vation of significant population shifts. Due to its slower rate of hydrolysis, it is possible that resistant starch is degraded throughout the colon while lactulose hydrolysis and fermentation mainly occur in the proximal colon.

***In vitro* degradation of starch by *Bacteroides thetaiotaomicron* alone or in association with a human H_2-utilizing acetogenic bacterium.** V Rochet, A Bernalier, M Durand *(INRA, laboratoire de nutrition et sécurité alimentaire, 78350 Jouy-en-Josas, France)*

Starch that escapes digestion in the small intestine may constitute an important source of carbohydrates for colonic bacteria. Its degradation and fermentation by amylolytic bacteria produced short-chain fatty acids (SCFA) and the gases H_2 and CO_2. In methane-excreting subjects, H_2 can be reutilized *in situ* by methanogens. However it has recently been shown that when methanogenesis is low reductive acetogenesis ($4\ H_2 + 2\ CO_2 \longrightarrow 1$ acetate $+ 2\ H_2O$) may become a significant pathway of H_2 disposal (Bernalier *et al* (1994) *In: Nouvelles tendances en microbiologie anaérobie* SFM, Paris, 110-118).

The objective of the present work was to investigate *in vitro* the interactions that occur during starch hydrolysis between *Bacteroides thetaiotaomicron,* a hydrolytic bacterium of the dominant colonic flora, and an H_2-utilizing acetogenic bacterium, strain M5a3, isolated in our laboratory from human feces (Decaudin *et al* (1994) *In: Nouvelles tendances en microbiologie anaérobie* SFM, Paris, 304-307).

The kinetics of the starch degradation was studied in monoculture *(B thetaiotaomicron)* and coculture (*B thethaiotaomicron* + M5a3) after 1–8 d of incubation at 37°C. The substrate consumption was assayed enzymatically (Boehringer assay). The glucose liberated from the starch was measured by the GOP method. The fermentation products (gases and SCFA) were analysed by gas chromatography and the ethanol was determined enzymatically (Boehringer assay).

The addition of acetogenic bacterium induced an increase in the rate of starch hydrolysis by *B thetaiotaomicron.* The maximum extent of starch degradation was obtained after 3 d of coculture compared with 8 d in monoculture.

The hydrogen concentration in the coculture was always lower than in the monoculture (43 µmol/l *vs* 135 µmol/l respectively), where it accumulates, which indicates that the acetogenic bacterium was able to use the H_2 produced by the hydrolytic bacterium. Acetate, propionate and succinate were always the main products of the starch metabolism. However, a change in the fermentation pattern was observed in the presence of the acetogenic strain. The acetate concentration was higher in coculture (15.1 mmol/l *vs* 7.2 mmol/l in the monoculture). As the increase in acetate production was concomitant with a decrease in the H_2 concentration, it could be partly due to its formation by the strain M5a3 which mainly produces acetate from H_2/CO_2 metabolism. Nevertheless the existence of an interspecies H_2-transfer inducing a shift in the metabolism of *B thetaiotaomicron* to acetate is also likely.

This work demonstrates the existence of an interrelationship between *B thetaiotaomicron* and an acetogenic bacterium leading to a faster degradation of starch. It also suggests that in the colonic ecosystem, reductive acetogens have a significant effect in H_2-reutilization and acetate formation *in vivo.*

Distribution of elastase I and II messenger RNAs in calf tissue. I Le Huerou-Luron, M Gestin, R Toullec, P Guilloteau *(INRA,*