Table 1. Group means and between individual correlations for continously observed and time-sampled courtship behavior.

Behavior	Mean proportions of observations in each category of behavior (N=80)				Correlations across individuals*
	Continuous		Time-sampled		
	Mean	S.E.	Mean	S.E.	
Orientation (OI)	0.392	0.027	0.381	0.024	0.94
Wing Vibration (WVI)	0.113	0.013	0.114	0.015	0.90
Licking & attempted copulation (LACI)	0.019	0.002	0.028	0.004	0.51
Copulation (COPI)	0.248	0.023	0.250	0.022	0.99
Overall courtship (CI)	0.772	0.028	0.773	0.028	0.96

*Correlations were computed within each inbred line (N=20 per genotype) and pooled across inbred lines. All are significant at the 1% level.

the derived time-sampling (TS) scores were thus obtained from viewing the videotape once. The courtship behavior of twenty pairs of three day old flies of each of four inbred lines of **D.melanogaster** was recorded. Analysis of this data is presented in Table 1.

Highly significant correlations were found between time-sampled and continuously observed courtship. As would be expected, the behavior which is the least reliably time-sampled is licking and attempted copulation, the behavior which has the least total duration and occurs in the shortest bouts. It should also be noted that the very close agreement between the mean time-sampled proportion of observations spent in a particular courtship element and the mean proportion of time spent in a particular courtship phase for the continuously observed data would, of course, be expected for a reliable measure averaged over 80 pairs of flies. Nevertheless it is strong evidence for the reliability and validity of the time-sampling technique. We can conclude that time-sampling gives good agreement with continuous observation for proportional time spent in particular categories of behavior, except where they are infrequent or of short duration. The courtship index scores have been subjected to tests for skewness and kurtosis and no significant departures from a normal distribution were found and hence the data require no transformation.

A further experiment was designed to test this time-sampling procedure. Could the time-sampling technique reliably detect the often cited effect that virgin males court fertilised females less vigourously than virgin females (Connolly & Cook 1973)? The male courtship behavior of fifty virgin and fifty fertilised females of one inbred strain was time-sampled for ten minutes. Figure 1 shows the male courtship profiles of these virgin and fertilised females. The results clearly show a marked reduction in the male courtship of fertilised females for each courtship element. Not surprisingly no males copulated with a fertilised female within the ten minute observation period and furthermore well over 75% of the overall courtship of the fertilised females was spent in orientation with little progression to the more important courtship elements. The method is therefore sensitive to the differences in courtship intensity caused by exposure to virgin or mated females.

The economy of the method makes courtship amenable to the detailed analyses of biometrical genetics (see Collins & Hewitt 1984). Further application of the method should permit analysis of the role of genotype-environment interaction in mating behavior. It is also hoped that the method should be useful in the screening for further mutants of courtship behavior and possibly in the study of the effects of drugs on courtship behavior. A more detailed presentation of this work has been submitted to Behavior Genetics.

This work was supported by SERC research studentships to MFC & JFC, MFC also acknowledges continued support through a SERC postdoctoral fellowship.

References: Collins, M.F. & J.K. Hewitt 1984, Heredity 53:321-337; Connolly, K. & R. Cook 1973, Behav. 64: 142-166; Hotta, Y. & S. Benzer 1976, P.N.A.S. 73: 4154-4158.

Cook, J.L. and D.T. Kuhn. University of Central Florida, Orlando, Florida USNA. Spatial distribution of tuh abnormalities.

Transformations of the eye-antenna to posterior abdominal tergites and genitalia appear in the tumorous-head strain (tuh-lh; tuh-3). A casual analysis would lead one to assume that the distribution patterns are random. The objective of this communication is to show that the defects seem to respect at least some of the developmental restrictions shown for the eye-antenna (Baker 1978; Campos-Ortega & Waitz 1978).

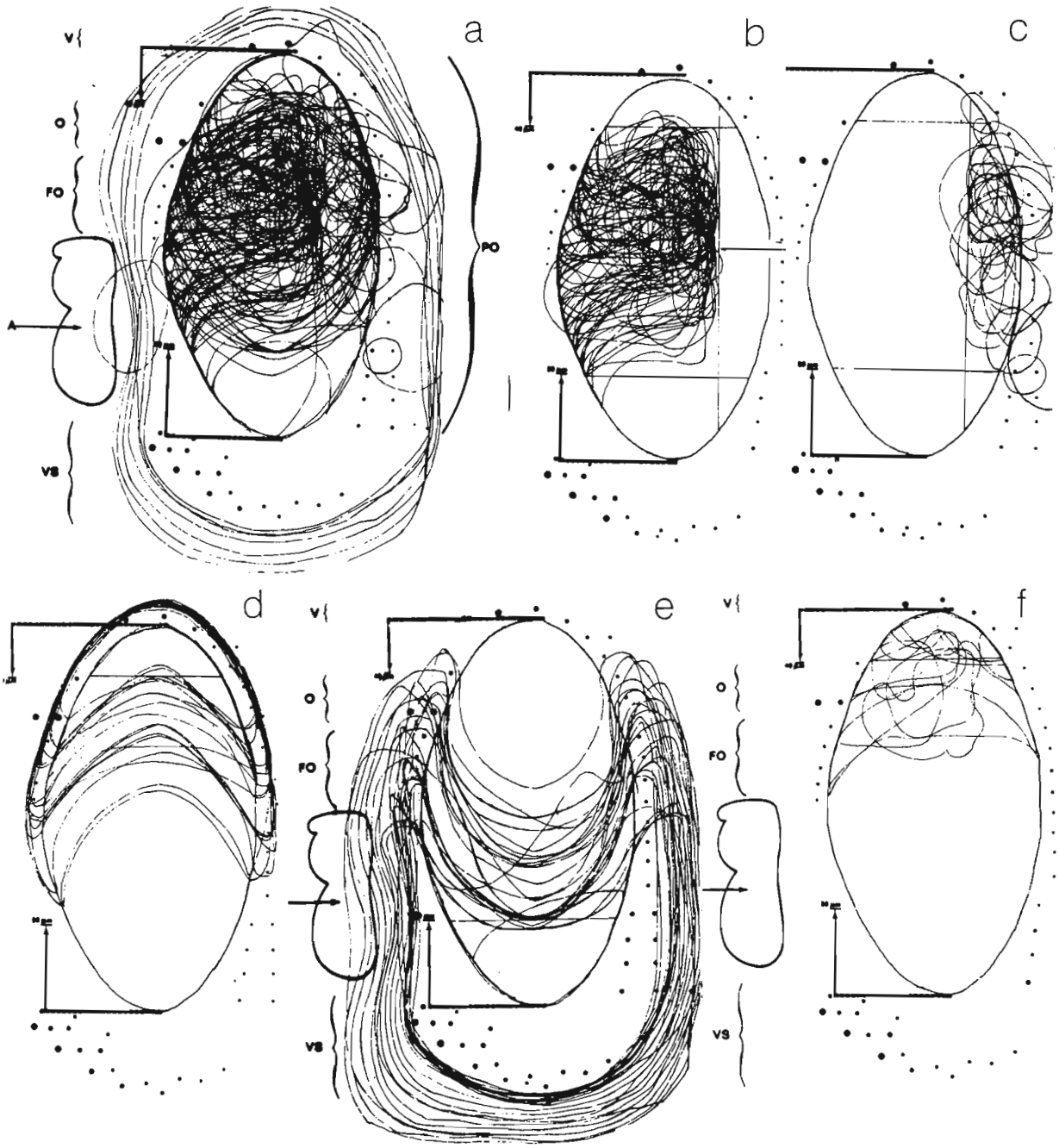

Figure 1. Distribution of selected tuh defects in the eye region. **V**, vertical bristles; **O**, orbital bristles; **FO**, frontorbital bristles; **A**, antenna; **VS**, vibrissae; **PO**, postorbital bristles.

Two hundred flies were hydrolyzed and the heads placed in lactophenol on microscope slides. Camera lucida drawings depicting the head were made using a wild-M8 stereoscopic microscope X80. For each group of head bristles emcompassing the eye, average number of bristles was determined from the drawings. An optical comparator (reticle graduated to 0.1 mm) was used to determine distances between diverse groups of bristles and those within a group. Data from 200 heads were averaged to produce a "typical" eye. Conversion factors were applied to each tuh eye to adjust its dimension to that of the model eye and the locations of the defects determined. The 200 tuh abnormalities selected for analysis were prescreened to insure that appropriate bristle markers were represented for accurate spatial mapping.

Camera lucida drawings are shown in Fig. 1a-f for the abnormalities. A compositie of defects seen in Fig. 1b,c,f and a group of abnormalities surrounding the entire eye are presented in Fig. 1a. Three restrictive margins were found. Figure 1a,b and c indicate that a large number of irregularities are confined to either the anterior or posterior side of a dorso-ventrally oriented restriction line that lies slightly posterior to the medio-lateral axis of the eye. Those abnormalities exhibited in half-heads demonstrating extensive reductions of the ommatidial number fail to observe this line. At about 130 µm down the longitudinal axis from the dorsal-most eye a region of high activity (HA) was observed (Fig. 1b). It lies on the anterior-posterior restriction line slightly above the horizontal bisector of the eye and expresses numerous abnormalities. Approximately 40 µm ventral to the top of the eye, there is a rather nebulous horizontal restriction line inasmuch as abnormalities more frequently exceed it than the previously described line (Fig. 1b,c,d and f). In the lower quadrant, roughly 50 µm from the bottom of the eye, there is another weak restrictive region (Fig. 1b,c and e). Small, isolated abnormalities circumscribed by ommatidia were occasionally documented in this area. The abnormalities in Fig. 1d and 1e exceed the dorsal and ventral restriction lines. Deviations in this neighborhood generally border a reduced eye.

Some previously described restriction lines correspond to regions frequently observed by the tuh defects. However, no specific abdominal tergite was confined to any of these regions although 8th tergite was expressed only in the anterior eye.

Supported by NIH Grant AGO-1846, NSF Grant PCM-8403124, ACS-Fla. Div. summer research fellowship to JLC.

References: Baker, W.K. 1978, Dev. Biol. 62:447-463; Campos-Ortega, J.A. & M. Waitz 1978, Wilhelm Roux's Arch. 184:155-170.

De Frutos, R. and L. Pascual. University of Valencia, Spain. Weak points and ectopic pairing in polytene chromosomes of **Drosophila subobscura.**

Intercalary heterochromatin in polytene chromosomes has been related to different biochemical and cytological features, such as ectopic pairing, tendency to break, late replication, etc. In a first attempt to detect intercalary heterochromatin sites in polytene chromosomes of **Drosophila subobscura**, the tendency to break (weak points) and ectopic pairing, were analyzed.

A total of 1152 slightly squashed nuclei of larval salivary glands were observed by optic microscopy analysis. 714 breaks and 374 ectopic contacts were detected. Centromeric contacts were not included because most nuclei showed centromeric pairing. Only ectopic contacts between not-centromeric or between non-centromeric and centromeric regions were taken into account. Weak points and ectopic contact sites are indicated in Fig. 1. Their location is based on the standard salivary gland chromosome map of Kunze-Mühl & Müller (1958). The map includes the situation of weak points or ectopic pairing sites only, but not their frequencies. A total of 63 weak points and 151 contact sites were identified. The number of weak points is clearly lower than ectopic contacts. In general, break points coincide with sites of ectopic pairing. The distribution of both features does not seem to be erratic. Clusters of them are found in some regions, for instance, the proximal half of the J and U chromosomes. On the other hand, weak points do not coincide with the boundaries of inversions. These chromosome arrangements are very frequent in **Drosophila subobscura.** The various types of weak chromosome points described by Zhimulev et al. (1982): breaks, semibreaks, constrictions and shifts, were found in polytene chromosomes of this species. Depending on the regions, they tend to show one or another type of break. For instance, 23E site generally shows constrictions, 27C shifts, etc. With respect to the regions involved in each of the ectopic contacts, they tend to take place between neighbouring zones of the same chromosome. Most of them occur between strong bands. Chromatin threads arise from either intact or broken large bands. However, in a few cases a tangle of threads arise from a whole interband, for instance, the whole of section 47. Also, threads arise from active puffs or the Balbiani ring with a very low frequency. Furthermore, in many cases