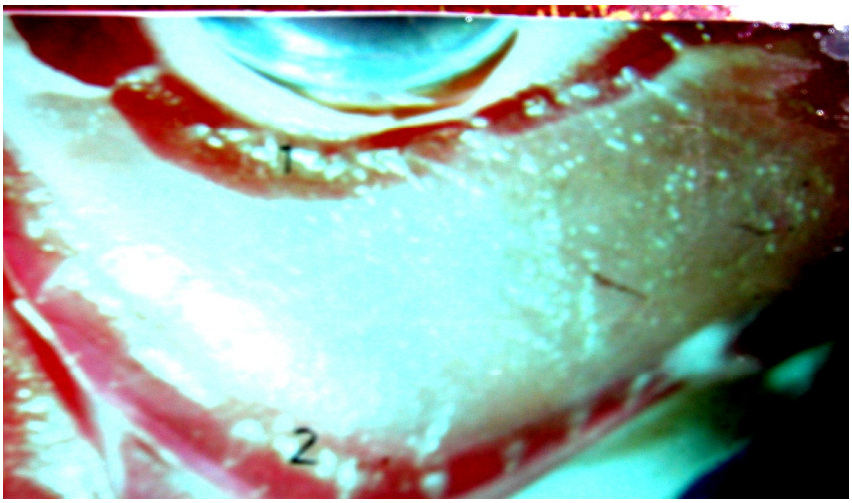

Fig 7 : 1-Suborbital canal 2-submandibular canal
Alizarine red stain 633.6X

Fig 8: Lateral line scale
1- Anterior opening of the canal
2-posterior opening 232.4X

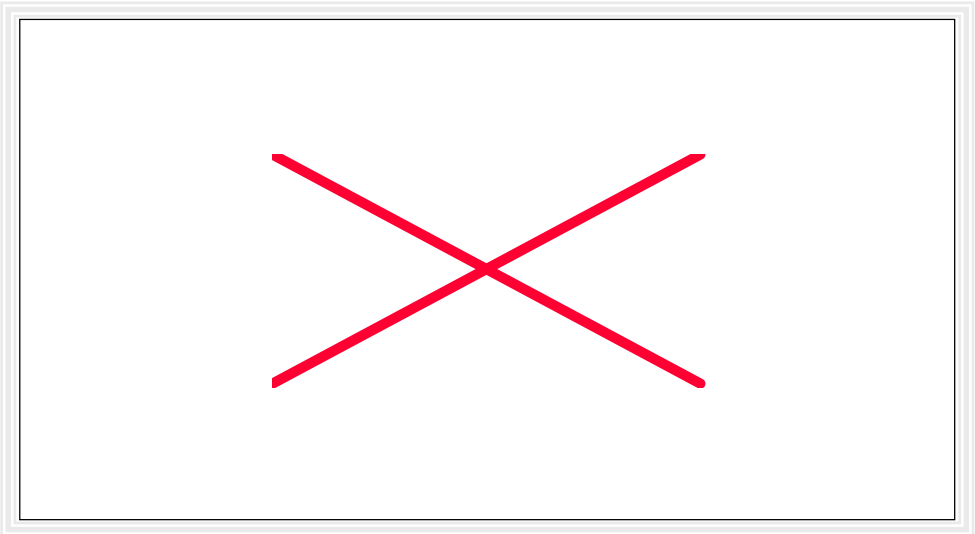

Fig 9: Cross section in neuromast
1-Sensory cell 2-Supporing cell
3-Basement membrane H&E 2000X

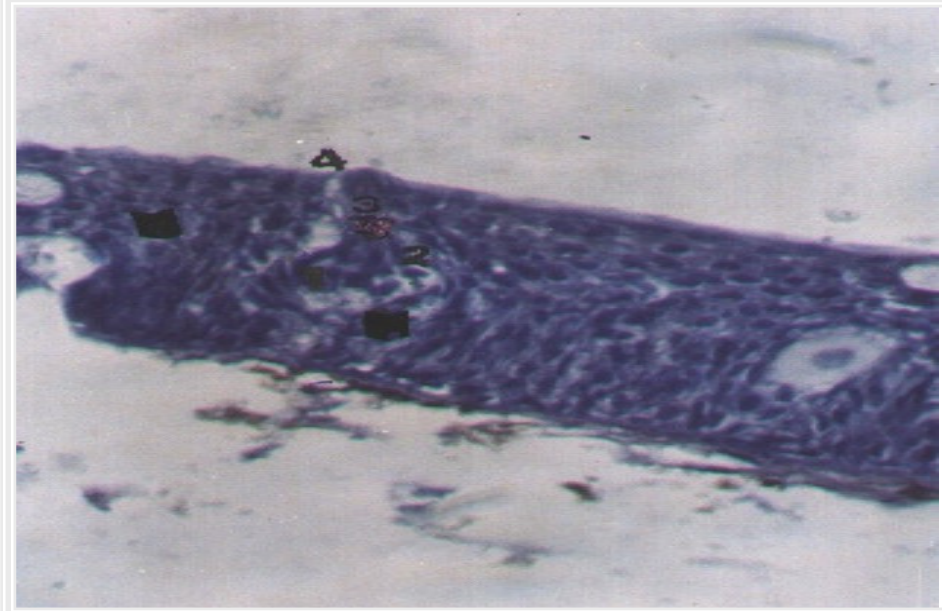

Fig 10: External neuromasts in common carp
1-Supporting cell 2-Sensory cell
3- Cupula 4-projection of neuromast H&E 1200X

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دراسة عيانية ونسيجية لبعض الأعضاء الحسية في أسماك الكارب الشائع

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الخلاصة

فحصت 50 عينة من اسماك الكارب الشائع لدراسة العضو الشمي والخط الجانبي والصواري العصبية،يمتلك الكارب زوجا من الفتحات الشمية زوج على كل جهة من الراس،يكون العضو ألشمي بيضوي الشكل ويتألف من 28 وريقة شمية كل وريقة تتالف من خلايا حسية وساندة وقاعدية،لوحظ وجود 6 قنوات رأسية للخط الجانبي فضلا عن القناة الجذعية، بلغ معدل حراشف الخط الجانبي 35 حرشفة. اضافة الى صاري الخط الجانبي هنالك نوعان من الصواري وهي الصواري السطحية والصواري الغاطسة. يتالف كل صاري من خلايا ساندة وحسية يتموضع أعلاها الكويب الذي يكون غائبا في صاري الخط الجانبي.