OERSKOVIA SPECIES: RARE OPPORTUNISTIC PATHOGENS

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PLATE XLI

OERSKOVIA species are nocardia-like bacteria found in the soil in many parts of the world. Although Sottnék et al. (1977) characterised 35 isolates from a variety of human sources, the clinical information that would allow definite attribution of a pathogenic role to any was lacking. The only clinical report of human infection caused by this genus was of a case of endocarditis after a heart-valve replacement (Reller et al., 1975). We report a case of pyonephrosis from which a member of the genus Oerskovia was isolated in circumstances that render its significance likely.

CLINICAL HISTORY

A farmer's wife, aged 47, was admitted to hospital in December 1977, complaining of pain in the right loin, general malaise, loss of appetite and a fall in weight of about 7 kg during the past three months. She had been admitted to hospital with 'kidney trouble' during her second pregnancy some years before. She was afebrile, but pale and unwell, and a large firm, smooth mass was palpable in the right hypochondrium. The erythrocyte sedimentation rate was 129 mm in 1 h (Westergren), haemoglobin 8.7 g/dl and WBC 13.0 x 10^9/litre with 83% neutrophils. Excretion urography revealed a non-functioning right kidney and a large right renal shadow. The patient was given a blood transfusion and a right nephrectomy was performed. She was discharged on the ninth day and has remained well since.

LABORATORY INVESTIGATIONS

The kidney consisted of a grossly dilated, pus-filled pelvi-calyceal system with almost complete destruction of the overlying cortex. Two large laminated stones were impacted in the ureter and the hilar lymph nodes were enlarged. Microscopy confirmed the pyonephrosis, but neither acid-fast bacillina nor other bacteria were demonstrable. Moderate numbers of polymorphonuclear cells, but no bacteria, were seen in gram-stained smears of the pus.

Culture of the pus on nutrient and horse-blood agars yielded an abundant pure growth of 2-mm diameter, high-domed, bright yellow colonies with smooth shiny surfaces and sharp entire borders, after overnight incubation. Gram's stain revealed extensively branched gram-positive rods with rather irregular outlines. Although initial appearances suggested Corynebacterium or Nocardia, some features were incompatible with these genera: rapid growth, excellent growth in anaerobic as well as aerobic conditions, fermentative rather than oxidative utilisation of sugars, and morphological features such as the marked degree of branching and the lack of aerial mycelium. Also acid-fastness was not demonstrated when smears were stained by the Ziehl-Neelsen and Kinyoun methods (Paik, 1970). The isolate grew well at room temperature and at 37°C, but not at 42°C, and was non-motile at all stages of growth. After a few days at room temperature the colonies developed a striking filamentous border which penetrated into the agar (fig. 1). Electronmicroscopy confirmed the presence of non-flagellate, irregular, branched rods and filaments (fig. 2). On prolonged culture the filaments fragmented into regular, gram-positive, non-sporing and non-motile coccobacilli.

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The bacterium was catalase positive and oxidase negative, and reduced nitrate to nitrite; gelatin, starch, DNA and urea were all hydrolysed. Glucose, melibiose and rhamnose were fermented; inositol, mannitol, raffinose and sorbitol were not. It was resistant by disc testing (Stokes and Waterworth, 1972) to benzylpenicillin, tetracycline, erythromycin, kanamycin and sulphonamide, and sensitive to ampicillin, cephaloridine, co-trimoxazole, streptomycin, gentamicin and amikacin.

The organism was referred to the American Type Culture Collection who placed it in the group 'non-motile Oerskovia' (NM0) on the basis of cellulase production, failure to break down into coccoïd forms in liquid trypticase-soy medium at 23°C, and lack of motility.

**Serology.** The patient's serum, taken a few months after her recovery, was tested for the presence of agglutinating antibodies to whole-cell suspensions of the Oerskovia strain treated by heat (100°C for 15 min.) and by formaldehyde. The patient's serum agglutinated heat-treated cells to a titre of 320, as did an antiserum prepared in rabbits by the injection of heat-treated cells, while six of 12 sera, selected randomly from those found negative in salmonella or brucella agglutinin tests, did so at titres of 80 or 160. Titres to the formaldehyde-treated antigen were generally one dilution lower. Absorption of the sera with the antigen reduced all titres to less than 20.

Attempts to isolate this bacterium from the soil on the patient's farm have proved unsuccessful.

**DISCUSSION**

The genus *Oerskovia* was separated from the genus *Nocardia* in 1970 on the basis of significant morphological and biochemical characteristics (Prauser, Lechevalier and Lechevalier, 1970). Originally described by Orskov in 1938, these bacteria were characterised by Erikson (1954) who designated them *Nocardia turbuta* n.sp. When further studies (Prauser, 1970; Sukapure *et al.*, 1970) revealed that, in contrast to the true nocardias, *N. turbuta* fragmented into motile rods, lacked aerial mycelium and had a distinctive cell wall containing large amounts of galactose, the new genus, *Oerskovia*, was proposed. Goodfellow's (1971) extensive taxonomic study of nocardioform bacteria strongly supported the proposition. A second species, *O. xanthineolytica*, found in soil, organic matter and aluminium hydroxide gel, was later added, and at the same time several strains of non-motile, nocardia-like soil bacteria were recognised as bearing a close resemblance to oerskovias and were given the name 'non-motile oerskovia-like organisms', or NMO (Lechevalier, 1972). Though the taxonomic position of the NMO is not yet officially defined, they fit much better into the *Oerskovia* genus than into any other.

The strain described in this paper differs from *O. turbuta* and *O. xanthineolytica* in its lack of motility, its ability to produce cellulase, its failure to hydrolyse casein, and certain sugar fermentation reactions. It corresponds most closely to, but is not identical with, the A-5 subgroup of Sottnek *et al.* (1977).

During 20 years, the Center for Disease Control, US Public Health Service, Atlanta, Ga, collected 57 clinical isolates of suspect organisms, most of which have subsequently been placed in the *Oerskovia* genus (Sottnek *et al.*, 1977). Of nine *O. turbuta* strains five were isolated from heart valves or heart tissue, and of 26 *O. xanthineolytica* eight were found in blood. The remainder came from various superficial sites (wounds, ears, tear duct) and deep situations (liver biopsy, pleural fluid, sputum, urine). Of the eight NMO in this collection three were isolated from cerebrospinal fluid and three from blood. For many of these isolations clinical significance seems likely, but details were not available to substantiate such a view.

The proven case of endocarditis occurred in a man who had a valve homograft inserted because of severe aortic insufficiency, associated with ankylosing spondylitis of 20 years standing, after ileal resection for Crohn's disease. He was taking prednisone 20 mg daily. *O. turbuta* was isolated from blood cultures on 29 occasions. He was cured by further valve replacement after failure of treatment with co-trimoxazole, to which the organism was sensitive *in vitro*, to eradicate the infection. Though preoperative culture of the homograft valve was negative,
FIG. 1.—Colonies of *Oerskovia* on nutrient agar, showing the penetration of filaments from the edge of the colony. × 4.

FIG. 2.—Electron photomicrograph of *Oerskovia*, showing pleomorphism and irregular branched filaments. × 11 700.
seven previously harvested valves had been discarded because of contamination with *O. turbata* (Reller et al., 1975).

The clinical significance of the organism in our own case seems hard to deny: pure abundant culture from a closed lesion, the presence of obstruction providing circumstances for opportunistic infection, and an apparently raised serum antibody level. The source is unknown. While the nature and specificity of the serological reactions of the group have yet to be studied, our findings suggest that contact with this organism may not be uncommon.

**Summary**

The second documented instance of opportunistic infection by member of the genus *Oerskovia* is reported. There is some evidence to suggest that this group of bacteria, which is extensively distributed in the soil, may be more closely associated with man than has hitherto been supposed.

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**REFERENCES**


