DISCUSSION

This study was conducted for a twelf-month period from January through December 1975. The culture plate technique was adopted because of its availability reliability and suitability for comparing the data with those obtained from other parts of the world. By using various solid media for trapping and culturing the fungi, it was possible to accomplish valuable and significant results.

The media selected in this study were potato dextrose agar, coconut medium, modified malt extract and a modified Mehrlich media. Solomon (1967) said that a large number of media were available for culturing fungi. However, none of the medium used approached the ideal of a universal medium. Therefore four kinds of media which promoted growth of mold related to allergy were used for the purpose of complementation.

Wallace et al. (1950) studied the distribution of molds in outdoor and indoor using two kinds of media, Sabouraud's agar and potato glucose agar, at Lexington, Kentucky. With both media Penicillium citrinum, Aspergillus niger and Aspergillus fumigatus were the most common and widely distributed species. Potato glucose agar was more satisfactory medium for a quantitative study of fungal colonies than the Sabouraud medium. Generally, potato dextrose or glucose agar is common by used

for culturing of fungi in the laboratory. The correlated results in the experiment, showed that a large number of Rhizopus (Table 1), and other fungal species such as Cladosporium sp., Curvularia sp. and Aspergillus sp. (Fig 2,6) were trapped at Chulalongkorn University and at Lan Luang on potato dextrose agar. These results were in agreement with those of Solomon (1969).

Coconut medium has never been used as a medium for trapping air-borne fungal spores in previous reports. Since 1958, Pandalai described that coconut juice or liquid endosperm contained quite a number of substances. Following his description, the coconut medium was then prepared and used in this study for trapping air-borne fungi. Our results showed that coconut medium promoted growth of many fungi such as Cladosporium sp., Aspergillus sp. Curvularia sp. and Pullularia sp. All of these genera have been reported as causes of hypersinsitivity. Especially, yeasts and Streptomyces sp. were found in a large number on this medium (Tables 3,4). It might suggested that coconut juice contained essential elements for yeast growth.

It has been reported that ingestion of yeast would lead to allergic reaction. At any rate inhalation of this microorganism has not been identified as a respiratory allergen. It might be a good point to study human hypersensitivity which may be caused by yeasts. It seemed that yeasts and lower fungi

favored coconut medium over other media. This might suggest that lower fungi and yeasts need more essential elements and vitamin than higher fungi.

In India Mishra et al. (1971) reported the periodical fluctuation of aerospora using different culture media at Gorakhur. The media used were the Martin medium, malt extract medium and Cazpek's agar medium. The dominant genera found were Aspergillus, Curvularia, Cladosporium and Helminthosporium, which shown related to allergy. The results shown the correlation with the previous papers for trapping Aspergillus, Cladosporium and Curvularia when modified malt extract was used in this experiment. The interesting point was Pullularia sp. which havey grew on modified malt extract medium in a large number when compared to other media (Fig 4,8). Since Pullularia sp. has not been reported favor on the Martin medium and malt extract which used for plating technique in previous experiments. Therefore modified malt extract medium provided a good condition for growth of Pullularia in Bangkok areas. This might index the dominant species of Pullularia in the atmosphere when compared to neighbour countries.

Swaebly et al. (1960) compared the Mehrlich medium to other media. They found that the modified Mehrlich medium gave a high number of mold colony count per plate than other media. He found that modified Smith-Humfeld salt agar also gave a high

colony counts but the Smith-Humfeld salt medium was limited inability to support the Phycomycetes such as Rhizopus and Mucor. A modified Mehrlich medium, Rooks et al. (1958) used as a culture medium to survey molds in Iowa city. He pointed out that culture plate method have valuable for indication a seasonal trend and incidence of Cladosporium and Alternaria. A modified Mehrlich medium had been used in the study. The results showed highest number of Cladosporium colonies both indoor and outdoor trap at Chulalongkorn University and Lan Luang district. Genera of Curvularia sp., Penicillium sp. and Aspergillus sp. (Fig 5,9) were found respectively smaller number.

Though the probability of a sedimentation of spores on each medium was equal. However, the germination of spores in each medium was depended on its nutritional requirement. Each medium contained specific nutrients which promoted growth for certain kinds of fungal spores. The number of Cladosporium colony on potato dextrose agar, coconut medium and the modified Mehrlich medium found no different. However the modified malt extract medium was limited to promote growth of Cladosporium when compared with other three media. In the other hand a modified malt extract medium promoted better growth of Pullularia species.

The most favorable medium for growing Curvularia was the modified Mehrlich medium. Colony count of Curvularia on the other three media showed almost equal numbers. Aspergillus colonies on the modified Mehrlich medium were less than on the other media. A number of colonies of Penicillium grew well on the modified Mehrlich medium. Both Aspergillus sp. and Penicillium sp. have been identified as a cause of allergy in human. (Gray 1959).

Sorensen et al. (1974) survey of air-borne fungi in United States and Puerto Rico. He reported that the greater concentration of spores of any fungus in the air the greater probability that the fungus would appear on any a plate. Therefore frequency of occurent colonies on plates should reflect the distribution of cultureable spores in the air.

In accordance with Sorensen reports, pool data of the study (Table 17-20) should reflect the distribution of mold spores in the air of Bangkok especially at Chulalongkorn University and Lan Luang district.

Comparative colonial number of top-three dominant genera of indoor and outdoor traps at Lan Luang. The pattern of genera distribution of outdoor and indoor at Lan Luang was different. The results showed higher number of spore of indoor trap than outdoor trap. This was indicated that the indoor area

of sampling had high humidity. There were many papers supported, Richard (1954), Sandhu (1964), Solomon (1967), Criep (1969), that number of fungal spore were increased in damp areas.

Cladsoporium Curvularia and Pullularia were the top-three dominant genera of indoor and outdoor trap at Chulalongkorn University. The followed genera were Aspergillus and yeasts. The pattern of spore distribution of top-three dominant genera of indoor trap was correlated to outdoor trap at Chulalongkorn University. Concentration of spores outdoor trap were higher than indoor trap. This results was compatible to other parts which had been done in circulation areas.

The pool data from four sample sites the results showed the common fungi in atmosphere were Cladosporium, Curvularia, Aspergillus Penicillium, Pullularia and yeasts. When compared genera of fungi found outdoor trap of two sites, Lan Luang and Chulalongkorn University, the top-four genera were Cladosporium, Curvularia, Aspergillus and Pullularia, Seemingly the distribution of spores in the air of two places shown almost the same. This might consider that these four genera are the molds which related to hypersensitivity in Bangkok.

Cladosporium spores showed dominance at two experimental sites in Bangkok was not curious. However it was a common fungus which has been found in the other parts of the world. The incidence of Cladosporium sp. in Bangkok reached high peaks in

November, December andJanuary (Fig 17). Torgow and Plunkett (1951) reported the atmospheric incidence of Cladosporium sp. in the Los Angeles which reached a peak in May June and July. The primary of occurence of Cladosporium spores was not the same because of environmental factors. There was supported paper, which had been done by Frey and Durie(1960), reported the pattern of Cladosporium sp. which showed three peaks in June, September and December in Sydney.

Shapiro et al. (1965) reported that Hormodendrum sp. was the most important fungus found in the survey and caused high percentage of allergy in California. AL-Doory (1966) also found that Hormodendrum sp. was the dominant species in San Antonio, Texas.

Reddi (1970) studied in India found that Curvularia sp. a fungal species which caused of allergy, was the subdomintant genus and had high incidence in August to December. In 1971 Mishra & Srivastava also studied in India found Curvularia sp. was also the subdominant genus in paddy field area and was abundant in November. From this study of two exposure sites in Bangkok, Curvularia sp. showed high colony counts especially in outdoor trap at Chulalongkorn University (Table 20). It was found during rainy season, in June to September.

Pullularia sp. was found high numbers through the study and was high incidence in outdoor trap on modified malt extract

medium at both sampling sites. Goodman et al. (1966) found Pullularia sp. as the dominant genus at Arizona and Lumpkins et al. (1973) supported that Pullularia sp. was isolated more frequently outside air than indoor air. In United States, Sorensen (1974) a studied and found Pullularia sp. was the sub-dominant genus from all sampling sites.

Aspergillus sp. was found in a large numbers on potato dextrose agar, outdoor and indoor traps at Lán Luang and also on modified malt extract medium indoor and outdoor traps at Chulalongkorn University (Table 19,20). Wallace et al. (1950) reported that Aspergillus sp. was the most common fungus which caused allergy, found in Lexington, Kentucky area. This fungus was also reported by alvarez and Castro (1952), was the common fungus encountered in Havana.

Penicillium species was reported by Wallace et al.(1950) and also by Targow and Plunkett (1951) as the common fungus related to allergy in Los Angeles area. From this study found a large number of Penicillium species on potato dextrose agar and on the modified Mehrlich medium indoor trap at Lan Luang.(Table 1,7)

Yeast was reported to be the most common fungi in April by Sandhu et al. in India and by Targow and Plunkett (1951). It was also found in a large numbers in this study throughout the year especially on coconut medium.

Indoor trap and outdoor trap both at Lan Luang and Chulalongkorn University, the incident genera found were shown in common. The data showed molds growing in the house were usually the common atmospheric contaminants. The botanical findings indicated that in the normal house the most important source of air-borne mold spores was the outside air. (Richards and Wales 1954) However, surprising finding was the prevalence of Rhizopus species indoor trap that higher concentration than outdoor trap at Lan Luang. This possibly suggested that at Chulalongkorn University sampling sites appeared to be an open place with good atmospheric ventilation. Mold distribution of indoor trap and outdoor trap were found correlated in numbers and genera. At any rate, Lan Luang, was congestion and dense of buildings which damp and poor ventilation.

Since moisture is required for growth and sporulation of fungi, especially within the house, these places provided an excellent enviroment for the proliferation of fungi on a massive scale.

This phenomenon was supported by Wallace et al. (1950) at Lexington, Kentucky. He found Mucor sp. to be the genus encountered exclusively in indoor trap. This was the significance shown the habitat of Phycomycetes and the sampling site.

Each dominant genera of twelve months were shown in histograms (Fig 10, 12, 14). The fungal spores content of the indoor and outdoor atmosphere of the sampling sites varied from month to month and its pattern depending upon climatic conditions. The met meteorological data was presented in an appendix.

During October to January, which suppose to be winter time the dominant fungi were Cladosporium sp. and Curvularia sp. especially for Cladosporium sp. was abundant.

In summer time, February to May, concentrations of common fungal spore were lower number than in winter time. However, Penicillium sp. and yeasts appeared to be dominant species in this period.

In rainy season, June to September, the concentrations of fungal spores was quite high. The dominant genera were Curvularia sp., Pullularia sp. and Aspergillus sp.

In rainy season, particular high moisture condition, warm temperature and adequate food substrates for fungal growth are most favorable and hence, the maximum air-borne species were recorded during this period of the year. Six genera were considered to be dominances at two sampling sites, Curvularia, Cladosporium, Pullularia, Aspergillus, Penicillium, yeasts and Rhizopus. These organisms have been identified as molds related to hypersensitivity.

However, further experiment need to be done is the colloborative work of mycologist and allergist to study these organisms especially, yeasts and Rhizopus which found to be dominant groups of air-borne fungi in tropical area.