SHORT COMMUNICATION

Reclassification of Corynebacterium pyogenes (Glage) in the Genus Actinomyces, as Actinomyces pyogenes comb.nov.

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(Received 7 January 1982)

Corynebacterium pyogenes (Glage) differs to such an extent from the type species of Corynebacterium, Corynebacterium diphtheriae (Lehmann and Neumann), that it cannot be retained in this genus. Numerical phenetic and chemical data indicate a close relationship between Corynebacterium pyogenes and the species Actinomyces bovis (Harz). It is proposed that Corynebacterium pyogenes be reclassified in the genus Actinomyces, as Actinomyces pyogenes (Glage) comb.nov.

The taxonomic position of Corynebacterium pyogenes, causative agent of summer mastitis in cattle and a variety of pyogenic infections in other farm animals and man, has always been controversial. The species bears little similarity to other animal or human corynebacteria and its retention within the genus Corynebacterium has been questioned by several workers (Cummins & Harris, 1956; Barksdale et al., 1957; Barksdale, 1970; Jones, 1975; Slack & Gerencser, 1975; Goodfellow et al., 1976; Minnikin et al., 1978; Collins et al., 1982a).

Cummins & Harris (1956), on the basis of cell wall studies, suggested a close relationship between C. pyogenes, bacteria named ‘Corynebacterium haemolyticum’ and certain streptococci. This view was supported by Barksdale et al. (1957) and these authors further suggested that ‘C. haemolyticum’ was a mutant form of C. pyogenes and both should be classified in the genus Streptococcus. In the 8th edition of Bergey’s Manual of Determinative Bacteriology, however, both taxa are listed in an addendum to the genus Corynebacterium (Cummins et al., 1974). Later, Slack & Gerencser (1975) tentatively suggested a relationship between C. pyogenes and Actinomyces bovis.

Recent numerical phenetic (Schofield & Schaal, 1981; Jones & Collins, unpublished) and chemical (Collins et al., 1982a, b) studies have indicated that C. pyogenes and ‘C. haemolyticum’ are distinct taxa. Collins et al. (1982b) have proposed that ‘C. haemolyticum’ be reclassified in a new genus, Arcanobacterium, as Arcanobacterium haemolyticum. In the earlier paper, good evidence was presented for the reclassification of C. pyogenes in the genus Actinomyces (Collins et al., 1982a). Further critical assessment of these data together with a re-examination of some cultural, morphological and biochemical features of strains of C. pyogenes supports our earlier suggestion (Collins et al., 1982a) that C. pyogenes is closely related to Actinomyces bovis, the type species of the genus Actinomyces. We therefore formally propose that bacteria presently designated C. pyogenes (Glage) be reclassified in the genus Actinomyces (Harz) as Actinomyces pyogenes comb.nov.
Description of Actinomyces pyogenes comb.nov.

This description is based on the studies of Cummins & Harris (1956), Barksdale et al. (1957), Roberts (1968), Barksdale (1970), Cummins (1971), Cummins et al. (1974), Jones (1975), Slack & Gerencser (1975), Goodfellow et al. (1976), Schofield & Schaal (1981), Holländer & Pohl (1980), Collins et al. (1982a) and our own observations.

Surface colonies of Actinomyces pyogenes on blood agar (incubated for 1–2 d) are non-pigmented, tiny, circular, low convex and surrounded by a zone of β-haemolysis which may be two to three times the diameter of the colony. Growth is sparse on nutrient agar but is much enhanced by blood, serum or Tween 80. On serum slopes, pits of liquefaction form around the colonies.

Gram stains of cultures grown on blood agar show slender, irregular bacillary forms (0.2–2 μm). Chains of coccoid forms resembling streptococci may be seen but short, diphtheroid forms normally predominate. All forms are Gram-positive but may decolorize easily. The organisms are non-motile, non-acidfast, and endospores are not formed.

Actinomyces pyogenes is facultatively anaerobic. Its growth is considerably enhanced by CO₂ (5–10%). The optimum temperature for growth is 37 °C and the temperature range of growth is from 20 to 40 °C. The organism will not withstand heating at 60 °C for 15 min. It is catalase negative (though weak catalase production has been noted; Cummins et al., 1974), but contains cytochromes (Roberts, 1968). The oxidase reaction is negative. Acid but no gas is produced from glucose. Acid is also usually produced from cellobiose, galactose, fructose, lactose, laevulose, maltose, mannose, dextrin, ribose, starch and xylose and may be produced from glycerol, sucrose and trehalose. Acid is rarely, if ever, produced from amygdalin, coniferin, dulcitol, inulin, raffinose or salicin. Litmus milk is acidified and the clot is digested. Casein is hydrolysed and DNAase is produced. The organism is methyl red and Voges–Proskauer negative, and does not reduce nitrate or hydrolyse aesculin. Indole, urease and H₂S are not produced.

The cell wall peptidoglycan of Actinomyces pyogenes is based on lysine, and glutamic acid and alanine are also present. The cell wall sugars are glucose and rhamnose. Mycolic acids are not present. The fatty acids are primarily straight-chain saturated and monounsaturated (oleic acid series) acids. The major fatty acids are tetradecanoic, hexadecanoic and octadecenoic acids. The principal isoprenoid quinones are tetrahydrogenated menaquinones with ten isoprene units. The G + C content of the DNA is 58 ± 1 mol%. The type strain of Actinomyces pyogenes is ATCC 19411.

REFERENCES


