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INTRA-OCULAR GNATHOSTOMIASIS*†

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INTRA-OCULAR helminthiasis is very rare in temperate regions (Ashton, 1960) and comparatively rare in the tropics. Invasion of the human eye by *Gnathostoma spinigerum* is rarer still, although many cases in remote and backward areas may have gone unreported. The most recent was that reported from Burma by Ko Gyi (1960).

Gnathostoma spinigerum was first recovered from a gastric tumour in the tiger by Owen in 1836 (Craig and Faust, 1951), and was later seen in similar sites in the domestic cat, wild cat, leopard, and dog, in India, Thailand, Malaya, China, Japan and Australia. Levinsen (1890) obtained an immature female specimen from a breast abscess of a native woman in Thailand. In a second case from Thailand reported by Leiper (1909), an immature male specimen was found in a cutaneous nodule. A little over sixty cases of human infestation have been reported from Thailand, India, Japan, China, Malaya, and Viet-nam (Faust, 1949a).

Domestic or wild mammals being the common reservoirs of infection and man a relatively incidental host, *Gnathostoma* is almost always found at an immature stage in subcutaneous tissues, but Chandler (1927, 1955) twice found eggs of *G. spinigerum* in stools, presumably human, from Burma and East Bengal. Thailand is regarded as the most heavily infested country, but it is the impression of the writer that the organism is equally prevalent in Burma, with its similar climatic, geographical, and social conditions.

The life-cycle of *G. spinigerum* has only recently been elucidated. According to Prommas and Daengsvang (1933) and Yoshida (1935), eggs are evacuated in the faeces of the cat, the host in which the nematode may grow to maturity. The first-stage larva, which has a rotund cephalic bulb beset with spines, hatches in water in about a week. This larva survives free in water from only 2 or 3 days unless in the meantime it is ingested by various species of *Cyclops*. It then penetrates into the haemal cavity of the arthropod and in a week or two becomes a second-stage larva, which has four distinct rows of spines on the cephalic bulb as well as a functional digestive tract and two pairs of cervical glands like the mature organism. Prommas and Daengsvang (1936, 1937) discovered that a second intermediate host is required; this may be a fresh-water fish, a frog, or a snake. The adolescent *Gnathostoma* encapsulates in the muscles or other tissues of the host; it differs from the adult in having only four instead of eight rows of cephalic hooklets, and in this resembles the larval forms obtained by Morishita and Faust (1925) from peripheral lesions in the human host. Chandler has suggested that the full complement of cephalic hooklets is attained only after a final moult (Faust, 1949b). The specimens obtained by Leiper (1909) and Tamura (1921) had eight rows of hooklets and were practically mature in both size and structure.

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When the cat or other suitable host eats the infected fish, etc., the organism develops to maturity in the stomach wall in about 6 months, and produces eggs which are excreted by the host, thus completing the cycle. In the tiger an adult may measure from 11 to 54 mm., but in smaller hosts they are much smaller.

Most of the infected persons studied by Prommas and Daengsvang (1934) had domestic cats. The epidemiology so far as man is concerned has been inadequately studied, but consumption of inadequately cooked fish or frog meat containing the encapsulated larva probably introduces the infection. On the other hand an infected *Cyclops* may be swallowed in drinking water (Faust, 1949c).

Gnathostoma is not a fully-adapted parasite in man. It usually produces abscesses in the skin or subcutaneous tissues as the larva migrates. Like many other helminths in a strange host, it fails to reach its proper destination in the stomach wall, and as it wanders aimlessly in the body it occasionally blunders into the eye.

Infection in true reservoir hosts where the adult worms are coiled inside tumours of the digestive tract is referred to as "Gnathostoma interna"; this condition has never been described in man, and the immature forms seen in peripheral lesions are referred to as "Gnathostoma externa". These forms may be stationary with the development of abscess pockets or migratory with the formation of deep cutaneous or subcutaneous tunnels ("larva migrans" causing "creeping eruptions").

Occasional cases of ocular gnathostomiasis have been reported: one in 1939, one in 1945, three in 1949, one in 1950, and one in 1960, the symptoms being iritis and inflammatory reactions in the anterior chamber.

Another species of *Gnathostoma*, *G. hispidum*, a stouter type with twelve rings of cephalic spines which is a relatively common parasite in pigs, has also been reported as causing ocular damage in a Chinese (Chen, 1949).

Case Report

An N.C.O. aged 48 with 18 years service in the Burmese Army was admitted on September 21, 1964, to the ophthalmic wing of the Defence Services General Hospital as a case of "red eye", with defective vision and a probable foreign body in the left eye. About a month before he had suffered a bout of diarrhoea lasting for about 12 days. On September 10, while on operational duty in the jungle, at about 6 o'clock in the evening, he felt a pain in front of the left ear—"something like earache". This was severe enough to prevent him from sleeping, and next morning the unit medical orderly noticed that his eye was red and applied some eye-drops and ointment. After 4 days, as the condition grew worse, the patient was evacuated to the Defence Services General Hospital, Rangoon.

Examination.—He was a healthy man with no complaint apart from the pain, redness, and defective vision (acuity 1/60) in the left eye.

The visual acuity was 6/6 in the right eye which was perfectly normal.

The left eye was severely congested and chemosed. A pterygium on the nasal side encroached on to the cornea for 2 to 3 mm. The slit lamp showed that the cornea was clear with many large and small keratic precipitates in the lower half. There was no hyphaema. The anterior chamber was deep with numerous cells and a moderately dense flare. The pupil was constricted with posterior synechiae almost all around except in the area between 10 and 12 o'clock. There were dense exudates in the pupil, where a small organism was seen to be moving. The ocular tension was 17 mm. Hg (Schiötz) in the right eye and 41·4 in the left.

Stool examinations revealed nothing but some whip-worm ova. The urine and blood were normal.

Treatment.—He was given Diamox 250 mg. four times a day, prednisolone 5 mg. three times a day, and atropine and betamethasone ointment 3-hrly with analgesics for the pain. The next day the organism had

dropped to the 7 to 8 o'clock position in the anterior chamber, and as the uveitis had somewhat subsided it was decided to remove the parasite.

Operation.—This was carried out under local anaesthesia with retro-ocular lignocaine 2 per cent. with adrenaline.

A conjunctival flap was raised in the lower temporal quadrant and the anterior chamber entered through a limbal incision extending from 3 to 7.30 o'clock. The live worm was found to be firmly adherent to the iris at 6.30 to 7 o'clock and was removed with some difficulty with forceps. The synechiae in the vicinity of the parasite were gently broken down with a Langs lacrimal cannula and a stream of saline. The limbal wound was closed by six post-placed sutures and the anterior chamber reformed with normal saline. 0·5 ml. hydrocortisone acetate were injected subconjunctivally.

Result.—Convalescence was delayed by anterior uveitis, but the eye gradually settled and after 2 months the vision had recovered to 6/9.

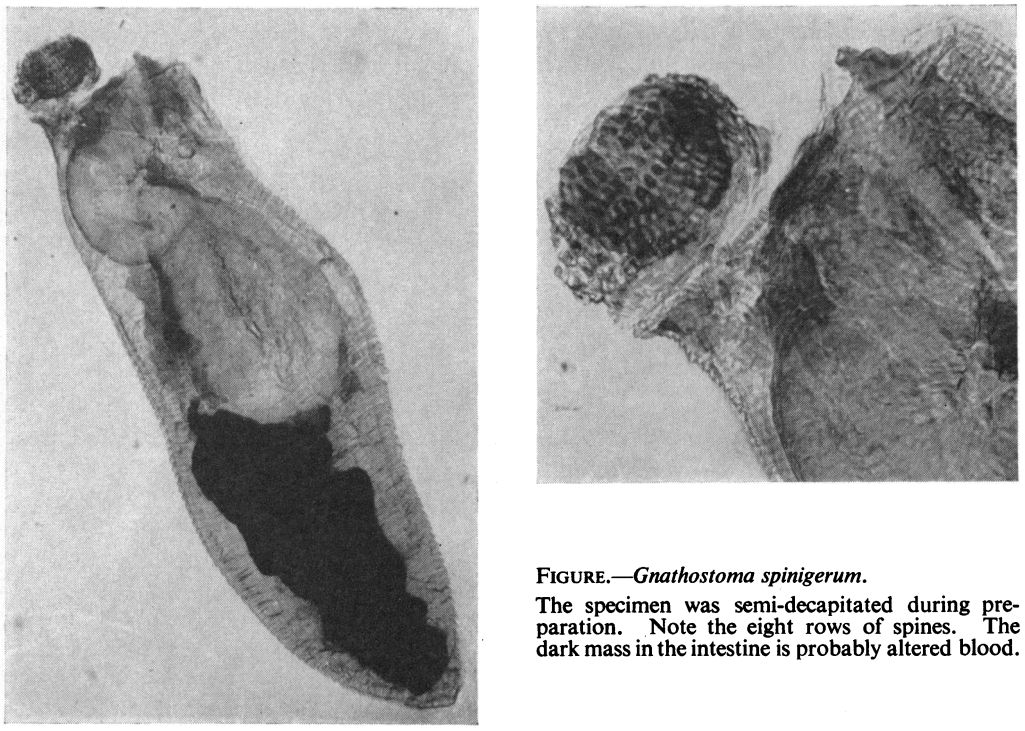

FIGURE.—*Gnathostoma spinigerum.*
The specimen was semi-decapitated during preparation. Note the eight rows of spines. The dark mass in the intestine is probably altered blood.

Pathology

The specimen consisted of a worm measuring some 3–4 × 0·5 mm. (Figure). The cephalic end had eight rows of hooklets, and the large paired cervical secretory glands were clearly visible. The lower half of the body showed the intestine filled with a dark brown mass which had the appearance of altered blood. The organism was identified without much difficulty as *Gnathostoma spinigerum.*

Discussion

The patient had no previous history of eye trouble apart from pterygium (a common condition in Burma) which did not inconvenience him. He had adopted a stray cat 4 months before, but had never been very close to it and had had no other pets. He had

never eaten raw fish or prawns, but had once had raw beef soaked in fresh lime-juice in 1954.

The mode of infection is thus uncertain. The patient's diet is like that of his compatriots and the parasite may have entered by way of unfiltered and unboiled water containing an infected *Cyclops*. The organism recovered had eight rows of hooklets but was of immature form. Perhaps, as Chandler (1955) suggested, it had moulted and attained the full complement of eight hooklets while in the host but failed to attain adult size and form because it did not reach its proper destination in the stomach wall. Eosinophilia in the present case was relatively slight.

Summary

A case is reported of intra-ocular infestation by *G. spinigerum*. The patient regained almost normal vision after surgical removal of the parasite. The life cycle of *Gnathostoma* is briefly described. It is presumed to enter a human host through drinking unpurified water containing an infected *Cyclops*. The specimen in this case had eight rows of cephalic hooklets resembling the adult form.

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