obtained with more refined fluorescent antisera, but it should be borne in mind that a coating of antibody derived from the patient may block specific fluorescence.

SUMMARY

Bacterium-like structures were seen in renal casts in the urine from eight patients with pyelonephritis and from two with glomerulonephritis. Although these structures were morphologically identical with bacteria, an attempt to demonstrate their nature with fluorescent antisera was unsuccessful.

Most of this work was performed in the Radcliffe Infirmary, Oxford, and I am grateful to the clinical staff there for access to their patients and case records.

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BRAIN ABSCESS DUE TO *TRICHOSPORON CUTANEUM*

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PLATE XIII

THERE is increasing awareness amongst clinicians and microbiologists of the importance of infection by "opportunistic" bacterial, fungal or viral organisms. The patient described here had a brain abscess complicating a secondary deposit from a primary bronchial carcinoma; the fungus *Trichosporon cutaneum* was cultured from the abscess contents. We know of no previously recorded association of this organism with cerebral abscess. Although it is a recognised cause of white piedra of hair and occasional nail infections, it is not known to have other pathogenic roles in man.

CASE HISTORY

A. M., an African woman aged 39 yr, was admitted to King Edward VIII Hospital, Durban, from a peripheral hospital, with a 3-wk history of progressive weakness of the right side of the body. A chest radiograph taken at the latter hospital revealed a right-sided hilar mass, and a skull radiograph showed calcification of the falx cerebri, which was central in position.

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CLINICAL FINDINGS

On examination, the patient was fully conscious and afebrile, and appeared to understand the nature of questions put to her, although she was dysarthric. Relevant clinical findings related mainly to the central nervous system. Motor power was diminished in right arm and right leg and she showed right 5th and 7th nerve palsies. There was no increase in tone on the right side. Sensory loss to pain and light touch was demonstrable on the right side of the face, right arm and right leg and right side of the body. The deep reflexes were increased on the right side; the abdominal reflexes were absent on that side and a right extensor plantar response was detected.

Other positive findings of note were a minor degree of deviation of the trachea to the right side and an enlarged solitary lymph-node on the right side of the neck. There was also a large mobile irregular mass arising from the pelvis.

A clinical diagnosis of bronchial neoplasm with metastatic deposits in the brain, and a fibroid of the uterus, was made, although the possibility of an ovarian neoplasm could not be excluded.

RESULTS OF FURTHER INVESTIGATIONS

On admission to King Edward Hospital a second skull radiograph was taken. This was 3 wk after the first radiograph and showed extensive shift of the calcified falx cerebri to the right side.

Examination of the blood revealed a haemoglobin value of 13.4 g per 100 ml and a total leucocyte count of 6000 per μ l with normal differential count. The Wassermann reaction was negative. Cerebrospinal fluid was under increased pressure, but no chemical or cellular abnormalities were detected and cultures were sterile.

In spite of the hilar mass, cytological examination of the sputum failed to reveal malignant cells and biopsy of the enlarged lymph-node in the neck showed only non-specific lymphadenitis.

A brain scan was performed with technetium-99m and a lesion in the left parietal area was demonstrated.

Bronchoscopy showed that the hilar mass was a large tumour arising from the right intermediate bronchus.

Surgical intervention was contra-indicated by these findings. The patient's condition deteriorated rapidly and she died 4 wk after admission.

NECROPSY FINDINGS

The salient post-mortem findings were (a) considerable emaciation (weight 100 lb., i.e., 45 kg); (b) a well-circumscribed yellowish-white solid tumour approximately $5\frac{1}{2} \times 5 \times 4$ cm present in the hilar region of the right lung; and (c) secondary tumour deposits in the brain. The latter consisted of an extensive cystic swelling located in the left cerebral hemisphere and mainly involving the frontoparietal region, a smaller area of necrosis and cavitation in the right internal capsule and in the region of the basal ganglion, and a gelatinous lesion in the right cerebellar hemisphere. In addition, a calcified cysticercus lesion was found in the left occipital lobe. There were small petechial haemorrhages in the brain-stem. The falx cerebri showed osseous metaplasia.

No secondary lesions were found in any other tissue.

The histological appearances of the lung tumour were those of an adenocarcinoma of the bronchus with many areas of tumour necrosis and infiltration with polymorphonuclear cells.

Histologically the brain lesions show metastatic deposits. In addition, at the periphery of these areas are large numbers of small (2–5 μ m) round, deeply staining basophilic bodies resembling yeast-phase structures (figure). These occur both singly and in clusters, the latter ranging in size from 10 to 40 μ m. Many of the clusters show a pale structureless central zone. Occasional filaments resembling hyphae were also observed. There is infiltration of necrotic

TRICHOSPORON CUTANEUM BRAIN ABSCESS

FIGURE.—Brain. Area of metastatic deposits with collections of deeply staining basophilic bodies resembling fungal elements in the yeast phase. Haematoxylin and eosin. $\times 720$.

areas with polymorphonuclear leucocytes and eosinophils. The basophilic bodies were PAS-negative and no similar structures could be found in the lung sections.

There was a large calcified subserous fibromyoma of the uterus.

MYCOLOGICAL FINDINGS

No fungal elements were observed in direct microscopical preparations of pus from the brain abscess. However, culture on Sabouraud's glucose agar at 25°C yielded a soft cream-coloured colony within a few days and this later became wrinkled and grey. Microscopical preparations demonstrated septate hyphae with numerous arthrospores.

Further identification of the fungus was kindly undertaken at the Commonwealth Mycological Institute, Kew, by Miss P. M. Stockdale. The organism produced blastospores as well as arthrospores. This property and the results of biochemical tests indicated that the isolate was *Trichosporon cutaneum*.

Repeated mycological cultures from the lung tumour failed to grow a similar organism, but yielded a scanty growth of *Candida albicans*.

DISCUSSION

Trichosporon cutaneum species is a member of the subfamily *Trichosporoideae* in the family *Cryptococcaceae*. A normal inhabitant of the soil, it may be found on occasion on human skin as part of the normal flora and may cause finger-nail infection. It is also a cause of white piedra which is more commonly associated with *Trichosporon beigeli*. This condition occurs not uncommonly in temperate zones and has been recorded in Europe, Britain and Japan as well as in tropical zones of South America.

The increasing importance of opportunistic infection by fungi is well documented in the Ciba Foundation Symposium on Systemic Mycoses (Baker, 1968). Apart from occasional examples that occur *de novo*, opportunistic mycoses fall into three categories according to the major precipitating factors, namely (1) those associated with other diseases; (2) those arising as complications of drug therapy, either resulting from alterations of normal bacterial flora, e.g., by antibiotic therapy, or from the depression of immune function by cytotoxic agents; and (3) those associated with either hypogammaglobulinaemia or dysimmunoglobulinaemia. The use of immuno-suppressive drugs in transplant surgery and in treatment of auto-immune disease is likely to bring further unusual pathogens to our notice.

SUMMARY

Trichosporon cutaneum, the causative organism of white piedra, was isolated from a brain abscess superimposed on a secondary metastatic deposit from a bronchial adenocarcinoma.

We are indebted to Mr A. Johnston and Miss P. M. Stockdale of the Commonwealth Mycological Institute, Kew, for their assistance in identifying the fungus, and to Dr I. G. Murray, School of Hygiene and Tropical Medicine, London, who confirmed the identification at Miss Stockdale's request.

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