

oyster which appeared to have stopped spawning was opened and it was found that the gonads were about one-third empty.

Several water temperatures were measured. The shallow water on the reef flat was 32° C. at a depth of six inches. The unusually calm weather had permitted a surface layer of warm water (29.0–29.5° C.) to develop; it was more than 8 ft. deep to the west, 6–9 ft. deep to the east and less than 3 ft. deep to the south of the islet. Below this layer cooler water with a temperature of 28.4° C. was found. The temperature close to a group of both species spawning in 3 ft. of water at the east end of the islet was 29.1° C.

The spawning molluscs were in the warmer layer of water and it is suggested that warming of this surface layer triggered spawning. Such a relationship between temperature and spawning has been described for other molluscs¹.

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¹ Galtsoff, D. S., *Biol. Bull. Woods Hole*, **74**, 461 (1938).

Psorosis Virus A on the Mandarin Orange (*Citrus nobilis* Lour.) in Malaya

Psorosis of citrus has hitherto not been reported from Malaya. Recent investigations on the possible presence of virus diseases on citrus have shown a large number of mandarin orange trees in Segamat, Johore, to be affected by severe scaling of the bark. Affected trees showed signs of decline. No leaf symptoms, however, have been observed in the field.

The disease was present in almost all the mandarin orange orchards examined. It is evident that the disease is well established in Malaya, but has not been

detected until now. The disease was probably introduced into Malaya on plants imported from countries where psorosis was present. The extensive use of marcots by farmers has contributed largely to the wide spread of the disease.

Bud-wood was collected from two eight-year-old mandarin orange trees affected by bark scaling, and patch bark-grafted¹ on to key lime indicator plants. The inoculated plants were topped off to a few inches above the bark patch. Bark patch inoculations were made on 12 key lime indicator plants, and 12 uninoculated plants were maintained as controls.

Flecking and stippling of young leaves (Fig. 1) were observed 19 days after inoculations on 9 of the 12 inoculated plants. Plants which showed symptoms were slightly retarded in growth compared with the controls. Some of the affected leaves were found to curve downward. More severe symptoms, 'shock symptoms', were observed on 3 of the 9 infected plants. Young shoots were slightly twisted. These shoots eventually become bowed, and the leaves drop off with the least disturbance. Growing points frequently wither and drop. No symptoms developed on any of the 12 uninoculated plants maintained as controls.

This is the first record of a virus disease on citrus in Malaya. At the moment, only mandarin oranges have been proved experimentally to be affected by psorosis virus A. Investigations are being continued to detect the presence of psorosis and other viruses on citrus varieties in Malaya.

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¹ Wallace, J. M., *Phytopathology*, **35**, 535 (1945).

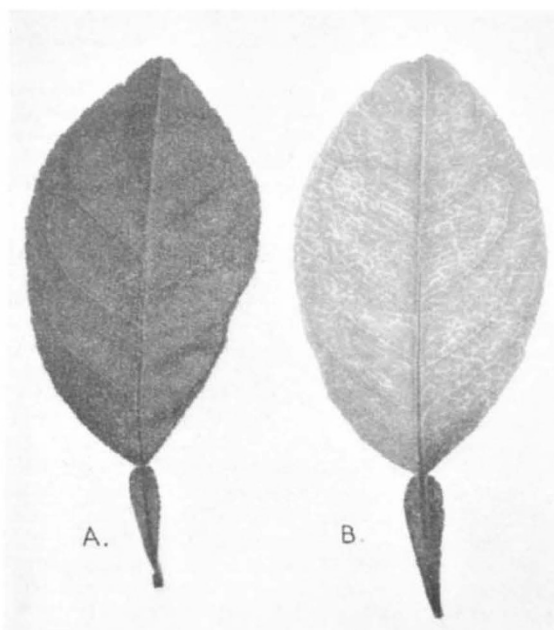


Fig. 1. (A) Symptomless leaf from uninoculated Key lime plant. (B) Young leaf of key lime showing flecking

MICROBIOLOGY

Naturally Occurring 'Variants' of *Salmonella pullorum* possessing an Unusual Sensitivity to Bile Salts and Other Agents

RECENTLY, two freshly isolated strains of *Salmonella pullorum* which failed to grow on either deoxycholate-citrate agar or MacConkey agar were examined. One had been cultured from the kidney of a chicken suffering from nephritis and the other from a typical outbreak of pullorum disease in young chicks; there was no obvious epidemiological relationship between these two strains.

Both strains possessed the typical cellular and colonial morphology of standard strains of *Salm. pullorum* and gave the usual reactions to the biochemical tests normally employed to identify this organism. Their antigenic structure was reported by Dr. Joan Taylor, of the Salmonella Reference Laboratory, London, N.W.9, to be O = IX, XII, H = —, —.

Further tests showed that their unusual sensitivity was not confined to bile salts. The minimal inhibitory concentration of a number of agents for these strains was determined by inoculating nutrient agar plates containing doubly falling concentrations of the agent under test with suitably diluted broth cultures of the variant strains and of three standard strains