STUDIES IN BACTERIOSIS. VII

COMPARISON OF THE "STRIPE DISEASE" WITH THE "GRAND RAPIDS DISEASE" OF TOMATO

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IN the course of an investigation of the "Stripe Disease" of tomatoes a yellow organism was frequently found associated with the causal organism. The properties of this organism were so similar to those of *Aplanobacter michiganense*, E.F.S. (1) as to suggest close relationship with it, and in a former communication (2) the question was raised whether on further investigation the Grand Rapids Disease might not prove to have a common etiology with the "Stripe Disease."

By the courtesy of Dr E. F. Smith and Professor Nakata, to both of whom the authors wish to express their thanks, a tomato plant infected with the Grand Rapids Disease was obtained and a careful comparison of the two organisms rendered possible. From this plant *Aplanobacter michiganense* was isolated without difficulty and compared with the yellow organism referred to above. The two organisms were given preliminary culture by several transfers in broth tubes and their characteristics on different media were then investigated with the following result.

		<i>Aplanobacter</i> (Paine and Bewley)	<i>Aplanobacter</i> <i>michiganense</i> E.F.S.
Pathogenicity		Not pathogenic for tomato when associated with <i>B.</i> <i>lathyri</i>	Pathogenic for tomato
Bouillon-agar plate culture		Colonies round, smooth, glistening, viscous, deep orange	Colonies round, smooth, glistening, very pale yellow at first deepening with age to a mid-chrome
Bouillon-agar slope		Deep orange, very viscous	Pale yellow, not nearly so viscous
Broth.		Slow growth, clear after 24 hours, cloudy after 48 hours, no pellicle	The same
Gelatine slope		Liquefaction starts in 48 hours	No liquefaction until the 11th day
Nitrate broth		No reduction of nitrate	The same

			<i>Aplanobacter</i> (Paine and Bewley)	<i>Aplanobacter</i> <i>michiganense</i> E.F.S.
Glucose broth	...	...	Slight acid on 6th day lit- mus reduced, pellicle	Slight acid on 13th day litmus not reduced, no pellicle
Lactose broth	...	...	Slight acid on 9th day lit- mus reduced, pellicle	Slight acid on 13th day litmus not reduced, no pellicle
Sucrose broth	...	...	Slight acid on 6th day lit- mus reduced, pellicle	Slight acid on 13th day litmus not reduced, no pellicle
Potato plug	...	...	Thick viscous growth, wet shining, deep orange, po- tato dark grey	Growth not nearly so vis- cous, pale yellow, potato pinkish
Diastatic action	...	...	Strong	Strong
Milk tubes	...	...	No clotting, digestion of casein apparent after 9 days, complete in 3 weeks	No clotting, casein diges- tion not apparent until the 14th day, only slight after 30 days
Indol formation	...	...	Slight sign	No sign
Staining	...	...	Gram positive when first isolated but later became gram negative	Gram positive
Size and shape	...	...	Small oval rods, $1.6\mu \times 0.6\mu$	Small oval rods, $1.6\mu \times 0.6\mu$
Motility	...	...	Non-motile	Non-motile

From the above it is seen that while these two organisms possess many properties in common, certain differences, mainly differences in degree only, clearly mark them as different species and the name *Aplanobacter dissimulans* is now proposed for the species isolated by Paine and Bewley.

INFECTION EXPERIMENTS.

Inoculations of young tomato plants were carried out in the experimental houses at Waltham Cross by Dr W. F. Bewley, to whom the authors tender their best thanks. The two *Aplanobacters* and *Bacillus lathyri* were pricked separately into three sets of eighteen plants; the results with *Aplanobacter dissimulans* were negative in every case; many successful infections were obtained with *B. lathyri* and *A. michiganense*, the effect upon the pith was identical and altogether indistinguishable, but marked differences were observed when the organisms, having passed through the cortex, produced lesions on the exterior of the stem. The former produced dark brown sunken furrows with usually no cracking of the epidermis, while the latter gave no special colouring but produced deep fissures in the outer cortex whose margins had the appearance of callus formations; no effect upon the fruits was observed in the case of *Aplanobacter michiganense*. The two diseases therefore appear to be entirely distinct, and the senior author desires to withdraw the suggestion

made in the former paper, to which reference has been made above, that in his investigation of the Grand Rapids Disease Dr Smith had possibly been in error as to the etiology of the disease.

SUMMARY.

1. The Stripe Disease and the Grand Rapids Disease of tomato are distinct diseases caused by two bacterial parasites, *Bacillus lathyri* and *Aplanobacter michiganense*.

2. The yellow organism, *Aplanobacter dissimulans* n.sp. (Paine and Bewley), which is frequently found associated with *Bacillus lathyri* is not identical with *Aplanobacter michiganense*.

REFERENCES.

- (1) SMITH, E. F. (1914). The "Grand Rapids Disease" of Tomato. *Bacteria in relation to Plant Diseases*, Washington, D.C. III. 161.
- (2) PAINE, S. G. and BEWLEY, W. F. (1919). Studies in Bacteriosis. IV. "Stripe Disease" of Tomato. *Ann. App. Biol.* VI. 183.

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