Status of the Name *Proteus morganii* and Designation of the Neotype Strain

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In 1906, Morgan described a new bacterium, referred to merely as "Bacterium No. 1," which he isolated from the intestines and feces of patients suffering from infantile diarrhoea. The first to name this organism were Winslow et al. (1919), who called it *Bacillus morgani* (sic). Subsequent authors transferred Morgan's organism to a number of different genera. Among these was Rauss (1936), who stated that Morgan's bacillus belongs to "the *Proteus* group," but who did not use or propose a scientific name for the organism. In 1939 Yale described Morgan's "Organism No. 1" under the scientific name "*Proteus morganii* (Winslow et al.) Rauss." The questions arise whether the name *Proteus morganii* was validly published and, if so, by whom? It is clear that Yale was the first to propose the name *P. morganii*, although he attributed the name to Rauss, apparently because Rauss was the first to suggest placement of Morgan's bacillus in *Proteus*. Therefore it was Yale, not Rauss, who validly published the name *P. morganii*, and Yale, not Rauss, should be cited as the author of this name. ATCC 25830 (ATCC 8076h; NCTC 235), described herein, is designated as the neotype strain for *P. morganii* Yale.

In his studies on the bacteriology of summer diarrhoea of infants, Morgan (9) isolated a previously unrecognized organism of pathogenic importance from the intestines and feces of patients suffering from infantile diarrhoea. Morgan described the organism but did not name it, referring to it merely as Bacterium No. 1. Winslow et al. (14), the first to name the organism, called it *Bacillus morgani* (sic). [Although Winslow et al., the authors who first named this organism, spelled the specific epithet as "*morgani*," the epithet has been orthographically corrected to "*morganii*" in accordance with Recommendation 27e(2) of the Bacteriological Code (see reference 8).] Subsequently the organism was placed in the genus *Salmonella* by Castellani and Chalmers (2), in *Bacterium* by Holland (7), in *Escherichia* by Thjøtta (13), and in *Morganella* by Fulton (6). Rauss (10) stated that "Morgan's bacillus No. 1" belonged to the "*Proteus* group." However, Rauss neither used nor proposed a scientific name for Morgan's organism. Yale (15) was the first to propose the name *Proteus morganii* for Morgan's bacillus No. 1. Although Yale cited Rauss (10) as the author of *P. morganii*, as mentioned above, Rauss neither used nor proposed this name. References to the

name *P. morganii* subsequent to its proposal by Yale cite either Rauss (4, 5, 11, 12) or Yale (1) as the author. However, the indications are clear that Yale was the first to propose the name *P. morganii* even though he attributed the name to Rauss, apparently because Rauss was the first to place Morgan's bacillus in *Proteus*. Regardless of the reason why Yale cited Rauss as the author, the fact remains that it was Yale who made the combination *P. morganii*, and Yale, not Rauss, should be cited as the author of the name *Proteus morganii*.

It appears that none of Morgan's original isolates of the organism now known as *P. morganii* exist; therefore a neotype strain should be designated.

MATERIALS AND METHODS

Strain. ATCC 25830 (= ATCC 8076h = NCTC 235 = 33 MO) was isolated by H. de R. Morgan from a case of diarrhoea.

Methods. Aside from the determination of pathogenicity, the methods used in characterizing the neotype strain are those given by Edwards and Ewing (3). In determining pathogenicity, Morgan fed young rats half an agar tubefull and young rabbits a whole tubefull of the organism. The animals usually died within 24 hr, death being preceded by violent diarrhoea. In the determination of pathogenicity of the

TABLE 1. *Description of Proteus morganii and its neotype strain*

Characteristic	Morgan's Bacterium No. 1 ^a	Neotype strain (ATCC 25830)	<i>Proteus morganii</i> ^b (%+)
Gram-negative rods		+	+
Motility	+	+	±
Peritrichous (Fig. 1)	+	+	+
Oxidase		—	—
Nitrate reduction		+	+
Potassium cyanide		+	+
Phenylalanine deaminase		+	+
Hydrogen sulfide		—	—
Gelatin liquefaction		—	—
Pectate liquefaction		—	—
Indole	+	+	+
Methyl red		+	+
Voges-Proskauer		—	—
Citrate (Simmons)		—	—
Malonate		—	
Litmus milk (alkaline)	+		
Lysine decarboxylase		—	—
Arginine dihydrolase		—	—
Ornithine decarboxylase		+	+
Urease		+	+
Adonitol		—	—
Amygdalin	—	—	
Arabinose	—	—	
Cellobiose		—	
Dextrin	—	—	
Dulcitol	—	—	
Erythritol	—	—	
Fructose	+/+	+	
Galactose	+/+	+/+	
Glucose	+/+	+/+	+/+
Glycerol		(+)	
Inositol		—	—
Inulin	—	—	
Lactose	—	—	
Maltose	—	—	—
Mannitol	—	—	—
Raffinose	—	—	
Rhamnose		—	
Salicin	—	—	—
Sorbitol	—	—	
Sucrose	—	—	—
Trehalose		—	
Xylose		—	—
Pathogenicity:			
rabbits	+	—	
rats	+	—	

^a Morgan (reference 9, p. 910).^b Edwards and Ewing (reference 3, p. i, iv, and 231).

neotype strain, albino rats approximately 8 weeks old and weighing between 101 and 125 g and albino rabbits approximately 6 weeks old and weighing between 3 lb and 3 lb, 15 oz were used. Each of the animals

was fed 3 ml of nutrient broth containing 1.52×10^{12} organisms. Control animals were fed 3 ml of sterile nutrient broth. The animals were observed for 9 days, during which time none of them died or became ill.

Fig. 1. Peritrichous cells of *Proteus morganii* ATCC 25830. Twenty-four-hour broth culture at 26 C. Staining by Leifson's method. $\times 1,200$. Left: single, lateral flagellum; this is frequently the predominant form. Right: multitrichous.

DISCUSSION

Winslow et al. (14) regarded strain 692 [ATCC 8076d; ATCC 25829 (ATCC, American Type Culture Collection, Rockville, Md.); NCTC 417 (NCTC, National Collection of Type Cultures, London)] of the American Museum of Natural History collection as the type of *Bacillus morgani*. However, this strain was isolated by H. E. Smiley from the stool of an infant at the Providence City Hospital, Providence, R.I. Because this strain is not one of the strains on which Morgan's original description was based, it cannot be designated as the type strain. Although one of Morgan's strains of this organism does exist (ATCC 25830), there is no evidence that it is one of the strains on which he based his original description. Strain ATCC 25830 is therefore here designated as the neotype strain of *P. morganii*. A description of the neotype strain as well as the original description of organism no. 1 by Morgan and a description of the current concept of *P. morganii* are given in Table 1. From the data presented, it is clear that the characters of ATCC 25830, the neotype strain of *P. morganii*, agree not only with those recorded in Morgan's original description (with the exception of pathogenicity) but also with the current concept of *P. morganii*. There are many factors which affect pathogenicity, and for this reason pathogenicity is generally of little value as a taxonomic characteristic. Therefore, the fact that the neotype strain does not agree with respect to pathogenicity with the original description does not detract from its suitability to serve as the neotype. The neotype strain does possess all of those characteristics of *P. morganii* which are currently of taxonomic and diagnostic importance.

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