

# ABOUT THE TRANSVERSAL SCLEROTIC LINES OF THE LONG BONES OF THE EXTREMITIES

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The Third Radiological Congress of the Czechoslovakian Radiologists at Brno discussed the pathology of the bone growth. The investigations are focused on the living youth naturally, but Brno has the international fame of being one of the research centers in human evolution also, owing to the fact, that in its vicinity many finds of the prehistoric man has been found.

The genius loci gave me the inspiration to present a new approach of bone growth pathology, where the historical and prehistorical past and the recent populations can be compared by means of the analysis of the Harris—Calvin Wells lines.

## 1.

In the course of our everyday radiological work, sclerotic transversal lines are regularly found in long bones namely femur, tibia and fibula. These osteosclerotic "annual rings" on pathological specimens were described by G. Wegner in 1874, but positively they were found by H. A. Harris (1933) in human and animal bone radiographs. In his study he fought the theory that in case of every temporal interruption of the bone growth a more translucent mineral-poor zone of the bone is found at the epiphyseal cartilages, which, after recovery will be mineralised more than the vicinity. These sclerotic transversal zones of Harris — after whom they are named — can be found after starvation, chronic diseases in childhood, so by leukaemia, nephritis as by grave infectious diseases etc. and on the opinion of J. Caffey also in case of chronic metal intoxications.

In Hungary B. Rossmann (1960) had written about these Harris lines mentioning, that these lines can be of pathogenetical retrograde significance. So these transversal lines are often found in radiographs — see fig. 1 — and they have practical significance for retrograd detections of the chronic diseases of children and youth.

## 2.

Calvin Wells (1961) found in these lines — which should be called Harris—Wells lines or simply lines — the possibility for the proof of the pathology in the childhood in the fossil human bones. He

investigated prehistoric burials in England with the generous help of the Ilford Photographical Co. as for the lines in radiographs of femurs and tibias. The following data were found: the average of the lines were between 0—8, — 5,1 and number in 40—89 % of persons with Harris—Wells lines.

Calvin Wells found that in these historical and prehistorical burials from England the number of the lines is different and the frequency of the lines differs also among various populations. On the base of the average number of the lines — called by him "index of morbidity" morbidity rate can be estimated and consequently an idea of the morbidity conditions of the prehistorical and historical past can be identified. The Calvin Wells method is important and can be well applied in paleopathology. The localisation of these lines can give us information also on the age at which a child had been afflicted with chronic disease and healed.

## 3.

Calvin Wells studied only archeological specimens, therefore no direct comparisons with morbidity of the living population could be made. This gave us the possibility to examine the number and distribution of the Harris—Wells lines on the traumatological radiographic records of our hospital. We

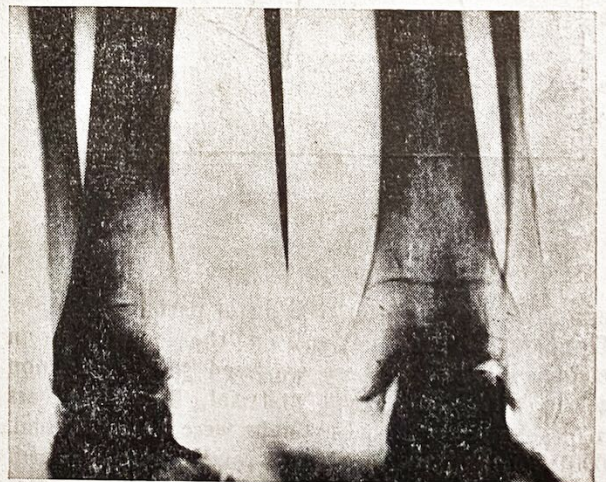


Fig. 1.

AGE DISTRIBUTION OF THE INVESTIGATED PERSONS.

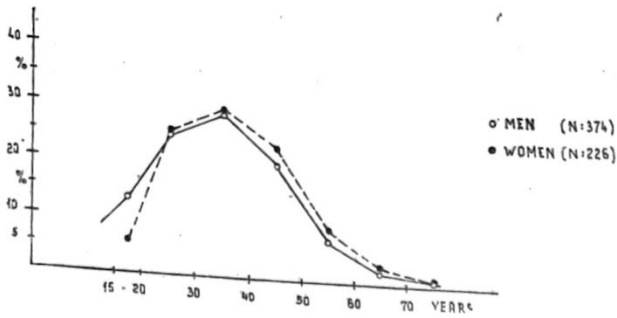


Fig. 2.

NUMBER OF THE HARRIS-WELLS LINES ON ONE INVESTIGATED PERSON.

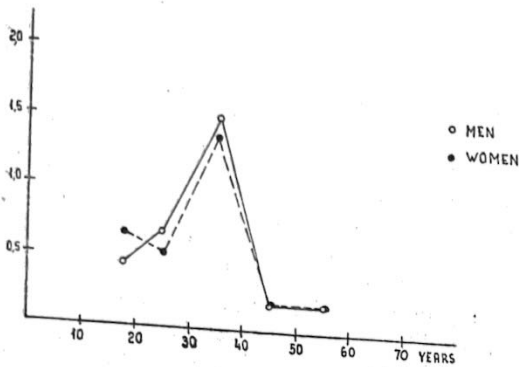


Fig. 3.

PERSONS WITH HARRIS-WELLS LINES.

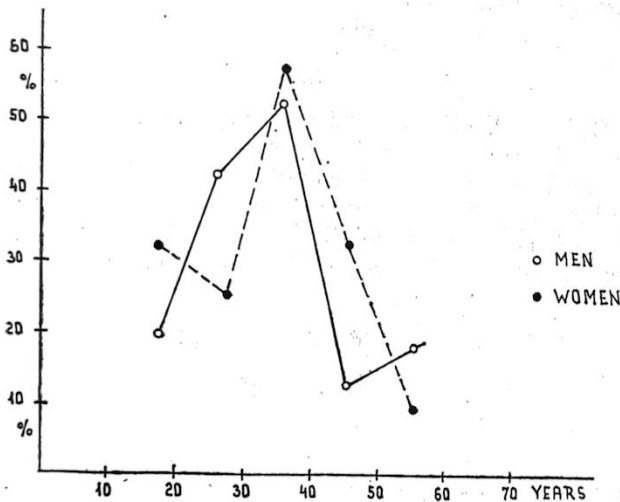


Fig. 4.

examined the lines on the distal part of the tibia. Comparative examinations on the femurs are in course. For this purpose we used simply the non selected traumatological material, from 15 years at least. Rheumatological patients were not examined. 600 radiographs of the ankle joint were examined. The age and sex distribution of the examined radiographs is shown in the figure 2.

The average number of the Harris—Wells lines in one person is shown in the figure 3. we divided the number of the lines with the number of the persons examined. This numerical value is called by Calvin Wells "index of morbidity in childhood and youth". It is well seen that the average number of the Harris—Wells lines is increased in the age group of 30—40 years old persons. This age group was born during the second world war, and in this time and in the following years the starvation, avitaminoses, frequent infections and other serious diseases together with bad social environmental

RELATIVE NUMBER OF THE HARRIS - WELLS LINES ON THE TIBIA.

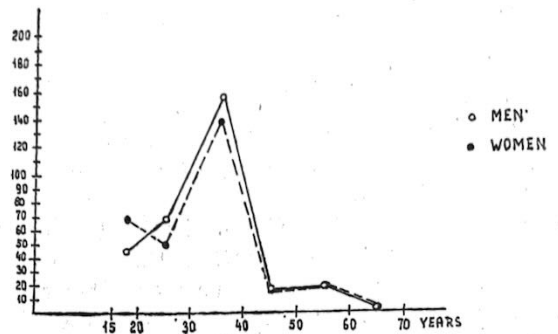


Fig. 5.

△ RECENT POPULATION (BUGYI)  
○ MEDIEVAL POPULATIONS (CALVIN WELLS)

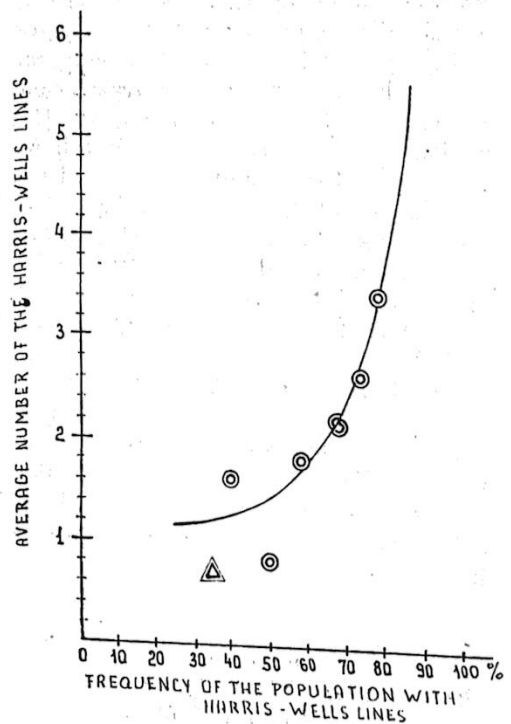


Fig. 6.

factors manifested themselves in the high rate of the social diseases in the childhood.

The percentual value of the persons with Harris—Wells lines is an indicator of the frequency of the ill and disabled children and youth (Figure 4). Not every person was disabled in childhood, or the disease was from light course with help of the efficient drugs. So the relative procentual number of the persons without Harris—Wells lines can be used as an index for the intact — healthy — children and youth.

If we are dividing the number of the Harris—Wells lines with the number of persons with these lines we receive "the relative number" of the Harris—Wells lines.

$$\text{relative number} = \frac{100 \cdot \text{number of lines}}{\text{number of persons with the lines}}$$

This relative number gives information about the degree of the morbidity in a population in childhood and youth. The figure 5 gives the necessary information about the relative number of the Harris—Wells lines on the distal end of the tibia according to its age and sex distribution. The relative number of the lines and so the degree of the morbidity in childhood and youth is to find in the age groups 30—40 years. The reasons of the elevation of the values we discussed before.

4.

CONCLUSIONS

Calvin Wells prehistorical and historical finds are given in the figure 6. The site of the burial, its description, the number of the examined persons, the average number of the Harris—Wells lines and the % of persons with Harris—Wells lines are given in the table. Our recent hungarian, material investigated was 600 persons) the average number of the Harris—Wells lines was 0.86 and the % of the persons with Harris—Wells lines was 33. When comparing the data of Wells from the prehistorical and medieval burials with our recent radiographic material we can see (figure 6), that our recent population has smaller average number of the Harris—Wells lines, and so the smallest index of morbidity in childhood and youth, but also the smallest percentual value of persons with the Harris Wells lines and so the frequency of serious diseases in childhood and youth is smaller than it is in the prehistorical and historical populations in England.

So it seems to be apparent that the existence of the Harris Wells lines helps to estimate sanitary situation of the children and youth in the recent population and in the historical and prehistorical burials as well.

TAB.

Site	Description	Number of the invest. persons	Average Number of the Harris—Wells lines	% of persons with Harris—Wells lines
Crichel and Shrewton (Dorset)	Bronze Age Barrow burials Probably pastoralists	17	0.8	50.0
Shouldham (Norfolk)	12th—15th century Gilbertine Priory	23	1.6	40.0
Red Castle Thetford (Norfolk)	Late Saxon — possibly of Frisian or Flemish Origin	42	1.8	57.2
Eriswell (Norfolk)	Early Saxon	34	2.1	67.6
St. Catherine Thorpe (Norwich Norfolk)	Late Saxon	45	2.2	66.7
Burgh Castle (Suffolk)	Middle Saxon	225	2.6	73.3
Thornham (Norfolk)	Early Saxon	36	3.4	77.5
Caister by Yarmouth (Norfolk)	Middle Saxon	139	5.1	89.3
Data published from Calvin Wells.				
Hungary	Recent population our investigation	600	0.86	33.0

## SUMMARY

The transversal sclerotic lines (zones) of the lower end of the tibia, the so called Harris Wells lines, give information about sanitary situation in past, and in recent populations. This new approach in child pathology elaborated by Calvin Wells makes possible the comparison of the child-pathology of the prehistorical, historical and recent populations on the basis of the Harris—Wells lines, on the basis of the osteo-pathology in childhood and youth.

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