

ANNUAL PROGRESS REPORT

SEATO Medic Study No. 102 Urologic and Nutritional Studies of  
Calculous Disease of the Bladder

Project No. 3A 025601 A 811 Military Medical Research Program  
S.E. Asia

Task 01: Military Medical Research Program  
S.E. Asia

Subtask 01: Military Medical Research Program  
SEASIA (Thailand)

Reporting Installation: US Army-SEATO Medical Research Laboratory  
APO 146, San Francisco, California  
Division of Medical Research Laboratories  
Department of Virology (Special Project)

Period Covered by Report: 1 April 1963 to 31 March 1964

Principal Investigator: Dr. Aree Valyasevi

Associate Investigator: Major Scott B. Halstead, MC

Reports Control Symbol: MEDDH-288

Security Classification: UNCLASSIFIED

ABSTRACT

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The objective of this study is to elucidate the pathogenesis of vesical calculi. The volume of 24-hour urine excretion in subjects living in Nong Kohn village endemic for bladder stone was about half that of subjects living in Ubol city during the hot, dry weather (April 1963). The same group of villagers excreted about half as much during the hot, dry weather as compared to the rainy (August 1963) and cool, dry seasons (November 1963). Urinary calcium concentration was higher even when corrected for volume in the samples from Nong Kohn than from the city. However, the lower volume of urinary excretion in the children under 5 years old is probably partly responsible for the higher urinary calcium concentration. Urinary crystals, mainly oxalate, were found more frequently in urine specimens from the village

than from the city. It seems probable that a stage of dehydration during the hot, dry season leads to lower urinary output with high urinary calcium, oxalate and uric acid may play a factor in the stone formation. Determinations of creatinine and uric acid in 24-hour samples are in progress. Further studies comparing the capacity of urine obtained from village and city to dissolve oxalate and studies of oxalate and uric acid metabolism will be done in the future.

BODY OF REPORT

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Objectives: To study seasonal variation in the amount and type of foodstuff and urine findings in residents of hyper- and hypoendemic areas for bladder stone with a view to elucidating the pathogenesis of vesical calculi.

Description: Previous epidemiological studies have established that prevalence of bladder stone varies markedly between the city of Ubol and Nong Kohn village (only 15 kilometers apart). Highest incidence of stone passing and presumptive symptoms occur during the hot, dry weather in February, March and April and after the cessation of the rainy season in November.

Sixteen families each in Nong Kohn and Ubol were subjected to dietary survey for 3 days each during April (hot and dry), August (rainy) and November (cool and dry) of 1963. In addition to nutritional study, 24-hour urine specimens have been collected from each study household member and freshly voided morning specimens obtained from a larger group. A nurse investigator stayed with each family for a period of not less than 16 hours daily and closely supervised the collection. Since there is no latrine in the house, individuals have to go outside for voiding or use the supplied container. Each household member has been restudied 3 times.

Complete urinalysis, included determination of pH, protein, sugar, calcium and specific gravity. A microscopic examination was performed within 2 hours after the collection. Twenty-four hour samples were thoroughly mixed, measured for amount, specific gravity, calcium, protein, creatinine and uric acid.

Progress: The number of casual urinary samples and age distribution of the subjects studied in 1963 are shown in Table 62. Age of these subjects varies from 1 month to 90 years old.

The number of 24-hour urine samples collected are shown in Table 63. Children up to the age of 19 in Nong Kohn village excreted about half the volume of children in the city of Ubol during the hot, dry season in April, 1963. As controls five medical students who were working in the project at that period of time excreted almost the same amount as adults living both in the village and the city. At any sample period, the amount of urine excretion in village children was always lower in the 2 to 4 year age group than city children, however, other than in April, there was no significant difference between other age groups. Volume of urine excreted by villagers in Nong Kohn was about half as much in April as in August and November. However, the subjects living in the city excreted almost the same amount during these three studied periods.

Calcium concentration in the urine: Sulkowitch test showed higher concentration of urinary calcium in persons of less than 20 years of age living in the village than in the city. This finding is demonstrated in both freshly voided morning specimens and 24-hour samples (see Figures I, II and IV). Higher concentrations of urinary calcium are found more frequently in village children of less than 5 years of age than in older individuals. These findings were confirmed in 24-hour samples (see Figures III and V). The lower volume of urinary excretion in 0-4 year old village children is probably partly responsible for this higher urinary calcium concentration (Table 63). However, there is no significant difference in the volume of urine excretion in other age groups; yet calcium excretion appears to differ.

### Urinary Crystals

Microscopic examination of freshly voided morning specimens revealed more crystals found in village than in city subjects as shown in Figure VI & VIII. About 70 to 80 percents of the crystals were oxalate; uric acid comprised the bulk of the remainder. Phosphate and sulfate crystals were only occasionally found.

### Urinary Leucocytes and Erythrocytes

Microscopic examination showed no difference in the numbers of leucocytes and erythrocytes found in the centrifuged urinary specimens from the subjects living in Nong Kohn and Ubol city.

### Urinary pH

There was no difference in pH between the specimens from Nong Kohn and Ubol city. About 70 percent of the children under 2 years old gave acid reaction to the pH paper; this increased to 90 percent in the older age groups.

### Urinary Protein Concentration

The protein concentration tested was the same in the specimens from Nong Kohn and Ubol city. Less than 10 percent in both samples contained 30 mg of protein or more per litre of urine.

Summary and Conclusions: The volume of 24-hour urine excretion in subjects living in Nong Kohn village endemic for bladder stone was about half that of subjects living in Ubol city during the hot, dry weather (April 1963). The same group of villagers excreted about half as much during the hot, dry weather as compared to the rainy (August 1963) and cool, dry seasons (November 1963). Urinary calcium concentration was higher even when corrected for volume in the samples from Nong Kohn than from the city. However, the lower volume of urinary excretion in the children under 5 years old is probably partly responsible for the higher urinary calcium concentration. Urinary crystals, mainly oxalate, were found more frequently in urine specimens from the village than from the city. It seems probable that a stage of dehydration during the hot, dry season leads to lower urinary output with high urinary calcium, oxalate and uric acid may play a factor in the stone formation. Determinations of creatinine and uric acid in 24-hour samples are in progress. Further studies comparing the capacity of urine obtained from village and city to dissolve oxalate and studies of oxalate and uric acid metabolism will be done in the future.

Table 62. Number of "Casual Urinary Samples" studied in three different seasons, Ubol City and Nong Kohn Village, 1963.

Age (yrs.)	City			Nong Kohn		
	April	August	November	April	August	November
Under 1	25	22	25	19	33	15
1 to under 2	15	27	26	8	16	17
2 to 4	38	46	71	44	63	63
5 to 9	65	56	66	67	67	77
10 to 19	63	75	90	72	70	74
20 to 39	63	58	64	66	59	70
40 to 60	38	43	40	48	54	56
over 60	24	28	39	10	21	26
Total	308	355	421	321	383	398

Table 63. Average 24 hour urine volume collected in different seasons, Ubol City and Nong Kohn Village, 1963.

Age (yrs.)	City			Nong Kohn		
	April	August	November	April	August	November
2 to 4	1,140(1)	530(3)	680(4)	176(8)	384(8)	390(11)
5 to 9	655(13)	507(15)	612(18)	310(22)	530(22)	574(21)
10 to 14	811(16)	855(17)	938(21)	484(13)	947(15)	712(14)
15 to 19	834(11)	695(17)	924(23)	484(11)	1,222(15)	1,183(10)
20 and over	723(42)	1,060(55)	1,008(55)	661(39)	1,063(38)	1,056(43)
Med Student	--	--	--	676(5)	--	--

The number in bracket indicates number of subjects studied.

FIGURE I

URINARY CALCIUM (SULKOWITZ'S TEST) IN FRESHLY VOIDED MORNING SPECIMENS,  
UBOL AND NONG KOHN, APRIL 1963

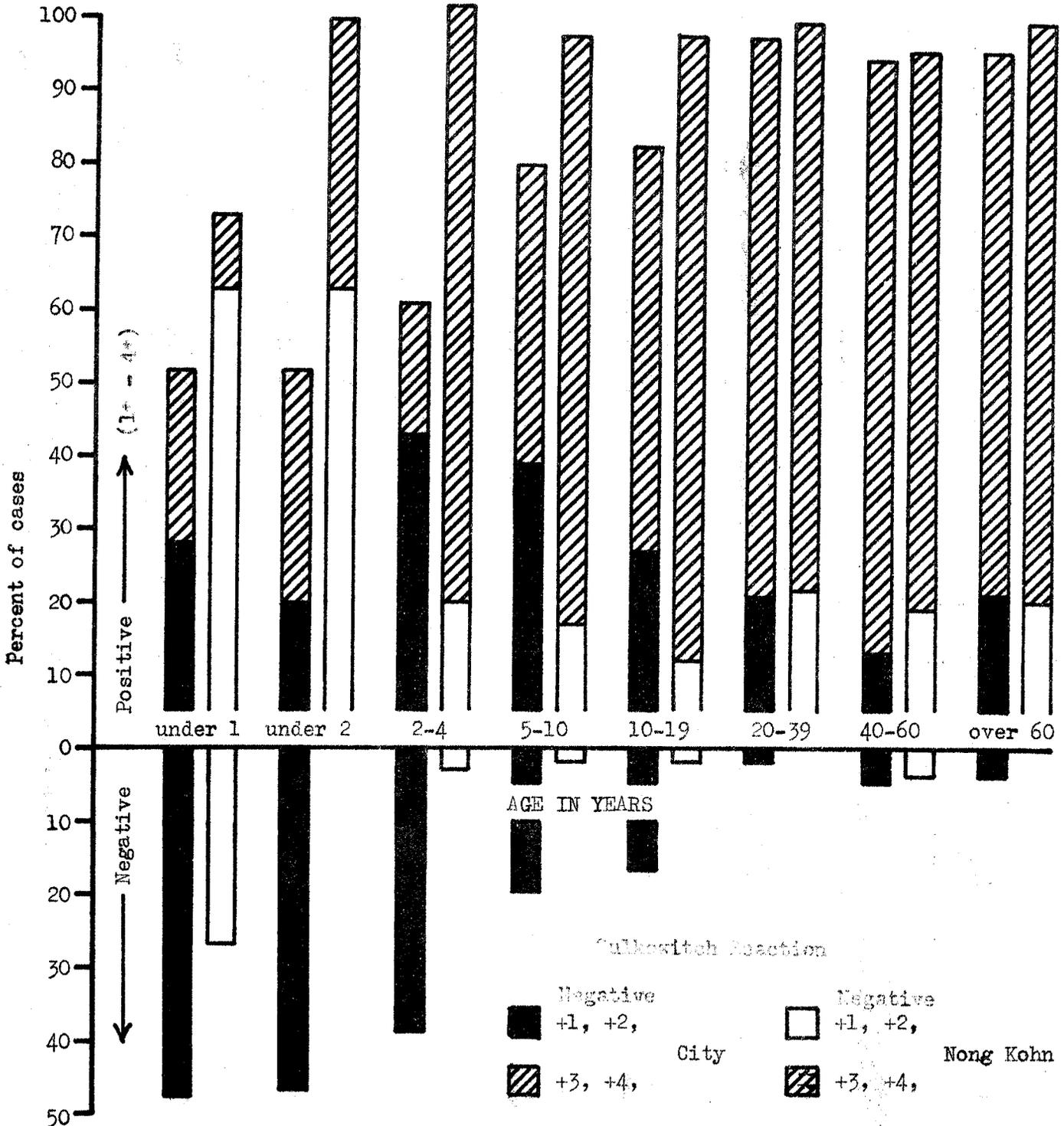


FIGURE II

URINARY CALCIUM (SULKOWITZ'S TEST) IN FRESHLY VOIDED MORNING SPECIMENS,  
UBOL AND NONG KOHN, AUGUST 1963

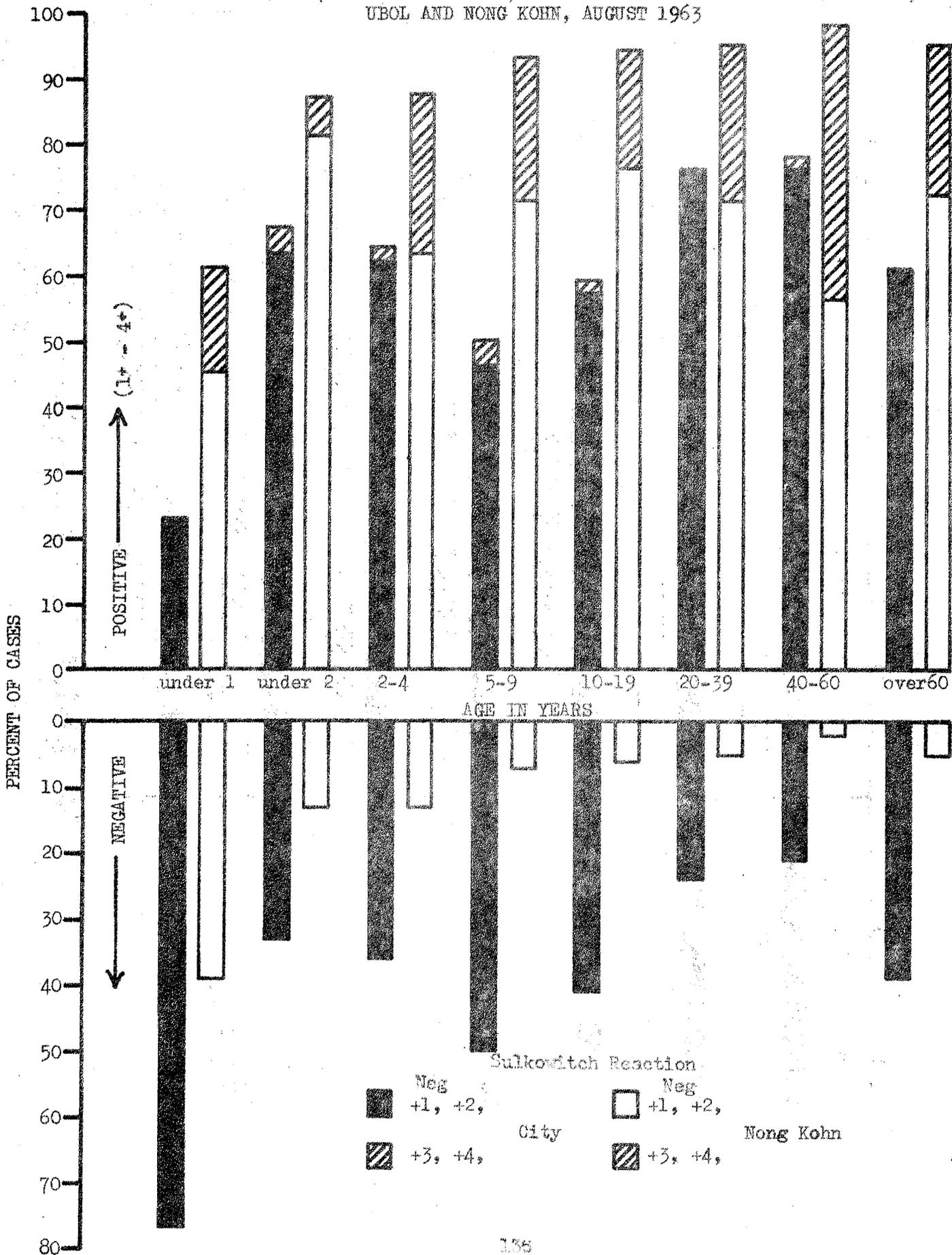
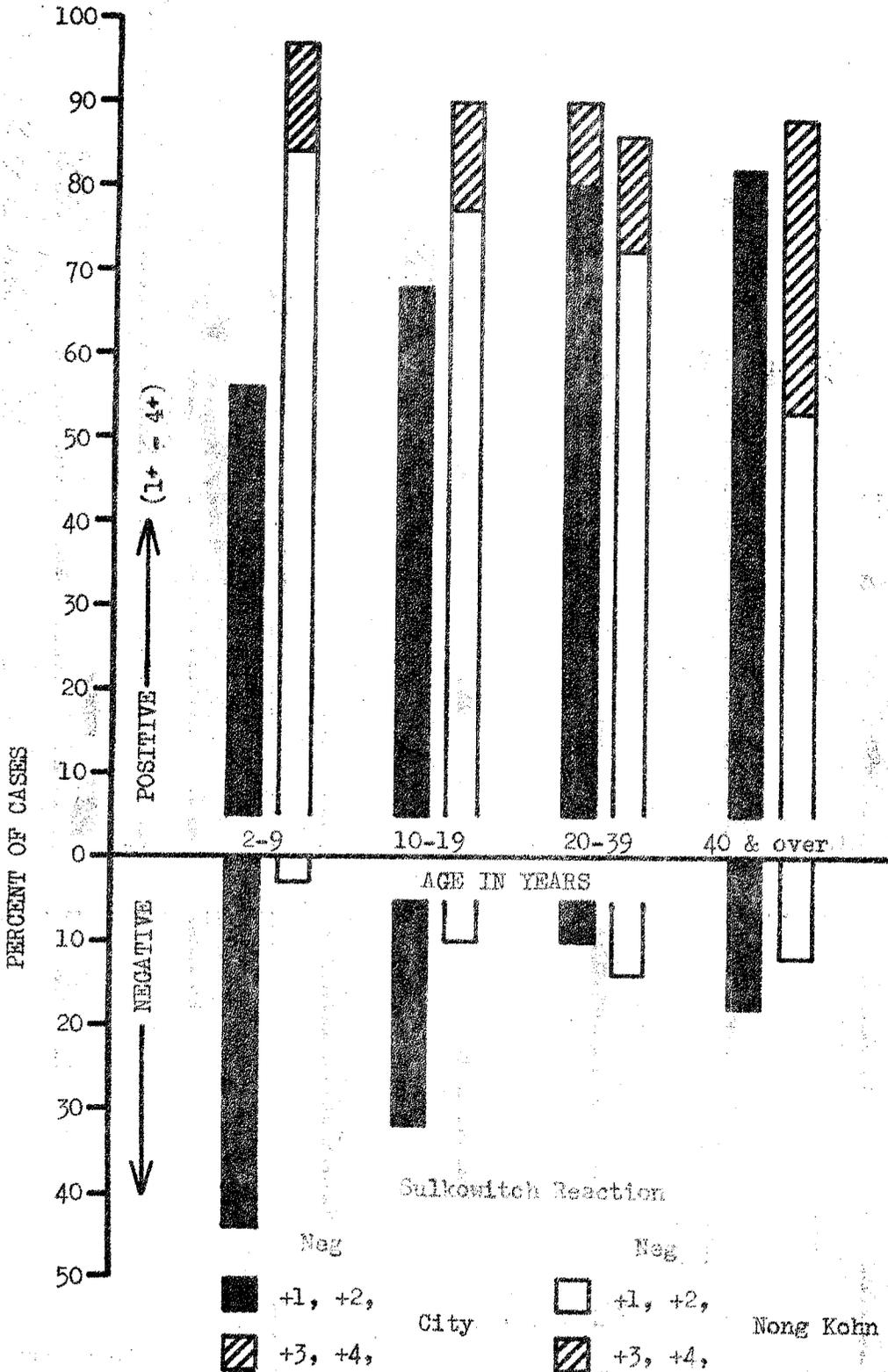


FIGURE III

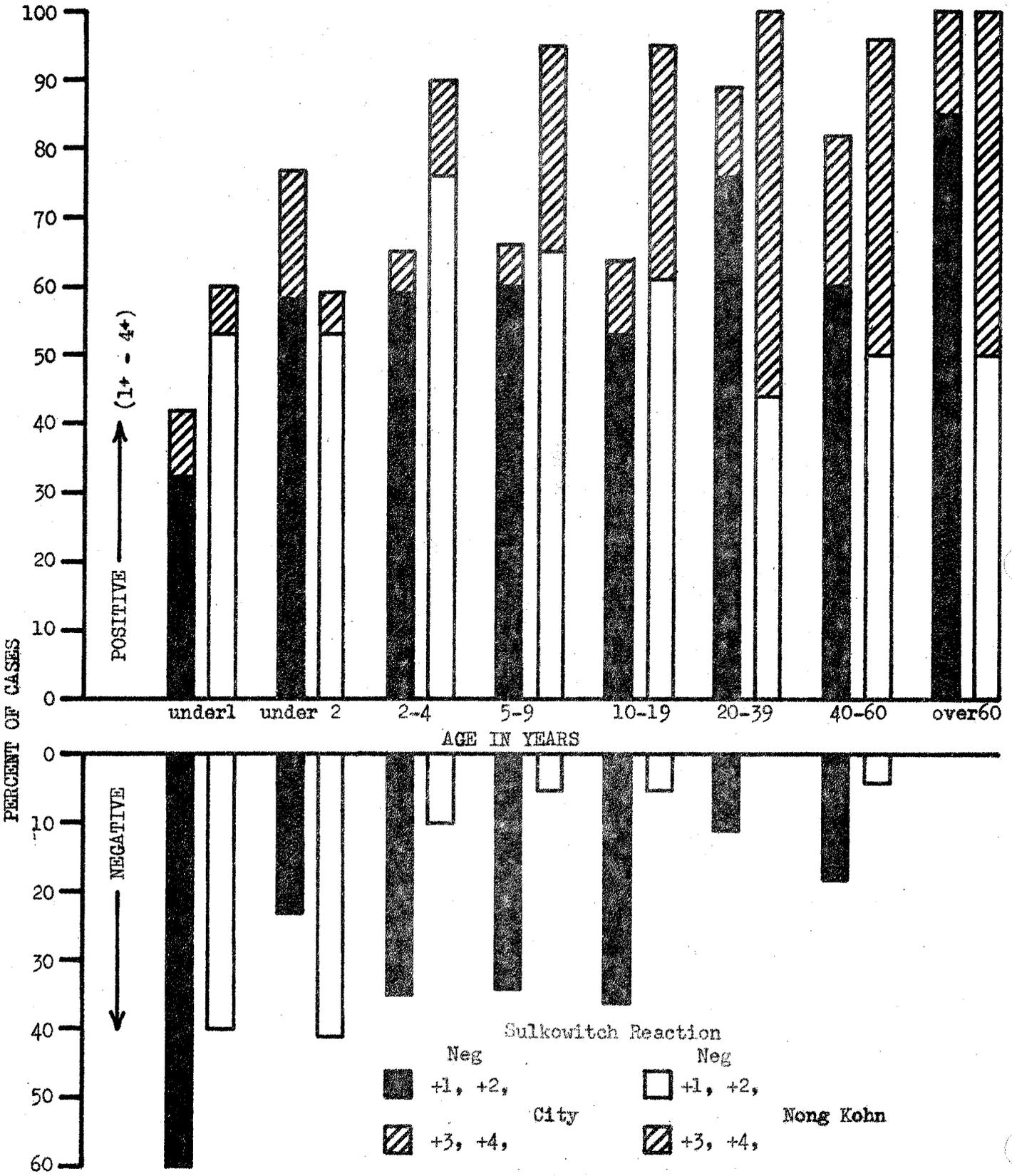
URINARY CALCIUM (SULKOWITZ'S TEST) IN 24-HOUR SPECIMENS,  
UBOL AND NONG KOHN, AUGUST 1963



NUMBER ABOVE COLUMN INDICATES NUMBERS OF SUBJECTS STUDIED

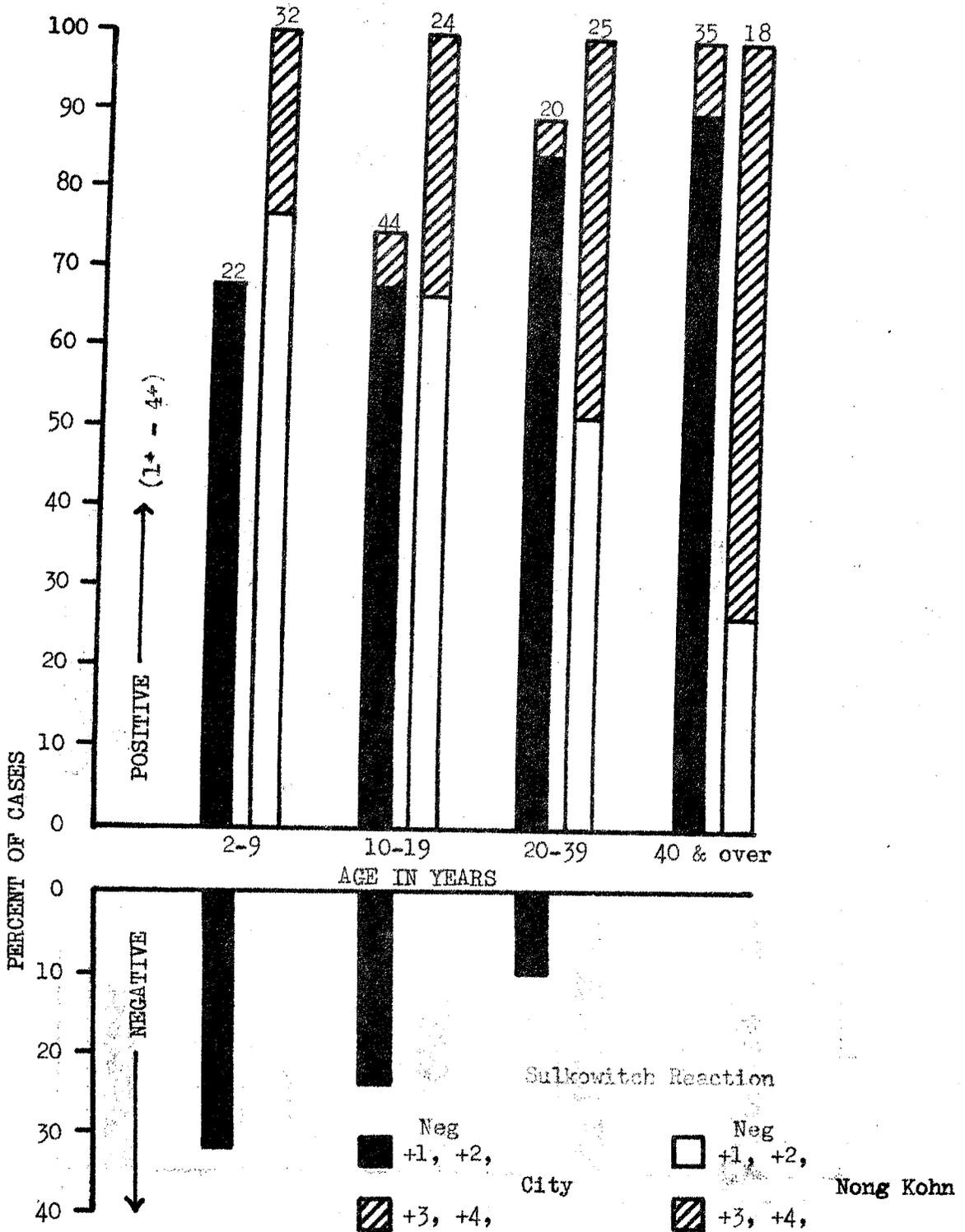
FIGURE IV

URINARY CALCIUM (SULKOWITZ'S TEST) IN FRESHLY VOIDED MORNING SPECIMENS,  
UBOL AND NONG KOHN, NOVEMBER 1963



**FIGURE V**

URINARY CALCIUM (SULKOWITZ'S TEST) IN 24-HOUR SPECIMENS,  
UBOL AND NONG KOHN, NOVEMBER 1963



NUMBER ABOVE COLUMN INDICATES NUMBERS OF SUBJECTS STUDIED

FIGURE VI

URINARY CRYSTALS (MICROSCOPIC EXAMINATION) IN FRESHLY VOIDED MORNING SPECIMENS,  
UBOL AND NONG KOHN, APRIL 1963

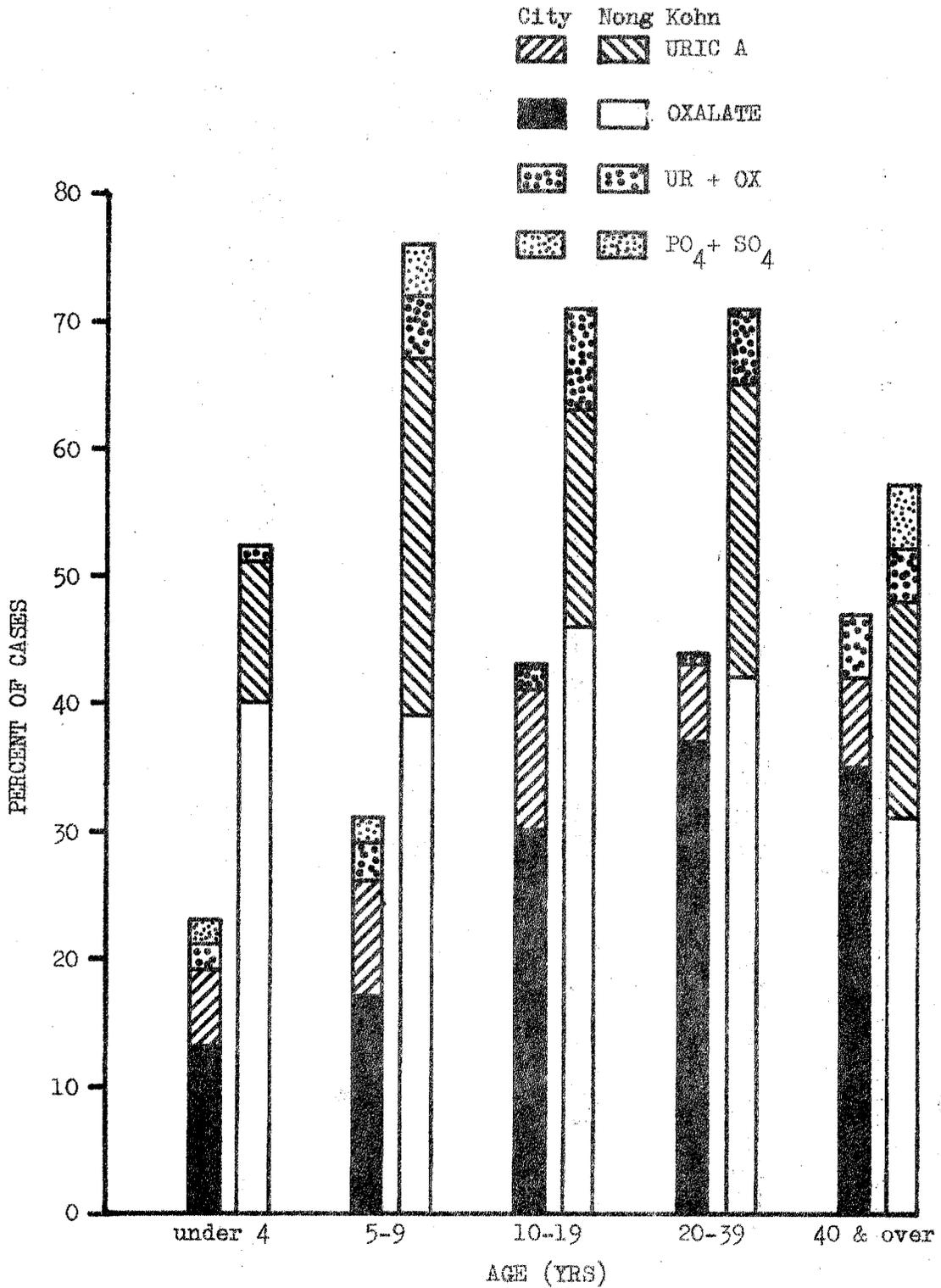


FIGURE VII

URINARY CRYSTALS (MICROSCOPIC EXAMINATION) IN FRESHLY VOIDED MORNING SPECIMENS,  
 UBOL AND NONG KOHN, AUGUST 1963

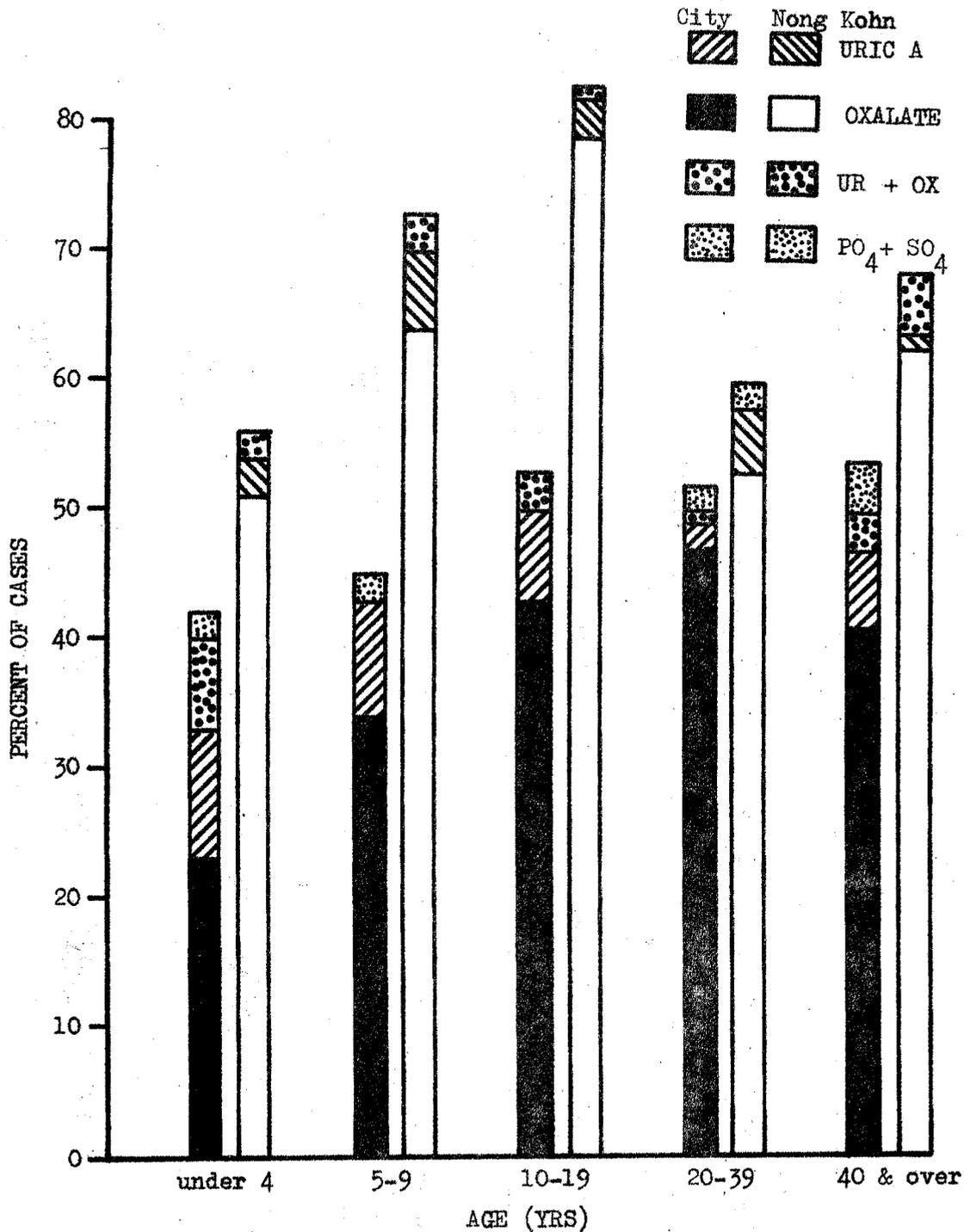


FIGURE VIII

URINARY CRYSTALS (MICROSCOPIC EXAMINATION) IN FRESHLY VOIDED MORNING SPECIMENS,  
UBOL AND NONG KOHN, NOVEMBER 1963

