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SOME ZOONOTIC DISEASES PREVALENT IN MALAYSIA

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Summary

A description of eight zoonotic diseases investigated at the Division of Virus Research, Institute for Medical Research, is given. They include leptospirosis, rabies, influenza, Japanese encephalitis, toxoplasmosis, ornithosis, *Q* fever and monkeypox. Of these, *Q* fever and monkeypox were found to be of little public health significance in this country. Ornithosis in large population of pigeons could pose a problem to their human contacts and this possibility should be borne in mind in the investigation of pyrexia of unknown origin. Rabies is not endemic in Malaysia and occurs sporadically mainly in the states bordering on Thailand from where rabid animals, especially dogs, enter. Leptospirosis, influenza, Japanese encephalitis and toxoplasmosis are endemic in Malaysia and the relationship of these infections between infected animals and their human contacts is discussed.

Among the many zoonotic diseases prevalent in Malaysia are leptospirosis, rabies, influenza, Japanese encephalitis, toxoplasmosis, ornithosis, *Q* fever and monkeypox which have been investigated at the Division of Virus Research, Institute for Medical Research, Kuala Lumpur.

LEPTOSPIROSIS

Serological surveys and clinical studies have shown that leptospirosis is highly endemic in W. Malaysia.[1] About 30 different serovars of leptospires have been isolated and all the known serogroups have been represented in the agglutinins found in positive sera.

Rural residents had a 16.4% SEL (Sensitized-erythrocyte-lysis) antibody rate compared with 5.6% in urban residents. Of the 18 occupational groups studied, oil palm workers, rubber estate workers and labourers in rural and forest areas were most highly infected due presumably to the relatively higher infestation of rats in those areas.[1]

Five rubber estates were surveyed and very high antibody rates (43–46%) were found in labourers living in small rubber estates which were close to the forest fringe and easily accessible to the highly infected forest rats.[3] Conversely, workers in large estates far distant from the forest fringe had rates of 0–3% only. The main species of rats in the rubber estates themselves was R. *jalorensis* which is normally arboreal in habitat and therefore does not usually come in contact with rubber estate workers. This is in contrast to the conditions in oil palm estates where rats are strongly attracted to the oil palm fruit and are very numerous at ground level when the fruit is cut down and stored.

Leptospirosis has been closely associated with rice cultivation in various parts of the world. In West Malaysia, clinical leptospirosis is uncommon among padi planters in the state of Kelantan but common in Perlis. Field studies conducted in five Kelantan ricefields[4] showed that the padi planters there have been infected, their SEL antibody rate being 14.2%. Moreover, the R. ***argentiventer*** rats prevalent in such areas, have been found to excrete leptospires at a high rate into the ricefields.[5] However, the water and soil samples collected from the five Kelantan ricefields studied were found to be acidic, the mean pH of the water being 5.9 and of the soil 5.2 during the rainy season. The pH of the soil alone during the dry season was 4.8. The soil type was mainly clay which under laboratory conditions adsorb leptospires and render them helpless.[6] It is therefore possible that the Kelantan padi planters have managed to acquire immunity through infection by leptospires which had been rendered relatively avirulent owing to the unfavourable conditions of growth.

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Table 1 shows the distribution of leptospiral agglutinins among domestic animals. Of the 3 species of animals examined, cattle was by far the most highly infected. Pig and cattle slaughterers had higher infection rates than veterinary laboratory workers possibly indicating transmission of leptospirosis from the animals to man. The prevalent infecting serovars in the domestic animals are shown in Table 2.

RABIES

Although rabies has been known to occur in Malaysia since 1884, it was only since 1924 that there have been records of human cases. The majority of outbreaks occured in states bordering on Thailand.

The prevalence of rabies in W. Malaysia from 1924 to 1980 is summarised in Table 3.

Transportation of army dogs from one locality to another appeared to play an important role in the spread of rabies south of the border states in 1945 and in 1963. From 1963 to 1975 outbreaks were concentrated mainly in Kedah with the exception of the 1970 epidemic which involved Perlis.[7] However, from 1977 to 1980, rabies appeared to have shifted to Perlis.

The so-called "immune belt" which is 30-50 miles wide, includes the entire state of Perlis and those districts of the states of Kedah, Perak and Kelantan which border Thailand. Here, continual compulsory vaccination and registration of dogs and destruction of stray and unlicensed dogs are supposed to be maintained to prevent the spread of rabies introduced through dogs infiltrating from Thailand. Movement of dogs out of the immune belt into the rest of Malaysia requires certification of rabies vaccination performed at least 30 days but not over 3 years previously. Dogs may be brought into the "immune belt" only upon permission of the State Veterinary Officer of the state entered. Immediate vaccination upon arrival, if not performed earlier, is mandatory.

The continued outbreaks of rabies in the so-called "immune belt" since its establishment clearly indicates that the belt is not being effectively maintained and active precautionary measures need to be stepped up to a much greater extent by the relevant authorities in that area.

INFLUENZA

Influenza HI antibodies were studied in pig, goat and cattle sera collected in the 1960s by the Veterinary Research Institute, Ipoh. No antibodies or antibodies at negligible levels were detected in 147 pig and 194 goat sera. How-

TABLE 1

LEPTOSPIROSIS ANTIBODIES IN DOMESTIC ANIMAL,+VETERINARY* AND ABBATOIR WORKERS*

Group	No. Examined	No. Positive	% Positive
Cattle	255	118	46.3
Goat	193	33	17.1
Pig	146	15	10.3
Veterinary workers	68	2	2.9
Piy slaughterers	60	9	15.0
Cattle slauyhterers	42	7	16.7
Abbatoir workers	102	16	15.7

\+ M.A. Antibodies
* SEL. Antibodies

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TABLE 2
SIX COMMONEST INFECTING SEROVARS IN DOMESTIC ANIMALS
(IN DESCENDING ORDER OF FREQUENCY)

Animal	1	2	3	4	5	6
Cattle+	L. hyos	L. hebdomadis	L. australis	L. djasiman	L. pomona	L. ictero
Goat*	L. pomona	L. hebdomadis	L. ballum	L. ictero	L. australis	L. canicola L. djasiman L. hyos
Pig$^{\Delta}$	L. pomona	L. pyrogenes	L. ballum	L. cynopteri	L. canicola	L. celledoni

\+ +ve to 14 serovars
* +ve to 11 serovars
$^{\Delta}$ +ve to 6 serovars

TABLE 3

RABIES IN MALAYSIA (1924 – 1980)

1924 – 44 :	Minor sporadic outbreaks in states bordering on Thailand.
1945:	Major outbreak in Province Wellesley and Perak (through army dogs from India and Burma).
1945 – 53 :	Rabies highly endemic in Perak.
1952:	Outbreak in Selangor. Control measures stepped up.
1954:	Malaya declared "Rabies Free". "Immune" belt established.
1963:	Small outbreak in Perlis and Selangor (through army dogs from Perlis).
1965:	Sporadic cases in Kelantan.
1970:	Major outbreak in Kedah and Perlis (11 human cases). W.H.O. consulted on unusual laboratory observations.
1972:	Sporadic cases in Kedah (2 dogs).
1973:	Sporadic cases in Kedah (1 human case, 1 dog).
1974:	Sporadic cases in Kedah (1 human case, 2 dogs).
1975:	Sporadic cases in Kedah (1 dog), Bukit Mertajam (2 dogs), Penang-General Hospital (2 human cases).
1977:	Sporadic case in Perlis (1 dog).
1978:	Sporadic cases in Perlis (2 dogs).
1980:	Outbreak in Perlis (5 dogs, 1 human case). Sporadic case in Kroh, N. Perak (1 human case).

ever, a number of cattle sera were positive to the antigens examined (Table 4).

Antibody rates to A/Swine/31 (12.7%) and A/Hongkong/68 (20.2%) were higher than those to A/New Jersey/76 (0.5%). A/Victoria/75 (1.1%) and A/USSR/77 (3.5%), which confirms that the latter 3 virus strains were not prevalent during the 1960s.

In 1976–77, sera were collected for examination from 173 pigs at the Shah Alam abbatoirs, 60 pig slaughterers of the same abbatoir and 65 veterinary workers of the Veterinary Diagnostic Laboratory, Petaling Jaya.[8] This time, the pigs were positive for antibodies against swine as well as human strains of influenza type A virus but not against type B (Table5).

The pig slaughterers had different antibody distributions from those of the pigs but similar distributions to those of the veterinary laboratory workers who do not come into constant and direct contact with the pigs, and who therefore serve as a control group. This probably indicates absence or a very low index of transmission of influenza from the pig to their slaughterers. The presence of A/New Jersey/76 antibodies detected in man might be attributed to the virus actually circulating among the population, albeit in low amounts and without causing an overt outbreak in the country.

JAPANESE ENCEPHALITIS

Japanese encephalitis (JE) is not an important public health problem in Malaysia. From 1968 to 1980, out of 21,985 cases examined only 308 (1.4%) were positive by serology/virus isolation. All the cases were in the age group 5–14 years. The majority were Chinese and male. Table 6 shows the distribution of JE neutralisation antibodies in domestic animals and man. Pigs, buffaloes and cattle were most frequently infected (IMR Annual Report, 1956) but rarely, if ever, suffered from the disease itself. In man those living in coastal regions have the highest antibody rates and those living in mountainous areas, the lowest.[9]

An outbreak of JEV infection among imported race-horses occurred in 1965 in Ipoh.[10] Birds and monkeys were investigated by Marchette (unpublished) for JE neutralisation antibodies but only a negligible number was positive.

TABLE 4
INFLUENZA HI ANTIBODIES IN CATTLE SERA COLLECTED IN THE NINETEEN SIXTIES

Antigen	No. Examined	No. Positive	% Positive
A/Swine/31 (Hsw1N1)	371	47	12.7
A/New Jersey/76 (Hsw1N1)	371	2	0.5
A/Hongkong/68 (H3N2)	203	41	20.2
A/Victoria/75 (H3N2)	363	4	1.1
A/USSR/77 (H1N1)	369	13	3.5
B/Hongkong/72	369	78	21.1

TOXOPLASMOSIS

Except as a possible cause of congenital malformation, toxoplasmosis does not pose an important health problem to Malaysia. Tan and Zaman[11] demonstrated that Malaysians had an IHA antibody rate of 13.9%, with Malays having the highest rate (21.2%) followed by Indians (13.6%) and Chinese (5.0%).

A study of Malaysian domestic animals for IHA antibodies[12] showed that the incidence of seropositivity in pigs was 12.5%, in buffaloes 11.2%, in goats 9.5% and in cattle 4.1%. However, contrary to expectation, cattle slaughterers at the Shah Alam abbatoir revealed a much higher IFA antibody rate (54.8%) than pig slaughterers (20.6%) (Tan and Mak, unpublished). Most of the cattle slaughterers were Malays and most of the pig slaughterers, Chinese. The distribution of antibodies in Malaysians of other occupational groups (Table 7) showed higher rates in padi planters and veterinary workers (mainly Malays) than in estate workers and antimalarial labourers (mainly Indians) and tin miners (mainly Chinese).

It is possible that infection with toxoplasmosis in Malaysia is not acquired through contact with animals other than with cats as pets, and that Malays are more frequently infected than the other two races because the majority of them love to rear and fondle cats. Unfortunately, this is only conjecture as the rate of toxoplasmosis infection in Malaysian cats has yet to be established.

ORNITHOSIS

Ornithosis was first recognised in Malaysia in Grik in Perak state, when in May 1959 a German missionary lady-doctor reported fever, headache and cough in a Chinese family of seven who were rearing pigeons, several of which were also found to be ill. An investigation revealed that although all the human cases were negative, all the three pigeons examined were positive for complement fixation (CF) antibodies at titres of 1:20. No viruses were isolated from the faecal samples of the pigeons, however.

In 1970, a study of ornithosis in 119 randomly selected patients with pyrexia of unknown origin revealed 2 (1.7%) positive cases.[13] One of the patients was a lady-doctor acting as a volunteer medical officer for the Pure Life Orphanage-cum-school in Puchong (about 10 miles from Kuala Lumpur). As the orphanage she frequented had many stray pigeons which were seen to fall ill sometimes, they as well as the volunteer teachers, supervisors and orphans of the Orphanage were tested. The other positive PUO case was an Indian male aged 69 years resident in Seremban. No history of contact with birds was available.

Twelve of the rapidly increasing number of pigeons which infest the Batu Caves Hindu Temple (where a Tamil school was situated) were examined in 1972. Table 8 shows the results of these investigations. Of 17 pigeons tested, 10 (58.8%) were positive, their antibody titres ranging from 1:4 to 1:256 or more. However, no evidence of transmission of ornithosis to their human contacts has been found so far. Nevertheless, pigeons in Malaysia must be recognised as a potential source of human ornithosis especially if they come into close contact with man in large numbers, and ornithosis must be considered as one of the possible

TABLE 5
INFLUENZA HI ANTIBODIES IN PIG AND HUMAN SERA (1977)

Species	Antiyen	A/SW/31(Hsw1N1)		A/NJ/76(Hsw 1N1)		A/PC/73(H3N2)		A/Vic/75 (H3N2)		B/HK/72	
		%	GMT	%	GMT	%	GMT	%	GMT	%	GMT
Pigs (6 months old)		9.5	43	7.4	44	11.7	25	4.2	34	0	
Pigs (2–3 years old)		17.7	46	21.5	45	35.4	23	17.7	23	0	
TOTALS		13.3	45	13.9	45	22.5	24	10.4	29	0	
Pig Slaughterers			0	10.0	18	90.0	20	93.3	20	13.3	16
Vet workers			0	6.2	10	98.4	25	100.0	28	6.3	3
TOTALS			0	8.0	14	94.4	23	96.7	24	9.8	10

TABLE 6
JEV NEUTRALISING ANTIBODIES IN DOMESTIC ANIMALS (IMR ANNUAL REPORT, 1966)

Animal	No. Examined	No. Positive	% Positive
Pigs	69	52	75.4
Buffaloes	98	73	74.5
Cattle	175	130	74.3
Dogs	29	17	58.6
Cats	15	0	0

IN MAN (SMITH, 1958)

Community	No. Examined	No. Positive	% Positive
Coastal Rice Plain	51	45	88.2
Coastal Swamp	58	44	75.9
Narrow Rice Valley	50	31	62.0
Forest Fringe	54	30	55.6
Mountains	49	6	12.2

TABLE 7
TOXOPLASMOSIS ANTIBODIES IN PENINSULAR MALAYSIANS BY OCCUPATION

Occupation	Study	No. Examined	No. Positive	% Positive
Padi planters		90	20	22.2
Vet workers	Tan and Zaman 1973	130	26	20.0
Estate workers	(IHA Antibody)	52	7	13.5
Anti-malarial labourers		109	11	10.1
Tin miners (lode mine)		27	1	3.7
Vet workers		65	23	35.4
Pig slaughterers	Tan and Mak 1977	63	13	20.6
Cattle slaughterers	(Unpublished) (IF Antibody)	42	23	54.8

causes of pyrexia of unknown origin when investigating febrile illnesses.

Q FEVER

In 1970, 119 febrile patients were examined for Q fever. None of them showed significant CF antibody increases in their paired sera (IMR Annual Report, 1973, p.220). It may be concluded, therefore, the Q fever is not an important zoonotic disease in Malaysia.

MONKEYPOX

Monkeypox virus (an orthopovirus like the variola virus) was first recognized in 1958 at the Statens Seruminstitut, Copenhagen, Denmark. Since then 10 monkeypox outbreaks have been

TABLE 8
ORNITHOSIS OF ANTIBODIES IN MALAYSIAN PIGEONS AND PEOPLE

Species	Locality (Year)	No. Examined	No. Positive	% Positive
Human patients	Grik (1959)	7	0	0
Pigeons		3	3	100.0
Human patient*	Pure Life Orphanage (1970)	1	1	—
Normal people (Orphans)		13	0	0
Pigeons		5	2	40.0
Pigeons	Batu Caves Hindu Temple (1972)	12	8	66.7

• Lady doctor (voluntary)

recorded in captive monkey colonies in laboratories or zoos. However, in all these outbreaks no transmission of the infection to the monkey handlers were observed. At least 4 of these outbreaks occurred among *Macaca* monkeys from Malaysia. However, a special serological survey failed to detect monkeypox infection in this area.[14]

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REFERENCES

1. Tan DSK. Sensitized-erythrocyte-lysis (SEL) test as an epidemiological tool for human leptospirosis serological surveys. Bull WHO **1969;40** : **899-902.**
2. Tan DSK. Occupational distribution of leptospiral (SEL) antibodies in West Malaysia. Med J Malaysia **1973; 27** : **253-7.**
3. Tan DSK. Leptospirosis in rural West Malaysia. Med J Malaya **1970; 24** : **261-6.**
4. Tan DSK. Leptospirosis in the ricefields of West Malaysia. Southeast Asian J Trop Med Public Health **1970;1** : **483-91.**
5. Smith CEG, Turner LH, Harrison JL, Broom JC. Animal leptospirosis in Malaya. **3.** Incidence in rats by sex, weight and age. Bull WHO **1961; 24** : **807-16.**
6. Smith CEG, Turner LH. The effect of pH on the survival of leptospires in water. Bull WHO **1961;24** : **35.**
7. Tan DSK, Abdul Wahab b. Mohd. Ariff, Mohd. Noordin Keling, Beran GW. An outbreak of rabies in West Malaysia in **1970** with unusual laboratory observations. Med J Malaysia **1972; 27** : **107-14.**
8. Tan DSK, Omar M, Yap TC. Influenza HI antibodies in pig and man in Malaysia (with special reference to swine influenza). Med J Malaysia **1979; 34** : **159-62.**
9. Smith CEG. The distribution of antibodies to Japanese encephalitis, dengue, and yellow fever viruses in five rural communities in Malaya. Trans R Soc Trop Med Hyn **1958;52** : **237-52.**
10. Chong SK, Teoh KC, Marchette NJ, Garcia R, Rudnick A, Coughlan RF. Japanese B encephalitis in a horse. Aust Vet J **1968;44** : **23-5.**
11. Tan DSK, Zaman V. Toxoplasma antibody survey in West Malaysia. Med J Malaysia **1973;27** : 188–91.

12. Mulkit Singh, Zaman V, Goh TK, Chong SK. A survey on the prevalence of toxoplasmic antibodies in animal sera. Med J Malaya **1967; 22** : **115–7.**

13. Tan DSK, Babudieri B. Ornithosis in Peninsular Malaysia (in man and pigeons). Med J Malaysia **1977; 31** : **188–91.**

14. Arita **I,** Gispen R, Kalter SS, et al. Outbreaks of monkeypox and serological surveys in nonhuman primates. Bull WHO **1972; 46** : **625–31.**