

On a Skin Disease and a Nematode Parasite of a Dolphin,
Tursiops truncatus (Montagu, 1821)

By

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Present paper deals with a skin disease due to a fungus and nematode parasite both found in a bottle-nosed dolphin, *Tursiops truncatus* (MONTAGU, 1821) which died in a pond of Yatsu Pleasure-ground at Yatsu sea-shore of Chiba Pref.

The animal was a female, 266 cm in length, 180 kg. in weight and was captured at the sea-shore of above-mentioned place on July in 1954 and attacked by a skin disease on December of that year, since then the animal gradually grew weak and died in the middle of the next month.

At first the skin became relaxation and on January of next year numerous nodules appeared on the skin.

Besides the skin disease, the animal was showing slight scoliosis. By the dissection, myositis caused by a bacterial infection and two cestode larvae were found at the part, moreover acute pneumonia was found. The scoliosis may be arisen from these pathological conditions.

A swimming pool merely divided by wire-netting and with the bottom of mud has been used to rearing the animal. Therefore the keeping condition was not fitted for the animal in various point. As the food, fish-flesh have been used. Probably, the unsuitable rearing made the animal weaken and lead to the diseases.

We have been studied the skin disease and nematode parasite of stomach, by used the materials preserved in formalin which obtained from the animal at the autopsy.

The investigation proved that the skin disease was due to a parasitic fungus and the nematode parasite was a larval form belonging to the genus *Anisakis*.

The skin disease should be diagnosed as Dermatomyosis accompanied with acute inflammaticula.

Probably fungoid diseases in sea mammalia may not yet unrecorded except only following note in the Discov. Rep. Vol. 17, p. 126—MATTHEWS, L. H.: "A pathological condition of the skin of the head was observed in two male whales at South Georgia and was noted as fungoid growth?"

Although, it seems that there is no relation between the skin

disease and the nematode parasite, we wish to report here the results of the studies.

We wish to acknowledge our indebtedness to Dr. M. NISHIWAKI of the Whales Research Institute who have kindly placed the materials our disposal on which the present study was based and we must express our hearty thanks to Dr. Hideo OMURA the Director of the Institute, who kindly offered them facilities for the publication of the report.

Skin Disease of a Bottle-Nosed Dolphin

1. Materials and Methods

The block of affected skin of a bottle-nosed dolphin, *Tursiops truncatus* (MONTAGU, 1821) preserved in formalin were used for the study. The materials were sectioned under celluloidin or paraffin method, and stained with Mayer's acid haemalaun and eosin, Heidenhains iron-haematoxylin, and other staining methods.

Besides the study by sectioned preparations, we studied the parasite separated from the skin tissue by dissecting the materials soaked in 3% H₂O₂ or 10% HNO₃ or 10% NaOH solution for a while to make them softened.

2. Macroscopic Figures (pl. I, figs. 1-2)

Numerous discrete conical nodules measured 21-36×16-27 mm in diameter, 5-8 mm in height were observed on the skin of latter half of the trunk. They were somewhat soft, and coloration was not discriminated compared with the normal skin. In the center of well developed nodule remained the tissue in columnar surrounded by peripheral eroded tissue.

The cut-section of the nodules showed no fundamental differences in the findings compared with that of normal skin but it was tainted partially by blood cells.

3. Microscopic Figures (pl. I, figs. 3-4)

The outline of structure of normal skin as follows: The epidermis, *stratum germinativum* consisting from pavement epithelium in the upper layer, somewhat polygonal or cylindrical cells in the middle layer and undifferentiated cells in the basal part and with thin *stratum semicorneum*. From the thin corium layer, corium-papillae with blood capillaries are projected into the *stratum germinativum* and there is a cavity filled with colloidal substances at the end of each papilla.

The corium is consisting from the network of fibrous connective tissue with blood capillaries.

The subdermal tissue is very thick and consisting from fatty and fibrous connective tissue.

The lesion was characterized by proliferation of epithelial tissue and swelling of corium-papillae. Somewhat swollen cells occurred in the upper to middle layer of the lesion and some of them became necrotic and showed vacuolated degeneration, chromatolysis and picnosis. And the layer showed at places longitudinal running plicae originating from the disintegration of the cells under the tissue pressure.

The proliferated cells occurring in the middle to lower layer were cylindrical or spindle form and not discriminative in general configuration to those of epithelial cells of normal skin but in the central part they became spindle and arranged more compact.

As shown pl. I, fig. 3 the tissue underlying the degraded tissue showed numerous cavities arosed by liquefy of the proliferated tissue.

The corium-papillae extremely enlarged and ruptured completely and filled by blood cells especially polynuclear leucocytes. Some of them contained the like of thrombus.

The skin disease was assignable to a parasitic fungus inhabited in the epidermis, and it was found mainly in the upper layer of the lesion.

4. Morphological Characters of the Fungus (pl. II. figs. 1-5)

Pl. II. fig. 1 shows the general configuration of the fungus. It grows penetrating and branching in the epithelial tissue of the lesion. The mycelium is divided by septae and measuring $2.1-6.4 \mu$ in diameter.

Vesicular bodies formed by swelling of the mycelium at the distal ends were observed in the upper layer of the lesion. They were measured $14.7-48.6 \mu \times 14.1-37.1 \mu$ in size and contained coiled mycelium which was well stainable with haematoxylin. They may be copulatory organ of the fungus (pl. II. fig. 2).

The spore formation was observed on the hyphae found in collapsed parts or tissue cavities of lesion. The spores were numerous, well developed, and covered with brownish thick-wall, and were almost circular or ovid or rearly spindle form. The circular or ovid spores were $3.6-11.4 \mu \times 3.0-6.7 \mu$, the spindles $9.9-12.0 \mu \times 2.6-3.9 \mu$ in size (pl. II. fig. 3).

They were pleurogenous and isolated or clustered on the vegetative mycelium (pl. II. fig. 4).

Germination of the spores was observed in the lesion. The germ tubes were well stained with eosin and measured $2.1-2.9 \mu$ in diameter (pl. II. fig. 3).

The arthrospore was formed at the tip of mycelium and each cell was circular or ovoid and $6.5\text{--}12.0\ \mu \times 6.4\text{--}8.6\ \mu$ in size (pl. II. fig. 5).

Judging from the above-mentioned characters, the fungus may be placed in the genus *Trichophytum* MALM. 1848 according to the classification of CLEMENTS and SHEAR (The Genera of Fungi, p. 231, 1931). The specific determination requires further studies.

5. Summary

We studied a fungoid skin disease found in a bottle-nosed dolphin, *Trusiops truncatus* (MONTAGU, 1821) which died in a rearing pond at Yatsu Pleasure ground, Yatsu sea shore of Chiba pref.

1. The disease formed many characteristic conical nodules ruptured at the tip on the skin.

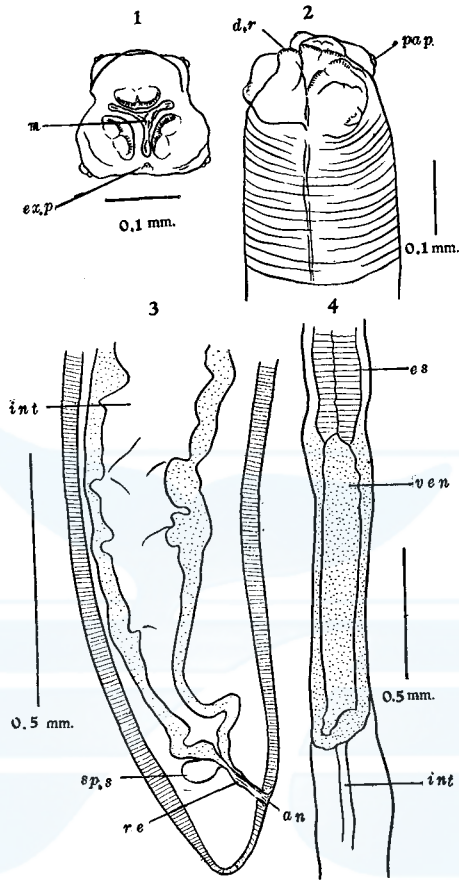
2. The nodules consisted of the proliferated epithelial cells and the extremely enlarged corium-papillae filled with blood cells, especially polynuclear leucocytes and were found parasitized by a kind of parasitic fungus. The proliferation of the epithelial cells was caused by the fungus, which was found in the epithelial tissue of the lesion.

3. The fungus was parasitic type and was identified with the genus *Trichophytum* MALM. 1848 provisionally.

Nematode parasite

Forty-one individuals of all immature specimens were obtained from the stomach of the same host.

The morphological characters of the parasite (textfigs. 1-4) are as follows: Body 17.0-30.0 mm. in length, 0.4-0.6 mm. in breadth; cuticle presented a series of fine rings and a pair of cervical papillae at the level of 0.4-0.7 mm. from anterior end. Head truncated, consisting of three large lips; dorsal lip nearly tetragonal provided with double papillae at the both corner; two subventral lips nearly triangular with double papillae at outside; each lip with dentigerous ridge and indented in the middle; interlabia absent; mouth triangular; Esophagus divided into an anterior muscular part and a posterior straight ventriculus, the former measured 2.32-3.38 mm \times 0.17-0.28 mm the latter 1.11-1.25 mm \times 0.20-0.28 mm. Intestine straight and thick walled with numerous fold; rectum short; anus situated 0.16-0.21 mm. from posterior end. Nerve ring situated 0.3-0.4 mm. from anterior end. Excretory pore located between subventral lips; reproductive organ undeveloped but origin of spicule sac with 0.06-0.08 mm \times 0.04-0.06 mm in size observed under the rectum. Tail bluntly conical with numerous caudal papillae.



Textfig. *Anisakis* sp. parasitic in the stomach of the bottle-nosed dolphin, *Tursiops truncatus* (MONTAGU, 1921)

Fig. 1. Head, end view

Fig. 2. Head, ventral view

Fig. 3. Posterior extremity

Fig. 4. Ventriculus

an, anus; d. r, dentigerous ridge; es, esophagus; ex. p, excretory pore; int, intestine; m, mouth; pap, papillae; re, rectum; sp. s, spicule sac; ven, ventriculus.

Judging from the characteristics of the head of the nematode, it may be immature form of *Anisakis catodontis* BAYLIS, 1929. Summary: A larval form of nematode parasite obtained from the stomach of *Tursiops truncatus* (MONTAGU, 1821) was described to be identified with the genus *Anisakis*.

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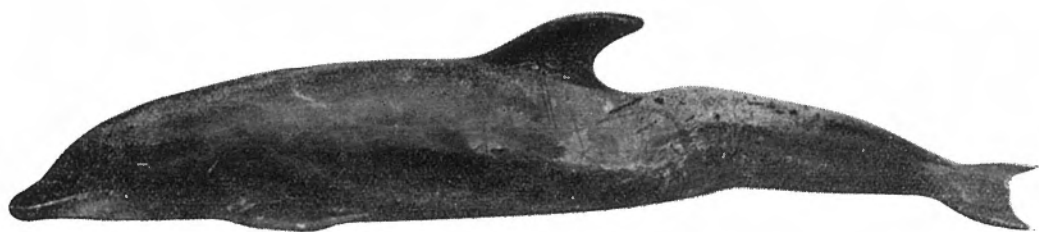
Explanation of Plate I.

- 1.** Showing the general configuration of the diseased bottle-nosed dolphin, *Tursiops truncatus* (MONTAGU, 1821).
- 2.** Showing the well developed lesion.
- 3.** Showing the longitudinal section of the lesion, stained with van Gieson's stain; EP, proliferated epithelial tissue; P1, normal corium-papilla; P2, abnormal corium-papilla.
- 4.** Showing the enlarged corium-papilla filled with blood cells especially polynuclear leucocytes stained with Mayer's acid heamalaum and eosin.

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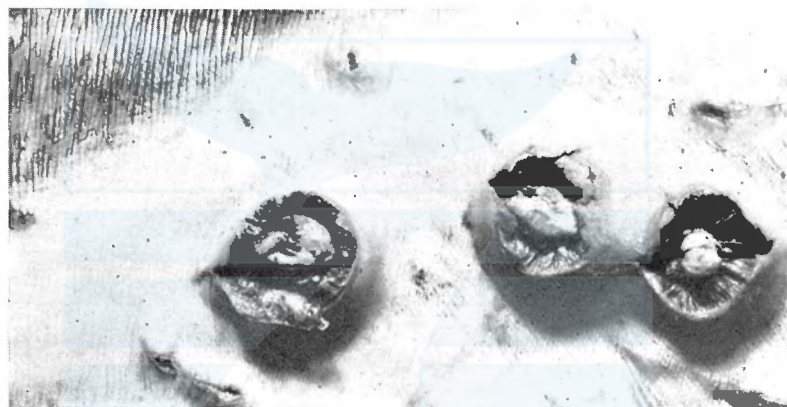
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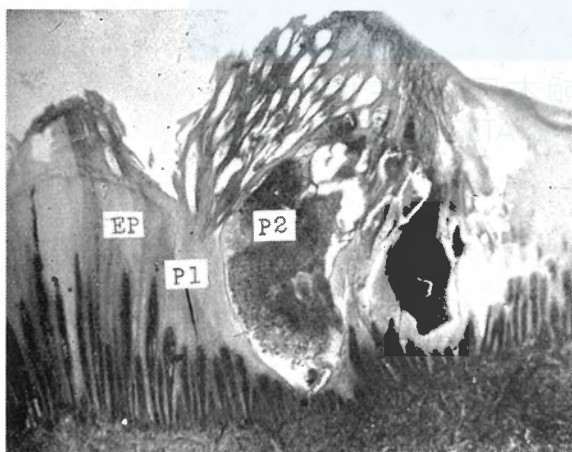
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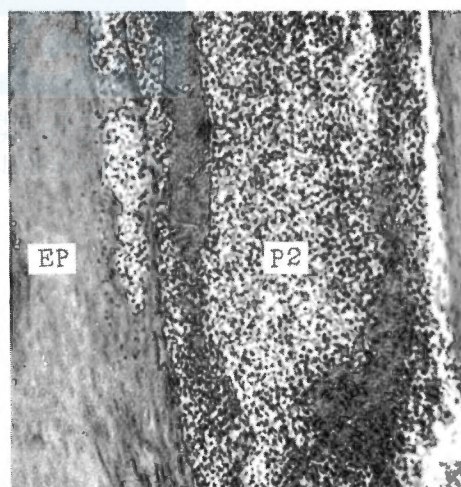
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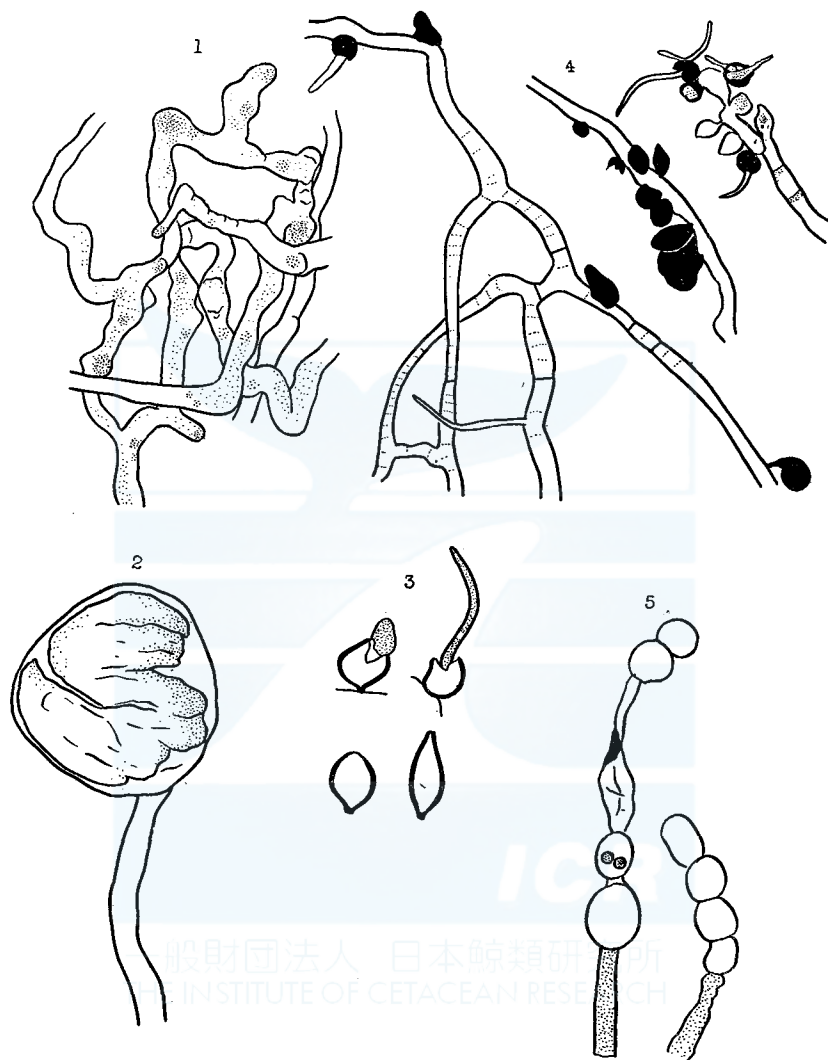
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Explanation of Plate II.

Showing the general configuration of the genus *Trichophytum* sp., found parasitic in the skin of *Tursiops truncatus* (MONTAGU, 1821).

1. Mycelium in the epithelial tissue.
2. Copulatory organ.
3. Aleurispores and the germinating spores.
4. Aleurispores.
5. Arthrospores.

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0.05 mm
for Figs. 1. 2. 3. 4. 5.

0.01 mm
for Fig. 3.