INTRODUCTION

India being predominantly an agricultural country has enormous cattle, buffalo, sheep, goat and poultry population. It is evident that population of buffalo is maximum in area of the world where protein deficiency is more acute and severe (Cockrill, 1974). There are about 150 million water buffaloes and spread over in 40 countries of the world (Cockrill, 1981). Besides milk, buffaloes also serve as the valuable meat animal. It is the only source of animal protein especially for the low income group of community in these areas. In India about 830 thousand buffaloes are slaughtered for meat purpose every year (FAO, 1974).

In live animals organisms are usually found on the hairs and skin and also in nostrils, alimentary tract and external parts of urinogenital tract. If the animals are healthy and in a physiologically normal condition, no microorganism should be present in bone marrow, blood, heart, lungs and lymph-nodes. The importance of bacteria in the spoilage of meat is well established. However, very little is known about the significance of fungi associated with the
internal organs of the meat animals. The present study is an attempt to record the spectrum of moulds, yeasts and actinomycetes in the lung tissues of the slaughter animals.

A number of fungi have been recovered from the various organs of the food animals. Sometimes pathogenic fungi have also been isolated from cold stored meat products. Abearman and Kaplan (1969) isolated Sporothrix schenckii from cold-stored frankfurters. Similarly Sinha et al., (1978) reported Aspergillus niger, A. flavus, A. nidulans, A. fumigatus, Rhizopus, Penicillium, Absidia, Curvularia and Helminthosporium from thigh muscles, chest muscles, mesenteric lymph nodes, liver and spleen of 100 market goat meat samples.

It has been known for many years that pneumonic lungs of animals contain a wide range of bacteria, yet very little information is available on the role of the fungi in the respiratory system of diseased animals. However, reports on the isolation of Aspergillus fumigatus, A. terreus, A. nidulans, A. flavescens, A. flavus, A. niger, Mucor, Penicillium from the lungs of buffaloes, sheep, goat, cattle and
pigs have appeared in the literature (Narayana et al., 1964; Richard, Cysewski and Pier, 1970; Singh and Singh, 1970; Ainsworth and Austwick, 1973; Aller and Aller, 1973; Sharma and Dwivedi, 1977; Ontiveros et al., 1979; Marcato, Benazzi and Alberizio, 1982; Baruah et al., 1984). Other fungi such as Rhodotorula rubra, Candida albicans, C. guilliermondii, Syncephalastrum, Candida are also infrequently recorded with the pneumonic lungs lesions in pigs, calves, sheep and goats (Rajan and Sivadas, 1973; Monga and Garg, 1980; Praisler, 1981; Baruah et al., 1984). Nocardiosis and actinomycosis in cattle, goats, sheep and pigs are rarely described (Van Der Wall, 1964; Ainsworth and Austwick, 1973; Sharma and Dwivedi, 1977; Otcenasek and Vitovec, 1982). Coccidioidomycosis caused by Coccidioides immitis was diagnosed in a heifer slaughtered at the Denverstock yards in 1931 (Stiles, Shahan and Davis, 1933). Later Maddy (1954) made extensive study covering 3,173 infected cattle and reported 1.8 per cent infection due to C. immitis during the course of meat inspection at various abattoirs in Southern California, U.S.A. Further, the incidence of coccidioidomycosis in steers and heifers in San Joaquin Valley feedlots was recorded 7.3 per cent. In endemic region of Phoenix, AZ, C. immitis
infection was described to be 1.3 per cent of all cattle slaughtered. (Prchal, 1948). Among the other pulmonary mycoses caused by dimorphic fungi, only a solitary report of paracoccidioidomycosis is available in sheep and goat in which the diagnosis was confirmed on the histopathological demonstration of yeast cells compatible with Paracoccidioides brasiliensis (Sharma and Dwivedi, 1977). Pulmonary sporotrichosis due to Sporothrix schenckii has been recorded in a cattle beast by Humphreys and Helmer (1943). Aller, Santiago, Escudero and Rey (1971) diagnosed pulmonary cryptococcal infection in goats. From these reports it is apparent that not much work has been carried out on the fungi and actinomycetes associated with the diseased lungs of the domestic ruminants.
MATERIALS AND METHODS

LOCATION OF SITE:

Lungs were mainly collected from Municipality and Military slaughter houses of Delhi. Few specimens were also obtained from the private butchers shops located in West Delhi. The hygienic conditions were quite good in Military abattoir whereas the local slaughter house managed by the Municipal Corporation of Delhi was poor from sanitary point of view. Butchers shops were satisfactory in their management.

SPECIMENS:

In Delhi cow slaughter is prohibited and therefore, specimens were available only for buffalo, goat and sheep. About 2.5 to 3 inches size of pneumonic lungs were collected from 191 animals on the days of slaughter in a sterilized wide mouth glass stoppered bottle and brought to the laboratory under ice. One hundred ninety one specimens originating from 73 buffaloes, 61 goats and 57 sheep were processed mycologically for the presence of fungi (Table - 21).

CULTURAL TECHNIQUES:

Lungs tissues were spread in sterilized Petri-
TABLE - 21

Sources of the Collection of the lungs from the slaughtered animals.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Animal species</th>
<th>Number collected</th>
<th>Municipal Slaughter house</th>
<th>Military abattir</th>
<th>Butcher's soap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Buffalo</td>
<td>73</td>
<td>73</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>2.</td>
<td>Goat</td>
<td>61</td>
<td>25</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>3.</td>
<td>Sheep</td>
<td>57</td>
<td>34</td>
<td>23</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>191</td>
<td>132</td>
<td>42</td>
<td>17</td>
</tr>
</tbody>
</table>
dishes and examined thoroughly for gross lesions. A small portion of the lung was seared with sterilized scissors and forceps and implanted directly on the slants of Sabouraud's dextrose agar, Sabouraud's medium with chloramphenicol (Emmons et al., 1977) and sunflower agar medium (Pal and Mehrotra, 1982). The inoculated slants were kept at 37°C for medium No. 1 and 2 and 25°C for media No. 3. These were daily observed for the presence of any fungus growth.

**IMPRESSION SMEARS:**

Smears from the lungs showing various gross abnormalities were prepared on clean, dry, glass slide and dried in the air.

**STAINING OF THE IMPRESSION SMEARS:**

Smears were fixed by warming the slide over the flame or on slides immersed in absolute alcohol for five minutes and gradually air dried. Following two methods were employed for staining the smears.

1. **Gentian violet staining:**

The smears were placed in one per cent aqueous solution of gentian violet stain for about 5-6 seconds and then washed in running tap water thoroughly to remove excess stain. The stained
smears were examined under microscope for the fungal elements.

2. **Modified Grocott's method:**

This method of staining the impression smear was done as per Mohan and Sale (1973).

1) The smears were first kept in 10% chromic acid for 10 minutes and then washed under tap water to remove excess chromic acid.

ii) The smears were then dipped in 1% sodium metabisulphite for 1 minute and rinsed in hot water for 1 minute.

iii) The smears were shifted to working methanamine silver nitrate solution and kept for about 5-10 minutes.

iv) Smears were rinsed in hot water and cooled gradually in tap water. Smears were then rinsed in distilled water.

v) Smears were toned in 1% gold chloride for 10 seconds, and rinsed in distilled water.

vi) Smears were transferred to 5% solution of thiosulfate for 3 minutes.
vii) Finally the smears were washed thoroughly in tap water.

viii) The smears were then examined under microscope.

IDENTIFICATION

1. Direct microscopy:

Pneumonic tissue from the lung was teased by needle on clean glass slide and treated with 10 per cent potassium hydroxide for 10 minutes. The KOH preparations were then examined for the fungal elements; if any.

2. Cultural characteristics:

The fungal colony appearing on the slants were examined for gross morphology on the mycological media employed in this study. The microscopic examination of the fungi was made in lactophenol cotton blue mounts. The isolates were subcultured on Sabouraud's medium and purified by serial dilution. The detailed identification of the fungi was done as per the standard procedures described by Gilman (1959); Raper and Fennell (1965); Lodder

3. **Pathogenicity test:**
   Thirteen fungal isolates comprising 8 yeasts, 10 moulds and 1 actinomycetes recovered from the pneumonic lung tissues of buffaloes, goats and sheep were tested for their pathogenicity test in Swiss albino mice. For this test, two male animals weighing about 13 to 20 gm were taken for each culture. These mice were kept on Hindustan Lever feeds.

4. **Preparation of inoculum of yeast culture:**
   Yeast cultures were grown on Sabouraud’s dextrose agar slants at 37°C for 72 hours. The suspension of the organism was prepared in sterile physiological saline solution so as to contain approximately $3 \times 10^5$ cells in 0.2 ml. Counting of the cells was done as described by Emmons et al., (1977). Each mouse was injected 0.2 ml of yeast suspension in the caudal vein by intravenous route.

5. **Mould culture:**
Pathogenicity of mould culture was done on the lines described by Sandhu et al., (1969). Spores were harvested with Tween-80 water (0.05%) and shaken to make an uniform suspension. Counting spores was done as described by Emmons et al., (1977) using haemocytometer. The suspension was diluted to the concentration of $3 \times 10^5$ spores in 0.2 ml. Each mouse was inoculated with 0.2 ml culture suspension intravenously with 26 gauze needles using tuberculin syringe.

Pathogenicity of Moccardia asteroides was tested in two male Guinea-pigs by intraperitoneal route (Pal, 1982).

Inoculated animals were daily observed for 4 weeks. If any mortality occurred, the autopsy was performed immediately. All the visceral organs were examined for gross lesions, if any. Portions of brain, heart, lung, liver, spleen and kidney were cultured on Sabouraud's dextrose agar for the reisolation of the organism.
TABLE - 22

Classification of the animals according to species which yielded fungi.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Animal species examined</th>
<th>Number of animals investigated</th>
<th>Number positive for fungi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Buffalo</td>
<td>73</td>
<td>6 (3.2%)</td>
</tr>
<tr>
<td>2.</td>
<td>Goat</td>
<td>61</td>
<td>4 (6.5%)</td>
</tr>
<tr>
<td>3.</td>
<td>Sheep</td>
<td>57</td>
<td>3 (5.2%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>191</td>
<td>13 (6.8%)</td>
</tr>
</tbody>
</table>

* Figures in parenthesis indicate percentage.
TABLE - 23

Distribution of fungi according to the source of lungs collected.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Source of material</th>
<th>Number examined</th>
<th>Number yielded fungi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Municipal slaughter house</td>
<td>132</td>
<td>10 (7.5%)</td>
</tr>
<tr>
<td>2.</td>
<td>Military abattoir</td>
<td>42</td>
<td>1 (2.1%)</td>
</tr>
<tr>
<td>3.</td>
<td>Butcher's soap</td>
<td>17</td>
<td>2 (11.7%)</td>
</tr>
</tbody>
</table>

Total: 191  13 (6.8%)

* Figures in parenthesis indicate percentage.
TABLE - 24
Fungi isolated from the pneumatic lungs of the slaughtered animals

<table>
<thead>
<tr>
<th>No.</th>
<th>Fungus/actinomycetes</th>
<th>Number isolated</th>
<th>Species of animals positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Buffalo</td>
<td>Goat</td>
</tr>
<tr>
<td>1.</td>
<td>Aspergillus fumigatus</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Aspergillus niger</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3.</td>
<td>Aspergillus candidus</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Mucor pusillus</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Absidia corynifera</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6.</td>
<td>Cryptococcus neoformans</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>Paecilomyces variotii</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Geotrichum candidum</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>Candida albicans</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10.</td>
<td>Candida guillermondi</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>11.</td>
<td>Nocardia asteroides</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Total: 13 6 4 3
RESULTS

A total of 191 lungs showing various gross abnormalities were investigated mycologically for the presence of fungi and actinomycetes. Of these samples examined, only 13 (6.8%) yielded different types of moulds, yeasts and actinomycetes. The positive specimens originated from 6 buffaloes, 4 goats and 3 sheep (Table 22). Distribution of positive lungs as per the source of collection is shown in Table 23. It is evident from the table that maximum number (10) of isolations were obtained from the lungs collected from Municipal slaughter house where the sanitary conditions were not satisfactory. Details of the fungi isolated are shown in Table 24. Among the different fungal pathogens, *Aspergillus* constitute the major group as shown by 5 isolates (2 buffalo, 2 goat, 1 sheep). Other organisms were isolated on single occasion from the pneumonic lungs. *Aspergillus fumigatus* was represented by three isolations, two from buffaloes and solitary one from a goat. Pneumonic lung of a weak adult female buffalo yielded pure and heavy growth of *Paecilomyces*.
TABLE - 25

Correlation of direct microscopy with cultural isolation of the fungi from lungs of animals.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Animal species</th>
<th>Number examined</th>
<th>Number positive by direct microscopy</th>
<th>Number positive by culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Buffalo</td>
<td>73</td>
<td>5/73</td>
<td>6/73</td>
</tr>
<tr>
<td>2.</td>
<td>Goat</td>
<td>61</td>
<td>2/61</td>
<td>4/61</td>
</tr>
<tr>
<td>3.</td>
<td>Sheep</td>
<td>57</td>
<td>2/57</td>
<td>3/57</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>191</td>
<td>9/191</td>
<td>13/191</td>
</tr>
</tbody>
</table>

* Numerator indicates number of lungs showed presence of fungal elements under direct microscopy and denominator number of lungs subjected for fungal examination.

** Numerator denotes number of lung specimens yielded fungi and denominator number of lung tissues cultured.
TABLE - 26

Fungi and actinomycetes demonstrated in pneumatic lungs by direct examination in 10% KOH mounts

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Types of organism detected in direct KOH preparation</th>
<th>Species of animals positive for organisms:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Buffalo</td>
</tr>
<tr>
<td>1.</td>
<td><em>Aspergillus fumigatus</em></td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td><em>Aspergillus niger</em></td>
<td>0</td>
</tr>
<tr>
<td>3.</td>
<td><em>Aspergillus candidus</em></td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td><em>Mucor pusillus</em></td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td><em>Geotrichum candidum</em></td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td><em>Cryptococcus neoformans</em></td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td><em>Nocardia asteroides</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>
Paecilomyces variotii isolated from the pneumonic lung of a weak adult buffalo on Sabouraud's dextrose agar with chloramphenicol at 30°C.
Halsed, irregular, orange coloured colonies of *Nocardia asteroides* isolated from a pneumonic lung of young male buffalo calf on plain Sabouraud's medium without antibiotics after 11 days of incubation at 37°C.
Impression smear from a pneumonic lung of an adult female sheep showing circular yeast-like cells compatible with *Cryptococcus*. Periodic Acid Schiff Stain X 400.
FIGURE - 20

Lactophenol cotton blue mount showing *Cryptococcus neoformans* isolated from pneumonic lung of a sheep x 500.
FIGURE - 21

*Candida albicans* isolated from pneumonic lung of a sheep. Lactophenol mount X 500.
FIGURE 22
Lactophenol cotton blue mount showing *Mucor pusillus* recovered from the infected lung of a buffalo, X 800.
variotii on Sabouraud's medium at 25°C (Fig. - 17). Geotrichum candidum could be recovered from a lung tissue of an indigenous old she-buffalo on Sabouraud's agar at 37°C. Raised, irregular, orange coloured colonies of Nocardia asteroides were isolated from the diseased lung of a young male buffalos calf on plain Sabouraud's medium without antibiotics at 37°C (Fig. - 18). Impression smear from a pneumonic lung of an adult, very weak female sheep demonstrated the presence of capsulated yeast cells with and without budding characteristic of Cryptococcus (Fig. - 19). The pathogen was isolated from the diseased lung of the sheep on sunflower agar medium. The yeast could be easily differentiated on this media by the development of light to dark brown colour colonies within 3-7 days at 25°C. The lactophenol cotton blue mount of C. neoformans isolate revealed circular yeast cells (Fig. - 20). Ovalto circular yeast-like cells of C. albicans isolated from pneumonic lung of a sheep were seen in lactophenal cotton blue mount (Fig. - 21). Mucor pusillus isolated from a pneumonic lung of a buffalo showed nonseptate hyphae with characteristic sporangia in lactophenol cotton blue mount (Fig. 22). Lactophenol cotton blue mount of Aspergillus candidus revealed
Aspergillus candidus isolated from pneumonic lung of a goat in lactophenol cotton blue mount X 240.
Comidiophore with conidia (Fig. - 23). The fungus was isolated from the pneumonic lung of a goat.

Correlation of direct microscopy with cultural isolation of the fungi is shown in Table - 25. Of the 191 lungs subjected for direct microscopy by potassium hydroxide technique, 9 (5 buffalo, 2 goat, 2 sheep) revealed the fungal elements. However, cultures of the fungi were achieved in 13 cases. Table - 26 indicates the types of organisms demonstrated directly under the microscope by the potassium hydroxide technique.

Of the 13 isolates tested for their pathogenicity in male Swiss mice or male Guinea pig, only 10 proved pathogenic to experimental animals by different routes. The pathogen could be reisolated on mycological media from most of the internal organs of the laboratory animals.

It is noteworthy that none of the pneumonic lungs investigated yielded Coccidioides immitis, Histoplasma capsulatum, Blastomyces dermatitidis and Paracoccidioides brasiliensis.
DISCUSSION

The results of this investigation revealed the association of various fungi and actinomycete with the pneumonic lungs of domesticated ruminants. The overall prevalence of the organism was found to be 6.3 per cent. Among the various pathogens recovered, *Aspergillus fumigatus* was represented by maximum isolations (13%). Similar observations were recorded by Baruah et al. (1984) who isolated more cultures of *A. fumigatus* from the abnormal lung tissues of pigs subjected to slaughter. The isolation of *Aspergillus terrues, Aspergillus nidulans, Aspergillus flavus, Aspergillus fumigatus* and *Absidia corymbifera* from the lungs of buffaloes, *Aspergillus flavus, Aspergillus terreus* and *Aspergillus nidulans* from goats lung and *Aspergillus terreus* and *Aspergillus flavus* from the lungs of sheep has been reported earlier by few investigators from many parts of the world including India (Austwick, 1962; Singh and Singh, 1970; Ainsworth and Austwick, 1973; Gill et al., 1977; Mandal et al., 1981; Krishna and Kulshrestha, 1984).

A recent study on the pathology of porcine
mycotic pneumonia covering 190 pairs of lungs with
gross abnormalities yielded different types of fungi
i.e. Aspergillus fumigatus, Aspergillus niger,
Candida quillermontii, Candida albicans, Penicillium,
Actinomyces, Syncpehalastrum, Microsporium (Beruch
et al., 1984). However, in the present study,
Candida stellatoidea, Syncpehalastrum, Actinomyces
and Microsporium could not be isolated from the
pneumonic lungs of the ruminants. Most of the
organisms recovered from the lungs of the slaughtered
animals are opportunistic pathogens and their role
in the respiratory mycoses of man is well recognised
(Rippon, 1974; Beneke, 1975; Emmons et al., 1977).
It is pertinent to mention that opportunistic
organisms become potentially pathogenic when the
body defence of the individual is lowered (Buxton
and Fraser, 1977).

Candida albicans, an important etiologic agent
of candidiasis has been isolated in pure and abundant
growth from the pneumonic lungs of a sheep. However,
the pathogen has been recorded earlier from the
cattle (Mc Carty, 1956) and goat (Rajan and Sivdas,
1973). As far as could be ascertained this constitute
the first record of isolation of C. albicans from the
ovine pneumonic lungs in India.
The isolation of *Cryptococcus neoformans* from the pneumonic lung on sunflower medium and its direct demonstration in the diseased lung of sheep is important from diagnostic point of view to establish unequivocal evidence of ovine pulmonary cryptococcosis. Though the yeast in India has been isolated from the mastitic milk of cows, buffaloes and goats, cutaneous lesion of a cat, pneumonic lung of a monkey (Monga, Mohapatra and Kalra, 1970; Pal, 1975, 1980), there appears to be hardly any report of isolation of *C. neoformans* from the lung of a sheep. As fungus is widely prevalent in Indian environment (Pal, 1975, 1980), it would not be surprising, if further studies may reveal more number of cryptococcal cases, as reported by rarity of reports.

Among the actinomycetes, only *Nocardia asteroides* could be recovered from the diseased lung of a young buffalo calf on Sabouraud’s agar at 37°C. The organism has been reported earlier from the lungs of sheep, goat and cattle (Van-Der-Wall, 1964; Sharma and Dwivedi, 1977). This appears to be the first report of isolation of *Nocardia asteroides* from the pneumonic lung of Indian buffalo (*Bubalus bubalis*).
It has been suggested that detailed and systematic study should be undertaken to find out the true incidence of pulmonary nocardiosis in meat animals.

Grossly, the lung parenchyma showed pin-head to millet sized, raised abscesses, miliary nodules, small grey or greenish spots, granulomas with pus, congestion and consolidation. Similar lesions have been described by earlier workers (Singh and Singh, 1970; Gill and Singh, 1976; Sharma and Dwivedi, 1977; Baruch et al., 1984; Srinivas et al., 1984).

As the hygienic conditions were extremely poor in Municipal slaughter house, there are great likelihood of getting the meat contaminated by the various microorganisms present in the environment. In this context Maddy (1967) has suggested that possibly the faecal contamination of meat at slaughter may serve as a source of animal to man transmission. Further, he has stressed that contamination of animal feed undoubtedly accounts for the spread of candidiasis in closely housed animals.

The isolation of *Aspergillus*, *Mucor* and *Absidia* from the lungs of the slaughtered animals
is of significance as these fungi are responsible for fungoid condition of the lungs. During meat inspection the lungs showing pneumonomycosis (fungoid condition) are usually condemned (Thornton, 1970). Hence, recognition of these fungi is of paramount importance from meat hygienic point of view. It has been emphasized that the lungs with these fungi should be immediately discarded and not to be considered for table use. The fungal contamination of market goat meat and its public health importance has been discussed by Sinha et al. (1978).
A study was conducted to record the pattern of the fungi associated with the pneumonic lungs of domesticated ruminants. In all 191 lungs specimens were examined for the prevalence of fungi and actinomycetes. These specimens were collected from 73 buffaloes, 61 goats and 57 sheep slaughtered in Municipal Slaughter House, Military abattoir and local butchers shops.

Out of 191 lungs cultured on various mycological media, 13 yielded fungi giving a prevalence of 6.8 per cent. The positive samples originated from 6 buffaloes, 4 goats and 3 sheep.

More fungi were recovered from the lungs cultured from the Municipal Slaughter House. It may be due to ill hygienic conditions prevailing in the atmosphere of the slaughter house.

Among the different fungi, Aspergillus spp. constituted the major group of organisms as evidenced from 5 isolations (2.6%). This was followed by Candida group (1.0%). Other organisms like Mucor etc., were isolated on single occasions only.
Among the actinomycetes group of organisms, only one isolate of *Nocardia asteroides* was recovered from the pneumatic lung of young male buffalo calf on plain Sabouraud's medium without the addition of antibiotics at 37°C.

Direct demonstration of the pathogen in the tissue was successful in 9 cases. The same morphology of the organism was detected by potassium hydroxide technique which was observed in the culture and thus correlate the etiological significance of the fungi and actinomycetes with the pneumatic lungs of the slaughtered animals.

Most of the isolates proved pathogenic to experimental animals as evidenced by the death of the mice as well as reisolation of the organism from most of the visceral organs. The pathogenicity of the *Nocardia asteroides* was tested in male Guinea pig. This actinomycetes was found highly pathogenic to Guinea-pig as resulted in death of the animal within 10 days. Further, the organism was cultured from the diaphragm, liver and spleen.

Perusal of available literature indicated that this is the first report of isolation of *Mucor*.
pasillus, Geotrichum candidum and Nocardia asteroides from the lungs of buffaloes, Aspergillus candidus, Absidia corymbifera and Candida quillermontii from goats and Aspergillus niger Candida albicans from sheep.
REFERENCES


