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A COMPARATIVE MORPHOLOGICAL STUDY OF BRYOBIA RUBRIOCULUS (SCHEUTEN) (ACARINA: TETRANYCHIDAE)

A Thesis

Presented to the

Department of Zoology

Brigham Young University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Robert L. Frommer

August 1971

This thesis, by Robert L. Frommer, is accepted in its present form by the Department of Zoology of Brigham Young University as satisfying the thesis requirement for the degree of Master of Science.

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INTRODUCTION

Bryobia rubrioculus (Scheuten), the brown mite, was originally described in 1857, but some questions have subsequently been raised as to its validity. Morgan and Anderson (1957) suggested that Scheuten's description was not especially useful because he may have confused B. rubrioculus with clover mites, Bryobia praetiosa (Koch), and also the type specimens had been lost. On this premise, they renamed B. rubrioculus as Bryobia arborea (Morgan and Anderson, 1957). Acarologists presently use both names although B. rubrioculus has priority.

In the reports of Kremer (1956) and Roesler (1952), where there is an apparent confusion of Bryobia rubrioculus with B. praetiosa, variation was reported in the life cycles of mites from locale to locale. Other studies have shown brown mites with four generations per year in Western Canada (Anderson and Morgan, 1958), Ohio (Miller, 1925), Oregon (Jorgensen, 1964) and the Palatinate, Germany (Roesler, 1952); seven in Switzerland (Mathys, 1954); five in New York (Lienk and Chapman, 1951); three in Belgium (Wybou, 1951) and six in California (Pritchard and Baker, 1952 and Summers, 1950); and two to three in Tasmania (Evans, 1942).

Reported mite movement within trees also varied considerably among localities. Brown mites were found pri-

marily on the leaves and moved rather infrequently to the twigs in British Columbia (Anderson and Morgan, 1958) and Oregon (Jorgensen, 1964); whereas Lienk and Chapman (1951) reported that mites occupied the twigs as much as the leaves in New York. Nelson and Jorgensen (1968) found a similar pattern in Utah, but noted considerably more movement between leaves and spurs. Summers (1950) reported that brown mites in California were found primarily on twigs and moved to leaves only for feeding.

Results of host specificity studies also vary considerably among brown mites from different geographic areas. Anderson and Morgan (1958) reported that brown mites had a preference for apples over plum, cherry, pear, peach, and apricot trees in British Columbia. In the San Joaquin and Sacramento Valleys of central California the main hosts were apricot, peach, and almond (Summers, 1950); while in the Palatinate, Germany, Roesler (1952) reported their main host to be pear trees, with less preference for apple and peach.

Since widely diverse variations have been reported in their life cycle, movement patterns, host specificities, and feeding habits; one might ask whether B. rubrioculus is one species with wide variation over the world, several discrete and somewhat isolated populations of one species, or several species. Pritchard and Baker (1955) suggested that the observed life cycle differences in brown mites could possibly have resulted from their parthenogenic reproduction, thereby forming a subspecies within the whole "praetiosa" complex. Kremer's (1956) explanation of the reported variation sug-

gested that the observed differences might be related to weather, feeding conditions, and the commencement of larvae hatching from over-wintering eggs.

The wide variations in reported life cycles, movement patterns, and host specificities implies that they might also be accompanied with morphological variations among B. rubrioculus throughout the world. If this is true, an intensive comparative morphological study would be expected to demonstrate if geographic variabilities exist as a result of isolation. The objective of this study is to determine if there is enough morphological variability among the geographically separated populations of B. rubrioculus to designate them as discrete populations of the same species, or different species. A numerical taxonomic procedure known as Ward's error sum cluster method (Ward, 1963, in Wishart, 1969a) was used in the analysis.

METHODS

Specimens used in this study were obtained from fruit trees (mostly apple) at 24 different locations -- 18 foreign countries and six locations in the United States. These locations were: Armenia, Belgium, Canada (British Columbia, Nova Scotia, Ontario), Bulgaria, Chile, Greece, Iran, Japan, Lebanon, New Zealand, Poland, Romania, U.S.S.R., South Africa, Turkey and the United States (Corning and Yuciapa, California, Indiana, Oregon, Ohio, Utah).

Mites from twenty-two of the twenty-four locations were *B. rubrioculus* while mites from Indiana and Ohio were *B. praetiosa*. The latter were included as a check to determine if the particular multivariate procedure used in this study functioned properly and to determine if *B. praetiosa* is clearly distinct from *B. rubrioculus*.

Adult specimens were collected from each area on the assumption that random collecting techniques were used; however, this could not be confirmed since specimens were supplied by local acarologists. Most of the mites were collected from late spring to early summer, with the remainder in late summer.

Approximately 50 mites from each locality were cleared in 30 per cent hydrogen peroxide and mounted in Hoyer's medium. This procedure allowed mites to properly clear,

relax and be mounted with a minimum of body damage or distortion. Ten of the best preparations were then selected from each of the 24 locations, and data were collected from these (240) samples.

The number of selected characters should not be less than 60; however, since B. rubrioculus is essentially a soft-bodied mite with few distinctive characters, only 47 characters were used. Characters were selected over a wide area on each mite with the goal of minimizing redundancy (Sokal and Sneath, 1963). The characters were:

1. Length of distal tarsal duplex seta III (Fig. 2D),
2. Length of tibia II (Fig. 2D),
3. Length of genu II (Fig. 2D),
4. Distance between left and right dorso-central setae 3 (Fig. 2F),
5. Length of tibia I (Fig. 2E),
6. Length of genu I (Fig. 2E),
7. Maximum length of setae on lateral propodosomal lobes (Fig. 1B),
8. Maximum length of setae on median propodosomal lobes (Fig. 1B),
9. Presence or absence of extrusions on lateral propodosomal lobes (Fig. 1B),
10. Distance between dorso-central setae 1 and 3 (Fig. 2F),
11. Width of dorso-central seta 2 (Fig. 2F),
12. Length of dorso-central seta 2 (Fig. 2F),

13. Maximum length of tarsal macroseta II (Fig. 2C),
14. Distance between macroseta and the end of tarsus I (Fig. 2A),
15. Width of posterior eye (Fig. 1A),
16. Width of anterior eye (Fig. 1A),
17. Width of stylophore (Fig. 1A),
18. Presence or absence of extrusion on median propodosomal lobes (Fig. 1B),
19. Length of proximal tarsal duplex seta III (Fig. 2B),
20. Distance between posterior eyes (Fig. 1A),
21. Distance between left and right ventro-central setae 3 (Fig. 2F),
22. Distance between left and right ventro-central setae 1 (Fig. 2F),
23. Distance between dorso-central setae on coxae I (Fig. 2F),
24. Distance between left and right lateral base depressions of propodosomal lobes (Fig. 1B),
25. Width of dorso-central seta 1 (Fig. 2F),
26. Length of dorso-central seta 1 (Fig. 2F),
27. Length of femoral tactile seta on the pedipalps (Fig. 1A),
28. Collected or not collected from apple trees,
29. Length of proximal coxal seta I (Fig. 2F),
30. Length of distal coxal seta I (Fig. 2F),

31. Width of peritremal base (Fig. 1A),

32. Distance between left and right ventro-central seta 4 (Fig. 2F),

33. Length of tarsal macroseta I (Fig. 2A),

34. Distance between the central anterior end of stylophore and its posterior center fusion (Fig. 1A),

35. Distance between the left or right posterior lobe to the antero-central point of fusion on the stylophore (Fig. 1A),

36. Distance between the tips of the lateral and medial propdosomal lobes (Fig. 1B),

37. Depth of depression between the 2 median propodosomal lobes (Fig. 1B),

38. Width of right cheliceral base (Fig. 1A),

39. Maximum width of lateral propodosomal lobe setae (Fig. 1B),

40. Maximum width of median propodosomal lobe setae (Fig. 1B),

41. Distance between left and right dorso-central setae 1 (Fig. 2F),

42. Distance between base of solenidium and the distal end of tarsus I (Fig. 2A),

43. Length of solenidium II (Fig. 2C),

44. Length of solenidium I (Fig. 2A),

45. Length of pretarsal seta I (Fig. 2A),

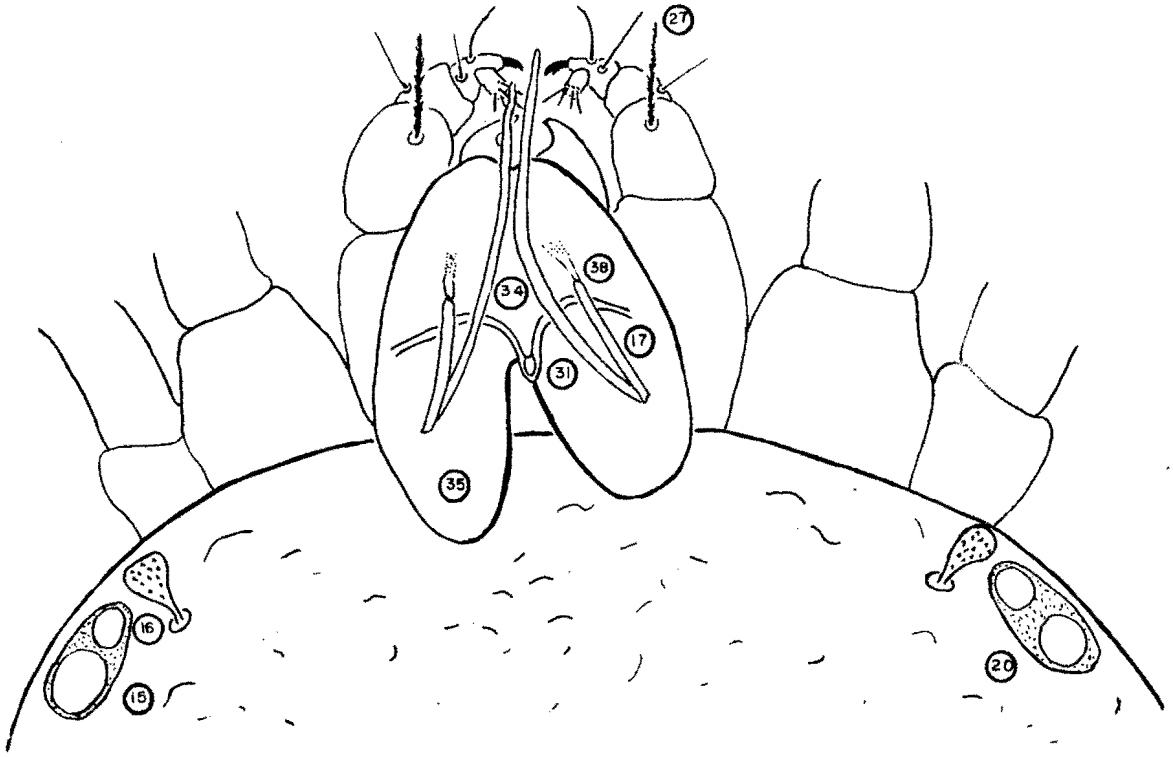
46. Distance between dorso-posterior seta and the proximal end of tarsus I (Fig. 2A),

47. Distance between the dorso-anterior seta and macroseta I (Fig. 2A).

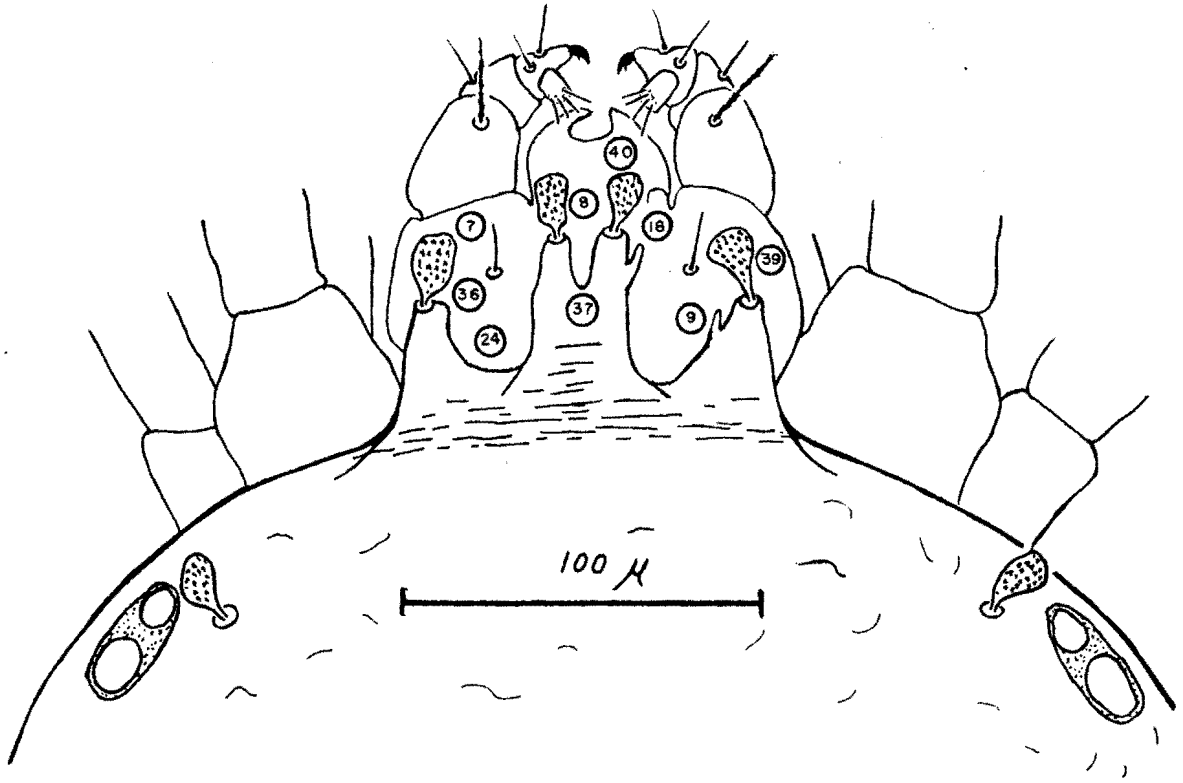
Each character was scored as a continuous numerical measurement (Wishart, 1969b), then converted to microns. Finally, the tabulated data for each mite were recorded on computer cards and transferred to an IBM 360-50 computer where it was analyzed.

Sneath and Sokal (1962) defined numerical taxonomy as the numerical evaluation of the affinity or similarity of multiple characters between taxonomic units, and the ordering of these units into taxa based on their similarities. Although these units or organisms may be viewed as having a phenetic, cladistic, or chronistic relationship, phenetic relationships (those based on overall similarities) among the organisms to be classified is the most used, and is likewise used in this study. Another important aspect of numerical classification is its hypothesis of non-specificity, which according to Sokal (1966) is based on the assumption that the evolutionary importance of separate characters has not yet been fully defined and is generally unknown, and that a consistent scheme for weighting characters before undertaking a classification is not yet available.

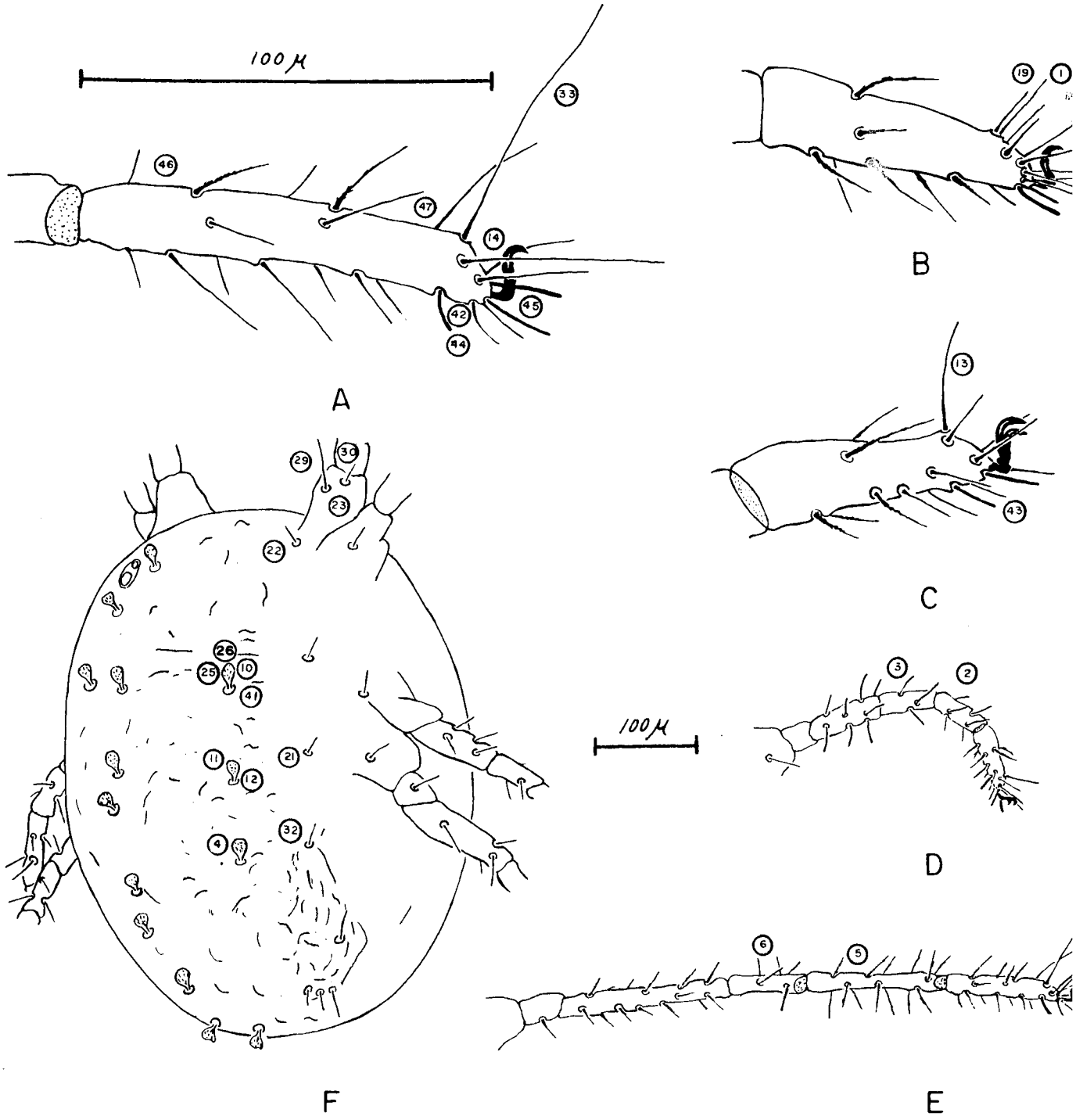
The objective of cluster analysis (a part of numerical taxonomy) is to partition individuals into meaningful classes or clusters. This is accomplished by considering each individual as a single member cluster and joining, in successive fusion steps, those two distinct clusters which are most similar. Ward's (1963) error sum cluster method



A



B


100 μ
33
46
47
14
45
42
44
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1
B
13
43
C
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30
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22
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41
11
21
12
32
4
F
100 μ
3
2
D
6
5
E

accomplished this by combining the two clusters whose fusion causes the least increase in the error sum of squares. The error sum of squares is defined as the within-group sum of squares, or the sum of the squared distances from each individual to its parent cluster (Wishart, 1969c).

Wishart (1969) warns that all methods of cluster analyses vary not only in technique, but also in results, and one cannot state "cluster analysis failed or succeeded" without first qualifying the statement by the name of the method which was used and the interpretation of the results.

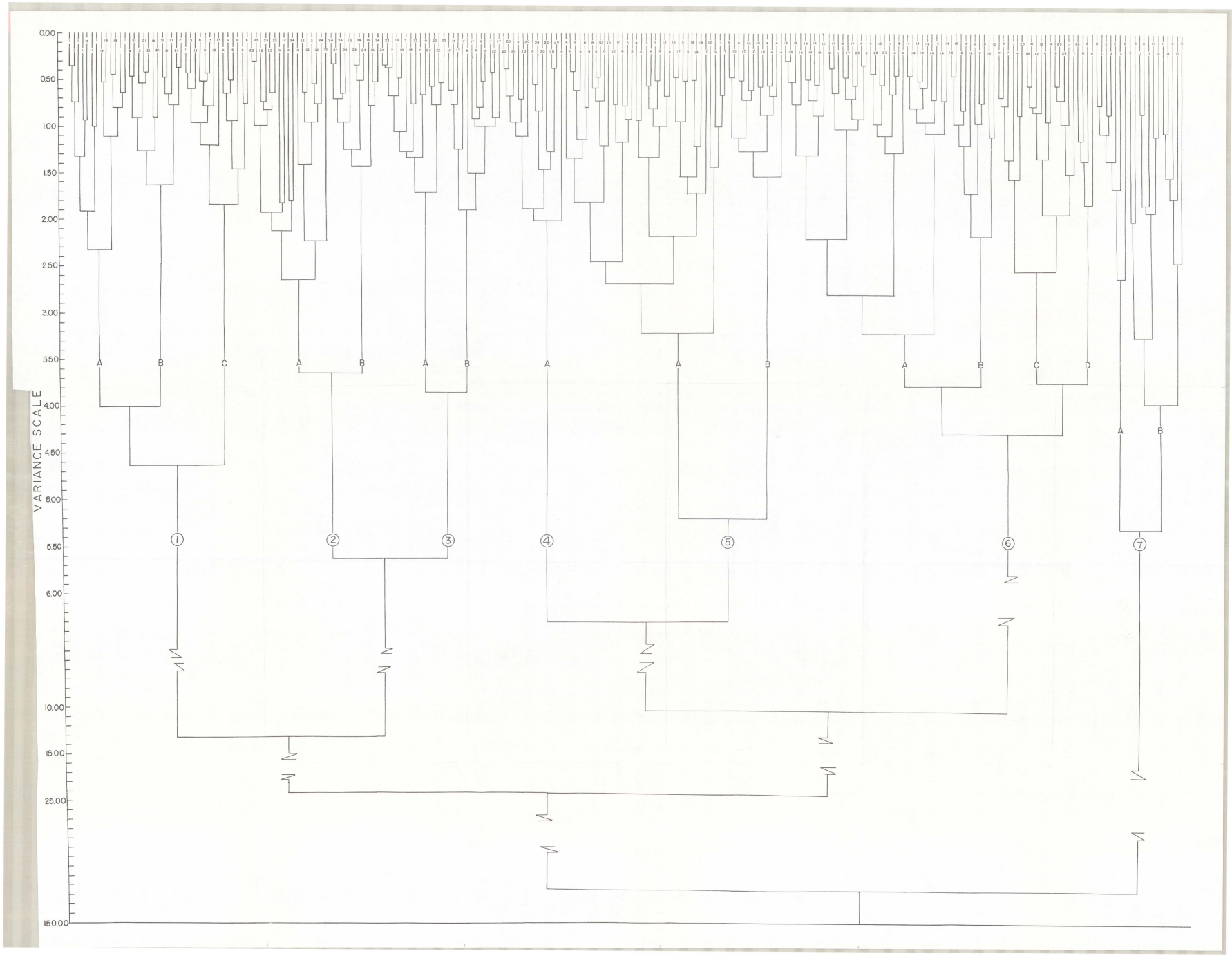
RESULTS

The cluster results are presented as a phenogram (Fig. 3) illustrating similarities at increasing variance levels among the 240 sample mites. Cluster diagnostic test results for each character at variance level 24.02 (Fig. 3) are presented in Tables 1-3. A clarification of terms used in the cluster diagnostic results are presented on Table 1.

Wishart (1968) described what the F and T values mean on Tables 1-3. Small F-values indicate characters that have relatively little variation within each cluster. Values below 0.300 have extremely low variability, since the expected value for randomness is 1.0. F-values above 0.300 can be interpreted as characters with significant variation. T-values may be used to identify those characters whose cluster means deviate significantly from the overall means. The expected T is 0.000, so high positive or negative values indicate substantial deviations. The overall cluster diagnostic character evaluations for B. rubrioculus and B. praetiosa are presented on Table 1.

Figure 3 (clusters 1ABC, 2AB, 3AB, 5ABC, 6BC) shows that mites from only 14 of 22 (64.0%) collection locations, for B. rubrioculus, form clusters when a minimum of 7 of 10[1] individuals from each locality were used as the cluster-

[1] To insure a meaningful interpretation, 7 of 10 individuals were selected arbitrarily after observing that none of the locales associated with B. rubrioculus had all their individuals together in one cluster.


VARIANCE SCALE
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3.50
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10.00
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25.00
150.00
A
B
C
D
1
2
3
4
5
6
7

Table 1. Overall cluster diagnostic character evaluations in percents for *Bryobia praetiosa* and *B. rubrioculus* at variance level 24.02 (Fig. 3).

Character Evaluation	*B. praetiosa*	*B. rubrioculus*
T-values[a]		
0.100 to 0.00	02.00%	08.50%
0.100 and greater	85.00%	02.00%
-0.100 to 0.00	06.00%	21.00%
-0.100 and greater	06.00%	68.00%
F-values[b]		
Below 1.000	72.00%	91.00%
Below 0.500	35.00%	35.00%
Below 0.300	04.00%	10.00%

[a] *T* = cluster mean less the population mean/population standard deviation.

[b] *F* = cluster variance/population variance.

Table 2. Cluster diagnostic test results for characters of *Bryobia rubrioculus* at variance level 24.02 (Fig. 3).

Character	Mean		Test Results	
	Cluster	Population[1]	T-value	F-ratio
1	024.0	025.3	-0.244	0.232
2	065.5	067.7	-0.252	0.279
3	058.3	060.2	-0.259	0.246
4	042.0	045.1	-0.244	0.453
5	161.9	166.4	-0.221	0.435
6	087.6	089.8	-0.218	0.449
7	026.2	026.8	-0.186	0.610
8	023.4	023.6	-0.074	0.952
9	000.8	000.7	-0.135	0.853
10	209.6	217.6	-0.219	0.438
11	016.7	016.9	-0.069	0.950
12	025.6	026.4	-0.200	0.528
13	034.8	036.0	-0.229	0.422
14	016.5	016.7	-0.128	0.791
15	021.4	021.6	-0.084	0.884
16	012.2	012.4	-0.195	0.544
17	094.9	009.8	-0.195	0.616
18	000.5	000.4	0.032	1.009
19	023.1	023.6	-0.125	0.648
20	313.0	320.4	-0.241	0.361
21	082.2	083.1	-0.079	0.912
22	070.5	070.7	-0.180	0.654
23	021.5	022.1	-0.192	0.215
24	051.1	052.8	-0.214	0.501
25	017.8	017.8	-0.001	0.970
26	026.6	027.2	-0.184	0.614
27	023.5	023.9	-0.131	0.714
28	000.8	000.8	-0.028	1.050
29	046.0	047.0	-0.162	0.694
30	023.5	023.4	0.002	1.029
31	010.8	011.2	-0.213	0.472
32	085.4	083.2	0.146	0.798
33	074.6	075.5	-0.096	0.730
34	075.9	076.9	-0.139	0.593
35	116.2	119.4	-0.239	0.388
36	037.0	037.8	-0.125	0.785
37	024.5	024.7	-0.031	0.996
38	003.8	003.8	-0.182	0.480
39	014.4	014.5	-0.063	0.987
40	010.6	010.7	-0.096	0.945
41	071.9	076.8	-0.263	0.235
42	014.1	014.2	-0.073	0.987
43	017.3	017.5	-0.153	0.735
44	017.6	017.9	-0.163	0.678
45	020.7	021.1	-0.172	0.690
46	038.8	038.8	0.009	1.033
47	033.9	034.4	0.010	0.898

Table 3. Cluster diagnostic test results for characters of *Bryobia praetiosa* at variance level 24.02 (Fig. 3).

Character	Mean		Test Results	
	Cluster	Population[1]	T-value	F-ratio
1	040.2	025.3	2.689	1.562
2	091.9	067.7	2.779	0.499
3	081.4	060.2	2.848	0.436
4	079.5	045.1	2.469	0.365
5	215.8	166.4	2.431	0.750
6	113.7	089.8	2.402	0.776
7	032.8	026.8	2.050	0.683
8	026.1	023.6	0.816	0.772
9	000.1	000.7	-1.479	0.235
10	306.0	217.6	2.416	0.797
11	018.7	016.9	0.705	0.981
12	034.8	026.4	2.200	0.892
13	049.8	036.0	2.518	0.443
14	019.0	016.7	1.412	1.058
15	023.3	021.6	0.924	1.273
16	014.7	012.4	2.145	1.029
17	117.7	009.8	2.120	0.316
18	000.3	000.4	-0.354	0.767
19	028.3	023.6	1.372	2.799
20	407.6	320.4	2.648	0.337
21	093.7	083.1	0.872	1.130
22	084.9	076.7	1.485	0.482
23	029.0	022.1	2.118	1.101
24	071.3	052.8	2.355	0.434
25	017.9	017.8	0.016	1.286
26	034.3	027.2	2.029	0.744
27	028.2	023.9	1.441	1.849
28	010.0	000.8	0.305	0.349
29	057.8	047.0	1.782	0.903
30	023.3	023.4	-0.023	0.654
31	016.0	011.2	2.353	0.812
32	058.7	083.1	-1.607	0.399
33	085.2	075.5	1.052	2.751
34	088.3	076.9	1.535	2.894
35	154.5	119.4	2.633	0.270
36	046.2	037.8	1.381	1.281
37	026.6	024.7	0.340	0.909
38	004.4	003.8	2.006	2.327
39	015.8	014.5	0.690	0.604
40	012.8	010.7	1.057	0.374
41	131.3	076.8	2.889	0.305
42	015.3	014.2	0.803	0.430
43	020.6	017.5	1.688	0.751
44	021.2	017.9	1.796	0.962
45	025.3	021.1	1.890	0.443
46	038.3	038.8	-0.095	0.620
47	033.9	034.4	-0.103	2.104

ing criteria. The 14 locales were: Armenia, Belgium, Canada (British Columbia, Nova Scotia, Ontario), Chile, Corning, California, United States, Iran, Japan, Lebanon, Portugal, South Africa, Turkey and the U.S.S.R. The remaining individuals from the locales that were not part of the cluster criteria plus the 8 locations that did not form clusters at all with 7 of 10 criteria, are overlapping at varying degrees with the overall population. The remaining 8 locations are: United States (Yuciapa, California, Oregon, Utah), Bulgaria, Greece, New Zealand, Poland and Romania. Using this same clustering criteria B. praetiosa from Indiana and Ohio (Fig. 3, cluster 7AB), each forms a separate cluster.

Geographic regions with multiple locations also tend to form clusters. This has occurred in parts of the Mediterranean, central Europe, and western North America, with the remaining regions, eastern Canada and Asia, having clusters mixed from several regions (Fig. 3, clusters 1B, 2AB, 3A, 5AB, 6AB).

DISCUSSION AND CONCLUSIONS

Snetsinger (1964) and Düzgüne (1959) stated that *B. rubrioculus* and *B. praetiosa* are not separate species, but are instead part of a large and diverse species complex. The *F* and *T* test results (Tables 1-3) of this study suggest that *B. praetiosa* has greater variability for like characters within each location than between them, when compared to *B. rubrioculus*. Figure 3 illustrates that *B. rubrioculus* was completely separated from *B. praetiosa* between 0.00 and 144.00 variance levels. Both the cluster diagnostics and the phenogram results indicate that the "*praetiosa*" complex proposed by Snetsinger (1964) and Düzgünes (1959) is not likely. It should be noted that the two samples of *B. praetiosa* are restricted in number and distribution and may not be generally representative of the total population. Due to extremely early separation of *B. praetiosa* from *B. rubrioculus*, this is most likely not the situation. However, the high *F*-values for *B. praetiosa* support the diverse morphological variation reported by Snetsinger in 1967. Morphological differences that have been reported may be correlated with different hosts, since *B. praetiosa* has been reported from numerous diverse hosts, or it may have resulted from their parthenogenic reproduction. Parthenogenic reproduction, if apomitic, would cause each mite to

form a "clone", thereby genetically as well as morphologically isolating itself from all other mites.

Mites within each locality would not be expected to be highly variable since they do reproduce entirely parthenogenically. Low variability occurred in only 64.0% of the areas (Fig. 3). A similar pattern was apparent in geographic regions which included several locations. Clusters of mites from separate locations and locations within regions that did not form recognizable clusters (7 of 10 mites) with themselves, but were found clustered at varying degrees with other locales and regions, were probably a result of several factors such as similar environments, life cycles, host specificities, feeding habits, introductions of mites from foreign locales, parthenogenic reproduction, and age differences. Although all possible causes for the observed cluster variation must be considered, reproduction and introduction are the most probable. Brown mites, as previously mentioned, are parthenogenic and produce only females, but it is not known whether this thelytoky is automictic or apomictic (Helle, personal communication). If frequent bursts of sexual recombination were to occur through automictic meiosis, a new source of variation would be generated, thus explaining some of the significant overlap variation found in the morphology among those mites collected from the United States (Corning and Yuciapa, California; Utah), Canada (Nova Scotia, Ontario), Chile, Iran, Japan, New Zealand, South Africa and the U.S.S.R. (Fig. 3). Introduction of indivi-

duals from other regions might also help to explain the overlapping variation found among these locales.

The conclusion, based on the results of Ward's error sum cluster method (Wishart, 1969c), when only 64.0% of the locales form independent clusters is: enough significant morphological variation exists between these locales to assume that B. rubrioculus forms one highly variable population, with clear evidence of local speciation in some locales, but not others -- probably due to repeated introductions from other areas.

Mites collected from the U.S.S.R. (Fig. 3, cluster 1B) were previously identified as Bryobia redikorzevi Reck. Due to clustering of mites from the U.S.S.R. with the mites from Chile, United States (Corning, California) and South Africa, B. redikorzevi appears to be synonymous with B. rubrioculus, with the latter maintaining priority.

The length of the distal dorsal duplex setae III (Fig. 2B) is part of the characters used by Tuttle and Baker (1968) to distinguish B. rubrioculus. The F-value for this character is 0.232. The character significantly tends toward uniformity suggesting that Tuttle and Baker (1968) made appropriate choices, in part, in selecting distinguishing taxonomic characters for B. rubrioculus.

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APPENDIX I

Character measurements (in microns) of *Bryobia rubrioculus* and *B. praetiosa*[a], with each location represented by a sample size of 10. Characters may be conveniently identified with their respective number designations in the methods (pp. 5-6). The locations are:

1-Chile
2-Ohio, USA[a]
3-Romania
4-Nova Scotia, Canada
5-Belgium
6-South Africa
7-Oregon, USA
8-Bulgaria
9-Poland
10-Portugal
11-Indiana, USA[a]
12-Armenia
13-Corning, California, USA
14-Turkey
15-New Zealand
16-Japan
17-British Columbia, Canada
18-Utah, USA
19-Yuciapa, California, USA
20-Iran
21-U.S.S.R.
22-Ontario, Canada
23-Greece
24-Lebanon

APPENDIX I

Character Number	Location Number and Observations							
	1	1	1	1	1	1	1	1
1	024.81	019.85	019.85	027.29	024.81	022.33	024.81	024.81
2	062.03	059.55	052.11	064.57	057.07	064.15	062.03	064.51
3	054.59	054.55	054.59	057.07	052.11	057.07	054.54	054.59
4	049.62	039.70	052.11	042.18	034.74	037.22	044.66	042.18
5	148.90	143.90	161.30	156.30	136.50	151.40	152.80	156.30
6	081.90	081.90	084.40	084.40	074.40	081.90	081.90	089.30
7	024.81	022.33	024.81	027.29	024.81	024.81	024.81	027.29
8	022.33	019.85	924.81	024.81	019.85	022.33	022.33	022.33
9	000.00	001.00	000.00	001.00	001.00	000.00	001.00	001.00
10	186.00	203.50	200.90	205.90	198.50	200.90	200.90	176.20
11	012.41	017.37	017.37	017.37	017.37	017.37	019.85	017.37
12	024.81	027.29	027.29	027.29	024.81	024.81	024.81	024.81
13	029.77	034.74	034.74	032.26	032.26	032.26	032.26	034.74
14	014.89	017.37	014.89	017.37	014.54	014.89	017.37	014.89
15	022.33	019.85	019.85	022.33	022.33	019.85	022.33	022.33
16	012.41	012.41	009.93	012.41	012.41	012.41	009.93	012.41
17	106.09	106.69	084.36	116.62	094.29	094.29	104.21	109.17
18	000.00	000.00	000.00	000.00	001.00	000.00	000.00	001.00
19	024.81	017.37	024.81	027.29	019.85	022.33	022.33	024.81
20	304.10	297.89	304.07	310.28	310.28	304.07	304.07	304.07
21	081.88	074.44	076.92	109.17	074.44	086.84	074.44	096.77
22	069.47	064.51	066.99	069.47	066.99	066.99	069.47	074.44
23	024.81	027.29	024.81	027.29	022.33	024.81	024.81	022.33
24	052.11	049.62	054.59	054.59	054.07	054.59	057.07	052.11
25	024.81	014.89	017.37	022.33	017.37	019.85	017.37	022.33
26	019.85	027.29	019.85	024.81	024.81	024.81	027.29	022.33
27	027.33	024.81	024.81	024.81	024.81	024.81	024.81	024.81
28	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
29	042.18	044.66	052.11	049.61	044.66	047.14	049.62	049.62
30	022.33	019.85	022.33	017.37	019.85	022.33	019.85	022.33
31	012.41	009.93	012.41	012.41	009.93	009.93	012.41	009.93
32	092.65	092.63	079.40	119.10	089.32	086.84	086.84	091.80
33	079.40	074.44	074.44	081.88	069.47	079.40	069.47	074.44
34	081.88	074.44	079.40	079.40	074.44	079.40	076.92	084.36
35	109.17	111.65	119.10	111.65	109.17	114.14	109.17	111.65
36	032.26	029.77	039.70	032.26	034.74	042.18	042.18	029.77
37	017.37	024.81	022.33	029.77	917.37	024.81	024.81	022.33
38	003.04	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	012.41	012.41	012.41	012.41	014.29	014.89	017.37	014.89
40	007.74	007.44	007.44	007.44	012.41	014.89	009.93	012.41
41	069.47	074.44	074.44	074.44	066.99	071.96	074.44	076.92
42	014.89	014.89	014.89	014.89	014.89	014.89	012.41	014.89
43	012.41	017.37	014.89	014.89	017.37	017.37	017.37	017.37
44	017.37	017.37	014.89	017.37	017.37	014.89	017.37	017.37
45	019.85	019.85	022.33	022.33	019.85	019.85	019.85	019.85
46	032.26	039.70	037.22	037.22	032.26	029.77	034.74	034.74
47	029.77	029.77	032.26	029.77	027.29	037.22	029.77	034.74

APPENDIX I (continued)

Character	Location Number and Observations							
Number	1	1	2	2	2	2	2	2
1	024.81	024.81	042.18	024.81	039.69	047.14	042.18	042.18
2	062.03	062.03	086.84	086.84	089.32	086.84	086.84	084.36
3	057.07	057.07	076.92	079.40	079.39	079.40	074.44	076.92
4	042.18	042.18	071.95	096.77	081.88	086.85	076.42	074.40
5	161.30	148.90	205.90	143.50	200.90	198.50	203.50	200.90
6	084.40	086.80	104.20	111.60	111.60	106.70	094.30	106.70
7	024.81	024.81	029.77	032.26	029.77	032.26	027.29	034.73
8	022.33	024.81	019.85	024.81	022.33	024.81	024.81	024.81
9	000.00	001.00	000.00	000.00	000.00	000.00	000.00	000.00
10	191.10	193.50	297.90	304.10	291.70	279.20	204.01	243.20
11	019.85	014.89	017.37	014.89	017.37	017.37	019.85	017.37
12	022.33	024.81	029.77	034.73	034.74	032.26	029.77	034.74
13	029.77	032.25	054.58	042.18	049.62	052.11	052.11	049.62
14	014.84	017.37	018.85	019.02	019.85	014.89	019.85	017.37
15	019.85	022.33	022.33	022.33	024.81	024.81	022.33	022.33
16	012.41	012.41	012.41	014.89	014.89	014.89	012.41	012.41
17	081.88	091.80	111.65	121.58	114.14	111.65	114.14	114.14
18	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
19	024.81	024.81	029.77	024.81	024.81	028.12	027.29	029.77
20	316.49	279.25	384.75	409.57	390.16	390.03	378.54	390.95
21	084.39	076.92	091.80	089.32	094.29	086.84	099.25	086.84
22	074.44	069.47	081.88	074.44	084.36	086.84	086.84	076.92
23	024.81	024.81	027.29	029.77	029.77	027.29	024.81	027.29
24	052.11	047.14	074.44	074.44	069.47	069.47	064.51	074.44
25	022.33	017.57	014.89	017.37	014.89	017.37	014.89	017.37
26	024.81	024.81	032.25	037.22	024.81	032.26	032.20	037.22
27	029.77	024.81	019.85	025.91	024.81	027.29	027.24	027.29
28	000.00	000.00	001.00	001.00	001.00	001.00	001.00	001.00
29	047.14	047.14	054.59	054.59	054.58	037.22	066.99	059.55
30	019.85	019.85	019.85	017.37	024.81	022.33	022.33	024.81
31	012.41	012.41	014.89	017.37	017.37	014.89	017.37	017.37
32	081.88	086.84	052.11	054.04	047.14	057.07	047.14	052.11
33	074.44	071.96	096.77	034.70	062.03	074.44	080.01	074.44
34	079.40	084.36	081.88	106.69	099.25	099.25	096.77	096.76
35	116.62	111.65	151.35	158.80	156.32	163.76	156.32	161.28
36	032.26	039.70	049.62	052.11	039.70	049.62	042.18	037.22
37	024.81	029.77	019.85	027.24	014.89	024.81	027.29	032.26
38	003.81	003.81	004.57	004.57	004.57	004.57	003.81	004.57
39	014.89	014.89	012.41	014.89	014.89	017.37	017.37	014.89
40	012.41	007.44	012.41	012.41	012.41	012.41	012.41	014.89
41	074.44	079.40	124.06	119.10	129.02	119.10	126.54	121.58
42	014.89	014.89	014.89	014.89	014.89	014.89	014.89	014.89
43	014.89	017.37	022.33	019.85	019.85	019.85	019.85	022.33
44	017.37	017.37	022.33	022.33	022.33	019.85	022.33	022.33
45	019.85	019.85	027.29	027.24	024.81	024.81	024.81	022.33
46	037.22	037.22	034.74	037.22	032.26	032.26	034.70	037.22
47	027.29	027.29	024.77	027.29	054.59	032.26	032.26	024.77

APPENDIX I (continued)

Character Number	Location Number and Observations							
	2	2	2	2	3	3	3	3
1	044.66	044.60	047.14	047.14	022.33	027.29	029.77	024.81
2	091.80	084.36	086.84	089.32	069.47	054.59	071.95	066.99
3	074.44	076.92	074.46	079.40	054.59	059.55	064.51	059.55
4	079.40	074.44	052.07	079.40	049.90	047.14	052.11	039.70
5	198.50	196.00	196.00	198.50	161.30	163.80	163.80	151.40
6	114.10	099.20	111.70	106.70	076.90	086.80	091.80	084.40
7	029.77	032.26	034.73	032.26	027.29	029.77	024.81	027.24
8	024.81	024.81	024.81	024.81	022.33	027.29	022.33	022.33
9	000.00	000.00	000.00	000.00	001.00	001.00	001.00	001.00
10	297.90	266.80	241.70	285.50	228.30	225.80	248.20	225.70
11	019.85	022.33	017.37	017.37	012.40	014.89	014.89	014.89
12	037.22	024.77	036.70	032.16	024.81	024.81	024.81	022.33
13	049.62	049.62	050.45	052.11	034.74	034.74	037.22	035.84
14	019.85	019.85	014.89	019.85	017.37	014.89	017.37	014.89
15	024.81	022.33	022.33	022.33	019.85	014.85	019.85	022.33
16	014.89	014.89	014.89	014.89	012.41	012.41	012.41	012.41
17	119.10	114.14	111.65	111.65	104.21	086.80	089.32	089.32
18	000.00	000.00	000.00	000.00	001.00	000.00	001.00	001.00
19	029.77	024.81	029.77	032.26	027.29	024.81	024.81	027.29
20	403.36	384.75	403.36	384.75	316.49	322.69	316.49	322.69
21	086.84	079.40	086.84	079.40	086.84	089.32	086.84	091.80
22	081.88	079.40	081.88	086.84	069.47	074.44	069.47	069.47
23	022.33	024.81	027.29	024.81	024.81	019.85	019.85	022.33
24	069.47	066.99	076.92	071.96	062.03	059.55	047.14	062.03
25	024.81	017.37	017.37	019.85	017.37	014.89	017.37	014.89
26	037.22	032.26	037.22	032.26	024.81	027.29	027.29	027.29
27	024.81	039.70	029.77	029.77	019.85	022.33	024.81	024.81
28	001.00	001.00	001.00	000.00	001.00	001.00	001.00	001.00
29	059.55	062.03	054.59	057.07	044.66	047.14	052.11	044.66
30	022.33	022.33	024.81	024.81	027.29	017.37	019.85	019.85
31	014.89	014.89	017.37	014.89	014.89	012.41	012.41	012.41
32	049.62	064.51	052.11	047.14	074.44	079.40	096.77	074.44
33	094.29	099.25	099.77	106.69	042.18	076.92	054.55	066.99
34	096.77	091.80	086.84	091.86	079.40	064.51	071.96	079.40
35	161.28	158.80	158.80	158.80	125.06	114.14	121.58	121.58
36	034.74	042.18	037.22	044.66	044.66	037.22	039.70	039.70
37	029.77	029.77	024.51	029.77	019.85	027.29	024.81	024.81
38	004.57	003.81	004.50	004.57	003.81	004.57	003.81	003.81
39	014.89	018.89	014.89	017.37	009.93	012.41	014.89	014.89
40	012.41	012.41	014.89	014.89	012.41	007.44	007.41	009.93
41	036.47	119.10	126.54	129.02	086.84	084.36	081.88	069.47
42	014.89	014.89	014.89	014.89	014.89	014.89	014.84	012.41
43	022.33	019.85	017.37	022.33	014.89	017.37	017.37	017.37
44	022.33	022.33	019.85	017.37	014.89	017.37	017.37	017.37
45	022.33	024.81	024.81	024.81	019.85	027.29	027.29	019.85
46	034.74	032.26	034.74	037.22	034.74	042.18	039.70	039.70
47	029.77	027.29	027.29	032.26	032.26	034.74	027.29	029.77

APPENDIX I (continued)

Character Number	Location Number and Observations							
	3	3	3	3	3	3	4	4
1	024.81	024.81	027.29	024.81	027.29	027.29	024.81	022.33
2	066.99	064.51	064.51	062.03	066.99	062.03	069.47	064.57
3	059.55	057.07	054.61	054.59	059.55	057.07	052.11	062.03
4	049.62	034.70	057.07	066.99	044.60	047.14	052.11	052.11
5	138.90	141.40	156.30	146.40	143.40	166.20	166.20	161.30
6	071.90	086.80	084.40	081.90	081.90	084.30	089.30	086.80
7	024.81	027.29	027.29	024.81	027.29	027.29	027.29	027.29
8	024.81	022.33	024.81	024.81	022.33	027.21	024.81	022.33
9	001.00	001.00	001.00	001.00	000.00	001.00	001.00	001.00
10	243.20	225.80	243.20	176.20	210.90	223.90	248.20	228.30
11	014.84	014.89	017.37	012.40	017.37	019.02	017.37	017.37
12	024.81	024.81	027.29	024.81	027.29	024.81	027.29	024.81
13	037.22	034.74	039.70	032.26	034.74	034.74	029.77	039.70
14	017.37	017.37	017.37	019.85	014.84	014.89	014.85	014.89
15	022.33	019.85	018.85	017.37	019.85	022.33	019.85	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	091.80	084.36	086.80	084.36	089.32	089.32	096.77	091.80
18	001.00	001.00	000.00	000.00	000.00	001.00	001.00	001.00
19	024.81	022.33	024.81	022.33	019.85	019.85	027.29	024.81
20	304.07	247.87	322.69	297.87	304.07	310.28	359.93	353.72
21	091.80	089.32	089.32	074.40	086.84	091.80	084.32	091.80
22	066.99	066.99	069.47	059.55	066.99	066.99	071.45	066.99
23	022.33	024.81	027.29	024.81	022.33	019.85	024.81	024.81
24	047.14	049.62	054.59	052.11	047.14	057.07	054.59	062.03
25	017.37	017.37	017.37	014.89	017.37	014.89	017.37	014.89
26	027.29	024.81	029.77	024.81	029.77	027.29	024.81	027.29
27	019.85	024.81	019.85	019.85	022.33	024.81	029.77	027.29
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	047.14	039.70	052.11	044.66	047.14	049.62	052.11	049.60
30	019.85	024.81	024.81	014.89	024.81	014.85	027.29	027.29
31	009.93	012.41	012.41	009.93	012.41	009.93	012.41	012.41
32	076.92	081.88	094.29	066.99	084.36	079.14	086.84	084.29
33	074.44	066.99	079.40	076.92	064.51	064.51	084.36	076.92
34	071.96	076.92	074.44	071.96	071.96	071.96	079.40	079.40
35	116.62	116.62	119.10	114.14	119.10	124.06	111.65	125.06
36	039.20	032.26	042.18	029.77	024.77	037.22	042.18	032.26
37	019.85	024.81	027.29	024.81	019.85	027.29	054.59	024.81
38	003.81	003.81	003.81	003.81	003.81	003.51	003.81	003.51
39	014.89	012.41	012.41	014.89	012.41	009.93	014.89	012.41
40	007.44	007.44	007.44	008.83	009.93	007.44	009.93	009.93
41	079.40	079.40	081.88	071.96	084.36	078.40	076.92	069.47
42	014.89	012.41	014.89	012.41	012.41	012.41	012.41	014.89
43	017.37	014.84	017.37	017.37	017.37	017.37	019.85	017.37
44	017.37	017.37	017.37	017.37	014.84	017.37	017.37	019.85
45	019.85	019.85	022.33	022.33	019.85	022.33	022.33	024.81
46	044.66	034.74	039.70	077.22	044.66	042.18	044.66	052.11
47	039.70	029.70	034.72	024.77	029.77	034.74	042.16	034.75

APPENDIX I (continued)

Character Number	Location Number and Observations 4	4	4	4	4	4	4	4
1	024.81	022.33	027.29	024.81	027.29	024.81	027.29	027.29
2	071.95	064.57	066.99	066.99	064.51	069.47	069.47	069.47
3	062.03	059.55	064.51	059.55	065.51	064.57	059.55	066.99
4	059.55	052.11	049.62	052.11	054.59	052.11	044.66	049.62
5	166.20	166.20	173.70	176.20	163.80	171.20	168.70	171.20
6	089.30	084.40	086.80	089.30	091.80	091.80	094.30	096.80
7	029.77	022.33	027.29	027.29	022.33	029.77	027.29	029.77
8	022.33	022.33	027.29	024.8 1	022.33	024.81	029.77	029.77
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	254.40	228.20	240.70	240.70	228.30	240.70	248.10	260.60
11	014.89	014.89	017.37	019.85	019.85	017.37	017.37	017.37
12	022.33	027.29	027.29	027.29	027.29	024.81	029.77	024.81
13	039.70	034.74	029.77	037.22	037.22	034.74	039.70	039.70
14	017.37	019.85	017.37	019.85	019.85	017.37	014.85	017.37
15	022.33	019.85	019.85	019.85	022.33	022.33	019.85	024.81
16	012.41	012.41	012.41	012.41	012.41	009.93	012.41	012.41
17	096.77	101.73	091.80	094.29	096.77	041.80	101.73	094.29
18	000.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
19	024.81	019.85	027.29	027.29	027.29	027.29	027.29	027.29
20	353.72	372.35	347.51	378.54	347.51	353.72	352.72	359.93
21	096.77	101.73	099.25	101.73	081.88	094.29	046.77	094.29
22	074.44	069.47	069.47	074.44	064.51	066.99	071.96	074.44
23	022.33	024.81	019.85	024.81	022.33	019.85	024.81	024.81
24	054.59	052.11	057.07	064.51	049.62	062.03	052.11	052.11
25	017.37	017.37	017.37	019.85	017.37	019.85	017.37	017.37
26	017.37	027.29	029.77	027.29	024.81	02729	029.77	027.29
27	019.85	027.29	027.29	027.29	024.81	027.29	024.81	027.29
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	047.14	054.59	052.11	057.07	049.62	049.62	052.11	054.59
30	027.29	024.81	029.77	029.77	029.77	027.29	027.29	029.77
31	009.93	012.41	012.41	012.41	012.41	012.41	009.93	012.41
32	101.73	084.36	101.73	096.77	081.88	094.29	094.29	084.36
33	086.84	079.40	071.96	086.32	074.44	084.36	084.36	079.40
34	076.96	071.96	074.44	069.47	052.11	071.96	076.92	074.44
35	094.29	119.10	119.10	121.58	116.62	114.14	121.58	121.58
36	022.26	029.77	034.74	042.18	054.59	042.18	044.66	039.70
37	024.81	022.33	024.81	032.26	024.81	029.77	024.81	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	012.41	014.89	017.37	012.41	014.89	014.89	014.89	012.41
40	009.43	012.41	007.44	012.41	012.41	012.41	012.41	012.41
41	081.88	074.44	074.44	084.36	069.47	074.44	086.84	086.84
42	014.89	014.89	014.89	014.89	014.89	014.89	014.89	014.89
43	019.85	017.37	019.85	019.85	019.85	017.37	022.33	017.37
44	019.85	017.37	019.85	017.37	017.37	017.37	017.37	019.85
45	022.33	019.85	922.33	022.33	019.85	019.85	022.33	019.85
46	044.66	042.18	044.66	044.66	042.18	037.22	032.26	037.22
47	032.26	037.22	039.70	037.22	037.22	042.18	037.22	037.22

APPENDIX I (continued)

Character	Location Number and Observations							
Number	5	5	5	5	5	5	5	5
1	024.81	027.29	024.81	022.33	024.81	027.29	022.33	027.29
2	069.47	062.03	066.03	064.31	064.51	071.95	052.11	066.99
3	059.55	059.55	069.47	057.07	059.55	062.03	057.07	059.55
4	052.11	049.62	042.18	047.14	042.18	044.66	037.22	047.14
5	163.80	166.20	158.80	163.80	058.80	173.70	153.80	166.20
6	094.30	094.30	094.30	086.80	094.30	099.24	084.40	091.80
7	024.81	027.29	027.29	027.29	029.77	029.77	024.81	029.77
8	019.85	024.81	024.81	027.29	029.77	022.33	024.81	027.29
9	001.00	000.00	001.00	001.00	000.00	001.00	000.00	001.00
10	238.20	235.70	225.80	223.30	233.20	248.10	198.50	198.50
11	014.89	014.84	014.89	017.37	017.37	017.37	017.37	019.85
12	024.81	022.33	022.33	024.81	027.29	027.24	024.81	027.29
13	037.22	034.74	037.22	034.74	034.74	022.33	032.26	037.22
14	014.89	014.89	017.37	017.37	017.37	017.37	014.89	017.37
15	024.81	022.33	022.33	024.81	022.33	024.81	019.85	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	084.36	086.80	086.80	084.36	089.32	084.36	094.29	096.77
18	001.00	000.00	001.00	001.00	000.00	001.00	000.00	001.00
19	024.81	024.81	024.81	022.33	024.81	024.81	022.33	022.33
20	328.90	328.90	328.90	322.69	328.90	335.10	304.07	335.10
21	089.32	089.32	089.32	089.32	089.32	086.84	089.32	094.29
22	071.95	071.96	069.47	066.99	071.96	071.66	066.99	071.96
23	022.33	019.85	022.33	022.33	022.33	018.85	022.33	022.33
24	059.55	057.07	054.59	052.11	049.62	052.01	054.59	049.62
25	014.89	014.89	014.89	014.89	017.37	014.89	017.37	017.37
26	027.29	029.77	027.29	024.81	024.81	027.29	022.33	027.29
27	023.98	023.98	019.85	023.98	027.29	022.33	024.81	027.24
28	001.00	001.00	001.00	001.00	001.00	001.00	000.00	001.00
29	047.14	052.11	042.18	044.66	049.62	054.59	047.14	049.62
30	029.77	024.81	027.29	029.77	027.29	022.33	019.85	022.33
31	007.44	009.93	007.44	009.43	009.93	009.93	012.41	009.93
32	086.84	079.40	079.40	041.80	084.32	079.40	086.84	084.36
33	081.88	069.47	071.96	074.44	081.88	081.88	079.40	084.36
34	079.40	076.40	074.44	074.44	071.96	076.92	079.40	064.51
35	121.58	121.58	121.58	116.62	121.58	121.58	116.62	119.10
36	029.77	044.66	039.70	032.26	034.74	034.74	042.18	044.66
37	024.81	022.33	017.37	024.81	027.29	024.81	024.81	029.77
38	003.81	003.51	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	014.89	014.89	014.89	014.89	012.41	012.41	014.89
40	009.93	012.41	009.93	007.44	009.93	012.41	014.89	007.44
41	086.84	049.62	066.99	081.88	066.99	074.41	071.86	081.88
42	014.89	012.41	012.41	014.89	012.41	014.89	014.89	014.89
43	019.85	017.37	017.37	017.37	018.85	017.37	017.37	017.37
44	017.37	019.85	017.37	017.37	019.85	017.37	017.37	017.37
45	022.33	022.33	022.33	019.85	022.33	022.33	022.33	022.33
46	034.74	047.14	042.18	037.22	042.18	942.18	029.77	042.18
47	032.26	039.70	037.22	037.22	034.74	037.22	027.29	039.70

APPENDIX I (continued)

Character	Location Number and Observations							
Number	5	5	6	6	6	6	6	6
1	024.81	027.29	024.81	027.29	019.85	027.29	027.29	027.29
2	069.47	071.83	066.99	062.03	064.51	062.03	059.55	062.03
3	064.51	057.07	054.59	054.59	054.85	054.59	052.11	054.59
4	042.18	047.14	047.14	081.88	064.51	057.07	042.18	044.66
5	178.60	168.70	163.80	158.00	161.30	158.80	148.90	153.80
6	094.30	079.20	084.40	081.90	086.80	084.40	079.40	079.40
7	027.29	027.29	024.81	024.81	022.30	022.33	024.81	022.33
8	024.81	027.29	017.37	019.85	019.85	019.85	019.85	019.85
9	001.00	001.00	001.00	001.00	001.00	000.00	000.00	001.00
10	260.60	240.70	178.60	215.90	213.40	210.90	176.20	213.40
11	017.37	012.40	014.89	014.89	017.37	014.84	012.40	014.83
12	029.77	027.29	022.33	024.81	024.81	027.29	022.33	024.19
13	039.70	039.70	037.22	039.70	032.26	037.27	034.74	032.26
14	017.37	017.37	014.89	014.89	017.37	014.88	014.84	017.37
15	024.81	024.81	022.33	019.85	019.85	022.33	019.85	019.85
16	012.41	012.41	012.41	009.93	012.41	012.41	012.41	012.41
17	089.32	079.40	096.77	104.21	094.24	099.25	096.77	104.21
18	001.00	001.00	001.00	000.00	001.00	000.00	000.00	001.00
19	022.33	019.85	024.81	022.33	017.37	019.85	024.81	024.81
20	341.31	335.10	323.90	323.90	335.10	328.90	304.07	311.44
21	079.40	091.80	071.96	076.92	079.40	079.40	066.99	104.21
22	066.99	066.99	074.44	071.96	074.44	071.96	074.41	104.21
23	022.33	022.33	022.33	019.85	022.33	022.33	019.85	018.85
24	062.03	049.62	052.11	049.62	057.07	052.11	044.66	059.55
25	017.37	017.37	014.89	017.37	017.37	017.37	012.41	019.85
26	029.77	029.77	024.81	024.81	024.81	024.81	022.33	022.33
27	024.81	024.81	017.37	022.33	022.33	024.81	022.33	022.33
28	001.00	001.00	001.00	001.00	000.00	000.00	000.00	001.00
29	054.59	047.14	039.70	042.18	042.18	037.22	042.18	039.70
30	034.74	024.81	017.37	022.33	022.33	022.33	022.33	017.37
31	009.93	012.41	012.41	009.93	012.41	012.41	009.93	012.41
32	079.40	074.44	079.40	047.18	086.84	074.44	066.99	106.69
33	096.77	084.36	071.46	076.92	079.40	079.40	076.92	076.92
34	079.40	071.96	076.92	071.96	074.44	062.03	074.44	076.92
35	121.58	124.06	116.61	119.10	119.10	114.14	106.69	114.14
36	042.18	037.22	032.26	037.22	042.18	032.26	027.29	034.74
37	032.26	022.33	014.89	012.41	024.81	029.77	024.81	029.77
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	009.93	012.41	012.41	014.89	014.89	014.89	012.41	017.37
40	009.93	009.93	012.41	012.41	012.41	012.41	009.90	012.41
41	066.99	071.96	091.80	086.84	094.29	091.80	079.40	086.84
42	014.88	012.41	014.89	014.89	014.89	012.41	014.89	014.89
43	019.85	017.37	017.37	017.37	017.37	017.37	017.37	014.89
44	017.37	014.89	019.85	017.37	019.85	019.85	017.51	017.37
45	022.33	022.33	022.33	022.33	022.33	022.33	022.33	019.85
46	042.18	047.14	039.70	039.70	039.70	034.74	029.77	039.70
47	032.26	034.74	037.22	028.77	029.77	039.70	029.77	029.77

APPENDIX I (continued)

Character Number	Location Number and Observations							
	6	6	6	6	7	7	7	7
1	024.81	027.29	029.77	022.33	022.33	027.29	024.81	022.33
2	062.03	062.03	059.55	062.03	064.51	062.03	064.51	066.99
3	049.62	052.54	054.59	054.59	057.07	057.07	057.07	057.07
4	042.18	047.14	039.70	044.66	034.75	027.29	032.26	032.26
5	156.40	161.30	153.80	156.30	163.80	186.20	166.20	166.24
6	081.80	081.90	084.40	084.40	084.40	084.40	091.80	086.80
7	024.81	024.81	024.81	022.33	024.81	024.81	024.81	024.81
8	022.33	022.32	022.33	017.37	019.85	024.81	022.33	022.33
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	186.10	186.10	186.10	188.60	213.40	223.30	213.40	198.50
11	014.89	014.84	014.83	014.89	012.41	015.44	014.89	014.89
12	022.33	024.01	024.19	024.81	024.81	021.50	022.33	024.81
13	037.22	037.22	027.29	034.74	032.26	032.26	024.81	032.26
14	017.37	017.37	017.37	014.89	017.37	017.37	014.89	017.37
15	022.33	019.85	022.33	019.85	019.85	022.33	017.37	018.85
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	099.25	094.25	101.73	099.25	096.77	091.80	101.73	099.25
18	000.00	001.00	001.00	001.00	001.00	000.00	000.00	000.00
19	019.85	019.85	027.29	022.33	024.81	022.33	024.81	022.33
20	310.28	316.49	310.28	310.28	297.87	304.07	304.07	310.49
21	069.47	076.92	069.47	074.44	091.80	084.36	079.40	129.02
22	071.96	076.92	071.96	071.96	074.44	071.96	069.73	074.44
23	019.85	019.85	022.33	019.85	019.85	022.33	019.85	019.85
24	044.66	052.11	057.07	044.66	044.66	069.48	047.14	044.66
25	014.89	017.37	016.54	017.35	017.37	017.37	017.37	019.85
26	024.81	027.29	024.53	024.81	024.81	028.77	027.77	024.81
27	024.81	022.33	022.33	022.33	024.81	024.81	024.81	022.33
28	001.00	000.00	000.00	001.00	001.00	001.00	001.00	001.00
29	047.14	047.14	047.14	044.66	044.66	039.70	049.62	049.62
30	022.33	022.33	022.33	022.33	019.85	014.89	019.85	022.33
31	009.93	009.93	009.93	009.93	009.93	009.93	062.41	009.93
32	074.44	074.44	076.92	079.40	109.17	101.73	084.30	119.10
33	069.47	074.44	074.44	064.51	109.17	069.47	064.51	074.44
34	079.40	074.44	076.92	084.36	076.92	076.92	079.40	084.36
35	121.58	104.17	114.14	119.10	086.77	116.61	124.00	111.65
36	037.22	034.74	042.18	034.74	039.70	029.77	037.22	032.20
37	009.93	019.85	019.85	024.81	032.26	027.29	022.33	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	012.41	012.41	014.89	012.41	012.41	014.89	014.89
40	012.41	012.41	009.93	014.89	009.93	009.93	009.93	009.93
41	084.36	089.32	086.84	079.40	054.50	062.03	066.99	064.51
42	014.89	014.89	014.89	014.89	012.41	010.15	014.89	012.41
43	017.37	017.37	017.37	017.37	016.82	014.85	017.37	017.37
44	017.37	017.37	017.37	017.37	018.85	019.85	019.85	017.37
45	019.85	017.37	022.33	022.33	022.33	022.33	027.29	019.85
46	037.22	037.22	037.22	034.74	042.18	079.70	047.18	034.74
47	034.74	037.22	032.26	037.22	032.20	037.22	029.77	027.29

APPENDIX I (continued)

Character Number	Location Number and Observations							
	?	?	?	?	?	?	8	8
1	019.85	024.81	019.85	022.33	029.77	022.33	022.33	024.81
2	064.51	066.99	062.03	062.03	059.55	059.55	066.99	069.47
3	057.07	057.07	059.55	049.63	059.55	054.59	059.55	062.03
4	027.29	032.26	047.14	029.77	037.22	027.29	039.70	034.73
5	166.20	171.20	153.80	138.90	148.90	166.20	176.20	183.60
6	091.80	086.80	089.30	076.90	081.90	089.30	094.30	099.20
7	024.81	024.81	024.81	022.33	024.81	024.81	027.29	029.77
8	024.81	027.29	027.29	022.33	024.81	024.81	022.33	027.29
9	001.00	001.00	001.00	001.00	000.00	001.00	001.00	001.00
10	218.30	148.50	205.90	178.60	183.60	205.90	196.00	198.50
11	017.37	017.37	014.89	017.37	014.89	017.37	019.85	019.02
12	027.29	024.81	024.81	027.29	029.77	024.81	027.29	026.46
13	032.26	032.26	032.26	029.77	029.77	032.26	034.74	039.70
14	017.37	014.89	017.37	017.37	017.37	017.37	014.89	017.37
15	022.33	022.33	018.85	017.37	017.37	019.85	019.85	022.33
16	012.41	012.41	009.93	009.93	009.93	012.41	012.41	012.41
17	111.65	116.62	119.10	104.21	099.25	091.80	088.25	104.21
18	001.00	000.00	000.00	000.00	001.00	000.00	001.00	001.00
19	022.33	022.33	019.85	027.29	022.33	022.33	027.29	024.81
20	297.87	304.07	291.66	297.89	291.66	304.07	322.69	328.90
21	101.73	079.40	086.84	069.47	074.44	079.40	085.84	079.40
22	071.96	069.47	071.96	076.92	064.51	074.44	069.47	066.98
23	017.37	022.33	022.33	018.85	027.25	017.37	019.85	024.81
24	052.11	049.62	042.18	047.14	049.62	054.59	052.11	054.58
25	017.37	017.37	018.85	017.37	017.37	017.37	017.37	020.47
26	027.28	027.29	024.81	027.29	027.29	027.29	027.29	028.53
27	022.33	022.33	022.33	024.81	024.81	024.81	024.81	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	052.11	047.14	044.66	047.14	047.14	049.62	044.66	049.62
30	022.33	022.33	022.33	018.85	022.33	024.81	019.85	019.85
31	012.41	009.93	009.93	012.41	009.93	009.93	009.93	009.93
32	119.10	086.84	109.17	086.84	094.29	084.36	094.25	084.36
33	074.44	074.44	069.47	071.96	071.96	076.92	084.36	084.36
34	086.85	084.36	074.40	076.92	079.40	081.88	079.40	076.92
35	121.58	121.58	116.61	121.58	114.14	126.54	116.61	121.58
36	024.81	044.66	032.26	034.74	037.22	039.70	034.74	039.70
37	027.29	037.74	027.29	037.22	024.81	034.74	012.41	017.37
38	003.81	004.57	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	014.89	014.89	014.89	014.89	014.89	017.37	014.89
40	012.41	012.41	009.93	007.44	009.93	009.93	012.41	007.44
41	064.51	057.07	066.99	062.03	064.51	059.55	079.40	069.47
42	014.89	014.89	014.89	012.41	012.41	012.41	014.89	012.41
43	017.37	017.37	017.37	017.37	014.89	017.37	017.37	017.37
44	019.85	019.85	019.85	019.85	017.37	017.37	017.37	019.85
45	022.33	019.85	022.33	022.33	022.33	019.85	019.85	022.33
46	037.22	039.70	039.70	037.22	039.70	044.66	037.22	038.70
47	032.26	032.26	029.77	027.24	029.77	034.74	039.70	034.74

APPENDIX I (continued)

Character Number	Location Number and Observations							
	8	8	8	8	8	8	8	8
1	017.37	022.33	024.81	024.81	024.81	024.81	024.81	019.85
2	069.47	066.99	069.47	069.47	066.99	071.95	069.47	064.51
3	059.55	062.03	059.55	059.55	059.55	064.51	059.55	057.07
4	039.70	042.18	039.70	047.14	039.70	039.70	037.22	042.18
5	188.60	166.20	168.70	166.20	168.70	176.20	168.70	151.40
6	099.20	084.30	096.81	091.80	091.80	094.30	096.80	084.40
7	027.29	029.77	024.81	024.81	027.29	027.29	024.81	027.29
8	024.81	027.29	022.33	024.81	024.81	022.33	018.85	022.33
9	001.00	001.00	001.00	000.00	001.00	001.00	001.00	000.00
10	193.50	200.90	200.90	215.90	183.60	203.50	188.60	171.20
11	019.02	019.02	019.02	019.02	017.37	019.02	019.02	018.85
12	026.46	032.26	026.46	026.46	027.29	026.40	026.46	024.81
13	039.70	034.74	034.74	034.74	032.26	034.74	034.74	032.26
14	014.89	017.37	014.89	017.37	014.89	014.89	017.37	014.89
15	019.85	024.81	019.85	022.33	019.85	022.33	022.33	019.85
16	009.93	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	099.25	094.29	099.25	094.29	086.80	091.80	106.69	106.70
18	001.00	001.00	000.00	000.00	001.00	000.00	000.00	000.00
19	024.81	022.33	024.81	014.89	024.81	022.33	024.81	019.85
20	328.90	304.07	322.69	322.69	310.28	316.49	316.49	297.87
21	081.88	089.32	079.40	091.80	079.40	089.32	101.73	069.47
22	069.47	064.51	069.47	071.96	069.47	069.47	094.29	066.99
23	022.33	019.85	019.85	019.85	017.37	019.85	022.33	017.37
24	052.11	049.62	044.66	054.59	044.66	049.62	042.18	044.66
25	019.85	017.37	020.47	029.47	019.85	029.47	020.47	022.33
26	027.29	029.77	028.53	028.53	029.77	028.53	028.58	029.77
27	027.29	027.29	019.85	027.29	022.33	022.33	022.33	024.81
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	049.62	047.14	047.14	049.63	049.62	049.62	049.62	044.66
30	024.81	022.33	027.29	027.29	027.29	024.81	027.29	024.81
31	009.93	012.41	009.93	009.93	012.41	009.93	012.41	009.93
32	076.92	096.77	086.84	106.64	076.92	064.51	094.29	079.40
33	086.84	076.92	081.88	079.40	079.40	079.40	076.92	084.36
34	071.86	066.99	079.40	076.92	074.44	071.96	076.92	076.92
35	114.14	109.17	116.62	121.58	111.65	116.62	109.17	104.21
36	039.70	037.22	037.22	049.62	042.18	034.74	042.18	029.77
37	022.33	018.85	017.37	027.29	022.33	024.81	027.29	019.85
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	012.41	014.88	017.37	014.89	012.41	014.89	012.41	014.89
40	009.93	007.44	012.41	009.93	007.44	012.41	012.41	008.93
41	064.51	064.51	076.82	074.44	074.44	071.96	074.44	074.44
42	014.89	017.37	014.89	014.89	012.41	014.89	014.89	014.89
43	017.37	017.37	017.37	019.85	014.89	017.37	017.37	017.37
44	017.37	017.37	017.37	019.85	014.89	012.41	017.37	014.89
45	022.33	022.33	019.85	019.85	019.37	019.85	019.85	019.85
46	037.22	047.14	037.22	029.77	029.70	032.26	032.26	037.70
47	037.22	039.70	039.70	042.10	032.20	042.18	037.22	042.18

APPENDIX I (continued)

Character Number	Location Number and Observations							
	9	9	9	9	9	9	9	9
1	027.29	017.37	024.81	022.33	024.81	024.81	022.33	024.81
2	066.99	066.99	069.47	064.51	069.47	066.99	064.51	069.47
3	061.03	059.58	057.07	062.03	062.03	054.59	062.03	057.07
4	057.07	027.29	042.18	039.70	039.70	057.07	037.22	039.70
5	171.20	151.40	153.80	156.30	166.30	161.30	156.30	168.70
6	091.80	086.80	084.40	089.30	109.20	086.80	086.80	086.80
7	029.77	027.29	024.81	027.29	027.29	027.29	027.29	024.81
8	024.81	027.29	022.33	024.81	022.33	024.81	024.81	027.29
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	235.70	208.40	203.50	203.50	232.20	215.90	213.40	225.80
11	017.37	019.85	014.89	019.85	014.89	014.89	019.85	019.85
12	029.77	022.33	024.81	029.77	032.26	027.29	024.81	027.29
13	034.74	032.26	037.20	034.74	037.22	034.74	034.74	034.74
14	014.89	014.89	014.89	014.89	017.37	014.89	017.37	017.37
15	022.33	017.37	022.33	019.85	019.85	022.33	022.33	019.85
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	099.25	094.29	101.73	096.77	089.32	094.29	094.29	091.80
18	001.00	001.00	001.00	001.00	001.00	000.00	000.00	001.00
19	024.81	022.33	022.33	022.33	024.81	024.81	022.33	022.33
20	328.90	310.28	322.69	322.69	316.49	310.28	210.28	316.49
21	097.14	079.92	084.36	091.80	086.84	106.69	086.84	079.40
22	066.99	064.51	069.47	069.47	069.47	066.99	071.96	069.47
23	022.33	022.33	019.85	022.33	019.85	017.37	019.85	022.33
24	047.14	047.14	047.14	057.07	047.14	037.22	049.62	044.66
25	019.85	019.85	014.89	022.33	019.85	019.85	019.85	019.85
26	029.77	019.85	027.29	024.81	029.77	029.77	027.29	027.29
27	024.81	022.33	027.29	024.81	029.77	024.81	024.81	024.81
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	042.18	044.62	042.18	039.70	047.14	054.59	039.70	049.62
30	019.85	022.33	022.33	024.81	024.81	022.33	024.81	024.81
31	009.93	009.93	009.93	009.93	012.41	009.93	007.44	009.93
32	136.47	105.86	116.61	089.32	084.36	121.58	101.73	086.84
33	074.44	074.44	069.44	076.96	071.90	079.40	074.44	081.89
34	081.88	074.44	081.88	079.40	062.03	069.47	079.40	076.92
35	111.65	106.69	138.95	111.65	114.62	111.65	116.62	114.14
36	039.70	044.66	037.22	034.74	047.14	039.70	027.29	039.70
37	014.89	024.81	009.93	022.33	021.23	027.29	024.81	024.81
38	003.81	003.04	003.81	003.81	003.04	003.81	003.81	003.81
39	014.89	014.89	014.89	014.89	012.41	017.37	014.89	017.37
40	009.93	012.41	012.41	012.41	009.93	012.41	009.93	009.93
41	069.47	066.99	071.96	076.92	057.07	064.51	066.99	064.51
42	012.41	012.41	014.89	014.89	014.89	014.89	012.41	014.89
43	017.37	014.89	019.85	017.37	017.37	017.37	017.37	017.37
44	017.37	017.37	017.37	014.89	017.37	019.85	017.37	017.37
45	022.33	017.37	019.85	022.33	022.33	019.85	017.37	022.33
46	039.70	034.74	032.26	037.22	042.18	039.70	032.26	042.18
47	037.22	034.74	027.29	034.74	034.74	037.22	039.70	039.70

APPENDIX I (continued)

Character	Location Number and Observations							
Number	9	9	10	10	10	10	10	10
1	024.81	019.85	019.85	022.33	024.81	024.81	027.29	024.81
2	069.47	069.47	066.99	071.95	071.95	066.99	069.48	069.47
3	059.55	057.07	057.07	062.03	064.51	057.07	057.07	064.51
4	042.18	047.14	037.22	049.62	042.18	039.70	044.66	052.11
5	168.70	173.70	176.20	178.60	178.60	168.70	178.60	171.20
6	089.30	089.30	091.80	099.20	101.70	091.80	096.80	099.20
7	029.77	027.29	027.29	027.29	027.29	024.81	027.29	029.77
8	022.33	024.81	027.29	029.77	032.26	024.81	024.81	027.29
9	001.00	001.00	000.00	001.00	001.00	001.00	001.00	001.00
10	213.40	223.30	235.70	235.70	230.80	223.30	238.20	245.60
11	017.37	019.85	014.89	014.89	027.29	019.85	017.37	017.37
12	027.29	027.29	022.33	029.77	017.37	027.29	027.29	027.29
13	037.22	037.22	034.74	037.22	034.74	037.22	037.22	034.74
14	014.89	014.89	017.37	017.37	017.37	017.37	014.89	019.85
15	022.33	019.85	022.33	022.33	022.33	022.33	022.33	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	094.29	104.21	101.73	106.69	104.21	101.73	096.77	116.62
18	001.00	001.00	000.00	001.00	001.00	001.00	001.00	001.00
19	024.81	022.33	027.29	022.33	022.33	027.29	027.29	027.29
20	316.49	328.90	341.31	341.31	341.31	341.31	335.10	328.90
21	097.14	161.28	094.29	089.32	086.84	089.32	079.40	081.88
22	069.47	096.77	071.96	076.92	071.96	069.47	071.96	076.92
23	022.33	019.85	017.37	019.85	022.33	024.81	022.33	024.81
24	054.59	047.14	059.55	042.18	062.03	049.62	044.66	059.55
25	019.85	024.81	014.89	017.37	014.89	019.85	019.85	019.85
26	027.29	027.29	032.26	027.29	029.77	027.29	029.77	029.77
27	024.81	024.81	027.29	027.29	024.81	022.33	027.29	029.77
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	049.62	052.11	052.11	049.62	052.59	049.62	052.11	052.11
30	029.77	027.29	027.29	029.77	027.29	027.29	032.26	027.29
31	012.41	012.41	009.93	009.93	012.41	012.41	012.41	012.41
32	091.80	124.06	086.84	076.92	091.80	096.77	090.74	090.74
33	081.88	084.36	074.44	079.40	069.47	069.47	074.44	066.99
34	071.96	076.92	086.84	079.40	086.84	079.40	076.92	081.88
35	114.14	116.62	116.61	126.54	126.54	121.58	121.58	119.10
36	042.18	039.70	039.70	044.66	042.18	039.70	037.22	039.70
37	017.37	024.81	029.77	027.02	024.81	014.89	029.77	029.77
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	014.89	012.41	012.41	014.89	014.89	017.31	014.89
40	009.93	012.41	009.93	014.89	007.44	009.93	009.93	009.93
41	066.99	069.47	086.84	071.96	079.40	081.88	071.96	081.88
42	012.41	014.89	014.89	014.89	014.89	012.41	014.89	014.89
43	017.37	017.37	017.37	017.37	019.85	017.37	019.85	019.85
44	017.37	017.37	014.89	014.89	019.85	017.37	017.37	017.37
45	019.85	019.85	029.77	019.85	019.85	022.33	019.85	022.33
46	037.22	039.70	042.18	047.14	044.66	044.66	042.18	042.18
47	034.74	034.74	037.22	039.70	034.74	042.18	039.70	037.72

APPENDIX I (continued)

Character	Location Number and Observations							
Number	10	10	10	10	11	11	11	11
1	024.81	029.77	024.81	027.29	042.18	042.18	042.18	042.18
2	074.44	059.55	071.85	069.47	094.29	099.25	099.25	101.73
3	064.51	062.03	062.03	062.03	081.87	086.84	084.36	081.88
4	049.62	044.66	049.63	044.66	076.92	081.88	074.44	074.44
5	183.60	171.20	178.60	168.70	223.30	243.20	235.70	233.20
6	091.80	091.80	094.30	091.80	111.60	116.60	119.10	124.06
7	029.77	032.36	027.29	027.29	032.26	034.71	032.26	032.26
8	027.29	027.29	029.77	024.81	027.29	029.77	024.81	027.29
9	001.00	001.00	001.00	001.00	001.00	000.00	000.00	000.00
10	228.30	230.80	243.60	223.30	353.70	335.11	304.11	353.70
11	014.89	014.89	017.37	014.89	022.33	017.37	017.37	017.37
12	027.29	029.77	032.26	029.77	037.22	037.22	032.26	032.26
13	037.22	039.70	039.70	037.22	042.18	052.10	054.58	052.11
14	019.85	017.37	014.89	017.37	019.85	017.37	019.85	022.33
15	024.81	019.85	022.33	022.33	017.37	024.81	024.81	019.85
16	012.41	012.41	012.41	012.41	014.89	014.89	014.89	014.89
17	096.77	099.25	101.73	099.25	126.54	124.06	119.10	129.02
18	001.00	001.00	001.00	001.00	000.00	001.00	001.00	001.00
19	024.81	029.77	027.29	027.29	014.89	029.77	024.81	029.77
20	341.31	328.90	347.51	273.05	434.39	415.78	415.78	453.01
21	079.40	086.84	079.40	084.36	124.00	101.73	081.88	106.69
22	071.96	071.96	069.47	069.47	086.84	089.32	091.88	091.80
23	022.33	024.81	024.81	022.33	029.77	029.77	029.77	034.74
24	059.55	054.59	054.59	059.55	071.96	074.44	079.40	079.44
25	017.37	017.37	017.37	017.37	017.37	017.37	019.85	017.37
26	027.29	027.29	027.29	029.77	032.26	037.22	034.74	037.22
27	024.81	027.29	024.81	024.81	029.77	027.29	029.77	032.26
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	054.59	054.59	054.59	054.59	057.07	062.03	054.59	062.03
30	029.77	027.29	029.77	032.26	024.81	022.33	022.33	019.85
31	009.93	014.89	009.93	012.41	017.37	017.37	019.85	017.37
32	101.73	106.69	091.80	074.44	069.47	052.11	081.88	065.06
33	081.88	066.99	081.88	079.40	079.40	089.32	089.32	096.77
34	084.36	076.92	089.33	079.40	099.25	089.32	091.80	096.77
35	121.58	116.62	126.54	119.10	156.32	156.32	156.34	158.80
36	042.18	039.70	039.70	042.18	054.59	044.66	054.59	054.59
37	029.77	032.26	032.26	022.33	024.81	039.70	024.81	024.81
38	003.81	003.81	003.81	003.81	004.57	004.57	004.57	004.57
39	017.37	012.41	014.89	014.89	017.37	017.37	017.37	017.37
40	007.44	009.93	012.41	009.93	012.41	014.89	012.41	012.41
41	084.36	074.44	086.84	089.32	136.47	111.65	129.02	141.43
42	014.89	014.89	012.41	012.41	014.89	017.37	014.89	017.37
43	019.85	017.37	019.85	019.85	019.85	022.33	022.33	022.33
44	019.85	017.37	017.37	019.85	019.85	019.85	022.33	024.81
45	022.33	019.85	019.85	022.33	024.81	024.81	027.29	027.29
46	039.70	044.66	042.18	044.66	039.70	042.18	042.18	039.70
47	042.18	042.18	039.70	044.66	034.74	029.77	032.26	034.74

APPENDIX I (continued)

Character Number	Location Number and Observations							
	11	11	11	11	11	11	12	12
1	029.78	042.18	044.66	024.81	034.74	047.14	022.33	019.85
2	101.73	096.77	099.25	094.29	081.88	096.77	062.03	066.99
3	091.80	086.84	086.84	086.84	086.84	081.88	057.07	059.55
4	084.36	096.77	079.40	074.44	076.92	086.84	044.66	054.59
5	230.80	235.70	240.70	215.90	235.70	228.70	143.90	161.30
6	126.50	116.60	126.50	124.10	120.71	121.60	081.90	089.30
7	032.26	034.73	034.73	037.22	032.26	037.22	024.81	024.81
8	027.29	029.85	029.77	029.77	024.81	029.80	017.37	017.37
9	000.00	000.00	000.00	000.00	000.00	000.00	000.00	001.00
10	328.90	353.70	304.11	316.50	328.90	341.30	151.40	191.10
11	017.37	019.85	014.89	024.81	019.85	019.85	012.40	017.37
12	039.70	042.18	042.18	032.26	034.74	034.74	022.33	027.29
13	052.11	049.62	042.18	047.14	049.35	052.11	029.77	034.74
14	017.37	019.85	019.85	017.37	017.37	017.37	017.37	017.37
15	027.29	024.81	022.33	024.81	024.81	024.81	024.81	024.81
16	014.89	014.89	014.89	017.37	014.89	014.89	012.69	012.41
17	119.10	124.06	121.58	111.65	121.58	111.65	084.36	091.80
18	001.00	000.00	000.00	000.00	001.00	000.00	000.00	000.00
19	024.81	029.77	032.25	024.81	026.19	047.14	017.37	024.81
20	415.78	428.19	421.98	409.57	415.78	421.98	273.05	310.28
21	091.80	104.21	066.99	114.14	104.21	096.77	069.47	071.96
22	091.80	086.84	086.84	084.36	084.36	081.88	047.66	066.99
23	032.26	029.77	029.77	037.22	029.77	032.26	017.37	019.85
24	062.03	059.55	069.47	076.92	071.96	069.47	044.66	052.11
25	014.89	014.89	017.37	022.33	022.33	017.37	017.37	014.86
26	037.22	034.74	034.74	034.74	032.25	034.74	027.77	027.29
27	029.77	027.29	034.74	022.33	024.81	024.81	017.3	024.81
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	062.03	059.55	059.55	047.14	059.55	054.59	032.26	042.18
30	027.29	029.77	027.29	022.33	022.33	029.77	017.37	017.37
31	012.41	014.89	012.41	009.93	014.89	009.93	009.93	012.41
32	052.11	064.51	066.99	091.80	071.96	101.73	084.36	074.44
33	091.80	069.48	081.88	066.99	087.67	081.88	062.03	062.03
34	081.88	086.84	089.32	079.40	084.36	084.36	071.96	071.96
35	148.87	146.39	143.91	116.62	153.83	121.58	099.25	114.14
36	034.74	047.14	057.07	029.77	044.66	042.18	034.74	029.77
37	034.74	022.33	024.81	029.77	019.85	029.77	024.81	017.38
38	003.04	004.56	003.81	003.81	004.57	003.81	003.04	003.81
39	014.89	014.89	014.89	014.89	014.89	014.89	009.93	017.37
40	012.41	012.41	012.41	012.41	009.93	012.41	009.93	009.93
41	138.95	091.80	133.99	074.44	148.87	138.95	064.51	069.47
42	014.89	012.41	014.89	014.89	014.89	014.89	012.41	012.41
43	017.37	017.37	019.85	019.85	019.85	019.85	014.89	014.89
44	017.37	019.85	022.33	017.37	022.33	019.85	017.37	017.37
45	024.81	022.33	024.81	022.33	027.29	027.29	017.37	019.85
46	042.18	034.74	042.18	042.18	042.18	042.18	044.66	044.66
47	034.74	039.70	042.18	039.70	039.70	039.70	034.74	032.26

APPENDIX I (continued)

Character	Location Number and Observations							
Number	12	12	12	12	12	12	12	12
1	022.81	022.33	022.33	027.24	023.21	019.85	024.81	022.33
2	069.47	066.99	071.95	066.99	069.47	069.47	074.44	071.95
3	062.03	062.03	062.03	059.55	057.11	062.03	062.03	064.51
4	049.62	049.62	057.07	049.62	059.55	049.62	052.11	059.55
5	158.80	151.40	163.80	158.80	166.20	156.30	156.30	171.20
6	086.80	091.80	089.30	094.30	091.80	089.30	089.30	099.20
7	027.29	027.29	027.29	024.81	027.29	027.81	029.77	029.77
8	019.85	019.85	019.85	019.77	017.37	017.37	022.33	022.33
9	000.00	000.00	001.00	000.00	001.00	000.00	001.00	001.00
10	223.30	200.90	156.30	210.90	176.20	200.90	163.80	208.40
11	017.37	014.89	014.89	012.41	014.89	014.88	014.89	012.40
12	027.29	029.77	017.37	029.77	029.77	027.29	032.26	027.29
13	034.71	032.26	034.74	034.74	027.29	034.74	037.22	034.74
14	017.37	014.89	017.37	017.37	014.89	017.37	017.37	017.37
15	022.33	022.33	022.33	019.85	019.85	019.85	022.33	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	094.29	096.77	089.32	079.40	091.80	096.77	094.29	096.77
18	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
19	012.41	027.29	022.33	022.33	017.37	019.85	019.85	019.85
20	328.90	316.49	316.49	291.66	297.87	310.28	310.28	316.49
21	081.88	081.88	079.40	076.92	081.88	081.88	076.92	076.92
22	069.47	069.47	066.99	064.51	064.51	066.99	069.47	062.03
23	022.33	022.33	022.33	017.37	019.85	019.85	019.85	022.33
24	054.59	057.07	054.59	047.14	057.07	052.11	042.18	052.11
25	022.33	017.37	017.37	014.89	009.93	012.41	017.37	019.85
26	034.74	029.77	027.29	029.77	029.77	029.77	027.29	024.81
27	022.33	022.33	024.81	027.29	019.85	022.33	024.81	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	029.77	042.18	042.18	094.66	042.18	032.26	042.18	034.74
30	019.85	024.81	019.85	019.85	019.89	022.33	019.85	024.81
31	009.93	009.93	009.93	007.44	009.93	009.93	009.93	009.93
32	086.84	079.40	079.40	076.92	049.62	081.88	076.92	099.25
33	066.99	059.55	071.96	062.03	064.51	081.88	076.92	066.99
34	069.47	074.44	076.92	074.44	074.44	069.37	076.92	076.92
35	111.65	116.62	121.58	114.14	084.36	111.65	114.14	114.14
36	032.26	029.77	027.29	029.77	032.26	029.77	032.26	042.18
37	019.85	027.29	027.29	019.85	017.37	022.33	022.33	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	017.37	014.89	012.41	012.41	014.89	012.41	009.93	012.41
40	007.44	009.93	012.41	009.93	012.41	009.93	012.41	009.93
41	071.96	074.44	074.44	066.99	069.47	064.51	064.51	064.51
42	014.89	014.89	014.89	012.41	012.41	014.89	012.41	014.89
43	019.85	017.37	019.85	017.37	017.37	014.89	012.41	017.37
44	017.37	014.89	017.37	017.37	017.37	017.37	017.37	017.37
45	019.85	022.33	019.85	019.85	019.85	019.85	019.85	019.85
46	049.62	039.70	037.22	049.62	032.06	044.66	042.18	049.62
47	032.26	032.26	039.70	034.74	034.72	034.74	037.22	034.74

APPENDIX I (continued)

Character Number	Location Number and Observations							
	13	13	13	13	13	13	13	13
1	024.81	022.33	022.33	022.33	024.81	019.85	022.33	022.33
2	062.03	062.03	059.55	064.51	002.03	074.44	064.55	062.03
3	052.11	054.59	057.07	057.07	054.59	054.59	054.59	054.62
4	039.70	076.92	027.29	039.70	044.66	034.74	044.66	049.18
5	143.90	131.50	146.40	143.40	141.40	138.90	146.40	138.90
6	081.90	076.90	084.40	081.90	086.80	079.40	084.40	081.80
7	024.81	022.33	029.77	024.81	022.33	024.81	024.81	024.81
8	019.85	014.89	027.29	024.81	019.85	022.33	024.81	022.33
9	001.00	001.00	001.00	001.00	000.00	001.00	001.00	001.00
10	193.50	186.10	158.80	208.40	186.10	193.50	196.00	186.10
11	012.40	012.40	014.89	017.37	017.37	012.40	017.37	012.40
12	024.81	022.33	027.29	024.81	024.81	019.85	027.29	024.81
13	034.74	034.74	037.22	032.26	034.74	034.74	032.26	024.81
14	014.89	017.37	014.89	014.89	017.37	017.37	017.37	017.37
15	019.85	019.85	022.33	019.85	019.85	019.85	022.33	022.33
16	012.41	012.41	009.93	012.41	012.41	012.41	012.41	012.41
17	096.77	099.25	101.73	081.88	096.77	091.80	084.36	094.29
18	001.00	001.00	000.00	000.00	000.00	001.00	000.00	000.00
19	022.33	019.85	022.33	027.29	024.81	022.33	022.33	022.33
20	291.66	291.66	310.28	285.46	291.66	291.66	000.00	304.07
21	049.62	069.47	084.36	081.88	064.51	074.44	089.32	071.96
22	069.73	066.99	064.51	066.99	071.96	066.99	069.47	069.47
23	019.85	017.37	017.37	019.85	022.33	022.33	022.33	019.85
24	049.62	054.59	052.11	049.62	054.59	049.62	044.66	049.62
25	017.37	014.89	017.37	014.89	017.37	014.89	017.37	017.37
26	024.81	022.33	029.77	029.77	022.33	024.81	027.29	024.81
27	019.85	019.85	024.81	024.81	022.33	017.37	027.29	022.33
28	000.00	000.00	001.00	000.00	000.00	000.00	000.00	000.00
29	042.18	037.22	039.70	042.18	042.18	039.70	049.62	037.22
30	017.37	019.85	022.33	019.85	019.85	022.33	022.33	019.85
31	009.93	009.93	012.41	009.93	012.41	009.93	009.93	009.93
32	066.99	069.47	084.36	096.77	076.92	066.99	086.84	071.96
33	066.99	074.44	081.88	074.44	074.44	066.99	079.40	079.40
34	079.40	074.44	076.92	069.47	074.44	076.92	069.47	076.92
35	114.14	106.69	121.58	119.10	116.61	121.58	119.10	119.10
36	032.26	039.70	039.70	044.66	054.59	042.18	039.70	037.22
37	022.33	022.33	012.41	022.33	019.85	009.93	029.77	017.37
38	003.81	003.01	003.81	003.81	003.81	003.81	003.81	003.81
39	012.41	012.41	012.41	014.89	012.41	014.89	012.41	012.41
40	012.41	009.93	012.41	007.44	009.93	009.93	007.74	009.93
41	081.88	069.47	069.47	066.99	012.41	071.96	069.47	079.40
42	012.41	012.41	014.89	012.41	014.89	014.89	012.41	014.89
43	019.85	017.37	017.37	017.37	017.37	017.37	014.89	017.37
44	019.85	017.37	017.37	017.37	017.37	017.37	019.85	017.37
45	019.85	019.85	022.33	019.85	017.37	022.33	022.33	019.85
46	037.22	029.77	032.26	034.74	039.70	034.74	037.22	032.26
47	029.77	029.77	034.74	032.26	034.75	029.77	037.22	034.74

APPENDIX I (continued)

Character	Location Number and Observations							
Number	13	13	14	14	14	14	14	14
1	019.85	022.33	024.01	024.81	024.81	022.33	024.81	027.29
2	064.51	059.55	059.55	064.51	064.51	066.99	064.51	062.03
3	057.07	057.07	057.07	059.55	059.55	059.55	054.59	054.59
4	044.66	037.22	029.78	034.74	039.70	029.77	034.74	032.26
5	146.40	143.90	148.90	151.40	151.40	151.40	151.40	148.90
6	081.90	086.80	086.80	084.90	091.80	086.80	081.90	084.40
7	022.33	024.81	024.81	024.81	029.81	024.81	022.33	024.81
8	022.33	022.33	022.33	017.37	022.33	022.33	019.85	019.85
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	205.90	188.60	191.10	171.20	200.90	208.40	186.10	176.20
11	014.89	012.40	019.85	019.85	019.85	019.85	019.85	017.37
12	024.81	019.85	024.81	027.29	024.81	024.81	022.33	024.81
13	034.74	034.74	037.22	037.22	034.24	039.70	037.22	039.70
14	017.37	017.37	014.89	017.37	014.89	019.85	017.37	017.37
15	019.85	019.85	017.37	022.33	022.33	022.33	019.85	019.85
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	091.80	091.80	099.25	099.25	104.21	109.17	099.25	101.73
18	000.00	000.00	000.00	000.00	001.00	001.00	000.00	000.00
19	024.81	022.33	022.33	024.81	019.85	024.81	024.81	024.81
20	291.66	285.46	297.66	297.87	310.28	310.28	291.66	291.66
21	079.40	076.92	074.44	079.40	086.84	076.92	076.92	069.47
22	062.03	071.96	074.44	074.44	076.92	076.92	071.96	074.44
23	024.81	017.37	019.85	019.85	019.85	019.85	022.33	019.85
24	049.62	044.66	047.14	062.03	049.62	049.62	042.18	044.66
25	017.37	014.89	019.85	019.85	019.85	019.85	019.85	017.37
26	027.29	022.33	024.81	027.29	027.29	024.81	024.81	024.81
27	019.85	017.85	024.81	024.81	024.81	022.33	024.81	024.81
28	000.00	000.00	001.00	001.00	001.00	001.00	001.00	001.00
29	047.14	044.66	042.18	047.14	042.18	049.62	047.14	043.01
30	019.85	019.85	024.81	022.33	024.81	027.29	022.33	024.81
31	012.41	009.93	009.93	009.93	009.93	012.41	009.93	012.41
32	081.88	074.44	086.84	079.40	086.84	066.99	081.88	076.92
33	071.96	064.51	081.88	081.88	086.84	076.92	071.95	089.32
34	079.40	074.44	079.40	079.40	086.84	081.88	079.40	084.36
35	119.10	116.62	119.10	119.10	119.10	116.62	119.10	119.10
36	027.29	037.22	034.74	037.22	039.70	042.18	039.70	037.22
37	027.29	027.29	022.33	024.81	019.85	017.37	019.85	022.33
38	003.81	003.81	003.81	004.57	003.81	003.81	003.81	003.81
39	014.89	012.41	009.93	017.37	014.89	012.41	017.37	014.89
40	009.93	009.93	009.93	012.41	012.41	009.93	009.93	012.41
41	069.47	076.92	966.99	074.44	066.99	071.96	074.44	071.96
42	014.89	014.89	014.89	014.89	014.89	014.89	014.89	014.89
43	017.37	014.89	017.37	017.37	019.85	017.37	017.37	017.37
44	017.37	019.85	017.37	017.37	017.37	019.85	014.89	017.37
45	019.85	019.85	019.85	022.33	022.33	022.33	019.85	019.85
46	039.70	032.26	039.70	037.22	037.22	032.26	037.22	039.70
47	029.77	039.70	032.26	024.77	034.74	034.74	024.81	029.77

APPENDIX I (continued)

Character	Location Number and Observations							
Number	14	14	14	14	15	15	15	15
1	022.33	022.33	024.81	022.33	024.81	014.89	027.29	029.77
2	064.51	066.99	066.99	066.99	066.99	069.47	064.51	069.47
3	057.07	059.55	057.07	057.07	057.07	071.95	059.55	062.03
4	034.74	032.26	037.22	039.70	044.66	049.62	049.64	057.01
5	148.90	148.90	156.30	161.30	176.20	176.20	168.70	188.60
6	084.40	084.40	086.80	086.80	089.30	089.30	091.80	099.20
7	022.33	024.81	024.81	027.29	027.29	029.77	024.81	024.81
8	019.77	022.33	019.85	019.85	022.33	027.29	022.33	019.85
9	001.00	001.00	001.00	000.00	001.00	001.00	001.00	000.00
10	200.90	205.90	208.40	181.10	220.08	208.40	230.80	238.20
11	017.37	019.85	019.85	017.37	016.75	016.75	014.89	017.37
12	024.81	024.81	024.81	024.81	022.95	022.95	017.37	024.81
13	037.22	039.70	034.22	037.22	034.74	037.22	039.70	017.37
14	017.37	019.85	017.37	014.89	015.72	015.72	014.89	017.37
15	019.85	019.85	022.33	022.33	022.33	019.85	022.33	019.85
16	012.41	012.41	012.41	012.41	012.41	012.41	009.93	012.41
17	104.20	096.77	109.17	101.73	099.25	094.29	101.73	101.73
18	000.00	001.00	000.00	000.00	000.00	001.00	001.00	000.00
19	022.33	022.33	022.33	022.33	024.81	014.89	024.81	029.77
20	297.87	304.07	304.07	304.07	335.10	335.10	322.69	341.31
21	079.40	076.92	081.88	076.92	076.92	074.44	096.77	071.96
22	066.99	076.92	074.44	076.92	076.92	074.44	079.40	076.92
23	022.33	019.85	019.85	022.33	022.33	022.33	024.81	024.81
24	054.59	057.07	054.59	062.03	052.11	052.11	047.14	059.55
25	022.33	019.85	017.37	019.85	019.85	017.37	017.37	017.37
26	024.81	024.81	027.29	024.81	024.81	029.77	024.81	026.67
27	022.33	022.33	022.33	024.81	022.33	022.33	024.81	017.37
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	044.66	029.77	039.70	044.66	049.62	052.11	057.07	052.59
30	024.81	024.81	022.33	027.29	022.33	024.81	024.81	022.33
31	009.93	012.41	014.89	009.93	009.93	009.93	012.41	012.41
32	076.92	089.32	084.36	084.36	084.36	086.84	099.25	057.07
33	084.36	079.40	071.96	079.40	079.40	066.99	076.92	081.88
34	079.40	076.92	081.88	084.36	079.40	079.40	071.90	076.92
35	121.58	111.65	124.06	121.58	121.58	171.20	121.58	124.06
36	044.66	042.18	039.70	042.18	037.22	044.66	042.18	032.26
37	027.29	024.81	027.29	024.81	024.81	022.33	014.89	034.75
38	003.81	003.81	003.81	003.81	003.04	003.81	003.81	003.81
39	014.89	014.89	012.41	012.41	014.89	017.37	014.89	012.41
40	012.41	009.93	012.41	012.41	012.41	009.93	007.44	009.93
41	069.47	071.96	069.47	066.99	089.32	081.88	079.40	084.36
42	014.89	012.41	014.89	014.89	014.89	014.89	012.41	014.89
43	017.37	014.89	017.37	017.37	017.37	017.37	017.37	017.37
44	017.37	017.37	017.37	019.85	017.37	017.37	019.85	019.85
45	019.85	022.33	019.85	022.33	019.85	019.85	022.33	022.33
46	029.77	039.70	029.77	032.26	042.18	037.22	034.74	037.22
47	029.77	029.77	024.81	029.77	029.77	039.70	032.26	044.66

APPENDIX I (continued)

Character Number	Location Number and Observations							
	15	15	15	15	16	16	16	16
1	024.81	022.33	019.85	022.33	027.29	029.77	024.81	022.33
2	064.51	064.15	062.03	066.99	066.99	062.03	062.03	066.99
3	054.59	059.55	054.59	057.07	054.59	059.55	054.59	057.07
4	039.70	044.66	042.18	042.18	042.18	062.03	044.66	044.66
5	168.70	181.10	161.30	168.70	163.80	176.20	173.70	186.10
6	089.30	094.30	081.90	081.90	086.80	091.80	094.30	089.30
7	029.77	027.29	029.77	027.29	027.29	029.77	024.81	027.29
8	022.33	027.29	024.81	024.81	027.29	029.77	024.81	022.33
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	193.50	193.50	213.40	215.90	188.60	191.10	240.70	230.70
11	014.89	017.37	017.37	019.85	017.37	019.85	019.85	019.54
12	027.29	029.81	027.29	029.77	022.33	024.81	027.29	024.81
13	034.74	034.74	034.74	034.74	032.25	034.74	037.22	039.70
14	015.72	014.89	014.89	015.72	017.37	014.89	014.89	017.37
15	019.85	024.81	022.33	019.85	022.33	022.33	022.33	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	009.93	012.41
17	091.80	094.29	096.77	096.77	091.80	094.29	101.73	099.25
18	001.00	001.00	000.00	001.00	001.00	001.00	000.00	000.00
19	024.81	026.67	019.85	022.33	029.77	024.81	022.33	022.33
20	322.69	341.31	316.49	328.90	316.49	322.69	328.90	335.10
21	071.96	084.36	076.92	074.44	081.88	074.44	071.96	071.96
22	066.99	079.40	079.40	074.44	071.96	071.96	071.96	071.96
23	022.33	024.81	019.85	019.85	024.81	022.33	022.33	022.33
24	044.66	047.14	044.66	049.62	047.14	054.59	052.11	044.66
25	022.33	019.85	017.37	019.85	022.33	017.37	019.85	019.85
26	027.29	024.81	029.77	029.77	029.77	029.77	024.81	027.29
27	024.81	022.33	022.33	022.33	022.33	019.85	024.81	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	049.62	047.14	047.14	044.66	054.59	047.14	047.14	047.14
30	022.33	022.33	024.81	019.85	024.81	022.33	027.29	032.26
31	009.93	009.93	009.93	009.93	009.93	009.93	012.41	012.41
32	086.84	091.80	081.88	091.80	079.40	096.77	084.36	089.32
33	074.44	066.99	071.96	069.47	071.96	079.40	086.84	052.11
34	076.92	079.40	079.40	071.96	084.36	081.80	079.40	084.36
35	119.10	116.62	114.14	119.10	124.06	119.10	171.20	126.54
36	034.74	029.77	042.18	034.74	034.74	032.26	042.18	042.18
37	029.77	029.77	019.85	024.81	027.29	029.77	029.77	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	014.89	014.89	014.89	014.89	017.37	017.37	017.37
40	009.93	012.41	009.93	014.89	009.93	009.93	009.93	009.93
41	074.44	074.44	076.92	081.88	084.36	084.44	069.47	071.96
42	012.41	014.89	012.41	014.89	012.41	014.89	014.89	014.89
43	017.37	019.85	017.37	017.37	017.37	017.37	017.37	017.37
44	017.37	017.37	017.37	017.37	014.89	017.37	017.37	019.85
45	017.37	022.33	019.85	019.85	019.85	019.85	022.33	022.33
46	039.70	042.18	039.70	039.70	039.70	037.22	032.26	039.70
47	034.74	039.70	039.70	034.74	032.26	034.74	032.26	034.74

APPENDIX I (continued)

Character Number	Location Number and Observations 16	16	16	16	16	16	16	16
1	022.33	024.81	024.81	024.81	024.81	022.33	022.33	024.81
2	064.51	064.57	057.07	066.99	066.99	064.51	059.55	066.99
3	054.58	057.07	054.59	057.07	057.07	057.07	054.59	062.03
4	042.18	044.66	037.22	039.70	039.70	032.26	042.18	032.26
5	173.70	193.50	161.30	176.20	178.60	191.10	168.72	196.00
6	086.80	094.30	084.30	091.80	086.80	099.80	076.90	096.80
7	027.29	027.29	024.81	027.29	024.81	027.29	024.81	024.81
8	024.81	024.81	022.33	027.29	024.81	024.81	019.85	019.85
9	001.00	000.00	001.00	000.00	000.00	001.00	001.00	001.00
10	213.40	208.40	191.10	233.20	215.90	220.80	176.20	238.20
11	024.81	017.37	019.54	019.85	017.37	019.85	019.85	017.37
12	022.33	027.29	024.81	024.81	024.81	022.33	022.33	027.29
13	037.22	034.74	032.26	037.22	037.22	039.70	042.18	039.70
14	014.89	015.95	016.74	017.37	017.37	017.37	017.37	017.37
15	022.33	022.33	022.33	022.33	022.33	022.85	019.85	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	009.93	012.41
17	086.80	086.80	079.40	096.77	089.32	091.80	091.80	099.25
18	000.00	000.00	000.00	000.00	001.00	001.00	001.00	000.00
19	022.33	024.81	022.33	024.81	024.81	024.81	024.81	022.33
20	291.66	297.87	279.25	322.69	297.90	341.31	297.87	328.90
21	074.44	069.47	057.07	084.36	066.99	076.40	074.44	076.92
22	066.99	071.96	069.47	071.96	066.99	069.47	071.96	069.47
23	019.85	019.85	019.85	019.85	019.85	022.33	019.85	019.85
24	044.66	042.18	042.18	042.18	042.18	047.14	042.18	049.62
25	014.89	019.85	022.33	019.85	019.85	022.33	022.33	022.33
26	022.33	027.29	022.33	024.81	024.81	024.81	029.77	022.33
27	022.33	022.33	022.33	024.81	022.33	024.81	022.33	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	239.70	049.62	039.70	044.66	044.66	049.62	049.62	047.14
30	022.33	024.81	019.85	024.81	024.81	027.29	029.77	032.26
31	009.93	009.93	009.93	009.93	012.41	009.93	009.93	009.93
32	081.88	086.84	081.88	124.06	091.80	081.88	106.69	106.69
33	081.88	074.44	071.96	086.84	071.96	089.30	086.84	089.32
34	064.51	071.96	069.47	076.92	076.92	079.40	079.40	081.88
35	109.17	116.62	101.73	121.58	116.62	121.58	116.62	119.10
36	032.26	029.77	037.22	037.22	032.26	039.70	037.22	034.74
37	029.77	034.74	024.81	024.81	027.29	044.66	027.29	029.77
38	003.04	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	017.37	014.89	014.89	017.37	017.37	014.89	019.85	017.37
40	009.93	009.93	012.41	014.89	009.93	009.93	012.41	009.93
41	059.55	069.47	054.59	069.47	069.47	076.92	054.59	071.96
42	014.89	014.89	014.89	014.89	014.89	014.89	014.89	014.89
43	017.37	017.37	017.37	019.85	017.37	019.85	017.37	014.89
44	017.37	017.37	017.37	017.37	014.89	017.37	017.37	017.37
45	019.85	022.33	019.85	022.33	019.85	019.85	017.37	019.85
46	039.70	037.22	034.74	037.22	029.77	037.22	037.22	032.26
47	029.77	037.22	037.22	037.22	032.26	037.22	037.22	032.26

APPENDIX I (continued)

Character	Location Number and Observations							
Number	L7	L7	L7	L7	L7	L7	L7	L7
1	024.81	022.33	024.81	014.89	024.81	024.81	019.85	024.81
2	062.03	059.55	057.07	064.51	059.55	059.55	059.55	062.03
3	059.55	057.07	054.59	062.03	054.59	057.59	054.59	052.11
4	032.26	027.29	044.66	037.22	034.74	034.74	037.22	037.22
5	151.40	146.40	146.40	153.90	156.30	156.30	141.40	141.40
6	084.40	084.40	084.40	089.30	084.40	084.40	079.40	079.40
7	027.29	029.77	032.26	029.77	029.77	029.77	029.77	032.26
8	022.33	027.29	022.33	024.81	029.77	027.29	024.81	024.81
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	178.60	158.80	171.20	215.90	171.28	171.20	191.10	186.10
11	014.89	014.89	012.40	022.33	014.89	014.89	014.89	017.37
12	022.33	027.29	029.77	032.26	027.29	027.29	027.29	027.29
13	034.74	037.22	034.74	037.22	034.74	034.74	034.74	034.74
14	014.89	014.89	014.89	017.37	017.37	017.37	017.37	017.37
15	024.81	022.33	019.85	022.33	019.85	022.33	022.33	019.85
16	012.41	009.93	012.41	012.41	012.41	012.41	012.41	012.41
17	086.80	101.73	101.73	099.25	094.29	091.80	101.73	086.80
18	000.00	000.00	000.00	000.00	001.00	000.00	001.00	000.00
19	024.81	022.33	027.29	027.29	022.33	022.33	027.29	022.33
20	316.49	310.28	304.07	328.90	384.75	304.07	310.28	297.87
21	086.84	084.36	079.40	086.84	089.32	089.32	069.47	081.88
22	064.51	064.51	066.99	071.96	069.47	069.47	071.96	071.96
23	017.37	017.37	019.85	017.37	022.33	022.33	014.89	019.85
24	054.59	052.11	052.11	047.14	054.59	052.11	047.14	052.11
25	012.41	017.37	014.89	017.37	014.89	014.89	019.85	014.89
26	029.77	029.77	032.26	029.77	027.29	032.26	029.77	032.26
27	024.81	024.81	027.29	029.77	027.29	027.29	027.29	027.29
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	044.66	039.70	044.66	039.70	044.66	044.66	032.26	047.14
30	022.33	022.33	024.81	022.33	027.29	027.29	019.85	022.33
31	009.93	012.41	014.89	009.93	012.41	009.93	012.41	009.93
32	084.36	084.36	084.36	084.36	074.44	074.44	076.92	084.36
33	066.99	081.88	079.40	081.88	074.36	084.36	071.96	074.44
34	071.96	076.92	079.40	081.88	079.40	079.40	066.99	074.44
35	111.65	121.58	114.14	109.17	124.06	114.14	114.14	114.14
36	044.66	039.70	034.74	042.18	042.18	042.18	029.77	039.70
37	022.33	012.41	024.81	022.33	022.32	017.37	024.81	019.85
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	012.41	012.41	009.93	014.89	012.41	012.41	014.89	012.41
40	009.93	012.41	009.93	009.93	012.41	012.41	009.93	007.44
41	071.96	069.47	064.51	064.57	059.55	079.40	066.99	071.96
42	014.89	014.89	014.89	014.89	014.89	012.41	012.41	014.89
43	017.37	017.37	017.37	017.37	014.89	017.37	017.37	017.37
44	019.85	017.37	017.37	017.37	017.37	014.89	017.37	017.37
45	019.85	022.33	022.33	019.85	022.33	019.85	019.85	019.85
46	039.70	032.26	034.74	032.26	042.18	034.74	042.18	037.22
47	034.74	034.74	034.74	032.26	034.74	037.22	039.70	034.74

APPENDIX I (continued)

Character	Location Number and Observations							
Number	17	17	18	18	18	18	18	18
1	024.81	024.81	022.33	019.85	027.29	022.33	022.33	022.33
2	064.51	059.55	062.03	069.47	066.99	069.47	059.55	066.99
3	057.07	054.59	059.55	062.03	059.55	059.55	062.03	062.03
4	032.26	034.74	022.33	034.74	034.74	024.81	029.78	032.26
5	161.30	131.50	161.30	181.10	178.60	176.20	168.80	176.20
6	089.30	071.90	086.80	094.30	079.41	089.30	091.80	089.30
7	029.77	032.26	024.81	024.81	024.81	027.29	024.81	024.81
8	027.29	027.29	022.33	022.33	022.33	022.33	024.81	022.33
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	193.50	183.60	200.90	173.70	203.50	218.30	225.80	203.50
11	019.85	012.40	014.89	017.37	017.37	017.37	016.82	017.37
12	027.29	027.29	022.33	017.37	027.29	027.29	025.91	029.77
13	034.22	037.22	032.36	034.74	034.74	034.74	034.74	029.77
14	014.89	016.27	014.89	017.37	014.89	017.37	017.37	017.37
15	024.81	027.29	019.85	022.33	022.33	019.85	019.85	019.85
16	012.41	012.41	009.93	012.41	012.41	012.41	012.41	012.41
17	089.32	081.88	089.32	094.29	104.21	101.73	094.29	101.73
18	001.00	000.00	000.00	001.00	001.00	000.00	000.00	001.00
19	024.81	022.33	017.37	019.85	027.29	019.85	022.33	022.33
20	310.28	310.28	291.66	366.13	310.28	310.28	310.28	310.28
21	089.32	089.32	079.39	079.62	076.92	099.25	084.36	079.40
22	074.44	069.47	071.96	071.96	071.96	071.96	074.44	071.96
23	022.33	017.37	022.33	019.85	019.85	024.81	017.37	019.85
24	047.44	049.62	044.66	052.11	047.14	042.18	057.07	049.62
25	017.37	014.89	017.37	019.85	018.20	019.85	017.37	019.85
26	029.77	029.77	027.29	027.29	027.29	029.77	027.29	029.77
27	022.33	024.81	022.33	022.33	022.33	024.81	024.81	024.81
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	047.14	044.66	049.62	047.14	049.62	047.14	049.62	049.62
30	022.33	027.29	022.33	024.81	024.81	024.81	024.81	024.81
31	009.93	009.93	012.40	009.93	012.41	012.41	012.41	012.41
32	086.84	109.17	071.96	089.32	069.47	084.36	081.88	084.36
33	084.36	081.88	062.03	069.47	076.92	079.40	076.92	076.92
34	071.96	064.51	076.92	074.44	081.88	069.47	069.47	084.36
35	109.14	116.62	124.06	124.06	121.58	116.62	114.14	121.58
36	037.22	037.22	039.70	034.74	034.74	034.74	034.74	032.26
37	027.29	022.33	017.37	024.81	024.81	027.29	017.37	022.33
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	012.41	012.41	014.89	017.37	017.37	012.41	014.89
40	009.93	009.93	009.93	012.41	012.41	012.41	009.93	012.41
41	071.96	071.96	064.51	071.96	062.58	059.53	066.99	057.07
42	014.89	014.89	012.41	014.89	014.89	014.89	012.41	012.41
43	017.37	017.37	017.37	019.85	019.85	017.37	017.37	017.37
44	017.37	017.37	014.89	017.37	017.37	019.85	017.37	019.85
45	022.33	014.89	019.85	022.33	022.33	022.33	022.33	019.85
46	032.26	037.22	032.26	047.14	044.66	042.18	039.70	039.70
47	032.26	039.70	032.26	037.22	034.74	034.74	029.77	034.72

APPENDIX I (continued)

Character Number	Location Number and Observations							
	18	18	18	18	19	19	19	19
1	024.81	024.81	024.81	019.85	024.81	022.33	017.37	022.33
2	064.51	064.51	066.99	064.51	069.47	066.99	064.51	066.99
3	057.07	057.07	059.55	059.55	057.07	059.55	057.07	059.55
4	034.74	034.74	034.74	042.18	032.26	032.26	029.77	029.77
5	183.60	181.10	176.20	171.20	171.21	163.80	163.80	171.21
6	096.80	096.80	094.30	096.80	091.80	089.30	086.80	086.80
7	024.81	027.29	024.81	024.81	024.81	027.29	024.81	024.81
8	027.29	024.81	024.81	022.33	022.33	024.81	024.81	022.33
9	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
10	215.90	193.50	218.30	218.30	225.80	223.30	218.30	218.30
11	014.89	017.37	017.37	017.37	017.37	017.37	012.40	017.37
12	027.29	024.81	029.77	027.29	022.33	022.33	024.81	027.29
13	034.74	034.74	034.74	034.74	032.26	034.74	032.26	032.26
14	014.89	017.37	014.89	017.37	014.89	017.37	017.37	017.37
15	019.85	022.33	019.85	022.33	022.33	022.33	022.33	019.89
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	099.25	096.77	101.73	109.17	099.25	096.77	094.29	096.77
18	001.00	001.00	001.00	000.00	000.00	001.00	001.00	001.00
19	024.81	022.33	019.85	017.37	022.33	022.33	022.33	022.33
20	316.49	310.28	310.28	310.28	328.90	310.49	310.28	304.07
21	076.40	071.96	074.44	074.44	074.44	076.92	074.44	076.92
22	074.44	071.96	074.44	071.96	069.44	064.51	066.99	071.96
23	022.33	022.33	019.85	019.85	022.33	022.33	019.85	019.85
24	054.59	052.11	049.62	054.59	054.59	047.14	049.62	052.11
25	019.85	012.41	017.37	019.85	017.37	019.85	012.41	019.85
26	027.29	027.29	027.29	022.33	027.29	027.29	027.29	027.29
27	024.81	022.33	022.33	022.33	022.33	019.85	022.33	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	000.00
29	049.62	047.14	047.14	044.66	042.18	047.14	044.66	047.14
30	027.29	024.81	024.81	027.29	022.33	027.29	024.81	022.33
31	014.89	009.93	009.93	012.41	009.93	009.93	009.93	012.41
32	091.80	091.80	076.92	084.36	091.80	099.25	084.36	089.84
33	076.92	069.47	064.51	076.92	066.99	071.96	079.40	074.44
34	084.36	084.36	074.44	086.84	081.88	081.88	074.40	084.36
35	121.58	121.58	114.14	116.61	116.61	119.10	109.17	119.10
36	039.70	044.66	034.74	034.74	032.26	037.22	039.70	039.70
37	034.74	027.29	024.81	024.81	027.29	032.26	012.41	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.04	003.81
39	014.89	017.37	014.89	014.89	014.89	014.89	014.89	014.89
40	012.41	009.93	009.93	012.41	014.89	012.41	009.93	012.41
41	069.47	049.62	062.03	062.03	062.03	064.51	064.51	064.51
42	012.41	014.89	014.89	012.41	012.41	012.41	012.41	012.41
43	019.85	019.85	017.37	017.37	014.85	017.37	017.37	019.85
44	019.85	019.85	017.37	019.85	019.85	019.85	019.85	019.85
45	022.33	022.33	022.33	022.33	022.33	022.33	019.85	019.85
46	047.14	034.74	034.74	039.70	037.22	037.22	034.74	042.18
47	037.22	034.74	037.22	032.26	029.77	039.70	024.81	032.26

APPENDIX I (continued)

Character	Location Number and Observations							
Number	19	19	19	19	19	19	20	20
1	022.33	022.33	022.33	019.85	022.33	024.81	022.33	024.81
2	059.55	064.51	059.55	064.51	064.51	064.51	071.95	074.44
3	057.07	059.55	057.07	054.59	057.07	062.03	062.03	049.62
4	037.22	029.77	029.77	074.44	032.26	029.77	052.11	044.66
5	166.20	158.80	143.90	161.30	158.80	168.70	163.80	168.70
6	086.80	059.50	079.40	086.80	091.80	094.30	091.80	081.90
7	027.29	027.29	027.29	024.81	024.81	024.81	024.81	027.29
8	024.81	024.81	024.81	024.81	024.81	027.29	022.33	024.81
9	001.00	001.00	001.00	001.00	000.00	001.00	000.00	000.00
10	228.30	218.30	210.90	205.90	218.30	243.20	254.40	260.60
11	019.85	017.37	012.40	017.37	014.89	017.37	017.37	017.37
12	022.33	029.77	027.29	024.81	027.29	027.29	024.81	024.81
13	034.74	034.74	034.74	032.26	034.74	034.74	039.70	039.70
14	017.37	017.37	017.37	017.37	017.37	017.37	014.89	014.89
15	019.85	019.89	019.85	019.85	019.85	022.33	022.33	019.85
16	012.41	009.93	012.41	012.41	012.41	012.41	009.93	012.41
17	089.32	096.77	101.73	099.25	096.77	109.17	091.80	099.25
18	001.00	001.00	000.00	001.00	001.00	001.00	000.00	000.00
19	022.33	022.33	022.33	022.33	024.81	024.81	024.81	022.33
20	310.28	310.28	310.28	310.28	316.49	335.10	316.49	335.10
21	076.92	074.44	081.88	079.40	076.40	081.88	096.77	071.96
22	069.47	059.55	069.47	069.47	074.40	071.92	069.48	071.96
23	019.85	022.33	019.85	022.33	019.85	019.85	022.33	024.81
24	057.07	052.11	059.55	047.14	054.59	047.44	049.62	054.59
25	019.85	014.89	017.37	017.37	017.37	017.37	014.89	017.37
26	027.29	027.29	027.29	024.81	024.81	027.29	027.27	027.29
27	027.29	024.81	024.81	024.81	022.33	024.81	019.85	022.33
28	001.00	001.00	001.00	001.00	000.00	001.00	001.00	001.00
29	047.14	049.62	042.18	042.18	047.14	047.14	042.18	052.11
30	024.81	024.81	024.81	027.29	022.33	022.33	022.33	024.81
31	009.93	009.93	012.41	012.41	009.93	009.93	009.93	009.93
32	084.36	086.84	090.78	090.63	091.81	114.14	109.17	090.74
33	076.92	074.44	057.07	066.99	066.99	076.92	079.40	069.47
34	079.40	076.92	074.44	079.40	081.88	079.40	074.44	069.47
35	109.17	116.62	109.17	119.10	114.14	119.10	114.14	114.14
36	039.70	034.74	037.22	034.74	037.22	044.66	027.29	034.74
37	027.29	027.29	027.29	024.81	027.29	019.85	027.29	022.33
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	017.37	014.89	012.41	014.89	017.37	012.41	014.89
40	007.74	012.41	009.93	012.41	012.41	009.93	009.93	009.93
41	066.99	066.99	067.47	062.03	066.99	062.03	084.36	089.32
42	014.89	012.41	012.41	012.41	012.41	014.89	012.41	014.89
43	012.41	017.37	017.37	017.37	017.37	019.85	017.37	017.37
44	019.85	017.37	017.37	019.85	017.37	019.85	017.37	017.37
45	019.85	019.85	019.85	019.85	019.85	022.33	022.33	019.85
46	034.74	042.18	039.70	034.74	044.66	042.18	039.70	044.66
47	039.22	032.26	029.77	039.70	032.26	029.77	032.26	044.66

APPENDIX I (continued)

Character Number	Location Number and Observations							
	20	20	20	20	20	20	20	20
1	027.29	017.37	022.33	024.81	027.29	032.26	019.85	022.33
2	069.47	074.44	071.95	076.92	069.47	069.47	069.47	071.95
3	066.99	064.51	062.03	062.03	059.55	064.51	064.51	059.55
4	052.11	057.07	057.07	052.11	049.62	052.11	049.62	047.14
5	173.70	173.70	176.20	166.20	166.20	171.20	193.50	166.20
6	089.30	096.80	086.80	091.80	091.80	091.80	086.80	086.80
7	024.81	029.77	024.81	027.29	027.29	027.29	027.29	027.29
8	022.33	022.33	022.33	024.81	022.33	019.77	022.33	022.33
9	000.00	000.00	000.00	000.00	000.00	000.00	000.00	001.00
10	260.60	260.60	238.20	233.20	254.40	260.60	254.40	213.40
11	017.37	014.89	019.85	014.89	017.37	019.85	017.37	017.37
12	029.77	029.77	027.29	027.29	027.29	024.81	017.37	027.29
13	042.18	037.22	037.22	042.18	037.22	044.66	039.70	042.18
14	014.89	017.37	017.37	017.37	017.37	014.89	014.89	019.85
15	019.85	022.33	022.33	024.81	022.33	019.85	019.85	019.85
16	012.41	009.93	012.41	009.93	012.41	012.41	012.41	009.93
17	091.80	089.32	096.77	086.80	089.32	091.80	091.80	096.77
18	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
19	022.33	017.37	022.33	024.81	027.29	022.33	024.81	023.16
20	335.10	335.10	341.31	316.49	310.28	322.69	322.69	316.49
21	089.60	091.80	081.88	081.88	091.80	096.77	066.99	126.54
22	069.47	066.99	071.96	071.96	071.96	071.96	069.47	069.47
23	027.29	024.81	019.85	022.33	027.29	024.81	022.33	024.81
24	054.59	049.62	054.59	049.62	049.62	054.59	034.74	049.62
25	019.85	017.37	017.37	014.89	017.37	017.37	019.85	017.37
26	029.77	024.81	024.81	027.29	029.77	027.29	029.77	027.29
27	022.33	022.33	024.81	022.33	024.81	019.85	022.33	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	052.11	052.11	047.14	047.14	047.14	049.62	044.66	047.14
30	027.29	029.77	027.29	019.85	022.33	027.29	024.81	024.81
31	012.41	011.03	012.41	009.93	009.93	012.41	009.93	012.41
32	076.92	101.73	057.07	091.80	091.80	096.77	074.44	083.61
33	076.92	081.88	084.36	066.99	069.47	074.44	076.92	074.44
34	074.44	054.59	074.44	064.51	069.47	064.51	069.47	071.96
35	116.62	096.77	111.65	114.14	104.21	114.14	111.65	114.14
36	029.77	027.29	022.33	027.29	024.81	027.29	039.70	027.29
37	024.81	027.29	024.81	027.29	027.29	027.29	027.02	034.74
38	003.81	004.57	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	014.89	014.89	012.41	014.89	014.89	014.89	014.89
40	009.93	009.93	009.93	009.93	012.41	012.41	009.93	012.41
41	084.36	084.36	094.29	079.40	086.84	079.40	091.80	089.32
42	014.89	014.89	012.41	012.41	014.89	014.89	017.37	012.41
43	014.89	017.37	017.37	017.37	017.37	017.37	014.89	014.89
44	017.37	017.37	019.85	019.85	017.37	019.85	017.37	017.37
45	019.85	019.85	019.85	022.33	017.37	019.85	019.85	019.85
46	042.18	042.18	042.18	039.70	044.66	039.70	044.66	039.70
47	034.74	037.22	034.74	032.26	027.29	034.74	034.74	032.26

APPENDIX I (continued)

Character	Location Number and Observations							
Number	21	21	21	21	21	21	21	21
1	022.33	024.81	019.85	027.29	027.29	024.81	024.81	024.81
2	062.03	064.51	059.55	057.07	062.03	064.51	062.03	062.03
3	059.55	059.55	057.07	057.07	057.07	062.03	057.07	057.07
4	032.26	042.18	042.18	047.14	039.70	047.14	042.18	042.18
5	138.95	141.40	136.50	131.50	138.90	131.50	138.90	138.90
6	084.40	079.40	084.40	079.40	084.40	089.30	081.90	084.40
7	024.81	024.81	022.33	022.33	024.81	024.81	022.33	022.33
8	022.33	022.33	022.33	022.33	017.37	019.85	019.85	019.85
9	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
10	171.20	181.10	163.80	176.20	191.10	230.80	196.00	171.20
11	014.89	014.89	014.89	017.37	017.37	012.40	012.40	012.40
12	019.85	024.81	019.85	022.33	024.81	022.33	022.33	022.33
13	037.22	022.33	037.22	037.22	037.22	039.70	037.22	032.26
14	014.89	014.89	017.37	014.89	014.89	017.37	014.89	017.37
15	019.85	019.85	022.33	019.85	019.85	017.37	022.33	019.85
16	012.41	009.93	012.41	012.41	012.41	012.41	012.41	012.41
17	081.88	084.36	099.25	091.80	086.80	091.80	091.80	089.32
18	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
19	017.37	024.81	024.81	019.85	027.29	019.85	019.85	024.81
20	279.25	304.07	279.25	285.46	304.07	322.69	297.87	291.66
21	076.92	076.92	054.59	076.92	074.44	099.25	071.95	071.95
22	066.99	066.99	066.99	066.99	066.99	074.44	071.95	069.47
23	022.33	024.81	022.33	022.33	017.37	022.33	024.81	019.85
24	044.66	054.59	044.66	044.66	052.11	062.03	049.90	044.66
25	014.89	017.37	014.89	014.89	014.89	014.89	014.89	017.37
26	022.33	019.85	022.33	022.33	022.33	022.33	024.81	022.33
27	019.85	019.89	019.89	017.37	022.33	019.85	022.33	019.85
28	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
29	042.18	052.11	039.70	039.70	047.14	047.14	052.11	042.18
30	014.89	017.37	019.85	017.37	019.85	017.37	017.37	019.85
31	009.93	009.93	009.93	007.44	009.93	009.93	009.93	009.93
32	099.25	052.11	059.55	066.99	073.89	079.40	069.47	066.99
33	074.44	069.47	074.44	064.51	071.96	069.47	074.44	076.92
34	069.47	066.99	074.44	009.47	074.44	069.47	076.92	069.47
35	106.69	106.69	106.69	111.65	114.14	116.62	114.14	111.65
36	037.22	042.18	039.70	037.22	032.26	044.66	037.22	037.22
37	017.37	022.33	017.37	019.85	029.77	034.74	027.29	027.29
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	012.41	014.89	012.41	014.89	014.89	012.41	014.89	012.41
40	007.44	009.93	009.93	009.93	009.93	007.74	007.74	009.93
41	074.96	069.47	066.99	064.51	069.47	081.88	066.99	069.47
42	014.89	014.89	014.89	014.89	014.89	014.89	014.89	014.89
43	012.41	014.89	014.89	014.89	017.37	017.37	014.89	012.41
44	014.89	014.89	017.37	014.89	017.37	017.37	014.89	014.89
45	019.85	019.85	022.33	017.37	022.33	019.85	017.37	019.85
46	037.22	032.26	032.26	034.74	037.22	037.22	037.22	032.26
47	032.20	037.22	039.70	034.74	035.57	039.70	037.22	034.74

APPENDIX I (continued)

Character	Location Number and Observations							
Number	21	21	22	22	22	22	22	22
1	022.33	027.29	022.33	022.33	024.81	027.29	022.33	024.81
2	062.03	062.03	064.51	059.55	062.03	059.55	062.03	062.03
3	057.07	057.07	057.07	052.11	049.12	054.59	054.59	052.11
4	042.18	042.18	029.77	032.26	032.26	037.22	037.22	034.74
5	133.90	138.90	161.30	156.30	153.80	158.80	153.80	168.70
6	084.40	086.80	084.40	084.40	084.40	086.80	086.80	089.30
7	022.33	022.33	022.33	022.33	024.81	024.81	022.33	024.81
8	019.77	022.33	024.81	022.33	024.81	022.33	024.81	027.29
9	001.00	001.00	001.00	001.00	001.00	001.00	000.00	001.00
10	183.60	183.60	022.58	188.60	208.40	191.10	210.90	273.00
11	017.37	014.89	017.37	017.37	017.37	017.37	017.37	014.89
12	019.85	019.85	027.29	024.81	027.29	027.29	024.81	024.81
13	034.74	034.74	034.74	029.77	034.74	029.77	034.74	034.74
14	014.89	017.37	017.37	017.37	017.37	017.37	017.37	017.37
15	019.85	019.85	022.33	022.33	017.37	022.33	024.81	022.33
16	012.41	012.41	009.93	009.93	012.41	012.41	009.93	012.41
17	091.80	089.32	106.70	094.29	091.80	096.77	094.29	091.80
18	000.00	000.00	000.00	000.00	000.00	000.00	000.00	000.00
19	019.85	019.85	019.85	022.33	022.33	019.85	022.33	024.81
20	291.66	297.87	310.28	297.87	291.66	297.87	297.87	304.07
21	076.92	071.96	079.40	074.40	081.88	074.40	076.92	074.44
22	064.51	071.96	066.99	064.51	069.47	066.99	066.99	069.47
23	022.33	024.81	019.85	022.33	019.85	019.85	019.85	022.33
24	049.62	052.11	047.14	044.66	049.62	049.62	052.11	054.59
25	019.85	017.37	017.37	017.37	017.37	014.89	019.85	019.85
26	022.33	024.81	024.81	024.81	027.29	027.29	027.29	024.81
27	019.85	019.85	022.33	022.33	024.81	024.81	024.81	027.29
28	000.00	000.00	001.00	001.00	001.00	001.00	001.00	001.00
29	044.66	042.18	049.62	044.66	049.62	047.14	044.66	049.62
30	017.37	017.37	019.85	024.81	024.81	022.33	027.29	022.33
31	012.41	009.93	012.41	012.41	009.93	009.93	009.93	009.93
32	059.55	071.96	081.88	086.84	094.29	091.80	084.36	089.32
33	062.03	064.51	062.03	076.92	074.44	081.88	081.88	081.88
34	074.44	071.96	081.88	081.88	079.40	079.40	069.47	079.40
35	104.21	104.21	121.58	111.65	114.14	116.62	104.21	116.62
36	047.14	039.70	037.22	037.22	034.74	034.74	037.22	042.18
37	022.33	022.33	017.37	024.81	019.85	022.33	019.85	027.29
38	003.81	003.81	003.04	003.81	003.81	003.81	003.81	003.81
39	014.89	014.89	014.89	014.89	014.89	014.89	014.89	014.89
40	007.44	009.93	009.93	012.41	007.44	009.93	009.93	012.41
41	064.51	069.47	069.47	057.07	069.47	059.55	062.03	071.96
42	014.89	014.89	012.41	012.41	014.89	012.41	014.89	012.41
43	014.89	014.89	017.37	017.37	017.37	017.37	019.85	014.89
44	012.41	014.89	014.89	017.37	014.89	017.37	017.37	017.37
45	017.37	019.85	022.33	019.85	019.85	019.85	019.85	019.85
46	034.74	037.22	044.66	037.22	037.22	039.70	027.29	034.74
47	032.26	032.26	032.26	029.77	037.22	029.77	024.81	037.22

APPENDIX I (continued)

Character	Location Number and Observations							
Number	22	22	22	22	23	23	23	23
1	024.81	027.29	022.33	024.81	024.81	019.85	022.33	024.81
2	059.55	066.99	062.03	059.55	068.99	069.47	062.03	066.99
3	057.07	054.55	054.59	052.11	059.55	057.07	057.07	057.07
4	032.26	029.77	034.74	024.81	029.77	027.29	037.22	037.22
5	153.80	168.70	151.40	138.90	183.40	176.20	161.30	171.20
6	086.80	091.80	086.80	079.40	091.80	086.80	086.80	084.40
7	027.29	022.33	027.29	029.77	027.29	024.81	027.29	024.81
8	027.29	024.81	024.81	024.81	024.81	022.33	019.85	022.33
9	001.00	001.00	000.00	000.00	001.00	001.00	001.00	001.00
10	218.30	203.50	218.30	203.50	181.10	200.90	171.20	181.10
11	017.37	019.85	017.37	017.37	017.37	017.37	019.85	017.37
12	027.29	024.81	024.81	024.81	027.29	024.81	024.81	024.81
13	034.74	034.74	034.74	032.26	027.29	027.29	034.74	032.26
14	017.37	014.89	017.37	014.89	017.37	017.37	017.37	017.37
15	022.33	024.81	022.33	022.33	022.33	019.85	019.85	022.33
16	009.93	012.41	012.41	009.93	012.41	012.41	012.41	012.41
17	099.25	091.80	099.25	089.32	099.25	096.77	089.32	089.32
18	000.00	001.00	000.00	000.00	000.00	000.00	000.00	000.00
19	022.33	022.33	024.81	019.85	022.33	019.85	022.33	022.33
20	304.07	310.28	310.28	297.87	310.28	297.87	285.46	285.46
21	081.88	076.92	074.44	091.80	079.40	076.92	066.99	069.47
22	069.47	091.80	071.96	071.96	074.44	066.99	069.47	069.47
23	019.85	019.85	019.85	019.85	022.33	019.85	014.89	017.37
24	049.62	049.62	049.62	047.14	054.59	047.14	044.66	042.18
25	017.37	017.37	017.37	017.37	017.37	019.85	014.89	017.37
26	027.29	027.29	022.33	025.91	027.29	027.29	024.81	029.77
27	022.33	022.33	022.33	023.71	022.33	019.85	019.85	029.77
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	049.62	047.14	044.66	044.66	042.18	042.18	044.66	042.18
30	022.33	027.29	022.33	022.33	019.85	019.85	022.33	022.33
31	009.93	009.93	009.93	009.93	009.93	009.93	009.93	009.93
32	086.84	081.88	096.77	106.69	071.96	096.77	069.47	069.47
33	079.40	081.88	074.44	071.96	071.96	066.99	076.92	064.51
34	081.88	081.88	071.95	064.47	074.44	059.55	071.96	074.44
35	119.10	121.58	116.61	116.61	106.69	111.65	116.62	109.17
36	039.70	037.22	039.70	039.70	027.29	039.70	034.74	044.66
37	029.77	024.81	027.29	024.81	037.22	027.29	024.81	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	017.37	014.89	017.37	014.89	014.89	012.41	014.89
40	009.93	009.93	009.93	009.93	009.93	012.41	009.93	012.41
41	062.03	064.51	066.99	066.99	066.99	064.51	062.03	062.03
42	012.41	019.85	014.89	012.41	014.89	014.89	014.89	012.41
43	017.37	017.37	017.37	017.37	017.37	017.37	017.37	017.37
44	017.37	017.37	017.37	017.37	017.37	019.85	014.89	017.37
45	022.33	019.85	017.37	019.85	019.85	019.85	019.85	019.85
46	039.70	037.77	037.22	034.74	039.70	044.66	039.70	047.14
47	029.77	032.26	032.26	032.26	032.26	037.22	029.77	032.26

APPENDIX I (continued)

Character	Location Number and Observations							
Number	23	23	23	23	23	23	24	24
1	022.33	024.81	022.33	022.33	024.81	024.81	024.81	024.81
2	066.99	069.47	069.47	066.99	062.03	059.55	074.44	091.80
3	062.03	059.55	059.55	052.10	054.59	062.03	066.99	062.03
4	034.79	039.70	029.77	037.22	027.29	037.22	044.66	042.18
5	178.60	176.20	176.20	168.70	163.80	166.20	171.20	158.80
6	094.30	091.80	091.80	084.40	081.90	089.30	094.30	089.30
7	024.81	024.81	027.29	027.29	027.29	027.29	027.29	027.29
8	019.85	019.85	022.33	024.81	019.85	019.85	027.29	014.89
9	001.00	001.00	001.00	001.00	001.00	001.00	000.00	001.00
10	198.50	198.50	186.10	191.00	181.10	176.20	260.60	210.90
11	017.37	014.89	017.37	017.37	012.40	019.85	016.54	014.89
12	027.29	024.81	027.29	027.29	027.29	027.29	027.29	027.29
13	032.26	032.26	034.74	029.77	029.77	032.26	034.74	032.26
14	014.89	017.37	017.37	017.37	017.37	017.37	017.37	017.37
15	022.33	019.85	022.33	022.33	019.85	019.85	022.33	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	069.32	091.80	096.77	094.29	086.80	091.80	079.40	079.40
18	001.00	001.00	000.00	000.00	000.00	001.00	000.00	000.00
19	024.81	022.33	022.33	024.81	022.33	019.85	022.33	024.81
20	304.07	297.87	304.07	304.07	273.05	279.25	322.69	285.46
21	081.88	071.96	074.44	079.40	071.96	081.88	091.80	091.80
22	066.99	069.47	069.47	069.47	066.99	071.96	069.47	066.99
23	022.33	022.33	019.85	019.85	017.37	024.81	022.33	024.81
24	049.62	049.62	044.66	044.66	044.66	049.62	062.03	049.62
25	019.85	017.37	017.37	017.37	019.85	017.37	019.85	019.85
26	027.29	027.29	027.29	022.33	029.77	029.77	022.33	022.33
27	022.33	022.33	019.85	022.33	022.33	022.33	022.33	022.33
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	047.14	047.14	047.14	042.18	039.70	042.18	044.66	034.74
30	019.85	024.81	022.33	022.33	027.29	022.33	024.81	019.85
31	009.93	012.41	009.93	009.93	009.93	009.93	012.41	012.41
32	064.51	071.96	062.03	066.99	069.47	064.51	091.80	071.96
33	079.40	074.44	074.44	062.03	064.51	054.59	071.96	066.99
34	066.99	074.44	074.44	069.47	076.92	074.44	081.88	064.51
35	114.14	111.65	109.17	104.21	166.69	111.65	119.10	109.17
36	027.29	037.22	037.22	039.70	034.74	042.18	039.70	044.66
37	027.29	024.81	022.33	024.81	027.29	024.81	024.81	020.78
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	012.41	012.41	014.89	014.89	012.41	014.89	012.41
40	012.41	009.93	009.93	009.93	012.41	012.41	007.44	017.37
41	066.99	064.51	059.55	064.51	057.07	057.07	064.51	054.59
42	012.41	012.41	014.89	012.41	012.41	012.41	012.41	012.41
43	017.37	014.89	014.89	014.89	014.89	014.89	017.37	017.37
44	017.37	017.37	014.89	017.37	017.37	017.37	017.37	019.85
45	019.85	017.37	019.85	017.37	019.85	017.37	019.85	022.33
46	044.66	027.29	042.18	039.70	034.74	044.66	039.70	042.18
47	034.74	032.26	034.74	027.29	032.26	034.74	034.74	032.26

APPENDIX I (continued)

Character Number	Location Number and Observations 24	24	24	24	24	24	24	24
1	024.81	024.81	024.81	022.33	022.33	022.33	024.81	024.81
2	062.03	066.99	069.47	069.47	064.51	066.99	066.99	066.99
3	062.03	059.55	064.51	059.55	057.07	054.59	062.03	057.07
4	037.22	032.26	032.26	034.74	039.70	039.70	032.26	034.74
5	178.60	171.20	166.20	168.70	171.20	161.30	161.30	166.20
6	086.80	091.80	094.30	079.40	086.80	081.80	089.30	091.80
7	024.81	024.81	029.77	027.29	022.33	027.29	024.81	024.81
8	022.33	024.81	022.33	024.81	022.33	027.29	027.29	024.81
9	001.00	001.00	000.00	001.00	001.00	001.00	001.00	001.00
10	235.70	220.80	218.30	223.30	210.90	210.90	218.30	215.90
11	014.89	017.37	017.37	017.37	019.85	014.89	017.37	014.89
12	027.29	029.77	029.77	027.29	027.29	024.81	024.81	027.29
13	029.77	032.26	034.74	029.77	032.26	032.26	034.74	032.26
14	015.51	014.89	014.89	014.89	014.89	014.89	014.89	015.51
15	022.33	024.81	024.81	024.81	024.81	022.33	022.33	022.33
16	012.41	012.41	012.41	012.41	012.41	012.41	012.41	012.41
17	076.92	081.88	084.36	076.92	084.36	076.92	084.36	074.44
18	000.00	001.00	000.00	000.00	000.00	000.00	000.00	000.00
19	022.33	024.81	022.33	022.33	022.33	022.33	022.33	024.81
20	291.66	285.46	297.87	291.66	304.07	279.25	297.87	285.46
21	074.44	074.44	076.92	071.96	084.36	064.51	066.99	077.47
22	064.51	062.03	069.47	062.03	069.47	066.99	064.52	064.52
23	019.85	022.33	019.85	019.85	019.85	019.85	022.33	019.85
24	047.14	057.07	064.51	052.11	066.99	049.62	059.55	052.11
25	017.37	017.37	017.37	017.37	017.37	017.37	017.37	017.37
26	024.81	024.81	024.81	024.81	019.85	019.85	024.81	019.85
27	024.81	024.81	024.81	024.81	019.85	019.85	024.81	019.85
28	001.00	001.00	001.00	001.00	001.00	001.00	001.00	001.00
29	032.26	039.70	037.22	037.22	049.62	034.74	044.66	037.22
30	022.33	022.33	022.33	019.85	022.33	019.85	019.85	022.33
31	009.93	009.93	009.93	009.93	009.93	009.93	009.93	009.93
32	078.85	081.88	076.92	079.40	081.88	069.47	081.88	074.44
33	076.92	074.44	074.44	064.51	069.47	066.99	064.51	069.47
34	071.96	076.92	071.96	081.88	076.92	069.47	071.95	074.44
35	111.65	119.10	119.10	116.62	116.62	109.17	116.62	109.17
36	042.18	027.29	034.74	037.74	032.26	037.74	037.74	027.29
37	020.78	017.37	022.33	017.37	024.81	019.85	014.89	024.81
38	003.81	003.81	003.81	003.81	003.81	003.81	003.81	003.81
39	014.89	017.37	012.41	014.89	017.37	014.89	017.37	012.41
40	009.93	012.41	009.93	009.93	012.41	009.93	009.93	009.93
41	066.99	066.99	071.96	069.47	057.07	064.51	062.03	059.55
42	014.89	014.89	014.89	012.41	014.89	012.41	012.41	012.41
43	017.37	017.37	017.37	017.37	017.37	014.89	017.37	017.37
44	014.89	017.37	017.37	014.89	017.37	017.37	019.85	014.89
45	019.85	019.85	017.37	019.85	019.85	019.85	019.85	017.37
46	039.70	047.18	042.18	039.70	032.26	037.22	039.70	042.18
47	034.74	042.18	027.29	039.70	034.74	027.29	032.26	032.26

A COMPARATIVE MORPHOLOGICAL STUDY OF *BRYOBIA RUBRIOCULUS* {SCHEUTEN} {ACARINA: TETRANYCHIDAE}

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M.S. Degree, August 1971

ABSTRACT

A comparative morphological study of *Bryobia rubrioculus* {Scheuten} from 24 worldwide sites was made to determine if enough significant variation existed to designate the mites from each locale as an isolated population. Forty-seven characters were then selected and measured for each mite and analyzed with Ward's error sum cluster analysis procedures.

These analyses led to the conclusion that: {1} *B. rubrioculus* tends to form distinct populations within each respective locale, and mites from locales that did not form clusters are possibly a result of automictic parthenogenesis and introductions from other areas; {2} *B. rubrioculus* is distinctly separate from *Bryobia praetiosa* {Koch} and not part of a large "praetiosa" complex; {3} mites from the U.S.S.R. are not *Bryobia redikorzevi* Reck, but, instead, are *B. rubrioculus*; and {4} some of the characters used in earlier classifications of *B. rubrioculus* are excellent.

COMMITTEE APPROVAL:

VITAE