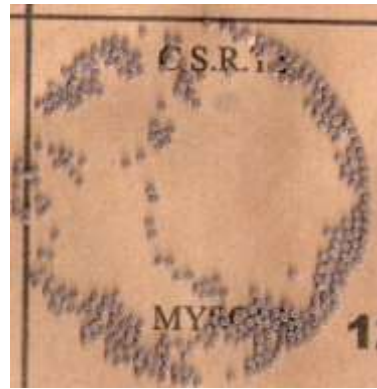


CHAPTER 1.



a. Non-diapausing eggs



b. Diapausing eggs



c. Fifth instar larvae



d. Pupae

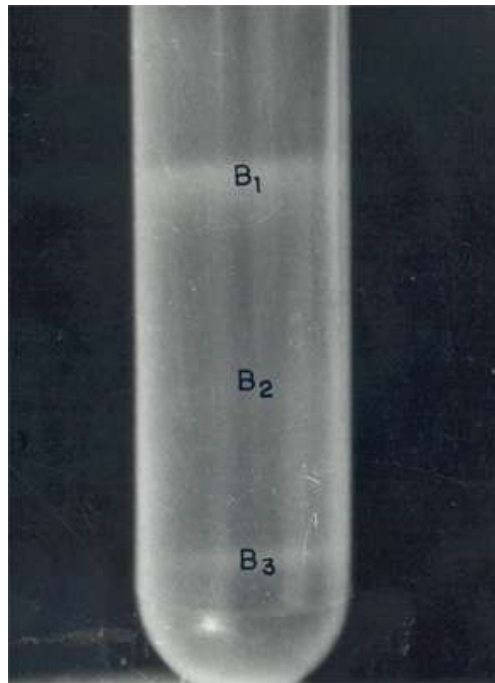


e. Cocoons

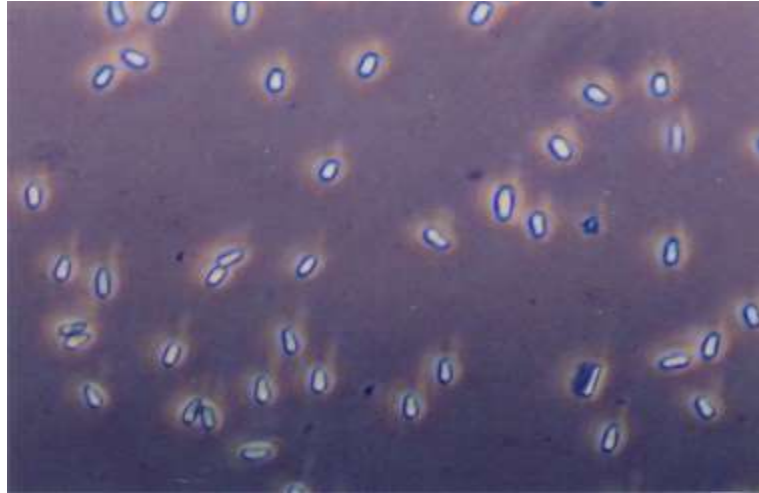


f. Moth.

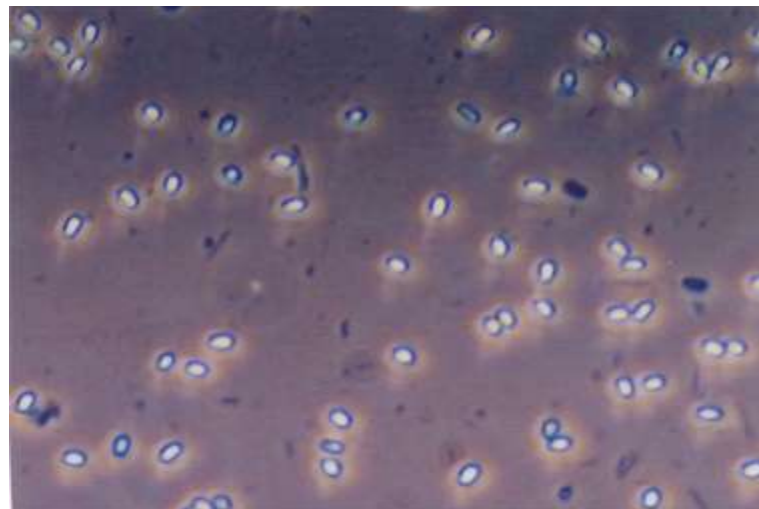
**Fig. 1:** Life cycle of Lamerin breed of the silkworm.



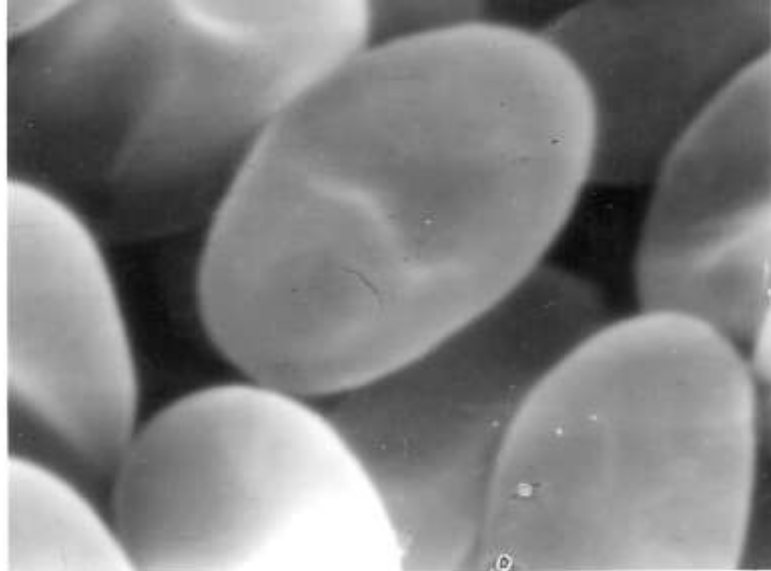
**Fig. 2:** Purification of the spores of microsporidian from Lamerin breed. Percoll gradient centrifugation showing three bands. B<sub>1</sub>: A sharp band consisting of tissues of host, mulberry leaves, bacteria *etc.*; B<sub>2</sub>: Light band consisting of immature and dead spores and B<sub>3</sub>: Sharp band consisting of mature spores.



**Fig. 3:** Microphotograph of purified Lamerin microsporidia spores (600x)



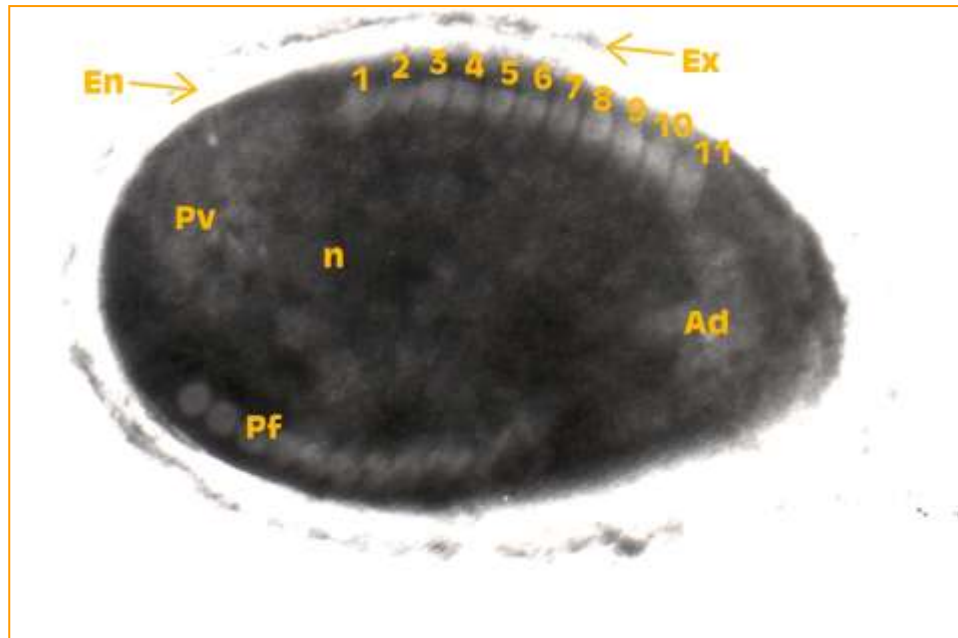
**Fig. 4:** Microphotograph of purified *Nosema bombycis* spores (600x)



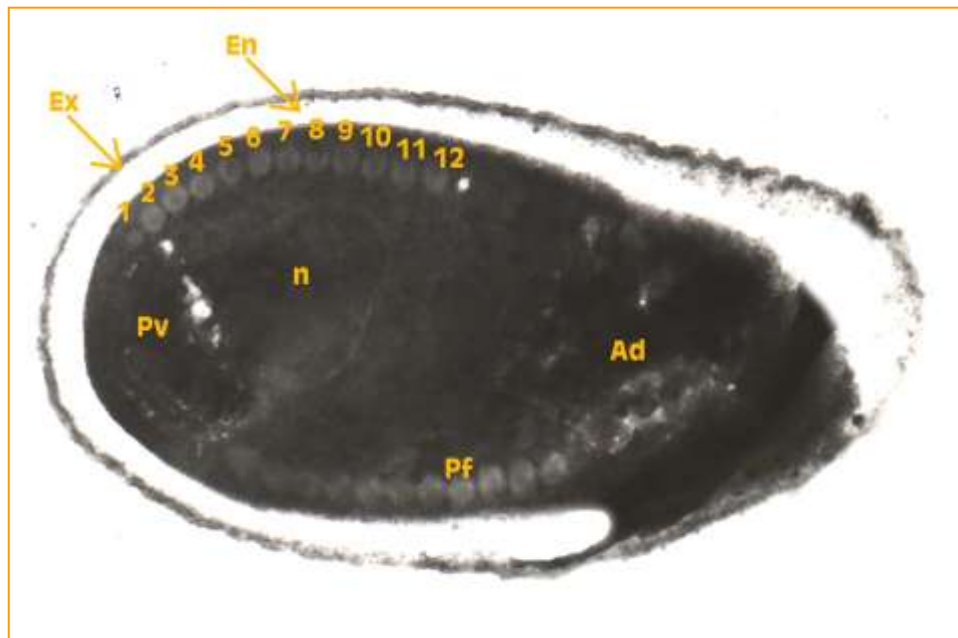
**Fig. 5:** Scanning electron microphotograph of purified spores of Lamerin microsporidia (20,000x) (Arrowhead showing the depression in spore)



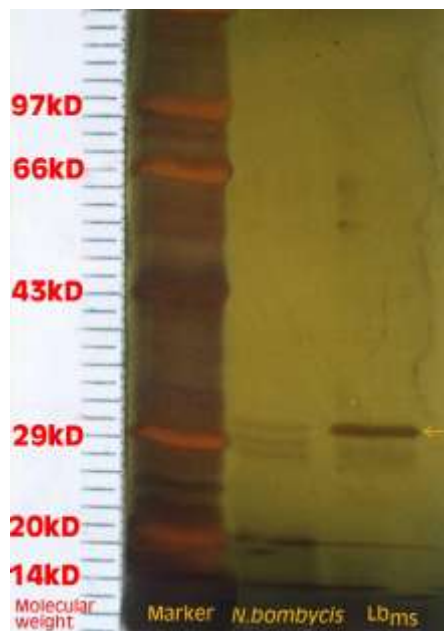
**Fig. 6:** Scanning electron microphotograph of purified spores of *Nosema bombycis* (20,000x)



**Fig. 7:** Longitudinal section of Lamerin microsporidian spore showing 11 coils of polar tube: pt – polar tube; Ex- exospore; En – endospore; Ad – anchoring disc (mushroom shaped); Pv – posterior vacuole; n- nucleus; (53307x)

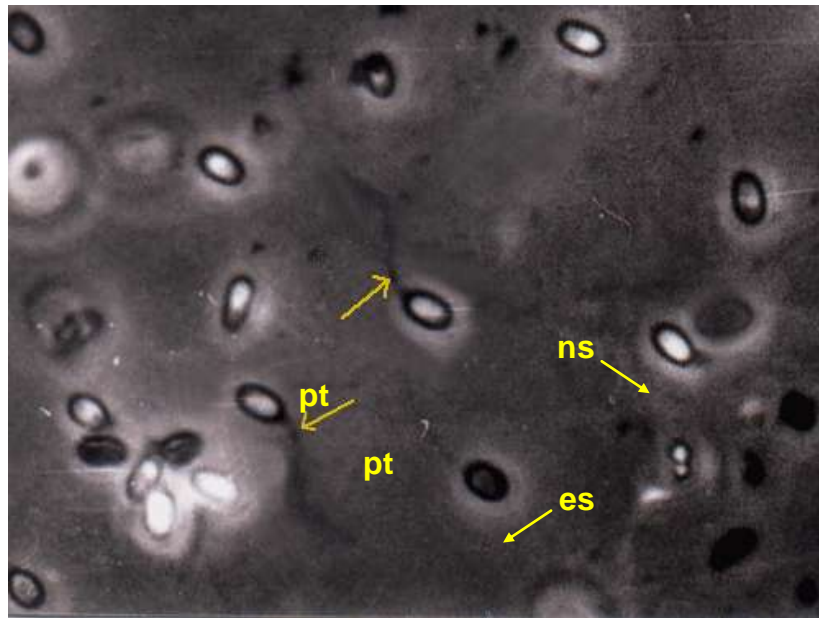


**Fig. 8:** Longitudinal section of *N. bombycis* spore showing 12 coils of polar tube: pt – polar tube; Ex- exospore; En – endospore; Ad – anchoring disc (mushroom shaped); Pv – posterior vacuole; n- nucleus; (53307x)

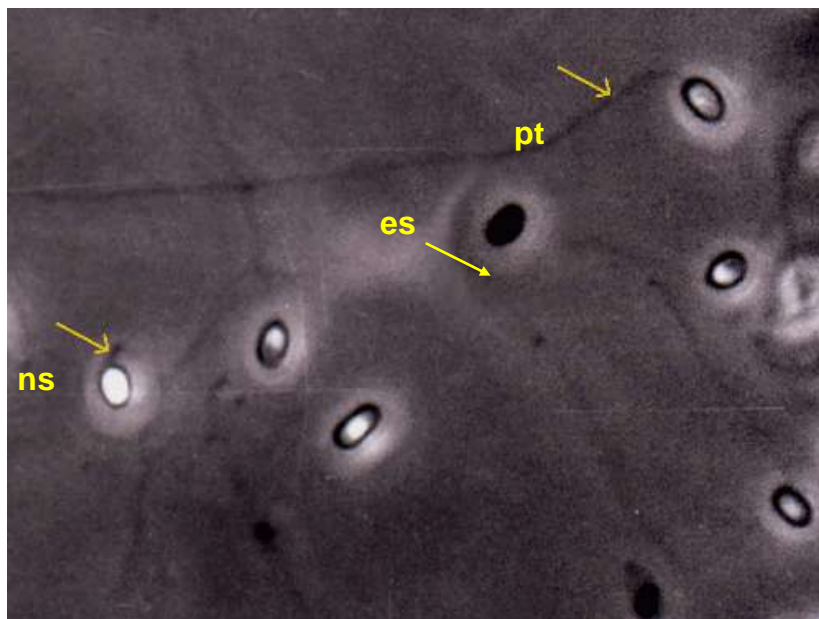


**Fig. 9:** Electrophoretic banding of spore surface protein of Lamerin microsporidian spore and *N. bombycis* : Lamerin microsporidian (lane 3) distinguishes from *N. bombycis* (Lane 2) on the basis of thick 31 kDa band Molecular weight is given in KDa on the left side. Arrow heads shows the unique band of Lamerin microsporidium





**Fig. 10.** Plate showing the extrusion of polar tube by the spores from Lamerin microsporidian spore: pt- polar tube; es- empty shell; ns -non germinated spores.



**Fig. 11:** Plate showing the extrusion of polar tube by the spores from *Nosema bombycis* pt- polar tube; es- empty shell; ns -non germinated spores.

CHAPTER 2.



Lamerin breed infected with  $Lb_{ms}$



Lamerin breed infected with *N. bombycis*



PM infected with  $Lb_{ms}$



PM infected with *N. bombycis*



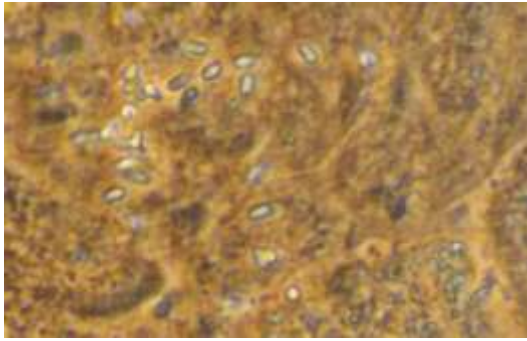
CSR2 infected with  $Lb_{ms}$



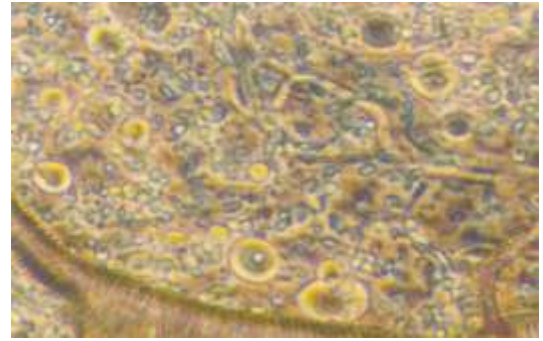
CSR2 infected with *N. bombycis*

**Fig.. 1:** Symptoms of infection of Lamerin, PM and CSR2 silkworm breeds with Lamerin microsporidia and *N. bombycis*.

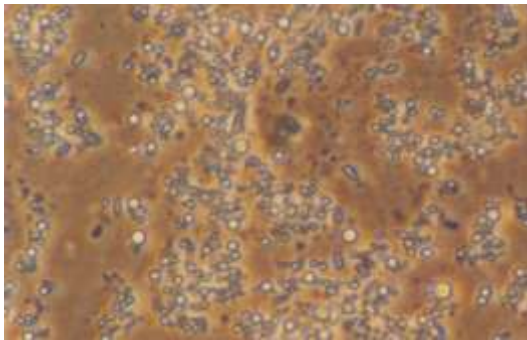




2a. Smears of gut infected with Lamerin microsporidia



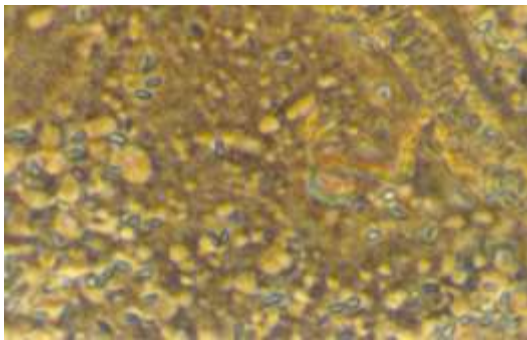
2d. Smears of gonad infected with Lamerin microsporidia



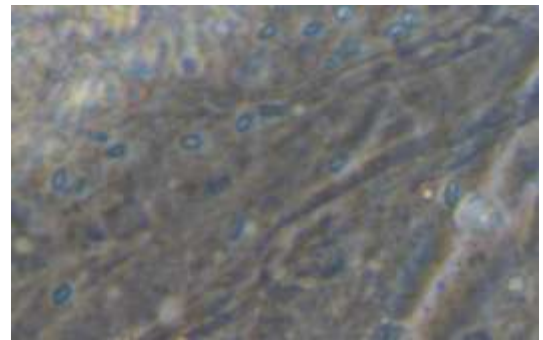
2b. Smears of fat bodies infected with Lamerin microsporidia



2e. Smears of trachea infected with Lamerin microsporidia

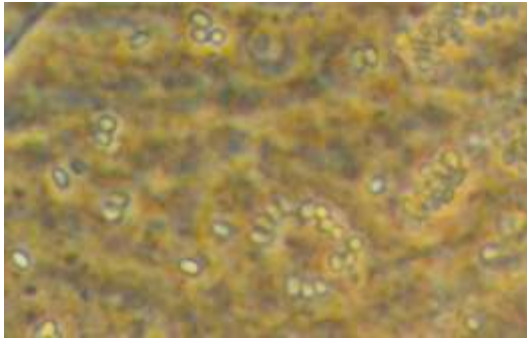


2c. Smears of malpighian tubule infected with Lamerin microsporidia

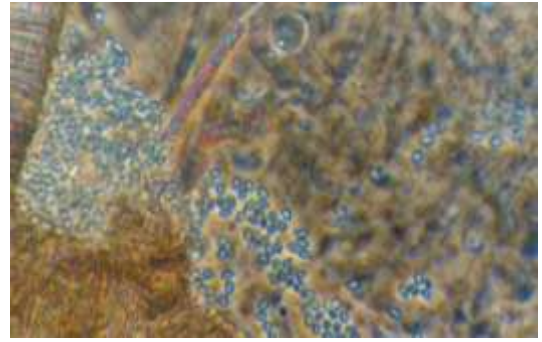


2f. Smears of silk gland infected with Lamerin microsporidia

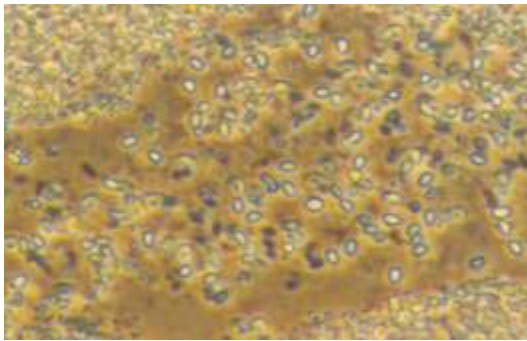
**Fig.. 2:** Microphotographs of Lamerin breed tissues (at 600x magnification under phase contrast microscopic camera) infected by Lamerin microsporidian



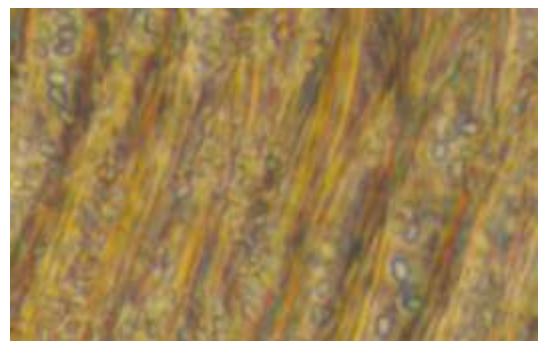
3a. Smears of gut infected with *N. bombycis*



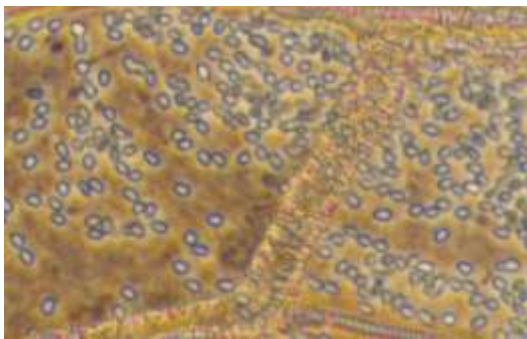
3d. Smears of gonad infected with *N. bombycis*



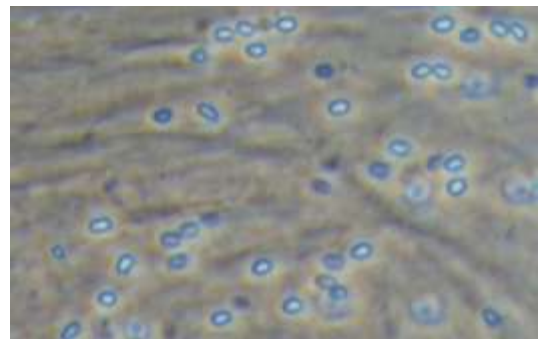
3b. Smears of fat bodies infected with *N. bombycis*



3e. Smears of Trachea infected with *N. bombycis*

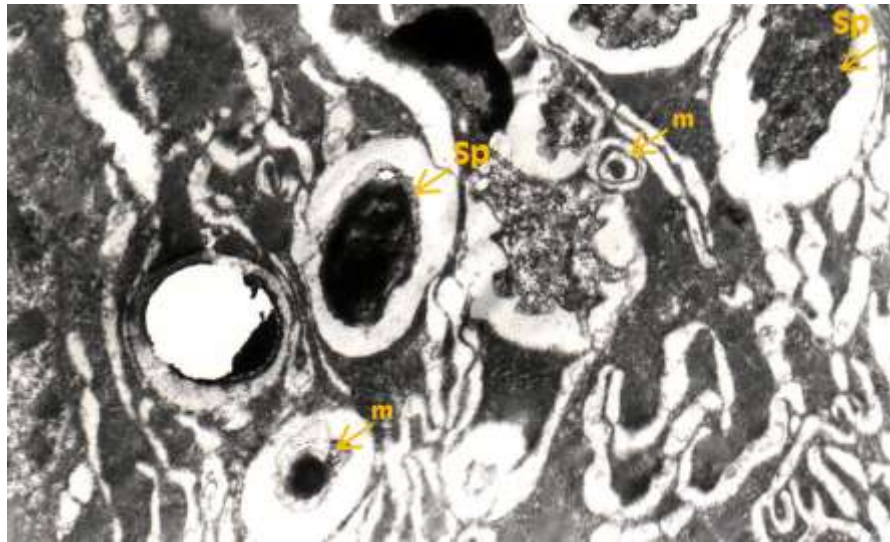


3c. Smears of malpighian tubule infected with *N. bombycis*

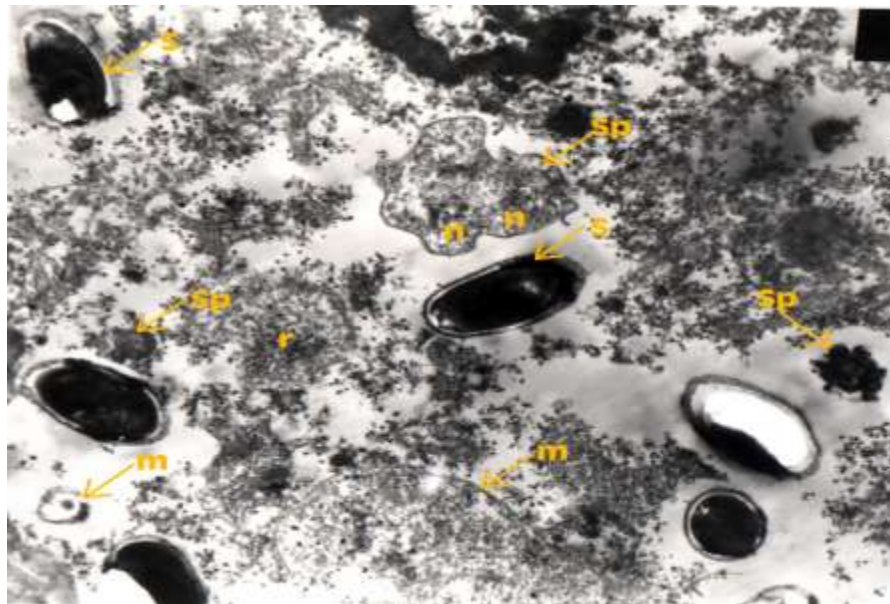


3f. Smears of silk gland infected with *N. bombycis*

**Fig. 3:** Microphotographs of Lamerin breed tissues (at 600x magnification under phase contrast microscopic camera) infected by *N. bombycis*



a. Ultrastructure of infected gut; m – meront ; sp-sporont.



b. Ultrastructure and development stages of microsporidian found in fat bodies; m-meront; sp- sporont; s-spore. n-nucleus; r – ribosomes.

**Fig. 4:** Electron microscopic photographs of infected gut and fat bodies of Lamerin breed showing some developmental stages of Lamerin microsporidia ( $Lb_{ms}$ ).





Silkworm infected with Lamerin microsporidia



Silkworm infected with *N. bombycis*

**Fig. 5:** Morphological symptoms of silkworm infected with Lamerin microsporidia and *N. bombycis*.