THE LIFE CYCLE AND THE PATHOGENICITY OF THE NEMATODE CRENOSOMA STRIATUM

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Abstract. The development of the nematode Crenosoma striatum in its intermediate and definitive host was studied in experiments. The larvae did not exhibit any specificity in their choice of intermediate hosts (we used a total of 7 snail species belonging to 6 families). In the intermediate hosts, the larvae reach their infective stage within 12-15 days; in the definitive host they complete development within 19-21 days. A detailed description is given of the morphology of larvae and adults. The pathological picture of lungs attacked by this nematode is characterized by bronchitis accompanied frequently by abrasion or necrosis of the epithelium and by interstitial granulomatous pneumonia at the time of affection of the bronch by the adult worms. The lungs are pervaded with histiocytic granulomas harbouring dead or destroyed larvae. At the early stage of infection (approximately on day 10 p.i.) leucocytes participate considerably in cell lysis of the lung tissue; later the picture is dominated by a proliferation of macrophages. An activation of the alveolar epithelium and histiocytes of the interstitium can be observed at the early stage of infection.

The first data on the development of nematodes of the genus Crenosoma Molin, 1861 (the species C. vulpis) were published by Müller (1935) and Wetzel and Müller (1935). Increased interest in the life cycle of this species (its development in the intermediate and definitive host) was paid by Petrov (1938, 1941 a, b), Wetzel (1941) and Stockdale and Hulland (1970). Hobmaier (1941) described the development of C. mephitis in the intermediate host. Incomplete data on the development of the nematode C. striatum, the genotype of the genus Crenosoma, are contained in studies by Petrov (1941), Panebianco (1957) and Prokopič (1959). Frequent natural infection of the hedgehog offered material for a more detailed experimental study of the development of this species. The paper presents first knowledge of the morphology of the larvae and the pathogenicity of the nematode in the organism of its definitive host.

MATERIAL AND METHODS

Infection of the intermediate hosts: The larvae extracted from the uteri of female C. striatum and used for infection of the intermediate hosts were obtained from naturally infected hedgehogs (Erinaceus europaeus) in post-mortem examination. The larvae were placed on moistened filtration paper in petri dishes (10 cm ø). To each dish containing larvae from 20 female worms, we placed 10 snails collected from localities in which we had found no natural infection with C. striatum. Several of these snails were inspected by compression before the experiment and none of them was infected with C. striatum. After 8 hrs in the infected environment, the groups of snails were transferred to separate vessels containing moist herbage, and kept under laboratory conditions. The course of development of the larvae was followed in daily inspection of the intermediate hosts,
whereby all morphological and metrical changes were recorded. We employed these snail species in our experiments: *Lymnaea peregra* (Müller, 1774) — fam. Lymnaeidae; *Oxychilus glaber* (Férussac, 1822) — Zonitidae; *Succinea putris* (L.) — Succinidae; *Monachaides umbrosa* (C. Pfeiffer, 1828) — Helicidae; *Arion circumscriptus* (Johnston, 1828) — Arionidae; *Limax tenellus* (Nilsson, 1822) and *Milax rusticus* (Millet, 1943) — Limacidae.

Infection of the definitive host: We employed 4 young hedgehogs from our laboratory breed (aged 3½ months). Their faeces inspected before the experiment revealed no infection with *C. striatum*. Each hedgehog was fed with a single dose of 10 snails of the species *M. umbrosa* harbouring approximately 500 infective larvae each. In view of the few hosts available, we repeated the infection with the same larval load in two hedgehogs after 8 days and in one hedgehog after 56 days; thus, we secured a larger number of larvae at various stages of development. In one of the hedgehogs killed on day 10 p.i., we found also 2-day-old larvae from the reinfection. In the second hedgehog killed on day 23 p.i., we found also 15-day-old larvae from the reinfection. The remaining two hedgehogs were killed on day 60 p.i. and one of them harboured also 4-day-old larvae from the reinfection. The faeces of three hedgehogs (the one killed on day 23 p.i. and the two killed on day 60 p.i.) were inspected regularly in order to obtain information on the length of the prepatent period. In post-mortem examination, special attention was paid to the lungs. Several larvae from some parts of the lungs were used for morphological studies; other parts of the lungs were fixed in 10% formalin and used for histological studies.

![Image](image1.png)

**Fig. 1.** Larval stages of *Crenosoma striatum* (Zeder, 1800). A — free 1st-stage larva from the faeces of the host *Erinaceus europaeus* L.; B — 2nd-stage larva from the leg of the snail *Succinea putris* L. (on day 8 p.i.); C — infective larva from the same intermediate host (on day 12 p.i.). Orig.
A. THE DEVELOPMENT IN THE INTERMEDIATE HOST

The nematode *C. striatum* is viviparous. The first-stage larvae expelled with the faeces from the body of the definitive host enter actively the snails (through their leg) and continue their development in them. The body of these larvae (Fig. 1A) measures 0.255—0.287 mm in length, maximum width 0.016—0.019 mm. The cuticle bears fine transverse striaation. The oral pore is situated terminally, the oral cavity is small, funnel-shaped. The anterior portion of the oesophagus is formed by a feebly sclerotized tube, length 0.032—0.036 mm. The posterior portion is muscular, cylindrical, length 0.072—0.080 mm. The intestine is a straight tube filled with dark granules. The genital primordium is at 0.128—0.140 mm from the posterior end of the body, the anal pore at 0.032—0.040 mm. The tail terminates in a sharp peak. The exact location of the nerve ring and the excretory pore could not be established. In our experiments, the larvae of *C. striatum* did not show any specific requirements in the choice of their intermediate hosts. They attacked all snails species employed in our experiments (*L. peregra, O. glaber, S. putris, M. umbrosa, A. circumscriptionis, L. tenellus and M. rusticus*) and attained in them the infective stage. The larval burden ranged from 37—79 per intermediate host. Morphological changes were insignificant during this developmental stage and so was also the rate of growth. Under laboratory conditions (at +20 °C), the first moulting in the intermediate hosts occurred from day 8—10 p.i. (Fig. 1B). The larvae retained the old cuticle of the previous stage as a protective sheath. This came off when the larvae were liberated from the tissues of the intermediate hosts by compression.

The body of the second-stage larva (8 days p.i.) measures 0.343—0.365 mm in length; maximum width 0.021—0.029 mm. The sclerotized anterior portion of the oesophagus is 0.029—0.036 mm long; the muscular oesophagus is 0.073—0.087 mm long; maximum width 0.012—0.014 mm. The nerve ring is at 0.043—0.051 mm from the anterior body end, the excretory pore at 0.058—0.087 mm. The genital primordium is at 0.124—0.148 mm from the posterior end of the body, the anus at 0.036—0.043 mm. The second-stage larva grows steadily. The second mould accompanying the transition of the larva to the infective stage occurred from 12—15 days p.i. of the intermediate hosts (Fig. 1C). The infective larva attains about twice the length of the first-stage larva. Also these larvae retain their old cuticle as a protective sheath.

The body of the infective larva (age 12 days) is 0.423—0.511 mm long at a maximum width of 0.027—0.032 mm. The anterior sclerotized portion of the oesophagus is 0.044—0.051 mm long, the muscular portion is 0.100—0.115 mm long at a maximum width of 0.015—0.017 mm. The nerve ring is at 0.065—0.073 mm from the anterior end of the body, the excretory pore at 0.083—0.088 mm. The genital primordium is situated at 0.161—0.219 mm from the tip of the tail, the anus at 0.043—0.051 mm. Infective larvae were encountered as late as 3—4 months p.i. in the leg of the intermediate hosts without having undergone noticeable morphological and metrical changes. The definitive hosts are infected by feeding on intermediate hosts harbouring infective larvae.

B. THE DEVELOPMENT IN THE DEFINITIVE HOST

Post-mortem examination of 4 hedgehogs, experimentally infected with larvae of *C. striatum* and inspected at various times p.i., revealed in the lungs larvae and adults of this nematode species. In view of the reinfection of three hosts we obtained larvae at the age of 2, 4, 10 and 15 days and adult worms at the age of 23 and 60 days.
The morphology of parasitic larval stages: 3rd-stage larvae were found in the lungs of one of the hedgehogs on day 2 p.i. (Fig. 2A). These larvae measured 0.51—0.57 mm in length, their maximum width was 0.029—0.036 mm. Their cuticle showed fine long-

Fig. 2. Larval stages of *Ocrenseria striata*um (Zeder, 1800) from the lungs of the definitive host *Erinaceus europaeus* L. (A) on day 2 p.i.; (B) on day 4 p.i.; (C, D, E, F, G) on day 10 p.i.; (H, I, J) on day 15 p.i. A — parasitic 3rd-stage larva (general view); B — 4th-stage larva (anterior portion-detailed view); C, D — anterior portion of larval body during molting (transition to 5th stage); E — posterior end of female larva (detailed view); F — posterior end of male larva (detailed view); G — vulva region (lateral view); H — vulva region of 5th-stage larva (lateral view); I — anterior end of larval body (dorsal view); J — posterior end of female larva (lateral view). Orig.
itudinal and transverse striation. The anterior end of the body was oblique, the mouth situated terminally. The depth of the small buccal cavity was 0.003 mm, its width 0.005 mm. The oesophagus consistent in shape with that of the infective larva, was 0.16—0.18 mm long. The length of its sclerotized portion was 0.049—0.051 mm. The nerve ring was situated at 0.075—0.086 mm from the anterior body end, the excretory pore at 0.083—0.098 mm. The straight, tube-shaped intestine was filled with dark granules. The genital primordium was at 0.16—0.26 mm from the posterior end of the body. This end was conical with a sharp peak. The anus was 0.040—0.065 mm from the tip of the tail.

The larvae isolated from the lungs of the hedgehog on day 4 p.i. (Fig. 2B) differed from the 3rd-stage larvae in the shape of the oesophagus and in the slightly increased measurements. These morphological changes seemed to have occurred during the third larval moult which, however, had not been observed by us. Therefore, we consider larvae at the age of 4 days to be 4th-stage larvae. The length of these larvae was 0.65—0.73 mm, their maximum width 0.036—0.047 mm. On the cuticle we observed fine longitudinal and transverse striation. The buccal cavity was small, its depth was 0.004 mm, its width 0.006 mm. The cylindrical oesophagus consistent in shape with that of the adult stage, was 0.19—0.22 mm long. The nerve ring was at 0.075—0.084 mm from the anterior body end, the excretory pore at 0.09—0.11 mm. The posterior end of the body was conical with a sharp peak. The anus was at 0.036—0.044 mm from the tip of tail. At this stage it was impossible to distinguish the sex of these larvae.

More larval material was obtained from the lungs of a hedgehog examined 10 days after the experimental infection. We encountered larvae of this age at the fourth moult (Fig. 2C, D, E, F, G) and, hence, at the transition to the 5th stage. The exsheathed cuticle separated widely from the larval body throughout its length. The larval cuticle had fine transverse and longitudinal striation. The morphology of these larvae was consistent with that of the adult stages. The male larvae possessed spicules and a gubernaculum (this was still only feebly sclerotized): the structure of the copulatory bursa, however, had its definitive character. The sexual organs of the female larvae were distinctly differentiated. Sexual dimorphism was expressed clearly in the measurements of the larval body. The overall length of the male larvae at this age was 1.02—1.71 mm, their maximum width (without the cast off cuticle) 0.062—0.080 mm. The anterior end of the body was 0.036 mm wide. The oral cavity was 0.007 mm deep and 0.010 mm wide. The cylindrical oesophagus was 0.20—0.22 mm long at a maximum width of 0.032 to 0.040 mm. The nerve ring was at 0.10—0.13 mm from the anterior end of the body, the excretory pore followed close behind it. The spicules were 0.14—0.16 mm long, the gubernaculum 0.046—0.065 mm. The female larvae measured 1.89—2.65 mm, their maximum width was 0.10—0.12 mm. The anterior end of the body was 0.036 to 0.050 mm wide. The buccal cavity was 0.007 mm deep and 0.010 mm wide. The oesophagus was 0.21—0.22 mm long, its maximum width was 0.043—0.051 mm. The nerve ring was at 0.10—0.12 mm from the anterior end, the excretory pore at 0.11 to 0.13 mm. The unopened vulva was at 0.98—1.46 mm from the anterior end. The posterior end of the body was conical. The anlage of two tail papillae could be seen at 0.029—0.036 mm from the end of the tail. The anus was at 0.10—0.14 mm from the end of the tail.

Several fifth-stage female larvae aged 15 days (Fig. 2H, I, J) were obtained from the lungs of one of the hedgehogs. The body of these larvae was 4.68—5.41 mm long at a maximum width of 0.11—0.13 mm. The length of the oesophagus was 0.21 to 0.22 mm at a maximum width of 0.051—0.055 mm. The nerve ring was at 0.11 to 0.12 mm from the anterior end of the body, the excretory pore at 0.125—0.136 mm. The caudal papillae were at 0.036 mm from the tip of the tail, the anus at 0.12 to
0.14 mm. The vulva was at 2.11—2.65 mm from the anterior end of the body. Its margins were slightly elevated, smooth and connected with a short cuticular tube which appeared to function as the epithelial lining of the vagina. The vaginal wall itself was sclerotized. The cuticle of these larvae had distinct transverse and longitudinal striation. Transverse cuticular combs were present already along the entire length of the body; these were more developed in the anterior portion of the body, less developed in the posterior half.

Length of the prepatent period: The faeces of three hedgehogs were inspected every day. According to the findings of larvae in the faeces of the definitive host, C. striatum completed its development in one instance on day 19 p.i., in the second and third case on day 21 p.i.

The morphology of the adult stage: The morphology and measurements of C. striatum were evaluated at the age of 23 and 60 days p.i. respectively (each group contained 10 male and female worms). Nematodes of whitish colour, the body moderately attenuated at both ends. The cuticle with distinct longitudinal and transverse striation. The cuticle of both sexes bears clearly visible transverse combs (Fig. 3B); these are more distinct in the anterior than in the posterior part of the body. The distance between the cuticular combs of the anterior portion of the body is 0.029 to 0.051. Mouth circular surrounded by 6 papillae on the inner circle and 4 papillae and

Fig. 3. Adult stage of Crenosoma striatum (Zeder, 1800) from the lungs of the definitive host Erinaceus europaeus L. 2 months p.i. A — anterior female body (apical view); B — cuticular structure (detailed view); C — vulva (lateral view). Orig.

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2 amphids on the outer circle (Fig. 3A). Buccal cavity small, depth 0.007 mm. The cuticle covering the anterior portion of the body is distinctly distended in dorsoventral direction and forms a so-called pseudovesicle. A clear groove in the cuticle can be seen at the site of the excretory pore. The cervical papillae are located close above the nerve ring (Fig. 4B). The copulatory burse (Fig. 4C, D) of the male bears one small dorsal and two wide lateral lobes. The dorsal rib is divided in its distal portion into a median and 4 lateroventral extensions. The externodorsal rib separates from the dorsal rib. The mediolateral and posterolateral ribs extend in parallel direction to one another, the externolateral ribs are separated. The ventral ribs proceed in parallel direction. The spicules, identical in length and shape, are well-chitinized; from the posterior half of their length onwards they separate into two extensions, of which the ventral extension is longer than the dorsal one. Gubernaculum present (Fig. 4E). Cervical papillae at 0.058—0.073 mm from the anterior end of the body. The posterior end of the female is conical with a rounded peak. The two clearly visible tail papillae are situated at 0.051—0.058 mm from the end of the tail (Fig. 4F, G). The vulva lies in the anterior half of the body. Its smooth margins pass into a distinct cuticular extension, length 0.058—0.073 mm (Fig. 3C). The vaginal support is strongly sclerotized. The eggs in the uteri contain coiled larvae, which, in the posterior portion of the uterus, are unattached and mobile. The eggs measure 0.073—0.078 mm by 0.042—0.047 mm. The cervical papillae are at 0.070—0.080 mm from the anterior end of the body. The body measurements of the male and female worms are given in Table 1.

Table 1. Body measurements of the nematode Crenosoma striatum (Zeder, 1809) at the age of 23 and 60 days p.i. of the definitive host (in mm)

<table>
<thead>
<tr>
<th>Age of nematodes</th>
<th>Measurments</th>
<th>23 days</th>
<th>60 days</th>
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<tr>
<td></td>
<td>♂ ♂</td>
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<td>♂ ♂</td>
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<tr>
<td>Maximum width</td>
<td>0.160—0.300</td>
<td>0.220—0.280</td>
<td>0.170—0.180</td>
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<tr>
<td>Oesophagus length</td>
<td>0.210—0.240</td>
<td>0.210—0.250</td>
<td>0.220—0.240</td>
</tr>
<tr>
<td>Maximum width</td>
<td>0.040—0.051</td>
<td>0.060—0.062</td>
<td>0.040—0.058</td>
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<tr>
<td>Nerve ring</td>
<td>0.100—0.120</td>
<td>0.110—0.120</td>
<td>0.087—0.120</td>
</tr>
<tr>
<td>Excretory pore</td>
<td>0.120—0.140</td>
<td>0.120—0.130</td>
<td>0.150—0.180</td>
</tr>
<tr>
<td>Spicule length</td>
<td>0.170—0.220</td>
<td>—</td>
<td>0.210—0.220</td>
</tr>
<tr>
<td>Gubernaculum length</td>
<td>0.073—0.080</td>
<td>—</td>
<td>0.073—0.087</td>
</tr>
<tr>
<td>Anus</td>
<td>—</td>
<td>0.160—0.210</td>
<td>—</td>
</tr>
<tr>
<td>Distance of vulva from anterior end</td>
<td>—</td>
<td>3.120—4.580</td>
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</table>

C. THE PATHOGENICITY OF THE LARVAL AND ADULT STAGES OF C. STRIATUM IN THE ORGANISM OF THE DEFINITIVE HOST

The 4 hedgehogs in our experiment were examined histologically: one on day 10 p.i., one on day 23 and two on day 60 p.i. In the first hedgehog we found fifth-stage larvae and 2-day-old larvae (from the reinfection). In the second hedgehog we found adult worms (aged 23 days) and larvae from the reinfection (aged 15 days). The third hedgehog was infected with adult worms aged 60 days and with 4-day-old larvae (4th-stage larvae from the reinfection). The fourth hedgehog harboured only adults aged 60 days.

On day 10 p.i., the lungs were relatively well aerated, but the interalveolar septa were remarkably thickened and richly pervaded by cells. Some areas of the distended interstices contained groups of histocytes around the cut through the small larval body.
Fig. 4. Adult stage of Crenosoma striatum (Zauber, 1800) from the lungs of the definitive host Erinaceus europaeus L. 23 days p.i. (A, C, D, F) and 60 days p.i. (B, E, G). A — anterior portion of male body (lateral view); B — dto (ventral view); C — bursa copulatrix (lateral view); D — dto (ventral view); E — gubernaculum (ventral view); F, G — posterior end of female body (lateral view). Orig.
(less than 10-day-old larvae). Larvae of the size of a 10-day-old larva were present in the alveolar duets. At these sites, the larval bodies were generally surrounded by neutrophilic and eosinophilic granulocytes with several lymphocytes so that the agglomeration of lymphocytes was visible at a low magnification already; at other sites, sections through the body of these larvae in the alveolar duets were not surrounded by a marked exudation. The alveolar lumen close to the larva was filled with leukocytes-containing desquamated alveolar macrophages with a light, foamy plasma.

On day 23 (and 15) p.i., the pathological finding in the lungs was characterized by bronchitis and interstitial pneumonia with a consolidation of relatively large parts of the lungs. Worms were found in the bronchi, in the alveolar duets of bronchioles. Their size in the bronchi was that of a 23-day-old worm. The inflammatory reaction of the mucosa of the bronchi was, sometimes, surprisingly small and the epithelium appeared to be slightly thinned by the pressure of the worm’s body. At other sites, however, the epithelium was considerably flattened, abraded or necrotic. In such cases the denuded lamina propria mucosae was covered by a mass consisting of cellular detritus and eosinophiles. Worms were found also in the alveolar duets; there, their diameter was about 0.1 mm and, often, the reaction of the surrounding tissue was minimal. In some alveoli we found only an occasional alveolar macrophage with a foamy plasma, elsewhere, these occupied the lumina of a whole group of alveoli. Numerous large histocytes formed wide interalveolar septa. At several sites we found granulomas of histocytes surrounding sections through small larvae or their fragments.

On day 60 p.i., adult worms were found in the bronchi. The inflammatory infiltration of the mucosa of the bronchi was discreet and cellulization of the propria was caused mainly by cells of the histocyte type. Sometimes, the epithelium was completely flat, but we were unable to find the abrasion at this stage. The smaller bronchi contained leukocytes, alveolar macrophages and larvae. Considerably large areas of the lungs were airless because the alveoli were occupied by proliferating macrophages. In these so-called "epithelized" areas we also found occasional larvae surrounded by several eosinophiles. In the case of the combined incidence of 60-day-old adults and 4-day-old larvae the finding was similar to the preceding one.

DISCUSSION

The findings of Müller (1935), Wetzel and Müller (1935), Petrov (1941), Hobmaier (1941) and our own findings indicate a consistency in the basic concept of the described life cycle of nematodes of the genus Crenosoma. The necessity of utilizing an intermediate host to complete development has been confirmed reliably by all these authors. According to Petrov (1941), the intermediate hosts utilized by C. striatum are the snail species Succinea putris, Agriolimax agrestis and Arion circumscriptus. Prokopč (1959) added Arion rufus, Helix pomatia and Cepaea hortensis. In our experiments we employed successfully also Lymnaea peregra, Ozychilus glaber, Monachoides umbrosa, Limax tenellus and Milax rusticus. This makes a total of 11 snail species utilized by C. striatum as intermediate hosts. The described intermediate hosts belong to several families of the orders Stylommatophora and Basommatophora. This indicates that C. striatum is completely nonspecific as regards its intermediate hosts. This phenomenon has been confirmed also by data recorded by Wetzel (1941) and Petrov (1941) for the species C. vulpis and by Hobmaier for the species C. mephitis.

The differences in body measurements of the larvae of C. vulpis, C. mephitis and C. striatum during development in the intermediate host are minimal (see Table 2). The larvae of C. striatum are very close to those of C. mephitis in the shape of the
oesophagus (the presence and length of a sclerotized part), but differ from it in the shape of the tail which, in *C. mephitis*, has a rounded peak. Data on the duration of larval development of *C. striatum* in the intermediate host are given by Petrov (1941) and Prokopč (1959). These are fully consistent with our findings.

| Table 2. Body measurements of infective larvae of the nematodes *C. vulpis*, *C. mephitis* and *C. striatum* |
|---------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| **Species** | **C. vulpis** | **C. mephitis** | **C. striatum** |
| **Authors** | Wetzel (1941) | Hobmaier (1941) | Our data |
| Body length | 0.458—0.549 | 0.525—0.560 | 0.423—0.511 |
| Maximum width | 0.027—0.029 | 0.025—0.029 | 0.027—0.032 |
| Oesophagus length | 0.150—0.190 | 0.055 | 0.044—0.051 |
| Distance of genital primordium from end of tail | 0.145—0.174 | — | 0.161—0.219 |
| Anus | 0.034—0.037 | 0.043 | 0.043—0.051 |

Our observations of the development of *C. striatum* in its definitive host can be compared only with those made by Wetzel (1941) and Stockdale and Hulland (1970) on *C. vulpis*. The course of the third and fourth moult of the parasitic larvae of both species is the same. The rate of growth of the larvae of *C. striatum* is slower (especially that of 5th-stage larvae) than that of *C. vulpis*. According to our observations, the prepatent period lasted from 19—21 days, according to Prokopč (1959) 22 days, and to Petrov (1941) up to 29 days.

The pathogenicity of *C. striatum* infection is, according to our observations, dominated by an early activation of alveolar macrophages and histocytes of the interstice. As late as on day 10 p.i. the pathological picture was dominated by the participation of granulocytes in the inflammatory cellulitis around the larvae and their migration to the alveoli; later, however, (i.e. on day 15, 23 and 60 p.i. respectively) neutrophilic and eosinophilic leucocytes were found in the bronchi close to the adult worms, in the bronchioles and in the vicinity of some larvae; the picture became dominated by a consolidation of the lung tissue caused by the proliferation of macrophages and by interstitial pneumonia. On day 23 p.i., we found considerable damage of the mucosa of the bronchi, occupied by several adult *C. striatum*, and interstitial pneumonia. Although this type of pneumonia was found as late as on day 60 p.i., the alteration of the mucosa of the bronchi was less marked than that observed on day 23 p.i. This finding suggests a stabilisation of the process in the infected bronchi. At this time (on day 60 p.i.) also small larvae laid by the female worms were present in the bronchi, the bronchioles and the alveoli. On day 10, 23 and 60 p.i. respectively, minute (on day 10) and large (later on) granulomas of macrophages were found in lung tissue around larvae the diameter of which was smaller than that consistent with the duration of infection. In our opinion these larvae were either less viable or retarded in their development and the granulomatos reaction around them seemed to be the initial phase of their final destruction.

Our finding of the important participation of histocytes in the defence reaction of the host infected with nematodes *C. striatum* may be compared with a similar process in the lungs of cats infected with *Aclurostrongylus abstrusus* (Mackerras 1957), and
that in the lungs of dogs infected with *Crenosoma vulpis* (Stockdale and Hulland 1970). Panebianco (1957) reported only bronchitis in a spontaneous infection of hedgehogs with *C. striatum* without giving a description of histological changes or other details.

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EXPLANATIONS OF THE PLATES

Plate I.

Fig. 1. Leucocytic exudate in minute bronchus. HE, 500 x.
Fig. 2. Interstitial pneumonia associated with the formation of nodules from histocytes. Inside the nodule a multinucleate symplasia (arrow), in the adjoining alveoli destroyed alveolar epithelium. HE, 250 x.

Plate II.

Fig. 1. An adult C. striatum in a section through the alveolar duct. No marked defence reaction. A 60- and 4-day-old infection. Fig. 2. Crenosoma striatum in the alveolar duct. At one site (arrow) a marked flattening of the epithelium, in the environment a moderate cellulization of the interstice. HE, 250 x; 23 days (and 15 days) p.i.

Plate III.

Fig. 1. Detailed view on the nodule of histocytes around the larvae of C. striatum. HE, 500 x.
Fig. 2. Adult C. striatum in the bronchus. Adjacent to the bronchus an inflammatory cellulization of the distended interalveolar septa. HE, 150 x.

Plate IV.

Fig. 1. Larvae in a bronchiale filled with exudate. At another site (arrow) two multinucleate cells produced by desquamated epithelium 60 days p.i. HE, 250 x. At the right bottom: detailed view on alveolar macrophages. HE, 500 x. Fig. 2. Larvae in a small bronchus, the lumen of which is occupied by leucocytes. 60 days p.i. 250 x.