

simplifying separation from any small amounts of epimeric by-products. As an illustration, treatment of the (\pm) ester **3** with 1.5 equiv of lithium hexamethyldisilazide in THF ($-10\text{ }^{\circ}\text{C}$, 10 min, and 2.5 h at room temperature) gave the pure lactone **5**, $\text{R} = \text{CH}_3$, in 60% yield.⁹

We have examined a number of related cyclizations and can summarize our observations as follows: stereoselective formation of six-membered rings seems general with trans-disubstituted epoxides,² as in **1** and **3**; it is compatible with R groups of varying lengths, as well as with *E*- or *Z*-disubstituted homologues of the terminal vinyl groups of **1** and **3**; and finally, cyclization proceeded in the same manner when a disubstituted ethynyl group was

present in place of the vinyl group.

Acknowledgment. We thank Drs. H. J. Schostarez and F. Pulido for contributions related to this work and the National Institutes of Health and the National Science Foundation for their support.

Supplementary Material Available: Schemes detailing the general cyclization procedures and the preparation of (\pm)-**7** as well as of (2*S*,3*S*)-**7**, lactone **5**, and spiro ketols **2**, $n = 1$ and $n = 2$, together with the related spectral data (25 pages). Ordering information is given on any current masthead page.

Computer Software Reviews

DISFREE. Biosoft; P.O. Box 580, Milltown, NJ 08850. List price \$395.00.

DISFREE is a software package for nonparametric, or distribution-free, statistics. The program requires an IBM-XT, AT, or any compatible machine. This review was conducted primarily on an XT equipped with CGA, 8087 math coprocessor, and dot matrix printer. A Zenith PC with a monochrome monitor was also successfully used.

The package comes on 3.5 in. and 5.25 in. floppy disks that are not copy-protected; purchasers are permitted to make a single backup copy, but further distribution is not allowed. Also provided is an 88-page manual, but no mention is made of any further user support. In the Introduction to the manual the reader is informed that the software is based entirely on the book *Distribution-free Statistics—An Application-oriented Approach*, by Joachim Krauth (Elsevier: Amsterdam, 1988). There is a not-so-subtle admonition to have this book on hand, owing to the fact that many of the tests known from the literature have been modified and others are described here for the first time. An abbreviated listing of the more than 30 tests is given below; each has separate versions for large and small sample sizes, and the 25 most complex tests also allow for computation through simulations:

Two-sample tests of heterogeneity: Fisher-Pitman randomization test, Wilcoxon's rank-sum test, Gehan's test, McNemar's test, Lehman's test, Bowker's test.

Two-sample tests of dependence: Spearman's rank correlation test, Contingency-table test, Rank correlation test for censored data, Fisher's contingency-table test for variables with more than two categories.

Tests of heterogeneity for three or more samples: Kruskal-Wallis test, Schemper's test, Patel-Hoel test, Pitman-Welch test, Friedman's test, Wall's test.

For each of these, the manual lists the purpose of the test, the required data input, restrictions (sample size, etc.), output, interpretation of re-

sults, and finally some remarks. The fact that this is a very abbreviated treatment argues all the more for having the aforementioned book on hand before using this software. The following restrictions on input data are listed: A maximum of 10 groups of subjects with a maximum sample size in each group of 500. With contingency tables the maximum number of categories is 10 and the maximum sample size is 10000 for the small-sample procedure and 5000 for the simulation procedure. The largest possible cell frequency is 9999, and in the case of multivariate contingency tables you may have a maximum of 6 categories for 5 groups, 4 categories for 6 groups, 3 categories for 7 and 8 groups, and 2 categories for 9 and 10 groups.

Installation on the hard drive was easy, and the program appeared to execute flawlessly. The menu-driven format allows for input (and editing) of data as well as selection of the desired test. There is no provision for importing data. However, the files constructed by the DISFREE editor appear to be uncomplicated, and it should be possible to modify existing data files to be compatible with DISFREE. Only a few of the tests were tried in the course of this review. Those seemed to work properly, but in some cases run times were very long. Upon exiting the program it was found that some other software, e.g. WordPerfect 5.0, would not run on the XT without a warm restart. (Biosoft states that the problem has been overcome.)

This package will be of more value to researchers in the social sciences than to chemists. Most chemical data can be measured on some quantitative scale and is thus amenable to analysis by parametric methods. The social scientists, on the other hand, often have data that are susceptible to ordering but cannot be so readily quantitated. For those familiar with SPSS/PC+, it should be noted that the 16 tests found in procedure NPAR TESTS partly duplicate those in DISFREE.

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