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Gastroenteritis due to *Salmonella* subgenus III (Arizona). A second case diagnosed in Britain

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SUMMARY

The second patient with Arizona gastroenteritis to be diagnosed in Britain had just returned from the United States, where his illness began.

CASE HISTORY

A young Englishman who had lived for 2 years in the U.S.A. spent August, 1970, with his wife hiking and camping in California, Florida and Arizona followed by a 2-day stay in San Francisco. On 2 September 1970, the couple visited the Yellowstone Park where the patient developed quite severe diarrhoea and malaise, but he was too busy packing for return to England to see a doctor until after boarding an east-bound liner on which treatment by the ship's doctor gave him temporary relief. After reaching England the patient stayed for a few days in Winchester, where on 25 September he was seen by one of us (R.E.D.) who gave symptomatic treatment and sent a stool specimen to the laboratory. The patient, who by this time had lost $1\frac{1}{2}$ stones of weight, then left Winchester, but he later reported that by 12 October he was free of symptoms and regaining weight.

We are indebted to the patient himself for a full account of his illness. When he heard that he was suffering from an infection which might have been connected with turtles he remembered that between 17 and 20 August, during a raft trip down the Colorado river, in which turtles occur, he and his wife had drunk river water. The wife remained well.

BACTERIOLOGY

The faecal specimen collected on 25 September was a formed one. It was cultured on deoxycholate citrate agar and on bismuth sulphite agar; an enrichment culture in selenite broth was subcultured on the same two plating media after overnight incubation. The subcultures from selenite broth showed colonies resembling *Salmonella* on both media. Biochemical tests gave the results shown in Table 1.

These reactions identified the organism as a member of the genus *Salmonella*. The strain did not ferment dulcitol, but liquefied gelatin and utilized malonate, reactions which showed that it belonged to *Salmonella* subgenus III, also known as the Arizona group.

Table 1. *Biochemical reactions of the Arizona strain*

Dextrose	Acid and gas	(1)	Citrate (Simmons)	+
Lactose, 1 %	–	(7)	Potassium cyanide	–
Salicin	–	(7)	Lysine decarboxylase	+
ONPG	+		Ornithine decarboxylase	+
Dulcitol	–	(7)	Arginine dihydrolase	+
Gelatin liquified			H_2S	+
Malonate utilized				

Figures in parentheses indicate days of incubation of tests.

The Arizona group has its own antigenic scheme with somatic 'O' and flagellar 'H' antigens. Many of these antigens are identical with antigens in the Kauffmann–White antigenic scheme used for salmonellas of subgenera I and II. Using salmonella antisera our strain was shown to have the flagellar 'H' factors z_4, z_{23} and to be monophasic; its 'O' antigens could not be determined with the sera available and it was sent to the Salmonella Reference Laboratory, Colindale, where the antigenic structure was found to be *Arizona* 1,3:1,2,6:–. The equivalent *Salmonella* structure is 44:z_4, z_{23}:–. Edwards, Fife & Ramsay (1959) reported isolations of this serotype from reptiles and from a sample of egg or egg product.

DISCUSSION

Arizona food-poisoning has been more extensively investigated in the U.S.A. than in other parts of the world. In the United States human infections have been reported both as sporadic cases and outbreaks, and in Europe, Asia and Africa sporadic cases have been reported from many areas. In Britain the only previous record of human infection was that of Plows, Fretwell & Parry (1968), who reported gastroenteritis in a girl in Sheffield due to Arizona 26:32:21; another child in the family was a symptomless excreter and the source of infection was shown to have been a pet turtle (*anglice* terrapin) imported from Florida, U.S.A. Thus the only two incidents of human Arizona infection in Britain have both been directly traceable to the U.S.A.

Arizona bacteria have been isolated in Britain from imported bone meal (Harvey & Price, 1962) and from drain swabs in abattoirs where cattle, pigs and sheep were being slaughtered (Harvey, Price & Dixon, 1966). These workers examined 1641 swabs from four different abattoirs but made only six isolations of two Arizona serotypes; therefore in comparison with the *Salmonella* subgenus I serotypes, Arizonas are very rare in British livestock, although the presence of these organisms in animal food might lead to a build-up in the course of time. In the United

States there have been outbreaks in turkeys and chickens but there have been no reports of similar events in Britain. In the U.S.A. and elsewhere reptiles are regarded as reservoirs of Arizona infection, and Brookes & Fife Asbury (1966) reported the isolation of Arizona serotypes from three snakes and a tortoise in the London Zoo.

It has been suggested that Arizona strains are rarely reported from human material in Britain because they are overlooked in British laboratories. The fact that the only two human incidents so far brought to light involved an imported vector and a returning traveller suggests that bacteriologists in Britain are not blind to the possibility of meeting with Arizona strains and that these organisms really are uncommon in Britain. It has been pointed out by some of the authors quoted that the use of a bismuth sulphite medium, such as Wilson and Blair's or de Loureiro's, permits the recognition of Arizona colonies irrespective of lactose fermentation, in contrast to lactose–bile salt media on which lactose-fermenting Arizona strains may be indistinguishable from *Escherichia coli*.

We are grateful to Dr R. Rhode of the National Salmonella Centre, Hamburg, who confirmed the Arizona structure.

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