The exception to the effectiveness of intra-amniotic betamethasone was the woman with the anencephalic pregnancy. One week after the injection she showed no signs of beginning labour. It was reasoned that if the fetus had to absorb the drug for it to be effective then this would probably not have occurred because of defective swallowing. A 20-mg dose of betamethasone was therefore given intramuscularly to the fetus: labour began 86 hours later and was completed after 2·5 hours. The infant was a fresh stillborn anencephalic weighing 2,800 g.

Discussion

The experiments in sheep showed that a single dose of dexamethasone could initiate labour provided that the dose was large enough. Lambs delivered near to the end of a normal pregnancy appeared clinically normal while those delivered prematurely appeared more able to breathe than premature lambs of the same age not treated with dexamethasone. Liggins (1969) found that the minimum total reliably effective dose of dexamethasone given by continuous infusion into the fetus was of the order of 0·4 mg. In contrast in this study a single dose of 10 mg was only partly effective. This suggests that the fetal-maternal unit is able to eliminate the steroid very rapidly.

We thought that these findings made a trial of betamethasone in human pregnancy justifiable. The results were clear cut and left no doubt that betamethasone accelerates the onset of labour. There were no obvious ill effects in either mothers or babies, and if anything the treated infants (one in class B and five in class A) were healthier at birth than those in the control group (three in class B and two in class A). The method therefore seems to warrant further trial on a larger scale. Betamethasone seems to be at least as safe as other drugs currently used to initiate labour and in some respects the method appears to have great advantages over existing techniques of labour induction. (1) The technique is simple and can easily be carried out as an outpatient procedure; (2) the patient can be allowed home and labour begins and is completed in an apparently normal way, which has obvious practical and financial advantages as well as psychological ones for the woman, who is not continually made aware that her labour has had to be induced; (3) the method is based on physiological principles and reduces the risk of a failed induction when oxytocic drugs or other methods of induction may be working against physiological mechanisms which are attempting to maintain the pregnancy; (4) the method uses a substance which is known to stimulate the maturation of normal lung function, thus reducing the risk of fetal respiratory distress; and (5) it may have particular advantages in highly parous patients and in those who have had a previous caesarean section in whom oxytocics may be dangerous.

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Persistence of Tanapox in Tana River Valley

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Summary

Sera collected from inhabitants of the Tana River valley in 1971 were examined for antibody to tanapox virus. Neutralizing antibody was present in 16·3%. The levels of antibody and its presence in two children under the age of 10 years indicated that infection had been occurring in the area since the reported outbreak in 1962. A comparison of the incidence and distribution of antibodies in the same sera to West Nile virus revealed marked similarities suggesting that tanapox, like West Nile virus infections, might be transmitted in the same way—namely, by a culicine mosquito.

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Introduction

Outbreaks of tanapox in the Tana River area of Kenya were known to have occurred in 1957 and 1962 (Downie *et al.*, 1971). In those years extensive flooding had occurred so that the local population were confined along with their domestic animals and wild animals to high ground which formed islands in the flood area. The disease is a relatively mild febrile infection associated with one or two firm pocks on exposed areas of skin. There is only one resident doctor at Ngao and records of clinical tanapox in the population since 1962 are not available. In 1971, however, blood specimens were collected by one of us (P.E.C.M.-B.) from members of the local population. Sera from these blood samples have been examined for antibodies to tanapox virus and other viruses, and sera from senior schoolboys in Tanzania have been examined to serve as controls. The results suggest that tanapox has continued to occur in the Tana River area since the outbreak of 1962.

Materials and Methods

The sera were tested for neutralizing antibodies against tana-

pox virus by the technique previously described (Downie *et al.*, 1971) except that cultures of the monkey continuous cell line, BSC1, were used instead of the monkey Vero cell line. All sera after inactivation were tested at a dilution of 1/10 and those showing positive or doubtful results were retested in three-fold dilutions from 1/10 upwards. A number of the sera were also tested in doubling dilutions starting at 1/5 by the complement fixations technique against a tanapox antigen.

Results

The results of the tests for neutralizing antibodies against tanapox virus in the sera from residents in the Tana River valley and from Tanzania are shown in table I. It seemed possible that the neutralizing antibody present in some of the sera from the Tana River valley inhabitants might have been the result of the 1962 outbreak, although España (1971) suggested that neutralizing antibody does not usually persist more than 12 months after infection. Certainly complement-fixing antibody does not persist for this time (España 1971). Twenty-nine of the above sera which possessed neutralizing antibody and 31 which were negative were tested by the complement-fixing technique. Of these sera three were positive at a dilution of 1/5 only and these three were among the five that had neutralizing antibody titres of 1/10 to 1/19. One of these three sera was from a girl aged 8 who was born after the 1962 outbreak.

TABLE I—*Results of Tests on Sera from Two Groups of Subjects for Neutralizing Antibodies against Tanapox Virus*

Residents in:	Total No. of Sera	No. of Sera Showing Neutralizing Titres of:						
		<10*	10-19	20-29	30-39	40-59	60-79	80-100
Tana River valley	190	159	5	12	4	4	3	3
Tanzania	113	113	0	0	0	0	0	0

*Reciprocal of dilution of serum neutralizing tanapox virus.

It was not possible to identify those individuals in the Tana River area who had suffered from tanapox in the 1962 outbreak, so that the serum antibody titres shown in table I could not be related to a known history of infection. However, we were able to get some information as to the persistence of neutralizing antibody after tanapox infection, through the kindness of Dr. C. España of the Primate Center in Davis, California. During an outbreak of disease among macaque monkeys in Davis which proved to be tanapox (Downie and España, 1972) a number of the laboratory staff became infected between 1966 and 1968. Dr. España sent us follow-up specimens of serum from these patients and these were tested for antibody to tanapox virus together with later specimens of serum from a human volunteer infected in Liverpool with tanapox in 1963. The results of the tests on these sera are shown in table II.

No sera from these persons were positive by complement fixation tests one year after infection or later (table II). Two years or longer after infection only two of eight persons showed relatively low titres of neutralizing antibody—one (case 3) had a titre of 1/5 two years and five months after infection and another (case 4) had a titre of 1/15 two years and six months after infection. The results indicate that neutralizing antibody persists longer than complement-fixing antibody, but the titre had diminished considerably after one year and if present was of low titre after two years. On comparing these results with those of the sera collected from people in the Tana River area in 1972 it seems likely that the high antibody titres shown in table I must have been the result of infection with tanapox virus in the years since the 1962 outbreak in the Tana River area. Certain other observations on those

TABLE II—*Antibody Titres in Sera of Persons who had Tanapox Infection*

Case No.	Time Since Infection	Complement Fixation Test	Neutralization
1	2 years 3 months	<4	<5
2	3 days	<4	<5
	13 days	8-16	10-20
	31 days	16-32	40-80
	1 year 10 months	<4	8
	2 years 7 months	<4	<5
	4 years 1 month	<4	<5
3	Before onset	<4	<5
	16 days	32	20
	2 years 5 months	<4	5
4	Before onset	<4	<5
	16 days	16-32	40-80
	2 years 6 months	<4	15
5	6 days	4	<5
	23 days	<4	5
	8 months	<4	<5
6	3 years	<4	<5
7	14 months	<4	<5
	2 years 7 months	<4	<5
	Before infection	<4	<5
8	14 days	10	10
	23 days	20	50
	7 years	<4	<5
	8 years	<4	<5

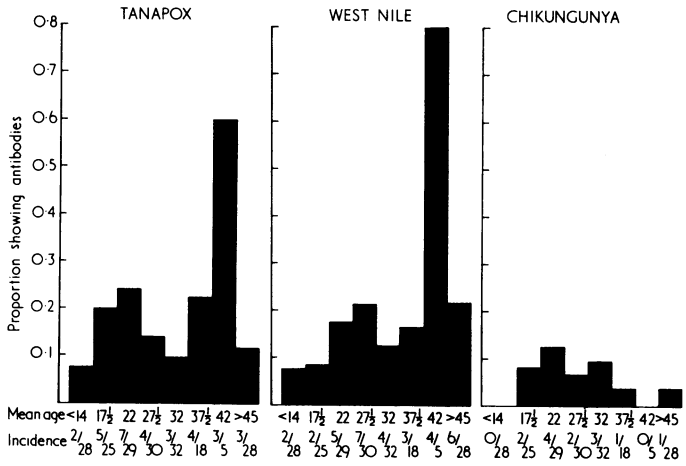
whose sera showed neutralizing antibody seem pertinent. There was no significant differences on a sex or tribal basis. The age specific incidence (see chart) shows that some of all age groups showed antibodies to tanapox, but further analysis is not possible because of the small size of many samples. The distribution of positive sera in relation to the villages examined shows no constant pattern. The population of this area is very mobile and the place of residence stated may have been for only the past six months. The absence of positive sera from Kipao on the north bank of the Tana River (table III) was probably because all 17 samples were from male adults, further specimens being refused because of opposition to the taking of blood.

TABLE III—*Antibody Studies to Tanapox, West Nile, and Chikungunya Viruses from Tana River Area*

	Neutralizing Antibodies Positive to Tanapox	Haemagglutination Inhibition Antibodies	
		Positive to West Nile	Positive to Chikungunya
Sex:			
Male ..	17/95 (17·9%)	18/95 (18·9%)	6/95 (6·3%)
Female ..	14/95 (14·7%)	15/95 (15·8%)	7/95 (7·4%)
Tribe:			
Pokomo ..	21/131 (16%)	21/131 (16%)	8/131 (6·1%)
Giriama ..	5/21 (23·8%)	5/21 (23·8%)	4/21 (19%)
Orma ..	5/34 (14·7%)	7/34 (20·6%)	1/34 (3%)
Others ..	0/4	0/4	0/4
Villages:			
Ngao ..	5/44	7/44	4/44
Golbanti ..	12/57	6/57	5/57
Gumba ..	3/7	3/7	0/9
Oda	3/8	4/8	0/8
Garsen ..	3/8	2/8	2/8
Pungawepepo	1/2	1/2	1/2
Sera	1/2	0/2	0/2
Shirikisho ..	1/1	1/1	0/1
Mambrui ..	1/2	0/2	1/2
Kipao ..	0/18	5/18	1/18
Tarasa ..	1/17	3/17	0/17
Kibusu ..	0/3	1/3	0/3
Others ..	0/21	0/21	0/21
Total.. ..	31/190 (16·3%)	33/190 (17·4%)	13/190 (6·8%)

COMPARISONS BETWEEN TANAPOX, WEST NILE, AND CHIKUNGUNYA

The sera were tested for antibody to two arborviruses by the haemagglutination inhibition test by Mr. E. T. W. Bowen and his staff at the Microbiological Research Institute, Porton. The two viruses are mosquito-transmitted (West Nile probably by *Culex* spp.; Chikungunya probably by *Aedes* spp.), and it was felt that a comparison of the incidence of positive antibody tests might indicate a similar mode of transmission. It will be seen from table III and the chart that there is a closer relation between the total incidence of tanapox



Age specific incidence of antibodies.

(16·3%) and West Nile (17·4%) than between tanapox and Chikungunya (6·8%), and there are similarities between tanapox and West Nile in sex, tribe, and age specific incidence. The distribution of antibodies in the villages showed the same similarities except that tanapox is absent from Kipao. Ten sera showed antibodies to two viruses but there was no evidence that this was due to anything other than chance.

Discussion

The examination of sera collected from the inhabitants of the Tana River valley in 1971 showed that 16·3% had neutralizing antibody for tanapox virus in their sera. The levels of antibody found in comparison with those observed in sequential samples of sera from persons who had clinical infection with tanapox virus in a primate centre in America, and the presence of antibody in two persons under 10 years of age in the Tana River valley, indicate that tanapox infection has continued to occur in that area since the recorded outbreak in 1962. Examinations of sera from vervet monkeys in Ethiopia and Kenya have shown that 15 to 20% contain antibody to tanapox virus (Downie, unpublished observations) and it seems likely that monkeys form the reservoir from which the inhabitants of the Tana River valley become infected. The method of transmission is unknown. Monkeys are not eaten in this area but are sometimes caught and kept as pets. It is unlikely, however, that handling of this nature would maintain such a high level of infection. Transmission by biting insects is a possibility and certain similarities in the distribution of antibodies to tanapox and West Nile viruses in the local population supports the suggestion that a culicine mosquito might be the vector.

We are grateful to Dr. Carlos España, of the Primate Centre in the University of California, in Davis, for the supply of sera from members of his staff, and to Mr. E. T. N. Bowen and his staff at the Microbiological Research Institute, Porton, for testing sera for antibodies to West Nile and Chikungunya viruses. The work of one of us (A.W.D.) has been supported by a grant from the Medical Research Council and of the other (P.E.C.M.-B.) by the M.R.C./W.H.O. Bilharzia Chemotherapy Unit, Tanzania.

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MEDICAL MEMORANDA

Strongyloidiasis of Respiratory Tract Presenting as "Asthma"

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The nematode parasite *Strongyloides stercoralis* is familiar as a common parasite of the intestinal tract, especially in tropical and subtropical areas.

It shares with some other intestinal nematodes the ritual of passing through the respiratory tract during its stage of migration after entry into the body, before achieving full maturity in the intestines. It is not generally appreciated, however, that it may settle down in the respiratory tract, mature, and "produce progeny" there (Fülleborn, 1914; Faust, 1935). The manifestations of respiratory strongyloidiasis need to be more widely known, and the possible consequences of inappropriate treatment when the correct diagnosis is missed deserve emphasis.

We report a case of pulmonary strongyloidiasis presenting with wheezing and chronic cough which had been treated as asthma before the condition was recognized.

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Case Report

A Nigerian girl aged 15 complained of chronic cough and wheezing of relatively sudden onset of six months' duration. She had recently been receiving treatment without improvement for asthma and later for suspected tuberculosis.

There was no family history of asthma or tuberculosis. On examination, she was breathless and wheezed audibly, but otherwise looked well and was apyrexial.

Chest examination showed scattered rales and rhonchi more noticeable on the left side than on the right. No other abnormal signs were noted.

The chest radiograph was normal and the Mantoux tuberculin test was negative.

Microscopical examination of unstained sputum and centrifuged deposits showed large numbers of strongyloides larvae, and ova in various stages of embryonation (see fig. 1). All larvae were of the rhabditiform type, measuring 150 by 20 microns and showing the characteristic short narrow buccal cavity and club-shaped oesophagus followed by a bulbous dilation (fig. 2). No filariform larvae were seen.

The stool showed some ova of hookworms, but no strongyloides larvae or ova. The urine was normal. Haemoglobin was 12·5 g/100 ml, W.B.C. 10,300/mm³. The differential leucocyte count showed an eosinophilia of 23% with 34% neutrophils and 42% lymphocytes.

She was treated with thiabendazole (25 mg/kg) for two days. This produced no improvement in symptoms or in sputum parasite content. She was then treated with diethylcarbamazine (Hetrazan) 12 mg/kg/daily for 18 days. The wheezing discontinued, and the cough stopped from the fourteenth day of treatment. Sputum