A COMPARISON OF *PSEUDOMONAS TESTOSTERONI*
AND *COMAMONAS TERRIGENA*¹

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ABSTRACT. The type strain of *Pseudomonas testosteroni* Marcus and Talalay 1956, ATCC 11996, is compared with the proposed neo-type strain of *Comamonas terrigena* (Günther) Hugh 1962, ATCC 8461. *P. testosteroni* has the same general characteristics as *C. terrigena* and the name of the former is a junior synonym of the latter. The name *Pseudomonas terrigena* (Günther) comb. nov. is proposed.

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INTRODUCTION

The isolation of "an unidentified, Gram-negative bacillus" which utilized testosterone as a sole source of carbon was reported by Talalay, Dobson and Tapley in 1952. It was isolated by enrichment culture from soil obtained in Berkeley, California and was named *Pseudomonas testosteroni* by Marcus and Talalay in 1956. It was described as a strict aerobe with optimal growth at about 30°C, asporogenous, nonpigmented, Gram-negative, straight rod with a single polar flagellum. The description was based on the study of one strain, which is the type strain by monotypy. Paul Talalay deposited this strain in the American Type Culture Collection (ATCC) in January 1955 where it was assigned an accession number 11996 and preserved. *P. testosteroni* is a validly published microbial name.

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Günther (1894) isolated from surface soil a schizomycete which he described and named Vibrio terrigenus. Hugh (1962) proposed a neotype strain (ATCC 8461) for Günther's organism, which he regarded as identical with Comamonas percolans (Mudd and Warren 1923) Davis and Park 1962. For this organism Hugh proposed the new combination Comamonas terrigena (Günther), of which Comamonas percolans becomes a later subjective synonym.

ATCC strain 8461 was accessioned by the ATCC in 1942 from the National Collection of Type Cultures (NCTC) as Vibrio percolans Mudd and Warren NCTC 1937. This strain is the type for Vibrio percolans and Lophomonas alcaligenes as well as the proposed neotype for Vibrio terrigenus and Comamonas terrigena (Hugh 1962).

The following names (synonyms) have been used for:

Vibrio terrigenus Günther 1894, 721.

Microspira terrigena (Günther) Mez 1898, 65

Spirillum terrigenum (Günther) Migula 1900, 1017.

Vibrio percolans Mudd and Warren 1923, 447.

Lophomonas alcaligenes Galarneau and Leifson 1956,
102.

Comamonas percolans (Mudd and Warren) Davis and
Park 1962, 101.

Comamonas terrigena (Günther) Hugh 1962, 34.

Descendants of the above-described strains of P. testosteroni and C. terrigena have been accessioned by several culture collections, and carry the corresponding strain numbers recorded in Table 1.

The purpose of this report is to compare the morphological and physiological characteristics of P. testosteroni ATCC 11996 with the proposed neotype strain of C. terrigena ATCC 8461 and to evaluate the desirability of retaining two different names for these two schizomycetes.

MATERIALS AND METHODS

P. testosteroni and C. terrigena were obtained from ATCC in 1960 and 1951 respectively. The procedures used to study these strains were described by Hugh and Ryschenkow (1961) and Hugh (1964). The effects of the bacteria on

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sugars and alcohols were determined in oxidative-fermentative (OF) medium (Hugh and Leifson 1953 - Difco 0688).

Table 1. Corresponding strain numbers for Pseudomonas testosteroni and Comamonas terrigena.

	ATCC	NCTC	NCIB	NRRL	CCM	RH
<u>P. testosteroni</u>	11996			B-2611		1104
<u>C. terrigena</u>	8461	1937	8193	B-781*	1631	247

Key:

ATCC American Type Culture Collection, Rockville, Md.
 NCTC National Collection of Type Cultures, London.
 NCIB National Collection of Industrial Bacteria, Aberdeen
 NRRL Northern Utilization Research and Development
 Division, U.S. Department of Agriculture, Peoria
 (formerly Northern Regional Research Laboratory).
 CCM Czechoslovak Collection of Microorganisms, J.E.
 Purkyne University, Brno, CSSR.
 RH Rudolph Hugh
 * also NRRL B-1055.

RESULTS

The results of these observations are recorded in Table 2. The distinctive tuft of polar flagella of ATCC strain 11996 is illustrated in the photomicrograph (Figure 1).

DISCUSSION

Marcus and Talalay (1956) described ATCC 11996 as a motile organism with a single polar flagellum. Some cells of this strain in an 18-hour brain-heart infusion broth culture possess a single polar flagellum but many of the cells have a tuft of 3-6 polar flagella. The polar attachment of the tuft of flagella and the shape of the flagella are similar to the flagellation of ATCC 8461. The flagellar morphology of ATCC 8461 has been described (Hugh 1962) and illustrated in the photomicrograph published by Leifson and Hugh (1953, Fig. 14).

Table 2. Characteristics of Pseudomonas testosteroni and Comamonas terrigena.

	ATCC strain no.	
	11996	8461
Gram-negative; rod-shaped	+	+
Spores	-	-
Motility; tuft of polar flagella; flagellar wavelength approximately 3.1 μ	+	+
Growth at 21° and 37°C	+	+
Growth at pH 4.5; adonitol; l-arabinose; Cellobiose; dextrose (open) (sealed) and (gas)	-	-
Dulcitol (dulcitol); ethanol, 3%; d-fructose	-	-
d-Galactose; l-inositol; inulin (from Dahlia)	-	-
Lactose; maltose; d-mannitol (mannite)	-	-
d-Mannose; melezitose; melibiose; raffinose	-	-
Rhamnose; d-ribose; salicin; d-sorbitol	-	-
Sucrose; trehalose; d-xylose; indole	-	-
Methyl red; acetylmethyl carbinol	-	-
Citrate (Simmons) and (Christensen)	+	-
Catalase; indophenol oxidase	+	+
Gelatin-charcoal; hydrogen sulfide (Kligler)	-	-
2-Ketogluconate; malonate	-	-
l-Lysine decarboxylase-ninhydrin	-	-
Nitrate to gas	-	-
Nitrate to nitrite	+	+
Phenylalanine deaminase	-	-
Growth in potassium cyanide broth (Møller)	-	-
Urea (Christensen)	-	+
l-Lysine, l-arginine and l-ornithine (Møller)	-	-
Pigment-water soluble	-	-
% Guanine plus cytosine composition	61.1	64.6

Figure 1. Pseudomonas testosteroni ATCC 11996 showing 2 cells undergoing division. Each of the 4 new cells show a tuft of polar flagella. Leifson flagella stain, X 2,000.

ATCC 11996 grew abundantly in neutral brain heart infusion broth at 37°C and has been reported to utilize camphor as a sole carbon source (Jacobson et al. 1964). The molar guanine plus cytosine (GC) content of DNA for strains 8461 and 11996, reported in Table 2, was determined by Sebald and Véron (1963) and Véron (correspondence 1964) respectively.

ATCC 11996 possesses the characteristics attributed to it by Marcus and Talalay (1956) and is here designated as the type strain of P. testosteroni. The above description of this strain will serve to supplement the description as given by Marcus and Talalay (1956).

ATCC strains 11996 and 8461 have the same 9 positive characteristics and the same 43 negative characteristics enumerated in Table 2. The two strains differ in the citrate and urea reactions. The type strain of P. testosteroni

appears to possess the same general characteristics as the proposed neotype strain of C. terrigena. These two strains appear to be similar enough to be included in the same species. P. testosteroni Marcus and Talalay (1956) is a junior synonym of the basionym Vibrio terrigena Günther 1894.

Shewan, Hobbs and Hodgkiss (1960, 384), Colwell and Liston (1961, 13), Colwell and Mandel (1964, 1420), and DeLey (1964, 34), suggest that ATCC strain 8461 is a pseudomonad. On the basis of these observations and conclusions the new combination Pseudomonas terrigena (Günther) is recommended. DeLey (1964) emphasized the need for more research to establish the need for the generic name Comamonas Davis and Park 1962.

Leifson and Galarneault (1956) reported that Lophomonas alcaligenes (C. terrigena) had flagella and a physiology similar to that of organisms in the genus Spirillum. The relationship of Comamonas to Spirillum by means of numerical taxonomy and DNA base composition has not been reported.

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