

RESEARCH NOTE

MORPHOLOGICAL VARIATION IN EPHEMERAL FEVER VIRUS STRAINS

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The occurrence of bovine ephemeral fever virus has been reported from South Africa, Australia and Japan (Andrewes & Pereira, 1967). The similarity of the symptoms caused and the sensitivity of the South African and Australian viruses to ether and desoxycholate suggest that the same virus occurs in all these countries.

Electron microscopic studies on the South African form (EF 1) (Lecatsas, Theodoridis & Erasmus, 1969) have shown the virus to be cone-shaped. Ito, Tanaka, Inaba & Omori (1969) have published electron micrographs which indicate that the Japanese form (bovine epizootic fever) is bullet-shaped. The Australian form (7721) has not, to our knowledge, been characterized morphologically as yet.

In this communication are presented electron micrographs of the three viruses grown in BHK₂₁ cells and a comparison is made in the structure of the virus particles as they appear in thin section and in negative contrast. Cross neutralization tests using the three virus strains are also reported.

Our methods of preparation of material for electron microscopy are described in the accompanying article in this journal (Lecatsas, Erasmus & Els, 1969). Susceptible bovines were used for the preparation of immune sera. The Australian strain (7721)* was derived from the second passage in BHK₂₁ cells, the Japanese strain (bovine epizootic fever)** was derived from the 23rd passage in BHK₂₁ cells and the South African strain (EF 1) was derived from the 19th passage in BHK₂₁ cells. All the animals received two inoculations intramuscularly of 2 ml antigen adsorbed to an equal amount of aluminium hydroxide. The second inoculation was given 21 days later. The immune sera were collected four weeks after the first inoculation. Neutralization tests were performed in day-old suckling albino mice.

Plate 1 shows the three virus strains in section and negatively stained. Morphologically, it appears that the Australian and Japanese varieties are bullet-shaped particles closely resembling the virus of vesicular stomatitis. The South African form, however, is morphologically different being cone-shaped and larger in basal diameter. It is noteworthy that no cone-shaped particles could be found in the Australian and Japanese strains and no bullet-shaped forms could be found in the South African variety. Thus, on the basis of morphology the Australian and Japanese forms appear to be similar. Distribution of electron dense material in the virus particles appears to differ in that the conical form shows a relatively electron-

translucent centre. This may, however, be an effect due to the spiral ribonucleoprotein being cylindrical in the bullet-shaped forms and conical in the cone-shaped form.

TABLE 1.—Cross-neutralization of Australian, Japanese and South African strains of ephemeral fever virus

Immune sera	Viral antigens		
	Australian (7721)	Japanese	South African (EF 1)
Australian (7721)	13162*	6012	4981
Japanese	13162	6012	8943
South African (EF 1)	13162	11259	1001995

*Expressed as the neutralization index (antilog of number of logs of virus neutralized)

Table 1 indicates a close serological relationship between the three strains of ephemeral fever virus. At this stage it cannot be concluded that all South African isolates are cone-shaped and similarly, cone-shaped Australian and Japanese strains may exist. South African isolate EF 3 (Van der Westhuizen, 1967) has also been found to be cone-shaped.

Since no variation in form within each strain of virus appears to occur it would appear that a mutation affecting basically the structural arrangement of the ribonucleoprotein spiral has resulted in two morphological forms of the same virus.

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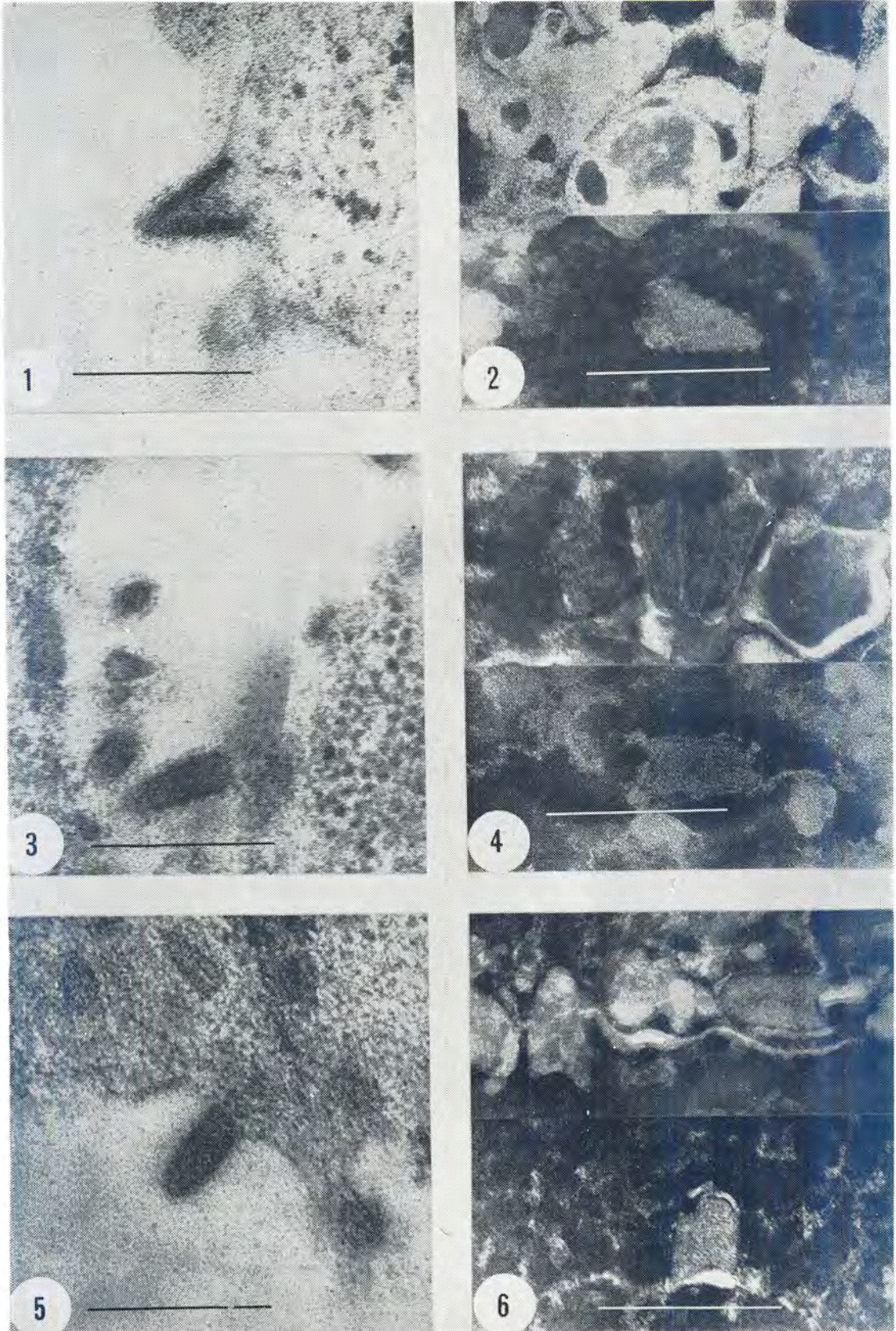


PLATE 1.—1 & 2. South African strain of ephemerical fever virus in section (1) and negatively stained with 2 per cent phosphotungstic acid (2). Bar equals 250 mμ. 3 & 4. Australian strain of ephemerical fever virus in section (3) and negatively stained with 2 per cent phosphotungstic acid (4). Bar equals 250 mμ. 5 & 6. Japanese strain of ephemerical fever virus in section (5) and negatively stained with 2 per cent phosphotungstic acid (6). Bar equals 250 mμ