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Chromosomes and Mental Changes in Octogenarians Preliminary Findings

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In conjunction with a longitudinal study of ageing twins (Jarvik, 1967) the opportunity arose to examine the postulated relationship between increasing aneuploidy and age (Jacobs *et al.*, 1961, Hamerton *et al.* 1965, Court Brown *et al.*, 1966). Chromosome analyses have been completed for 59 subjects, ranging in age from 77 to 93 years with a mean age of 84·5 years for the 23 men and 84·6 years for the 36 women.

For comparative purposes leukocytes were cultured also for ten younger subjects, five male and five female students in good health and between 17 and 26 years old.

The preliminary findings available to date (Kato and Jarvik, 1968), like those of Sandberg's group (1967), did not confirm an increase in hyperdiploidy with age, and corroborated a statistically significant increase in hypodiploidy only for females (Table I). Court Brown *et al.* (1966) concluded that with age there was a loss of sex chromosomes, Y (G group) in males and X (C group) in females. In the present study, however, analysis of hypomodal cells with 45 chromosomes revealed that a G chromosome (including Y) was missing more often than expected by chance in all four groups, men and women, aged and young. By contrast, C chromosomes (including X) were missing less often than expected by chance in both young and aged women, although the frequency was greater for the latter (Observed/Expected: 0·37 for young and 0·75 for aged). Explanations of the discrepancy between the present and previously published data are beyond the scope of this brief report, except to note the comparatively high percentage of aneuploidy observed for the young subjects in the present study. Although well within the range generally obtained in our laboratory and that reported in the literature for studies not specifically concerned with ageing (8–18 per cent hypodiploidy in: Moore *et al.* 1964, Judd and Brandkamp 1967, Loughman *et al.* 1967, Judd *et al.* in press), the relatively large proportion of hypodiploidy among the young may have obscured possible age differences.

The current study is also oriented toward examining aneuploidy in relation to mental functioning (Jarvik 1963). Nielsen (1968), for example, found a greater percentage of hypomodal cells in female patients with senile dementia than in elderly women matched for age but free of senile psychosis. A preliminary analysis of data from 10 of our survivors, all in good health as confirmed by medical examination revealed a clearly positive correlation between hypodiploidy and a well-known measure of mental impairment, the Graham-Kendall Memory-for-Designs Test (Graham and Kendall, 1960). The Spearman rank order correlation coefficient of 0·806 was statistically significant at the 1 per cent level of confidence (Fig. 1).

The findings obtained so far are considered provisional and await the completion of extensive medical, psychological and psychiatric examinations in the remaining subjects.

Meanwhile, there is clearly a need for independent laboratories to accumulate further data on the possible interrelation between chromosomal, chronological and mental changes.

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TABLE I
Distribution of Chromosome counts

Sex	Age	No. of subj.	Total cells	% Cells with Counts of ≤ 44	45	46	47≤*
Male	20–26	5	500	5·0	9·6	84·6	0·8
	78–90	23	1,125	8·7	6·6	84·2	0·5
Female	17–26	5	500	4·8	7·8	86·4	1·0
	77–93	36	1,762	8·5	7·9	82·8	0·7

*Excludes tetraploids

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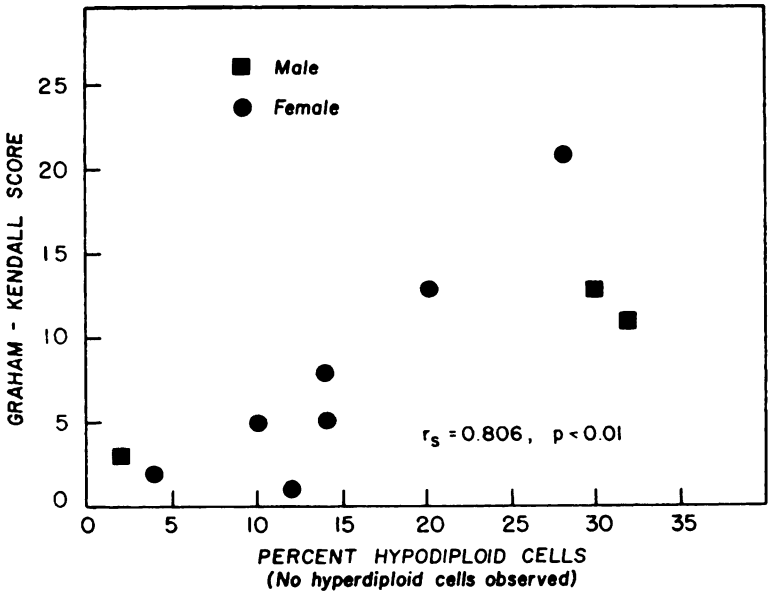


FIG. 1.—Graham-Kendall Score and Aneuploidy.

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