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Tumours of fishes 30

Epidermoid carcinoma of the lower lip in the cichlid *Hemichromis bimaculatus**

by

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1. INTRODUCTION

Several lip tumours of fishes are described in the literature. The following reported cases are known to the writer: epithelioma or epidermoid carcinoma in the white catfish (*Ictalurus catus*) by McFARLAND (1901), in the tench (*Tinca tinca*) by FIEBIGER (1909), in the barbel (*Barbus barbus*) by CLUNET (1910), in the croaker (*Pogonias chromis*) by BEATTI (1916), in the coalfish (*Pollachius virens*) by WILLIAMS (1929), in the northern brown bullhead (*Ameiurus nebulosus*) by LUCKÉ and SCHLUMBERGER (1941), SCHLUMBERGER and LUCKÉ (1948), in the brown bullhead by NIGRELLI (1953); papilloma in the barbel (*Barbus barbus*) by KEYSSELTZ (1908), in the halibut (*Hippoglossus hippoglossus*) by JOHNSTONE (1912); in the stint (*Osmerus eperlanus*) by BRESLAUER (1916), in the common eel (*Anguilla anguilla*) by THOMAS and OXNER (1930); fibroma in the eastern chain pickerel (*Esox niger*) by NIGRELLI (1953) and in the trout (*Salmo fario*) by STOLK (in press). The epithelioma or epidermoid carcinoma appeared to be in the majority in comparison with the fibroma.

This report is based on a histological investigation of an epidermoid carcinoma of the lower lip observed in an adult male specimen of the jewel fish, a Cichlid fish, *Hemichromis bimaculatus*.

The tumour was *in situ* fixed in Bouins fluid, decalcified in the usual way with trichloroacetic acid and embedded in paraffin. The serial sections (4—6 μ) were stained with haematoxylin and eosin, haematoxylin and phloxin and moreover according to the VAN GIESON method and the azan method.

2. DESCRIPTION

The lip carcinoma was observed in an adult male specimen of *Hemichromis bimaculatus* as a small nodule on the lower lip. In a period of

*) Received July 4, 1957.

about three months the tumour had grown to a crater-shaped nodule which ultimately measured $5.0 \times 3.5 \times 3.0$ mm (fig. 1). The tumour in the end prevented the animal from opening its mouth. Then the animal, which measured 83 mm, was sacrificed for the investigation.

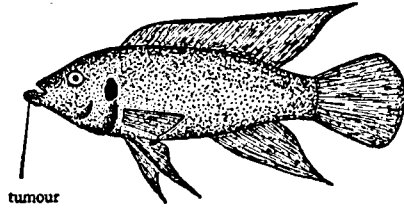


FIGURE 1. Epidermoid carcinoma of the lower lip in an adult male of the jewel fish *Hemichromis bimaculatus*. Irregular tumour on the lower lip.

The red, fleshy tumour was broadly sessile, nodular and had an irregular appearance (figs. 2 and 3). Locally a large ulcerated area was present with a dark-coloured, granular surface. Moreover, several dilated blood vessels were found. This has undoubtedly caused the bleedings which the tumour showed during the animal's life.

The histological investigation revealed that the tumour was composed of masses and strands of columnar or polyhedral tumour cells (fig. 4). These tumour cells appeared to be arranged as papillary pegs, which were supported by a loose, wide-meshed connective tissue stroma. In some regions no papillary pegs were present, however.

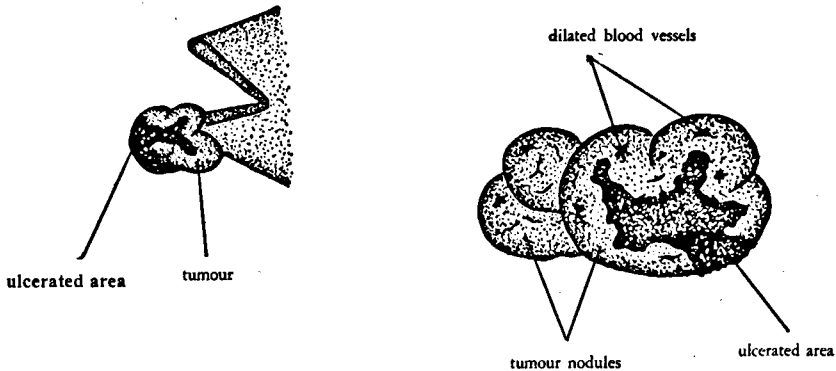


FIGURE 2. Epidermoid carcinoma of the lower lip in an adult male of the jewel fish *Hemichromis bimaculatus*. Front view, some times enlarged. Irregular, with ulcerated area.

FIGURE 3. Epidermoid carcinoma of the lower lip in an adult male of the jewel fish *Hemichromis bimaculatus*. Front view, some times enlarged. Irregular, nodular tumour with ulcerated area and dilated blood vessels.

The tumour cells were pleomorphic, the nuclei were very irregular and varied much in shape and size (figs. 4, 5 and 6). The chromatin network of the nuclei was densely structured and showed locally massive, irregular chromatin clumps (fig. 5). On the strength of the shape of the

nucleus three types of tumour cells could be distinguished (figs. 4, 5 and 6):

1. tumour cells with large oval nucleus,
2. tumour cells with large spindle-shaped nucleus,
3. tumour cells with small oval nucleus.

Mitoses were frequently observed. Locally in the tumour tissue necrotic areas were present consisting of remnants of tumour cells and pyk-

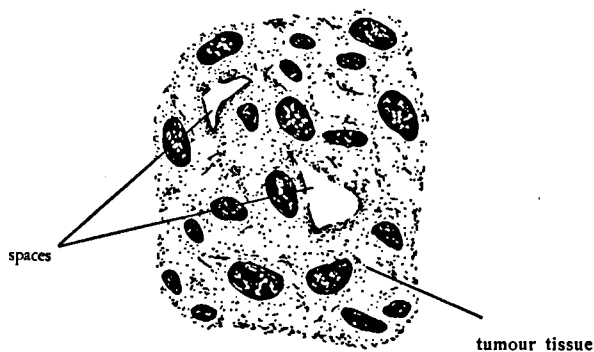


FIGURE 4. Epidermoid carcinoma of the lower lip in an adult male of the jewel fish *Hemichromis bimaculatus*. Transverse section, higher magnification. Tumour tissue with large oval nuclei, large spindle-shaped nuclei and small oval nuclei. Locally some spaces are present.

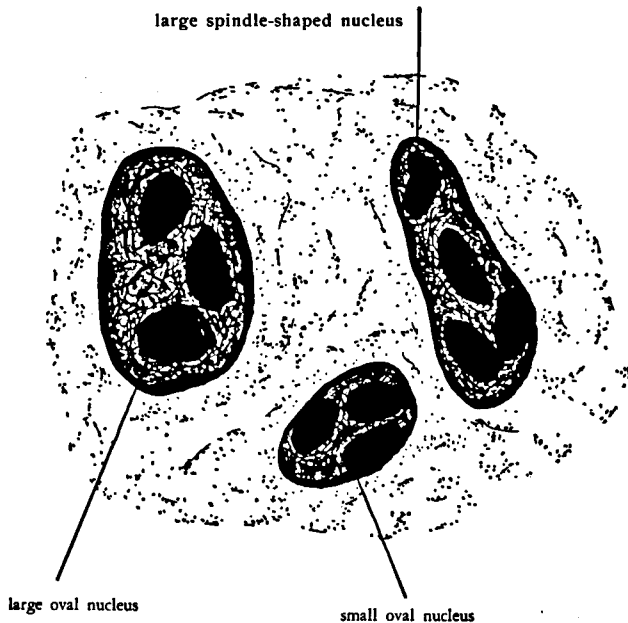


FIGURE 5. Epidermoid carcinoma of the lower lip in an adult male of the jewel fish *Hemichromis bimaculatus*. Transverse section, very high magnification. Tumour tissue with a large oval nucleus, a large spindle-shaped nucleus and a small oval nucleus. The chromatin network is densely structured.

notic nuclei (fig. 6). Also some spaces were found in the tumour tissue (figs. 4 and 6).

The vascularization of the tumour tissue was abundant. The blood vessels were located in the connective tissue stroma and were locally situated very close together. Several blood vessels appeared to be dilated, sometimes to such an extent that haemorrhages had occurred.

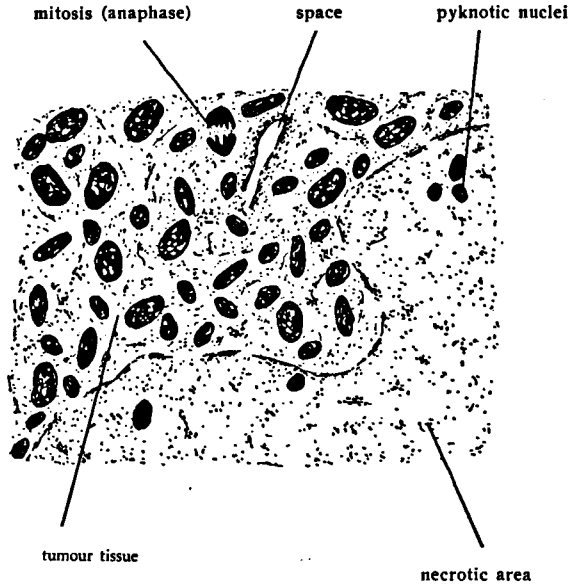


FIGURE 6. Epidermoid carcinoma of the lower lip in an adult male of the jewel fish *Hemichromis bimaculatus*. Transverse section, higher magnification. Tumour tissue with large oval nuclei, large spindle-shaped nuclei and small oval nuclei. Locally a mitosis is present and a space. Bottom right a necrotic area with remnants of tumour cells and some pyknotic nuclei. Mitosis (anaphase).

The tumour showed a distinct invasive growth. The pegs of tumour tissue penetrated the connective tissue and the musculature, the elements being pushed aside. In general the pegs were lined by a basement membrane, which was well preserved, but locally this membrane appeared to be pierced. The tumour cells were loosely arranged in these spots and extended far into the neighbouring tissue.

An accurate examination showed that emboli of tumour cells and metastases were lacking.

In the superficially situated ulcerated area inflammatory cells were present, such as lymphocytes, granulocytes and coarse granulocytes in the discharging state.

3. DISCUSSION

For a general survey of the lip tumours found in fishes reference is made to the publication of STOLK (1957).

As the lip carcinoma of the adult male of *Hemichromis bimaculatus* corresponds very well with the epithelioma of the northern brown bullhead (*Ameiurus nebulosus*) (LUCKÉ and SCHLUMBERGER 1941, SCHLUMBERGER and LUCKÉ, 1948), we give a detailed report of the last-mentioned tumour (quotation of SCHLUMBERGER and LUCKÉ, 1948):

" . . . a transplantable epithelioma of the lip and mouth of catfish *Ameiurus nebulosus* taken from streams near Philadelphia. During a period of 2 years, 166 live tumor-bearing fish were obtained. Since our previous publication approximately 100 additional cases have been studied. This neoplasm usually occurs as a solitary or multiple, large, red, fleshy mass upon the lips or dental plates; less often it involves other parts of the mouth or the skin. In our series the lips and dental plates were affected in all but 6 cases. All of the neoplasms are grossly similar. They are broadly sessile, with a smooth or coarseley nodular surface; in consistency they are firm and resilient. Most of the tumors average from 1 to 2 cm. in diameter but some are so massive as to prevent closure of the mouth. In approximately one-half of the cases, both lips or dental plates are involved. In 53, or 60 per cent, of 89 fish the tumors were in direct apposition. Histologically the tumors consist of closely packed masses of columnar or polyhedral cells, often growing as papillary pegs supported by a delicate richly vascular stroma. The smaller tumors grow outward, with little sign of invasion. Larger growths commonly push broad solid pegs of epithelial cells deep into the subjacent tissues; in some, these pegs are bounded by a well preserved basement membrane, but in the more massive tumors they are definitely invasive, and flame-shaped processes of loosely arranged cells extend far into the subjacent tissues. In the more invasive tumors emboli of neoplastic cells are often found, though no metastases have been observed. It seems evident that the small, outward growing tumors are early stages of a neoplastic process which later assumes a more malignant character.

It has been possible to study living tumors almost from the time of their inception. Tumor-bearing fish were maintained under laboratory conditions for periods up to 9 months; during this time we observed that growth of most of the neoplasms was relatively slow but progressive. The inception and development of appositional growth was studied by direct microscopic examination of the mucosal surfaces. The earliest evidence of neoplastic change was the establishment for a more or less circumscribed patch of hyperemia on the mucosa. At this time the mucosal surface was smooth and showed no signs of proliferation; after approximately two weeks the patch became slightly elevated; one or two months later the local thickening had progressed to the formation of a definite tumor.

Detailed microscopic study of the blood vessels *in vivo* brought out the fact that they undergo profound alterations during the development of the tumor. At the site of future neoplastic growth they gradually form irregular, wide meshed networks that contrast sharply with the small, uniform capillary loops of the adjacent normal mucosa. The caliber of the blood channels in the neoplastic

zone varies greatly; some are dilated and bear saccular expansions; others are constricted. Many of the proliferating vessels have thick walls, whereas others are thin and delicate. In brief, the neoplastic growth is preceded and accompanied by a striking vascular reaction; the number, arrangement, and structure of the vessels are conspicuously atypical. The relation of blood-vessels to tumor growth has previously been investigated mainly in fixed tissue; the catfish epithelioma provides material for such an investigation in the living animal."

The chief points of agreement between epidermoid carcinoma of *Hemichromis bimaculatus* and the epithelioma of *Ameiurus nebulosus* are:

1. growth as papillary pegs supported by a vascular connective tissue stroma,
2. pleomorphic tumour cells,
3. local breach of the basement membrane,
4. absence of metastases.

For a survey of the coarse granulocytes in the discharging state, which were observed in the ulcerated area, reference is made to the publication of STOLK (1956).

4. SUMMARY

Description of an ulcerated epidermoid carcinoma of the lower lip in an adult male of the Cichlid *Hemichromis bimaculatus* Gill.

Histologically the tumour was composed of masses and strands of pleomorphic, columnar or polyhedral tumour cells, partly arranged in papillary pegs, which were supported by a vascular connective tissue stroma. The chromatin network of the nuclei was densely structured.

The tumour tissue showed an invasive growth and had locally pierced the basement membrane.

Emboli of tumour cells and metastases were lacking.

5. ACKNOWLEDGEMENTS

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