LETTERS TO THE EDITOR

Letters to the Editor will be published, if suitable, and as space permits. They should not exceed 1,000 words (typed double spaced) in length, and may be subject to editing or abridgment.

Suggested Changes in Journal Editorial Policy

To the Editor:

This letter is in response to your recent editorial soliciting suggestions pertinent to *Circulation.* There are two long overdue "reforms" in the area of journal editorial policy. The first, already suggested by Stefadouros,[1] is that reviewers be blinded as to the authors and institution of origin of submitted manuscripts. This would eliminate unconscious bias possibly favoring more prestigious institutions and eminent scientific figures. Although the identity of some groups will be evident from references to previous publications, this should be true for only a relatively small percentage of manuscripts.

My second proposal has to do with the necessity for both reorganizing and retyping rejected manuscripts before they can be submitted elsewhere. A substantial proportion of manuscripts submitted to major journals are rejected, as evidenced by the rejection rate of at least 58.6% for Circulation.[2] In many cases articles are rejected because their publication has relatively low priority for a given journal and not because they are judged lacking in scientific merit. Since each journal insists that authors follow their particular format and that the submission include an original as well as copies, the author of a rejected paper must now 1) revise the format of the article and 2) require that the manuscript be completely retyped. Since the advantage of any particular format compared with others in common usage is dubious at best (does it *really* matter whether references in the text are given as superscripts or in parentheses on the same line?) and originals have no evident virtue over copies, the current practice is illogical and results in considerable waste of both physician and secretarial time.

I suggest that the reviewers of all manuscripts be blinded as to the authors and institutions of origin, that the editors of major journals agree on a standard format for mansucript preparation and that all manuscripts be submitted in copy form.

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2. Rapaport E: *Circulation:* The next five years. Circulation 58: 1, 1978

The Editor replies:

Webster defines "reform" as "amendment of what is defective, vicious, corrupt or depraved." The Associate Editors and I are not convinced that our policy of allowing reviewers to be aware of the identity of the authors of a submitted manuscript requires reform. We have not seen evidence to justify the conclusion that past abuses have taken place reflecting a favorable bias towards manuscripts submitted from prestigious institutions or particularly eminent scientific figures. It is also clear that were we to adopt your suggestion, it could and probably would be subverted quite readily by our authors, either through incorporation of suggestive sentences in the introduction or through excessive use of references to their own work. It is naive to think that they would not make it clear within the body of the manuscript as to where the article originated. Furthermore, at times it is useful for a reviewer to know an author's identity, since it tells him something about the reliability and sophistication of the techniques being used, as well as the author's general experience in the area of investigation being reported.

I am quite sympathetic toward your second suggestion. A standard format for submitted manuscripts to various scientific journals should be adopted in order to avoid unnecessary retyping and other manpower waste meeting formats of differing journals. This problem has recently been addressed by an ad hoc international steering committee of editors of scientific journals, which has developed a standard format with the request that major scientific journals adopt it. I am pleased to say that the present format of *Circulation* meets all of the proposed suggestions, except for the absence of "key words." There are discussions going on with the editors of journals with radically different formats regarding overall acceptability which must come before the plan is to be finalized and implemented. I assure you that when that does occur, *Circulation* will make any further necessary changes.

QRS Changes in Coronary Artery Disease

To the Editor:

Recent papers by Bonoris et al. describe an increased R wave amplitude in lead CM_5 immediately after exercise in patients with coronary artery disease.[1, 2] Their results indicate that augmentation of the R wave is a more sensitive and specific sign of coronary artery disease than a depression of the ST segment,[1] which is the generally accepted parameter for exercise-induced myocardial ischemia.

This conclusion differs from findings in male patients with coronary artery disease and in normal subjects studied at the Thoraxcenter in Rotterdam. Details of these studies have been published previously.[3, 4] Since these reports contained predominantly data on ST-segment changes during exercise, we present additional, as yet unpublished data on the changes of the QRS complex observed in these studies.

Representative ECG complexes were obtained by selective averaging of the correlated orthogonal Frank leads from 86 normal subjects, 52 male patients with coronary artery disease and a normal ECG at rest,[3] 49 patients with an old anterior wall infarction and from 61 patients with an old inferior wall infarction.[4] After computer wave form analysis the PQ, QRS and ST waves were time-normalized and eight amplitudes were measured in each segment.[4]

In figure 1 the differences between the ECG measurements at rest in the sitting position and during the highest work load on the bicycle ergometer are presented. The sensitivities obtained with various measurements of the P wave, QRS complex and ST-segment changes are shown in table 1, where the specificity for all measurements was set at approximately 90%.

The changes of the P wave in lead X are smaller in the three groups of patients than in the normal subjects. However, these differences have little diagnostic value, since the sensitivity ranges from 35–42% only.

No systematic changes were observed in the first three-eighths of the QRS complex in leads X and Y and in the first one-fourth lead Z. The midportion of QRS in lead Z (3/8–5/8), however, shows a significant augmentation of the R wave in all four groups during exercise, while again no systematic changes occur in the terminal part of QRS in this lead. The changes of the midportion and terminal part of the QRS complex in leads X and Y in patients differed from those in the normal subjects. The highest sensitivities for prediction of coronary artery disease from changes of the QRS complex are 35% in patients with a normal ECG at rest (lead X), 57% in those with a previous anterior wall infarction (lead X) and 52% in patients with an inferior wall infarction (lead Y).

In those patients with a normal ECG at rest, a sensitivity of 69%

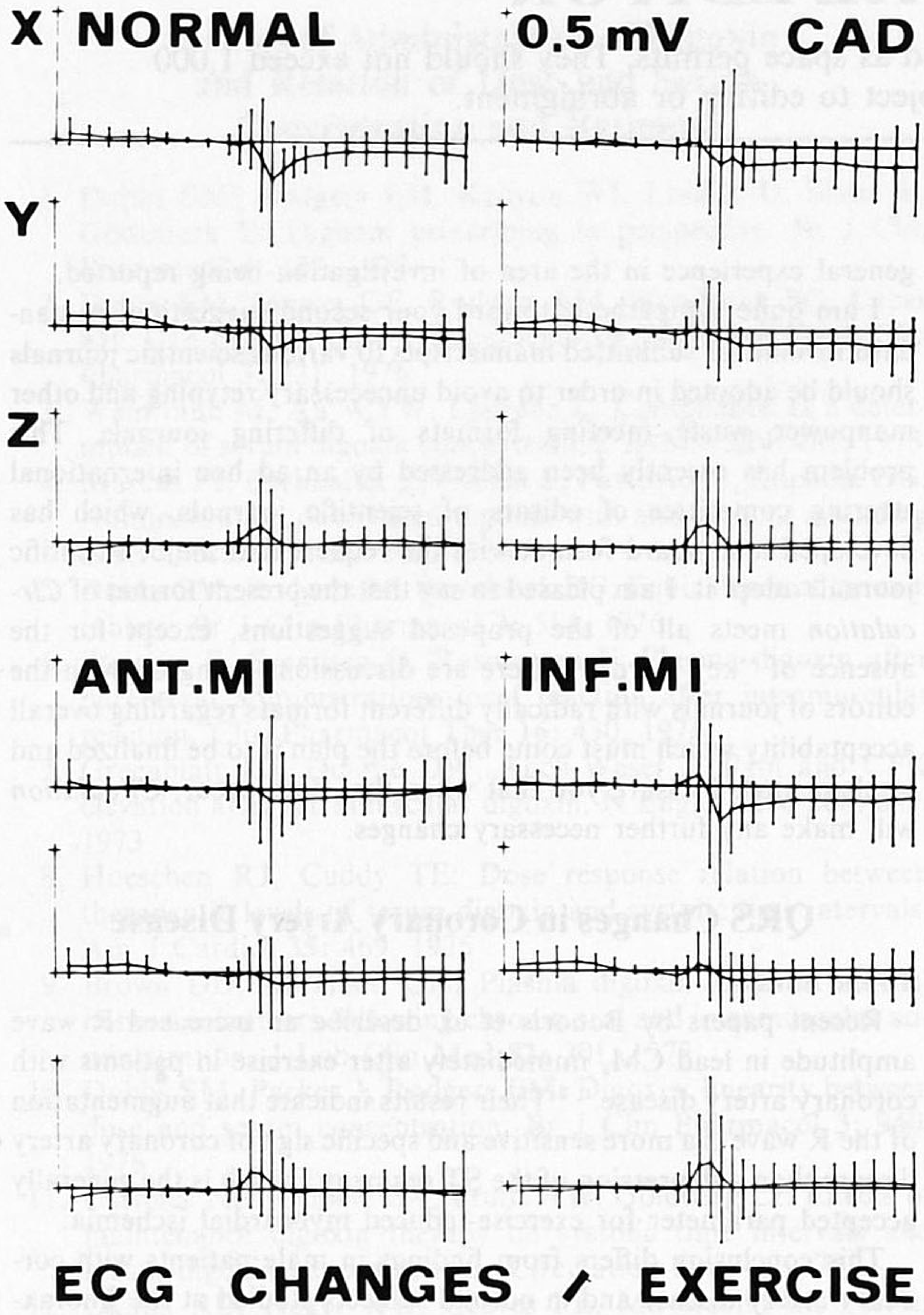

FIGURE 1. *Differences between ECG measurements at rest in the sitting position and during the highest work load on the bicycle ergometer.*

TABLE 1. *Specificity in 86 Normal Men and Sensitivities in 52 Patients with a Normal ECG at Rest (N ECG), 49 Patients with an Anterior Wall or Anteroseptal Infarction (Ant-MI) and 61 Patients with a Posterior Wall or Inferior Wall Infarction (Inf. MI).*

			Sensitivity		
Measurement		Specificity	N ECG	Ant. MI	Inf. MI
P decrease					
P 3/8	X	0.88	0.35*	0.38*	0.42*
	Y	0.88	0.15	0.10	0.14
	Z	0.86	0.16	0.16	0.18
QRS increase					
QRS 4/8	X	0.90	0.15	0.10	0.18
	Y	0.90	0.22	0.14	0.52*
	Z	0.90	0.15	0.04	0.26
QRS 6/8	X	0.88	0.35*	0.57*	0.16
	Y	0.89	0.30	0.06	0.32
	Z	0.90	0.18	0.08	0.26
ST depression					
ST 3/8	X	0.90	0.32	0.10	0.32
	Y	0.88	0.24	0.10	0.03
	Z	0.90	0.20	0.53*	0.04
ST 5/8	X	0.90	0.43	0.06	0.37
	Y	0.90	0.24	0.12	0.03
	Z	0.90	0.15	0.51	0.04
ST 90	X	0.90	0.69*	0.22	0.45*
	Y	0.89	0.43	0.16	0.16
	Z	0.89	0.03	0.16	0.06
ST elevations					
ST 3/8	X	0.88	0.07	0.46*	0.11
	Y	0.90	0.07	0.16	0.44
	Z	0.90	0.18	0.08	0.24
ST 4/8	X	0.90	0.05	0.40	0.06
	Y	0.89	0.13	0.14	0.49*
	Z	0.90	0.18*	0.06	0.24

*Highest sensitivity for each wave form in the three groups of patients.

was obtained with the degree of ST-segment depression measured 90 msec after the end of QRS. In patients with an anterior wall infarction ST depression occurred largely in lead Z (sensitivity 53%) and ST elevation in lead X (sensitivity 46%). In patients with an inferior wall infarction, ST depression in lead X resulted in a sensitivity of 45%, while the ST elevation in lead Y yielded a 49% sensitivity.

We conclude from these data that augmentation of the R-wave during exercise occurs more frequently in patients with coronary artery disease than in normal subjects, as was reported by Bonoris et al.[1, 2] The diagnostic value of these changes, however, is less than that of the ST changes in male subjects with a normal ECG at rest. The discrepancy between Bonoris' data and those presented here could be explained by patient selection, since Bonoris et al. purposely included patients with false positive or false negative ST responses during exercise. It may be expected that patients who are selected because they perform badly with one method, are detected better by an other independent measurement. The difference between the two laboratories is probably not due to the choice of the ECG leads, since lead CM_5 which was used by Bonoris et al. can be represented by a linear combination of the orthogonal leads X and Y used at our center.[5]

Our experience supports Bonoris' report on the value of the QRS changes in patients with a previous myocardial infarction. In this group QRS measurements may be as good as, or even better than ST measurements as shown in the table. More data are needed before these observations can be applied in clinical practice, since the pathophysiological mechanisms which cause the QRS changes during exercise are not yet fully understood. Bonoris et al. explain their findings by the influence of the intracardiac blood volume on the body surface ECG, the so called Brody effect.[6] According to this theory the increased R-wave amplitude reflects an increased left ventricular volume during exercise. If this would be the dominant mechanism, one would expect similar QRS-changes in all groups of patients. Our data indicate, however, that the region of impaired left ventricular contraction after a myocardial infarction or the extent of the electrophysiological abnormalities influence the orientation of the R wave changes during exercise. For example, patients with an inferior wall infarction show the largest difference with the normals in lead Y, while patients with an anterior wall infarction and those with a normal QRS complex had the largest augmentation of the R wave in lead X.

We believe that, just as with ST changes, three factors contribute to the QRS changes during exercise:

1) Those which are responsible for the changes which occur in all subjects: increased heart rate, increased hematocrit and the altered intracardiac blood volume;

2) Those which are present after a myocardial infarction: an abnormal activation pattern and abnormal wall motion.

3) Those which occur during myocardial ischemia: regional impairment of left ventricular contraction and altered depolarization and repolarization patterns.

We congratulate the group from Long Beach for their important observations and their emphasis on the analysis of the whole ECG waveform during exercise. Further studies of these phenomena may be valuable, especially in groups where the interpretation of ST-segment responses during exercise is difficult, as in females, in patients with a previous infarction and in patients on medication such as digitalis.

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The author replies:

To the Editor:

Dr. Simoons' observations and comments are of interest and appreciated. We are pleased that he confirmed our findings that the R wave almost always decreases in normal patients during an exercise test and that he found the diseased patients had an increase in amplitude, however, with a lesser sensitivity than was found for ST depression.

In a subsequent study of patients coming in for consecutive angiograms[1] and stress tests, we found that the ST segment had a sensitivity of 49% while the R wave had a sensitivity of 68% ($p = 0.054$).

In another group of 100 patients, 50 with angiographic disease and 50 young healthy asymptomatic subjects stressed as part of an American Heart Association study, the sensitivity for the ST was 76% and for the R wave only 60% ($p > 0.05$).

When either a positive ST or R wave response was taken as a positive test, sensitivity increased to 84% ($p > 0.05$). We agree that the sensitivity discrepancies are indeed secondary to patient population differences which we have demonstrated above.

Another consideration, however, is that we used a treadmill while Dr. Simoon's group used a bicycle ergometer. This would result in posture differences and patients usually are stressed to a greater degree on the treadmill. We calculated the control and immediate post-exercise R wave difference with the patient standing; Dr. Simoons calculated it with the patient in a sitting position. Perhaps the sitting posture after exercise reduces the venous return compared with the standing position. This could account for the increased number of false negative responses, lowering the sensitivity.

With regard to the mechanism, recent radionuclide studies[2, 3] with exercise have shown a decrease in the volumes with a subsequent increase in ejection fraction in normal patients, while patients with coronary disease increased their volumes. This supports the Brody effect as a probably mechanism for the R wave change with exercise.

Dr. Simoons' observations raise many interesting questions. Further studies are needed to evaluate the best position for the measurements of the R wave, to determine if the R wave trends during exercise and immediately after exercise are significant and determine how much of an increase in heart rate is necessary for the R wave changes to be of significance. We have some evidence to suggest that the R wave normally increases in normals until the patient has a heart rate of 120–130 when it begins to decrease. This would suggest that the measurements would have less significance in patients who stop very early in the protocol before their heart rates reach a significant increase.

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Long-Term ECG Monitoring to Assess Ventricular Ectopic Activity

To the Editor:

We read with interest the article by Morganroth and colleagues (Circulation 58: 408, 1978) regarding the limitations of long-term ambulatory electrocardiographic monitoring in the assessment of ventricular ectopic activity. While their overall impression of the variability of ectopic activity is undoubtedly correct, the statistical techniques they used and the conclusions drawn from their data may be unjustified.

Many different methods have been used to detect and quantitate ventricular premature depolarizations (VPDs) which use analog and/or digital electronic techniques. These methods are prone to both false-positive and false-negative errors. Therefore, system variability must be considered before defining patient variability. Morganroth et al. noted that the relative error ratio of VPD counts between their real-time control method and their analyst/analog detector method varied inversely with the degree of VPD frequency per hour, "but was on the average, 7.2%." The average value alone is not, however, adequate to describe the error distribution. A regression line between the relative error ratio and the degree of VPD frequency would have conveyed considerably more information. Even if the average value is used, a quantity that measures the variability, e.g., standard deviation, should have been reported so that the reader could realize the extent of the error ratio. Furthermore, and more important, the possible effects of the error ratio on the results of the analysis of variance were not discussed at all by the authors. They also did not comment on the extent of data loss in their recordings, since not all ambulatory recordings contain 24 hours of data.

The authors applied the analysis of variance to analyze a series of hourly frequencies of VPDs. Consideration was correctly given to the statistical assumptions of normality and variance homogeneity of the data by the use of the natural logarithmic transformation. The square root transformation, however, may have been more appropriate in this case, since the basic data relates to frequency of occurrence during certain time intervals which suggests a Poisson dis-