SUMMARY

1. The studies showed that the commonest etiological agent causing tinea infections to humans here at Rourkela was the fungus *Trichophyton rubrum*. The clinical types were identified to be tinea pedis, t.manum and t.unguim.

2. The infections were found to be more between the months of July and October and gradually decreased by December.

3. The soil collected from the floor sweeps and garbage sites of the patients' localities was studied by hair baiting method and cultured in SDA. The organisms isolated from the soil were *Chrysosporium indicum* and *Microsporum gypseum*; *C. indicum* was, thus, a geophilic fungus where as *M. gypseum* was zoophilic as well as geophilic, which caused diseases on the domesticated animals. The identified organisms were further confirmed in the Mycology Division of the school of Tropical Medicines, Calcutta, India. The isolation of three organisms in this part of the world is new. Further, *M. gypseum* was also isolated from domesticated animals of the patients who suffered from tinea infections.

4. The three isolated organisms were grown on different synthetic, semisynthetic and complex media up to 10 days and it was observed that maximum growth occurred in SD broth and Lilly and Barnett's medium. Therefore, the Lilly and Barnett medium was taken for carbon, nitrogen assimilation and vitamin requirement studies and SD broth was taken for the studies of optimum growth of different temperatures, pH, aeration and the total macromolecular contents of the cells.

5. The optimum temperature for the best growth of the organisms ranged between 30°C – 35°C. The highest growth was 35°C for *T. rubrum* and *C. indicum* and 30°C for *M. gypseum*. (Fig.2).

6. The organisms grew well in the pH range of 5.0 to 8.0. Maximum growth was observed at pH 7.5 in all the organisms. (Fig. 1).

7. When compared with static cultures aeration favoured better growth in all the organisms and the maximum growth was observed on the 10th day both under static and aeration conditions. (Fig. 3, 4).
8. It was observed that cellular protein content increased during active growth and decreased during autolysis in all the organisms (Fig. 5) and the cellular protein content was more in *C. indicum* than *T. rubrum* and *M. gypseum* on 10th day of incubation. The RNA content was observed to be maximum on 10th day in all the organisms (Fig. 9). But the total DNA content was detected to be maximum on 8th day of incubation in *T. rubrum* and *M. gypseum* and on 10th day in *C. indicum*.

9. The environmental parameters like pH, aeration and temperature also affected the total protein, RNA and DNA contents. The production of the macromolecules were highest at pH 7.5 in all the organisms and at 32°C in *T. rubrum* and at 30°C in *M. gypseum* and *C. indicum* (Fig. 7, 12, 16). Aeration also favoured better growth and greater production of the macromolecules (Fig. 6, 10, 14).

10. All the three organisms needed carbon source, as they did not grow well in the control medium, which lacked any carbon source. Hexose sugars like glucose, fructose supported the best growth of the organisms. Mannitol showed the best growth in *M. gypseum*. Glycerol also helped in the growth of the three organisms. Disaccharide, sucrose was the poor source of carbon for all fungi followed by maltose and lactose. Starch also supported growth in all the three organisms. (Fig. 17, 18).

11. Inorganic nitrogen compounds did not help the organisms in their growth when contrasted with organic ones excepting few variations. Among organic sources *T. rubrum* showed best growth with asparagine, valine and tryptophan. The best growth was observed in *M. gypseum* with valine, tryptophan, histidine and serine and with valine, glycine, serine and asparagine in *C. indicum*. Methionine and cystine were not good inducers of nitrogen (19, 20, 21, 22). NH₄NO₃ was better utilised in all the organisms among the inorganic nitrogen sources (Fig. 23).

12. In the study of the effects of vitamins on the growth, it was observed that they had little or no effect on the organisms. Out of five vitamins tested, biotin was better utilised in *T. rubrum* and *M. gypseum* and pyridoxine in *C. indicum* (Fig. 24, 25). In all cases, inhibition of growth showed a shift of pH to acidic range.

13. The trace elements although supplied in very negligible quantities yet induced good growth in all the organisms. *C. indicum* showed excellent growth with Fe (NO₃)₃.
and CuSO₄. *T. rubrum* showed highest growth with Fe(NO₃)₃, Zinc and Manganese had also stimulatory effects. *M. gypseum* also showed similar results. Trace element mixture also promoted good growth and shift of pH to Alkalinity was observed in all cases (Fig. 26).

14. The study of sulphur requirements showed that inorganic sulphur compounds were better utilised than the organic compounds. MgSO₄ induced the highest growth in all the organisms. Cystine and Methionine inhibited the growth of the organisms and the shift of pH to acidity was observed.

15. The study of effect of the antimycotic anti fungals showed azoles were more effective than polyene antibiotics. Clotrimazole was the most effective on *T. rubrum* and *C. indicum*. But Fluconazole could arrest in vitro growth abruptly in *M. gypseum*. Griseofulvin, Ketaconazole were also more effective than Nystatin (Table 5, 6, 7, 8, 9, 10)

16. Among the heavy metals tested, silver, bismuth, lead and copper had no fungistatic effect on *T. rubrum* (Table 11). Cadmium and mercuric compounds had good fungistatic effect on all the three organisms. Copper was slightly effective in *M. gypseum* and silver in *C. indicum*. (Tables 11, 12, 13).

17. The plant extracts of various types obtained from different plants were found to have pharmaceutical properties and out of 7 plant extracts tested under in vitro conditions on the organisms, it was found that *Azadirachta* oil and *Eucalyptus* oil had very high growth retarding properties on the organisms. The other oils used like *Pongamia* and *Coconut* oils were also effective in comparison to mustard oil and castor oil (Tables 14, 15, 16, 17, 18, 19). The extracts of Curcuma had greater fungistatic effect against all the 3 organisms. Table (20).