

Toxoplasmosis and Tristan da Cunha

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In October 1961 the volcano on Tristan da Cunha erupted driving the Islanders from Tristan. They eventually arrived in Britain thus providing interesting opportunities to study this, until recently, isolated community. Thanks to the work of Drs C. K. Thacker (at that time at the Hospital for Tropical Diseases) and Dr C. E. D. Taylor (of the Central Public Health Laboratory, Colindale) and others who helped in the collection of sera and clinical assessment of the Tristan population (Black, Thacker, Lewis & Thould, 1963), a survey of toxoplasma antibody was carried out on them. Reference has been made to this (Thacker, 1963), but it was felt that a more detailed analysis of the results would be of interest.

METHODS

Of the 267 Islanders who landed in Britain, the sera from 220 were tested with the dye test (Sabin & Feldman, 1948). The method of performing this test is similar to that previously described (Fleck & Payne, 1963).

The results of the dye tests were classified according to the age and sex of the Islanders and compared with a survey made in South Wales (Fleck, 1963).

A full clinical examination of the Islanders, including examination of the ocular fundi, was carried out. The intelligence, educational attainment and personalities of the school children were also tested (Keir, 1965).

RESULTS

Tables 1 (*a*) and (*b*) show the results of dye tests made on sera from blood donors and children admitted to hospital with afebrile illnesses in South Wales, classified according to age and sex. There is little difference in antibody incidence between the sexes, but there is a difference between those under 20 years of age and those over 20. The percentage positive at 1/16 or more is 25·8 %.

Tables 2 (*a*) and (*b*) show the results of dye tests made on sera from Tristan da Cunjans. Again there is little difference in incidence between the sexes but there is a difference between those under 10 years of age and those over 10. The Tristan community has a significantly higher overall incidence of toxoplasma antibody, when compared with people living in Wales. The percentage positive at 1/16 or more is 80 %. The only sera showing a dye test titre of 1/1024 were from children under 10. Although the figures are too small for any definite conclusions Table 3 shows that children's sera were less likely to be positive in the dye test, but when

Table 1a. *Dye tests titres of males in South Wales*

Dye test titres	Age in years						Totals
	0-10	11-20	21-30	31-40	41-50	51-60	
1/256-1/512	0	1	1	0	0	0	2
1/16-1/128	2	4	4	5	5	6	26
< 1/16	18	15	15	15	15	14	92
Totals positive at 1/16 or more	2/20	5/20	5/20	5/20	5/20	6/20	= 28/120 = 23%

Table 1b. *Dye test titres of females in South Wales*

Dye test titres	Age in years						Totals
	0-10	11-20	21-30	31-40	41-50	51-60	
1/256-1/512	0	0	0	0	0	0	0
1/16-1/128	1	3	5	9	9	7	34
< 1/16	19	17	15	11	11	13	86
Totals positive at 1/16 or more	1/20	3/20	5/20	9/20	9/20	7/20	= 34/120 = 28%

Total male and female positive at 1/16 or more = 62/240 = 25.8%.

Table 2a. *Dye test titres of males on Tristan*

Dye test titres	Age in years							Totals
	0-10	11-20	21-30	31-40	41-50	51-60	60+	
1/1024	2	0	0	0	0	0	0	2
1/256-1/512	0	2	0	2	0	1	0	5
1/16-1/128	2	14	16	13	10	13	12	80
< 1/16	5	6	2	6	3	1	3	26
Totals positive at 1/16 or more	4/9	16/22	16/18	15/21	10/13	14/15	12/15	= 87/113 = 77%

Table 2b. *Dye test titres of females on Tristan*

Dye test titres	Age in years							Totals
	0-10	11-20	21-30	31-40	41-50	51-60	60+	
1/1024	1	0	0	0	0	0	0	1
1/256-1/512	3	2	0	0	1	0	0	6
1/16-1/128	4	12	19	18	11	6	12	82
< 1/16	6	1	4	2	2	1	2	18
Totals positive at 1/16 or more	8/14	14/15	19/23	18/20	12/14	6/7	12/14	= 89/107 = 83%

Total male and female positive at 1/16 or more = 176/220 = 80%.

they were positive, they had higher titres than their elders. Unfortunately sera from children under 3 years were not collected, it is therefore not possible to say how much infection is congenital and how much acquired.

Of the twelve members of the community showing posterior segment lesions of the eye other than retinitis pigmentosa Mr D. P. Choyce examined seven. He considered three were clinical cases of toxoplasmic retinitis and two others were

probable cases of this disease. The incidence of this disease in the whole community is therefore at least 1%. This is very much higher (probably tenfold) than the incidence in Britain or in U.S.A. (Prof. E. S. Perkins, personal communication).

Dr G. Keir (1965), in her survey of the Tristan children, found one possible and four definite mentally defective children. Of these two were negative at 1/16 in the dye test, and one was positive at 1/32. The other two were not tested. One of the mentally defective children, with a dye test negative at 1/16, was a case of arrested hydrocephalus. Toxoplasmosis as a cause of mental deficiency on the Island was unconvincing.

Table 3a. *Dye test titres of males in Tristan children*

Dye test titres	Age in years			Totals
	3-5	6-8	9-11	
1/1024	1	1	0	2
1/256-1/512	0	0	0	0
1/16-1/128	1	1	0	2
< 1/16	3	1	1	5
Totals positive at 1/16 or more	2/5	2/3	0/1	= 4/9 = 44.5%

Table 3b. *Dye test titres of females in Tristan children*

Dye test titres	Age in years			Totals
	3-5	6-8	9-11	
1/1024	1	0	0	1
1/256-1/512	1	1	1	3
1/16-1/128	3	0	2	5
< 1/16	0	4	1	5
Totals positive at 1/16 or more	5/5	1/5	3/4	= 9/14 = 64.5%

Total male and female positive at 1/16 or more = 13/23 = 56.7%

Many authors have found the incidence of abortions to be increased among women infected with *Toxoplasma gondii*. This problem has been well reviewed (Remington, 1963). Information supplied by Dr E. J. S. Wooley, Medical Officer on the Island 1942-44, showed that two abortions occurred. During the same period there were sixteen live births. Drs M. Samuels, L. Schrire and S. Gooch were not asked to attend any cases of abortion while they were on the Island.

To avoid the possibility that toxoplasma infection occurred after the Tristan community moved to Britain, Dr J. H. S. Gear of the South African Institute for Medical Research sent 55 sera collected from the Islanders in 1961 before they left the Island. All except seven showed the same dye test titres as those obtained in Britain. Of the seven sera five differed by only a twofold dilution, one differed by a fourfold dilution and in one case, a boy aged 4, the titre rose from less than 1/16 to 1/1024. Nothing of note was found on clinical examination of this boy on reaching Britain. Only this last case was considered to show a significant rise in

titre, since, because of the technical difficulties of the dye test, Sabin, Feldman & Jacobs (1952) consider only an eightfold change in titre to be significant. The high incidence of antibody was therefore present in the island population while still on Tristan.

DISCUSSION

Numerous serological surveys in human populations of five continents have shown the widespread incidence of toxoplasma antibody. Usually the sex distribution has been equal and there is often an increasing prevalence with increasing age. The pattern is however, still too complicated to give a clear indication of the mode of transmission of the organism.

Feldman & Miller (1956) have suggested that the infection is less prevalent in temperate and more prevalent in tropical areas in the world. Certainly the highest incidence is in the wet Central American countries. Tristan da Cunha, although wet, is not tropical and is devoid of the forests common in Central America. Easter Island, in contrast, is dry and tropical and devoid of forests yet shows an incidence of 92% positive dye tests in its population (Morales *et al.* 1961).

The high incidence of toxoplasma antibody suggests a high prevalence of infection, but the organism has yet to be isolated from the Islanders. It is hoped that sera from various animals on the Island may be tested, and that attempts at isolation of the organism will be made.

SUMMARY

Sera from most of the Tristan da Cunha community were tested for toxoplasma antibody. In a comparison with sera from 'normal' inhabitants of South Wales there was a significantly higher incidence of dye tests positive at 1/16 or more in the Tristan community at all age groups. The incidence of retinitis was also found to be much higher than in Britain. It appears unlikely that toxoplasmosis caused any cases of mental defect or abortion on the Island.

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