

# Endemic Treponematoses in the Sudan

## A Report on a Survey\*

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*It has been recognized for many years that Africa contains a very large reservoir of endemic treponematoses, and all information on the foci of infection contributes to the goal of elimination of these diseases as public health problems.*

*In 1959 the author undertook, at the request of the Sudanese Government, a number of pilot surveys in areas where the endemic treponematoses were thought to be prevalent. From the information acquired in these surveys and from official data it is clear that yaws and endemic syphilis are a major problem of public health in the Sudan. It is estimated that some 5 million people in six provinces are at risk, and that about 20 % of the population in an area of 1 543 000 km<sup>2</sup> suffer from one or the other of the two diseases in the active clinical stage.*

*In some localities yaws was found to be prevalent, and in some endemic syphilis. In others, the two infections were seen to co-exist; and it is suggested that, since little is known of the extent to which one infection confers protection against the other, the situation in the Sudan provides a perhaps unique opportunity for scientific studies of the interrelationship of these two diseases and their possible relationship with venereal syphilis.*

*Another interesting finding, worthy of further investigation, was that mucous lesions occurred only in areas where syphilis was present and not where yaws alone was prevalent.*

At the Second International Yaws Conference (1957) it was pointed out that the African continent had the largest reservoir of endemic treponematoses in the world, with an estimated 25 million cases of yaws. In addition, endemic syphilis prevailed in several areas. Any action to explore and determine the foci of endemic treponematoses in these areas and to reduce this reservoir of infection is therefore an important step towards the goal of elimination of endemic treponematoses as a public health problem in the world as a whole (Guthe & Willcox, 1954).

Sudan is one of the countries in this region where endemic treponematoses still exist. While the nature of yaws and the problem of venereal syphilis have, for a long time, been appreciated in the Sudan, the significance of the non-venereal endemic treponematoses, including their exact extent, was not completely known. The medical facilities have been

steadily improving since Sudan gained independence but have not yet advanced to the point where complete statistical information for the many health problems, particularly those affecting the rural population, is available.

In 1959 at the request of the Sudanese Government and on behalf of the World Health Organization, the author undertook a visit to those areas of the Sudan where endemic treponematoses were thought to be highly prevalent in an effort to assess the importance of the problem. In view of the limited time and personnel available, it was not possible to attempt any precise prevalence survey, and the report that follows should therefore not be construed as a definitive statistical statement on the situation but rather as a practical basis for further work.

### AVAILABLE DATA ON TREPONEMATOSSES IN THE SUDAN

The official reports of the Ministry of Health for the years 1955-56 and 1956-57 give figures for yaws

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and syphilis for the whole of the Sudan by provinces (Table 1). According to these figures, there were 146 718 treponemal infections (yaws and syphilis) in the whole country in 1955-56 and 207 784 for the period 1956-57. These figures represent new cases diagnosed and treated among out-patients in the hospitals, dispensaries and dressing stations in rural areas. This means that in only a two-year period 354 502 new treponemal infections were diagnosed in a population of some 11 million. This corresponds to an annual incidence of 1611 per 100 000 population and well illustrates the magnitude of this national public health problem.

For a variety of reasons these figures are probably not exact. First, there is, as a rule, a tendency to over-diagnosis of yaws and syphilis by the rural health units. Secondly, the number of falsely diagnosed cases is, in fact, probably smaller than the actual number of cases with clinical manifestations or in latency, owing to the fact that only a relatively small sector in the rural population is covered by medical facilities. Thirdly, under-reporting by the health services must also be assumed to take place.

The figures for new cases of treponemal infections among out-patients for the years 1957-58 and 1958-59 (incomplete) show more or less the same pattern (Table 2).

According to these data, 171 839 new out-patients were reported as having treponemal infections in the

TABLE 1  
NEW CASES OF TREPONEMAL INFECTIONS AMONG  
OUT-PATIENTS IN THE SUDAN FOR THE PERIODS 1955-56  
AND 1956-57

Province	1955-56		1956-57	
	Syphilis	Yaws	Syphilis	Yaws
Bahr el Ghazal	5 174	8 508	9 022	15 000
Blue Nile	17 215	—	17 706	—
Darfur	31 660	—	38 700	—
Equatoria	3 841	13 770	17 436	14 938
Kassala	7 170	—	9 044	—
Khartoum	8 165	—	11 187	28
Kordofan	22 545	—	26 112	—
Northern	3 976	—	22 009	—
Upper Nile	13 515	11 209	13 771	12 831
Total	113 231	33 487	164 987	42 797

TABLE 2  
NEW CASES OF TREPONEMAL INFECTIONS AMONG  
OUT-PATIENTS IN THE SUDAN FOR THE PERIODS 1957-58  
AND 1958-59

Province	1 July 1957- 30 June 1958		1 July 1958- 30 June 1959	
	Syphilis	Yaws	Syphilis	Yaws
Bahr el Ghazal	8 364	12 316	7 315	8 897
Blue Nile <sup>a</sup>	17 561	1	—	—
Darfur	40 146	1	40 145	0
Equatoria	7 825	4 334	12 089	17 696
Kassala	12 680	1	8 246	—
Khartoum <sup>a</sup>	8 991	0	—	—
Kordofan	28 118	5	26 482	26
Northern	4 429	0	3 543	2
Upper Nile	13 866	13 201	24 865	15 196
Total	141 980	29 859	122 685	41 819

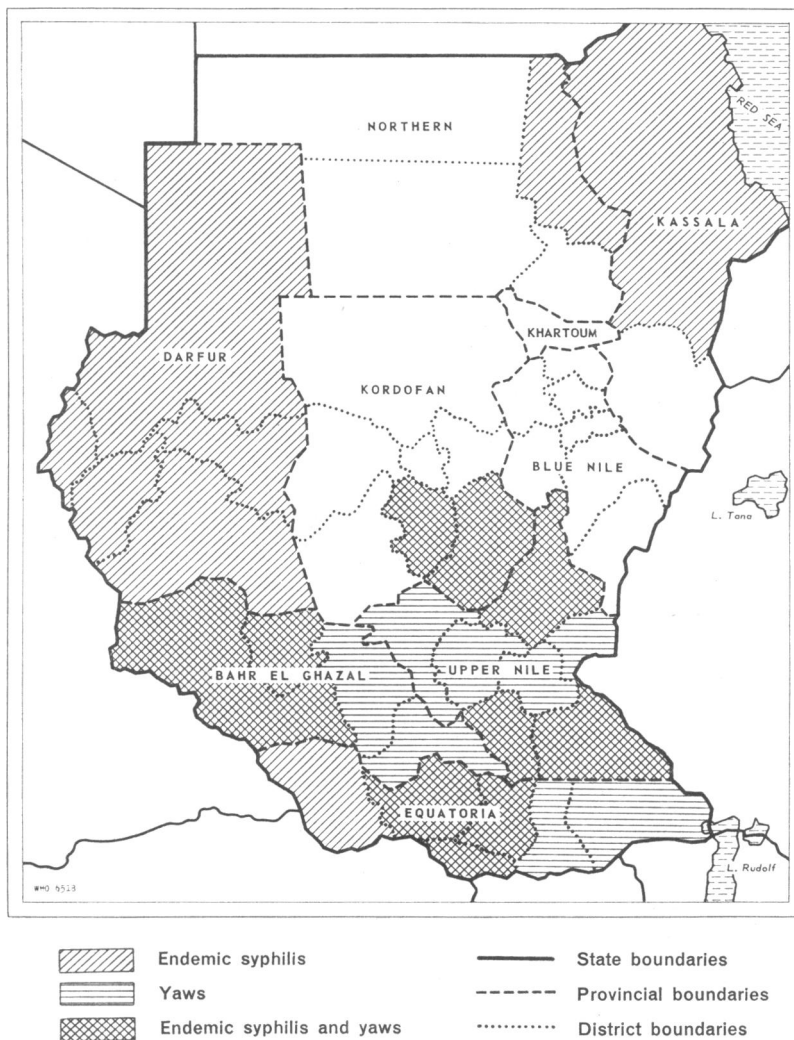
<sup>a</sup> Incomplete data.

period 1957-58 and 164 504 (122 685 cases of syphilis and 41 819 of yaws) in the period 1958-59.

The available statistical data vary to some extent from year to year, but nevertheless indicate large persistent foci of yaws, syphilis or both in certain areas. This situation is illustrated in Fig. 1, which has been prepared on the basis of the available data and of information gained in pilot surveys in the field carried out during the writer's recent visit to the Sudan.

The epidemiological aspect of treponemal infections, particularly their non-venereal endemicity, has not so far been sufficiently emphasized as regards the Sudan. This is particularly true in respect of syphilis infections, which have been considered so far mostly from the aspect of venereal spread. However, detailed data from the provinces contain clear evidence of the widespread existence of non-venereal endemic yaws and syphilis in children. The data from the three districts of Nasir-Eastern-Nuer, Akobo-Lau-Nuer and Pibor, in the Upper Nile Province, for the year 1958-59 (shown in Tables 3-4) demonstrate this. It is evident from these tables that of the new cases of syphilis and yaws seen in out-patients at various dispensaries, a large proportion is in children with treponemal infections of an endemic, non-venereal nature.

FIG. 1  
DISTRIBUTION OF ENDEMIC TREPONEMATOSES IN THE SUDAN



The diagnosis in children is based on clinical manifestations only. The significance of these figures is therefore obvious, and there must be a very high percentage of seroreactivity among the population. This was confirmed in the pilot surveys carried out by the present author in different areas of endemic treponematoses in the Sudan. But, on the basis of the official figures alone, it is evident that syphilis and yaws, as endemic treponemal infections, are a public health problem of considerable magnitude in different areas of the Sudan.

PILOT FIELD SURVEYS

A number of surveys were carried out on the basis of household and family censuses of the whole population, and were undertaken in villages in different areas of the country in the provinces of Equatoria, Upper Nile, Kassala and Kordofan.<sup>1</sup>

<sup>1</sup>I was assisted in these surveys by Dr Zein A. Ibrahim, Chief, Tuberculosis Division, Ministry of Health, Sudan, whose experience in public health problems was of great value in this work.

TABLE 3  
NEW CASES OF YAWS BY AGE-GROUP AMONG OUT-PATIENTS IN THREE DISTRICTS  
OF UPPER NILE PROVINCE, SUDAN, 1958-59

Dispensary	Adults				Children <sup>a</sup>		Total
	Men		Women		No.	%	
	No.	%	No.	%			
Eastern Nuer District (Nasir)							
Nasir	67	16.7	126	31.3	209	52.0	402
Dago	50	25.9	33	17.1	110	57.0	193
Ulang	187	26.0	213	29.7	318	44.3	718
Sokau	66	24.4	63	23.2	142	52.4	271
Kigille	90	33.2	80	29.5	101	47.3	271
Nasir (Mission)	153	33.5	216	47.3	88	19.2	457
<b>Total</b>	<b>613</b>	<b>26.5</b>	<b>731</b>	<b>31.6</b>	<b>968</b>	<b>41.9</b>	<b>2 312</b>
Lau Nuer District (Akobo)							
Akobo	40	30.1	60	45.1	33	24.8	133
Waat	809	45.4	700	39.2	274	15.4	1 783
Ful Turuk	310	29.5	302	28.8	437	41.7	1 049
Akobo (Mission)	40	29.8	34	25.4	60	44.8	134
<b>Total</b>	<b>1 199</b>	<b>38.7</b>	<b>1 096</b>	<b>35.4</b>	<b>804</b>	<b>25.9</b>	<b>3 099</b>
Pibor District							
Pibor	12	44.4	8	29.6	7	26.0	27
Boma	9	26.5	7	20.6	18	52.9	34
Agoi	372	55.2	202	30.0	100	14.8	674
Pascaalla	28	36.8	29	38.2	19	25.0	76
Gumurviz	18	28.1	27	42.2	19	29.7	64
Pibor (Mission)	7	28.0	8	32.0	10	40.0	25
<b>Total</b>	<b>446</b>	<b>49.6</b>	<b>281</b>	<b>31.2</b>	<b>173</b>	<b>19.2</b>	<b>900</b>

<sup>a</sup> Below 15 years.

The epidemiological and clinical aspects of yaws in the Sudan were studied, particularly in the Eastern part of Equatoria Province. In the Torit district, three villages (Yagi-Yagi, Chakari and Lofi) were systematically surveyed as well as a group of the population belonging to the Letuka tribe on the way to Yagi-Yagi village. Examinations were also carried out in two dispensaries (Liryra and Kiyalla) in this area, where advance notice was given to the surrounding population that they should convene for medical examination and treatment.

In the three villages, 212 families with a total of 682 people were surveyed; in the Letuka group 365 people, and in the dispensaries 149 people were examined.

The particulars of this survey are given in Table 5. It is obvious that the surveyed areas are typical active foci of yaws in the "wild" expanding stage of infection. The distribution of active clinical manifestations of yaws among the children—amounting to 43.1% clinical cases diagnosed among all the children examined in Chakari village, or 95.6%

TABLE 4  
NEW CASES OF ENDEMIC SYPHILIS BY AGE-GROUP AMONG OUT-PATIENTS IN THREE DISTRICTS OF UPPER NILE PROVINCE, SUDAN, 1958-59

Dispensary	Adults				Children <sup>a</sup>		Total
	Men		Women		No.	%	
	No.	%	No.	%			
<b>Eastern Nuer District (Nasir)</b>							
Nasir	246	30.7	216	26.9	340	42.4	802
Dago	70	47.0	61	40.9	18	12.1	149
Ulang	155	42.8	142	39.2	65	18.0	362
Sokau	189	27.3	156	22.5	348	50.2	693
Kigille	144	37.5	140	36.5	100	26.0	384
Nasir (Mission)	0	0	0	0	0	0	0
<b>Total</b>	<b>804</b>	<b>33.6</b>	<b>715</b>	<b>30.0</b>	<b>871</b>	<b>36.4</b>	<b>2 390</b>
<b>Lau Nuer District (Akobo)</b>							
Akobo	470	40.3	306	26.2	390	33.5	1 166
Waat	200	33.5	170	28.8	227	37.7	597
Ful Turuk	90	41.5	60	27.6	67	30.9	217
Akobo (Mission)	19	48.8	10	25.6	10	25.6	39
<b>Total</b>	<b>779</b>	<b>38.7</b>	<b>546</b>	<b>27.1</b>	<b>694</b>	<b>34.5</b>	<b>2 019</b>
<b>Pibor District</b>							
Pibor	205	54.1	100	26.4	74	19.5	379
Boma	20	33.9	20	33.9	19	32.2	59
Agoi	83	48.0	85	49.1	5	2.9	173
Pascaalla	55	48.7	34	30.1	24	21.2	113
Gumurviz	186	43.9	179	42.2	59	13.9	424
Pibor (Mission)	10	27.0	10	27.0	17	46.0	37
<b>Total</b>	<b>559</b>	<b>47.2</b>	<b>428</b>	<b>36.1</b>	<b>198</b>	<b>16.7</b>	<b>1 185</b>

<sup>a</sup> Below 15 years.

of all early cases—is a classical feature of endemic non-venereal treponematoses where transmission of the infection occurs primarily in childhood. This observation is closely related to the frequency of hyperkeratotic lesions in adults, as shown in Table 4. The prevalence of active clinical yaws in all the three systematically surveyed villages is as high as 54%. This area must therefore be considered holoendemic. In the selected group examined in the dispensary at Lirya active clinical cases were found to have a frequency as high as 73.1%.

Conditions similar to those described above are believed to exist in most rural areas of Bahr el Ghazal and Upper Nile Provinces. However, in the Upper Nile Province there are regions where yaws and endemic syphilis can be found either in separate localities or commingled among the population of the same locality. This was observed, for instance, among the Dinka tribe in Bor district, where yaws in certain areas appears to be in slow regression.

At the dispensary in Mangala, 11 active cases of treponemal infections were observed, six of them

TABLE 5  
RESULTS OF SYSTEMATIC SURVEYS OF DIFFERENT POPULATION GROUPS IN TORIT DISTRICT,  
EQUATORIA PROVINCE, SUDAN

Group	Number surveyed	Clinical active cases of yaws							
		Early		Late		Hyperkeratosis		Total clinical cases	
		No.	%	No.	%	No.	%	No.	%
Chakari village (105 families)									
Men	117	0	0	2	1.7	70	59.8	72	61.5
Women	51	1	2.0	3	5.9	33	64.7	37	72.6
Children	144	22	15.3	7	4.9	33	22.9	62	43.1
<b>Total</b>	<b>312</b>	<b>23</b>	<b>7.4</b>	<b>12</b>	<b>3.8</b>	<b>136</b>	<b>43.6</b>	<b>171</b>	<b>54.8</b>
Lofi village (65 families)									
Men	65	0	0	1	1.5	33	50.8	34	52.3
Women	61	3	4.9	0	0	25	41.0	28	45.9
Children	83	5	6.1	7	8.4	7	8.4	19	22.8
<b>Total</b>	<b>209</b>	<b>8</b>	<b>3.8</b>	<b>8</b>	<b>3.8</b>	<b>65</b>	<b>31.1</b>	<b>81</b>	<b>38.7</b>
Letuka group									
Men	132	17	12.9	12	9.1	48	36.4	77	58.4
Women	144	17	11.8	2	1.4	30	20.8	49	24.0
Children	89	17	19.1	0	0	4	4.5	21	23.6
<b>Total</b>	<b>365</b>	<b>51</b>	<b>15.0</b>	<b>14</b>	<b>3.8</b>	<b>82</b>	<b>22.5</b>	<b>147</b>	<b>40.3</b>
Yagi-Yagi village (42 families)									
Men	42	4	9.5	2	4.8	9	21.4	15	35.7
Women	31	4	12.9	1	3.2	11	35.5	16	51.6
Children	88	24	27.3	0	0	4	4.5	28	31.8
<b>Total</b>	<b>161</b>	<b>32</b>	<b>19.9</b>	<b>3</b>	<b>1.9</b>	<b>24</b>	<b>14.9</b>	<b>59</b>	<b>36.7</b>
Lirya dispensary									
Men	31	0	0	2	6.5	20	64.5	22	71.0
Women	25	1	4.0	0	0	13	52.0	14	56.0
Children	93	26	27.9	0	0	47	50.5	73	78.4
<b>Total</b>	<b>149</b>	<b>27</b>	<b>18.1</b>	<b>2</b>	<b>1.3</b>	<b>80</b>	<b>53.7</b>	<b>109</b>	<b>73.1</b>

being early infectious lesions. From the localization and the appearance of the lesions, three early cases were diagnosed as endemic syphilis (oral mucous plaques and papules in the genital region) and the other three as yaws (typical skin papillomata). Three of the remaining five patients had hyperkeratotic involvement of the soles and two had late lesions, one on the trunk and one on the back. One of these patients, with characteristic plantar hyperkeratosis, was the mother of a child who had the typical mucous lesions of endemic syphilis. One of the cases of endemic syphilis was a young girl who had on her neck a large papillomatous lesion which resembled a mother yaw. Furthermore, she had mucous oral patches with swollen indurated submaxillary lymph-nodes and papillomatous lesions of the genitalia (virgo intacta). Observations of this kind are very unusual and pose a number of interesting clinical and epidemiological problems, showing the need for further investigations.

It was sometimes very difficult on inspection of individuals to decide whether they were suffering from yaws or endemic syphilis. The possibility could not be ignored, taking into account a certain number of cases not unlike that of the above-mentioned girl, that one treponemal infection might be superimposed on the other. This mixture of endemic treponemal infections in one locality and even in one individual represents a scientific challenge.

It is known that yaws and endemic syphilis have many features in common; but, although the clinical and epidemiological differences appear to be rather of a quantitative than of a qualitative nature (Grin, 1936, 1956; Hudson, 1946, 1958), a distinction be-

tween them may still be justifiable on ecological and biological grounds (Turner & Hollander, 1947). It could also be shown in the course of this survey that mucous lesions in treponemal infections occur only in regions where syphilis exists and not in areas (e.g., eastern Equatoria) where only yaws is prevalent (Hackett, 1949).

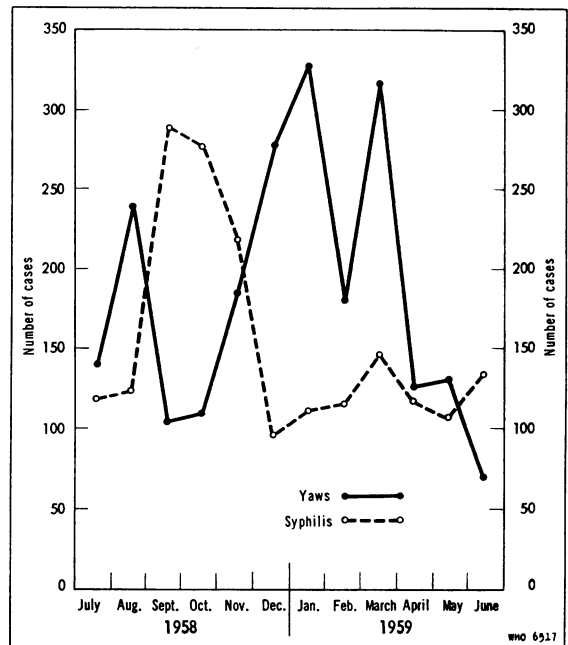
It is obvious that further detailed epidemiological, clinical and experimental investigations on this problem are necessary to clarify the nature of these conditions. In areas in the Sudan where both treponemal infections occur as endemic diseases there is an unique opportunity for acquiring more definite information on the relationship between the two. The gaps in the knowledge of treponemal infections have been pointed out by the WHO Expert Committee on Venereal Infections and Treponematoses on several occasions in the past, as well as by the WHO Scientific Group on Treponematoses Research in 1960.

There is evidence that the problem of the co-existence of the two diseases is acquiring increasing importance in certain regions of the Sudan where yaws has been somewhat reduced in recent years. Table 6 and Fig. 2 have been prepared on the basis

FIG. 2. MONTHLY INCIDENCE OF YAWS AND ENDEMIC SYPHILIS AMONG OUT-PATIENTS AT RURAL DISPENSARIES IN BOR DISTRICT, UPPER NILE PROVINCE, SUDAN, JULY 1958-JUNE 1959

TABLE 6  
RATIO OF TREPONEMAL INFECTIONS AMONG OUT-PATIENTS ATTENDING RURAL DISPENSARIES IN BOR DISTRICT, UPPER NILE PROVINCE, SUDAN, JULY 1958-JUNE 1959

Dispensary	Endemic treponematoses			Ratio of yaws to syphilis
	Number of cases		Total	
	Yaws	Syphilis		
Galle	417	13	430	1: 0.03
Duke	743	171	914	1: 0.23
Kongor	165	62	227	1: 0.38
Malek	826	602	1 428	1: 0.73
Anyidi	27	970	997	1: 35.93
<b>Total</b>	<b>2 178</b>	<b>1 818</b>	<b>3 996</b>	<b>1: 0.83</b>



of data from rural dispensaries in Bor District, where valuable observations can be made regarding the dynamics of yaws in relation to endemic syphilis, particularly as regards the replacement of yaws by endemic syphilis.

The "transitional stage" at which infection with *Treponema pallidum* replaces that with *T. pertenue* was obvious in the region of the Nuba Mountains, Kordofan Province. Yaws there is now reduced to such an extent that early infectious cases are hardly ever observed, and syphilis infections are now more frequent and are spreading among the rural population in the form of the endemic, non-venereal disease.

It is well known that the relaxation of tribal sexual morals may increase the risk of infection with venereal syphilis, and individual movements between rural and urban areas lead to the possibility that venereal syphilis acquired in the town may give rise to endemic syphilis in a population with low standards of living and hygiene and with little contact with civilization. This is another "transitional stage" in the treponemal infections which can be observed in the Sudan. In some villages in the Kadugli area of the Nuba Mountains region it was possible to establish how the first sporadic venereal syphilis infections were imported and then spread as non-venereal endemic syphilis on account of the generally low hygienic and living conditions of the population in the rural areas.

In the Nuba Mountains systematic surveys of 472 people in the Kadugli area and of 505 people in the Dilling area were undertaken. In addition,

six rural health units were visited and the patients examined. The results of these surveys are as follows:

(a) In the Kadugli area, of the 472 persons examined in Tabania village 80, or 16.9%, had active clinical manifestations of treponemal infection. Among these 80 cases, 55 had infectious manifestations of syphilis; the remainder had yaws in the form of hyperkeratotic palmar or plantar changes. No active early infectious case of yaws was observed in the group surveyed. Of the infectious early cases of syphilis, 24% were among children. In this area the focus of yaws is in regression and syphilis is expanding in an endemic, non-venereal form.

(b) In the Dilling area, two villages with 505 people were systematically surveyed (Mandal and Karko); 17.7% were found to have clinically active symptoms of endemic treponemal infection. Yaws was the most prevalent treponematoses but not in infectious form. Syphilis was diagnosed once only—in a child showing early clinical signs.

(c) In the six rural health units 30 cases of endemic syphilis with early infectious lesions were seen, as well as one case with late cutaneous syphilis. Ten cases of yaws with hyperkeratotic plantar lesions were also seen, but no early infectious manifestations.

Typical foci of endemic syphilis almost in regression could be seen in the northern part of the Kassala Province. Systematic surveys were performed in three villages, one populated by the semi-nomadic Arab tribe Rashaide, and the other two by the Bija tribe. Among 413 people representing the sur-

TABLE 7  
AREA AND POPULATION WHICH WOULD HAVE TO BE COVERED BY MASS TREATMENT  
CAMPAIGN AGAINST ENDEMIC TREPONEMATOSES IN THE SUDAN

Province	Area (km <sup>2</sup> )	Population			
		Total	Children	Women	Men
Equatoria	198 000	991 000	396 000	314 000	281 000
Bahr el Ghazal	213 000	1 150 000	493 000	330 000	327 000
Upper Nile	236 000	991 000	413 000	292 000	286 000
Darfur	496 000	1 458 000	605 000	472 000	381 000
Kassala (northern part)	323 000	474 000	201 000	166 000	107 000
Kordofan (Nuba Mountains only)	77 000	661 000	243 000	212 000	206 000
Total	1 543 000	5 725 000	2 351 000	1 786 000	1 588 000



veyed population in these villages, five active tertiary lesions and one early lesion of syphilis were observed. Many of the people gave a positive history of infection; 10 out of 18 blood samples were sero-reactive. The area has to be considered one of regressing syphilis, with most cases in latency.

#### CONCLUSIONS

From the information obtained in these pilot surveys in different areas of the Sudan and from data in the regular official reports it would appear that the main areas affected by yaws and endemic syphilis, or both, include four complete provinces—Equatoria, Bahr el Ghazal, Upper Nile and Darfur—and some regions of two other provinces—namely,

the northern part of Kassala Province and the Nuba Mountains in Kordofan Province. It is considered that the proposed national endemic treponematoses control programme in the Sudan would have to cover by systematic examination some five million people in an area of 1 543 000 km<sup>2</sup> (Table 7).

From the data at hand it may also be estimated that some 20% of the population of these areas is suffering from one or the other of the two treponemal infections in the active clinical stage. For a control campaign, therefore, a satisfactory method might well be that of total mass treatment (Hackett & Guthe, 1956), which is very effective in areas of high prevalence of endemic treponematoses where a great part of the population is at risk.

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#### RÉSUMÉ

Avec quelque 25 millions de cas de pian, sans parler de la syphilis endémique répandue en certaines régions, l'Afrique était considérée en 1957 comme le foyer le plus étendu des tréponématoses endémiques. Le Soudan est l'un des pays où ces maladies sont un grave problème de santé publique. L'enquête effectuée par l'auteur à la demande du Gouvernement soudanais, avec l'aide de l'OMS, en 1959, le prouve à l'évidence.

Les régions les plus fortement affectées par le pian ou la syphilis endémique, souvent par les deux, sont les provinces d'Equatoria, de Bahr el Ghazal, du Haut-Nil et de Darfur, la partie nord du Kassala et les Monts Nuba dans la province de Kordofan. Certaines régions, telles que le district de Torit dans la province d'Equatoria, sont des foyers actifs de pian en naturelle expansion. Les manifestations cliniques actives du pian parmi les enfants — 43,1% des cas cliniques diagnostiqués chez les enfants, et 95,6% de tous les cas récents — sont un des caractères typiques des tréponématoses endémiques non vénériennes, qui affectent au premier chef les jeunes. La fréquence globale du pian clinique actif était de 54% dans trois villages systématiquement examinés. De pareilles conditions paraissent se rencontrer aussi dans les régions rurales des provinces de Bahr el Ghazal et du Haut-Nil.

Les enquêteurs eurent parfois de la peine à distinguer les lésions du pian de celles de la syphilis endémique.

Il n'est du reste pas exclu que ces deux maladies coexistent chez le même individu. Un autre fait a été relevé: les lésions muqueuses des tréponématoses ne se rencontrent que là où existe la syphilis; elles ne se manifestent pas dans les régions exclusivement pianiques. Le Soudan, où les deux maladies sont endémiques, est un terrain de choix pour l'étude de leurs relations. Cette question est d'un intérêt particulier dans les régions du Soudan où le pian est en régression. Dans la région des Monts Nuba, on peut observer la phase de transition au cours de laquelle l'infection à *T. pallidum* remplace celle à *T. pertenue*. Le pian y est réduit au point que les lésions récentes sont exceptionnelles. En revanche, les infections syphilitiques sont fréquentes et se répandent dans les populations rurales, sous forme de syphilis endémique non vénérienne. On peut du reste constater également une transition entre syphilis vénérienne et non vénérienne. A partir de cas de syphilis vénérienne importés, se sont développées des séries de cas de syphilis endémique non vénérienne, favorisés par le niveau de vie généralement bas des populations rurales. D'autre part, plusieurs foyers typiques de syphilis endémique sont également en régression.

L'auteur conclut, à la suite de cette enquête, qu'étant donné la fréquence de l'infection dans les provinces et régions citées plus haut, le programme de lutte envisagé

par le Soudan devrait s'étendre à quelque 5 millions de personnes sur 1,5 million de km<sup>2</sup>. Environ 20% de la population de ces régions souffrent de l'une ou l'autre tréponématose, au stade clinique actif. La méthode de

lutte la plus satisfaisante serait le traitement de masse de toute la population, tel qu'il est conseillé pour les régions de haute endémicité où une grande partie de la population est exposée à l'infection.

#### REFERENCES

- Grin, E. I. (1936) *Urol. cutan. Rev.*, **39**, 482  
 Grin, E. I. (1956) *Bull. Wld Hlth Org.*, **15**, 959  
 Guthe, T. & Willcox, R. R. (1954) *Treponematoses, a world problem*, Geneva (reprinted from *Chron. Wld Hlth Org.*, **8**, 37)  
 Hackett, C. J. (1949) *Trans. roy. Soc. trop. Med. Hyg.*, **43**, 311  
 Hackett, C. J. & Guthe, T. (1956) *Bull. Wld Hlth Org.*, **15**, 869  
 Hudson, E. H. (1946) *Treponematoses*, New York  
 Hudson, E. H. (1958) *Non-venereal syphilis*, London  
 Second International Conference on Control of Yaws (1957) *J. trop. Med. Hyg.*, **60**, 27, 62  
 Sudan, Ministry of Health (1956) *Report of the Medical Services . . . 1955-56*, Khartoum  
 Sudan, Ministry of Health (1957) *Report of the Medical Services . . . 1956-57*, Khartoum  
 Turner, T. B. & Hollander, D. H. (1957) *Biology of the treponematoses*, Geneva (*World Health Organization: Monograph Series*, No. 35)