

## GEOSCIENCE NOTES

### A MULTIVARIATE STATISTICAL DETERMINATION OF SOME RECENT MORPHOSPECIES OF THE GENUS ELPHIDIUM FROM THE GULF OF MEXICO

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#### ABSTRACT

An analysis involving a set of 15 variables (Text-fig. 4) on each of 212 specimens of the genus Elphidium sub-equally distributed among 7 samples from the northwestern Gulf of Mexico (Text-fig. 1) results in 6 groups which are both observationally and statistically distinct. These 6 groups correspond to 9 previously described species.

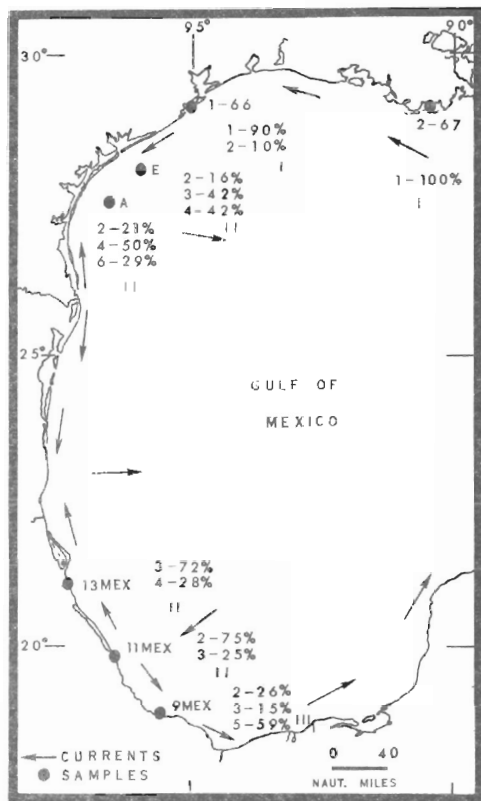
The raw data are subjected to the following series of multivariate statistical techniques:

1. Statistical normalization (z-form) and data condensation (factor analysis)
2. Formation of protogroups and a residual pool of ungrouped specimens (geometric distance)
3. Addition of ungrouped specimens to protogroups and verification of groupings (discriminant analysis)
4. Combination of protogroups (canonical variates of graphical technique)
5. Procedures 3 and 4 are repeated until no more specimens can be added to the protogroups and no more protogroups can be combined.

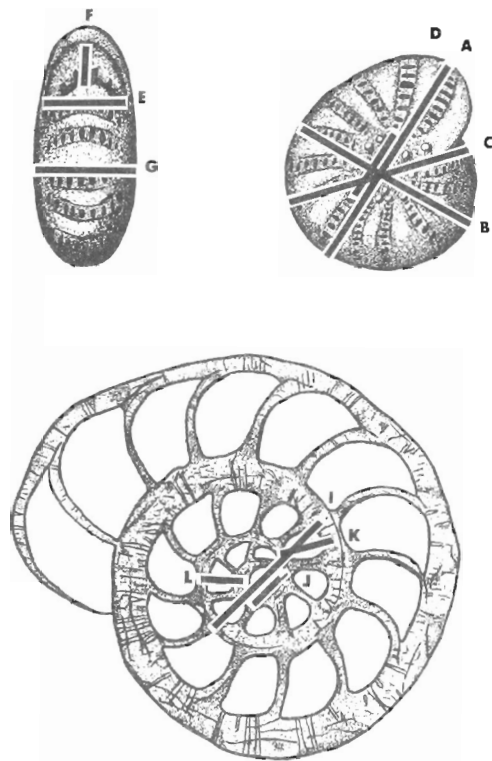
The resulting sets of specimens are the final statistical morphospecies.

The original 9 species are reduced to 5 species: (table 12) Elphidium discoidale, E. galvestonense, E. gunteri, E. incertum and E. poeyanum. Elphidium matagordanus is provisionally considered a junior synonym of E. incertum mexicanum; Criboelphidium poeyanum, Elphidium delicatulum and E. Translucens are provisionally considered junior synonyms of E. poeyanum.

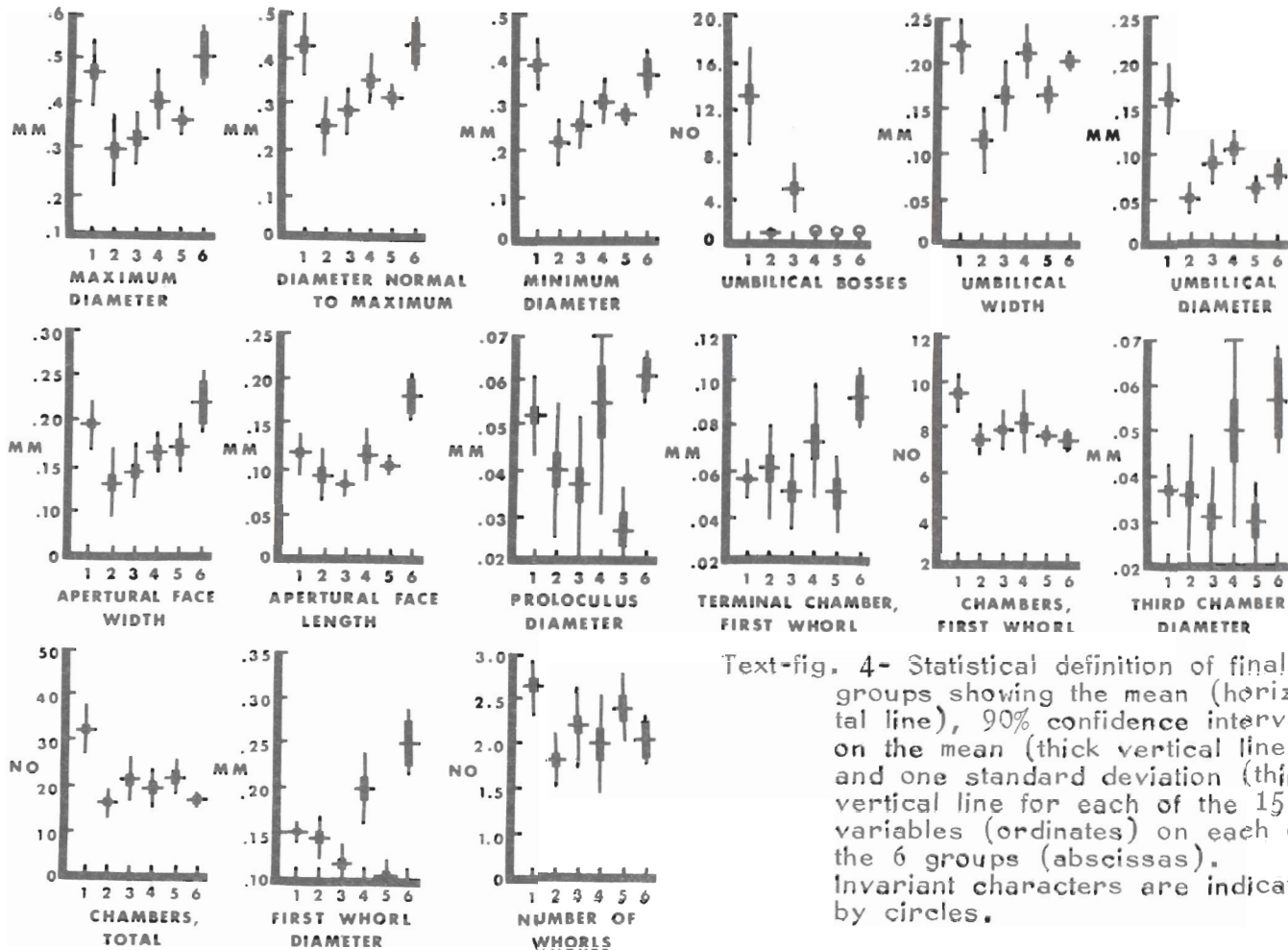
Geographic distributions of the groups in this study indicate that there may be three faunal areas of Elphidium in the Gulf of Mexico: the northern Gulf characterized by E. gunteri, the western Gulf characterized by E. discoidale and E. galvestonense, and the southern Gulf characterized by E. incertum mexicanum.



Text-fig. 1- Map showing sample locations, faunal areas (Roman numerals), and percentages of final groups (Arabic numerals) present in each sample.



Text-fig. 2 - Sketch of a generalized *Elphidium* showing lines of measurement.



Text-fig. 4- Statistical definition of final groups showing the mean (horizontal line), 90% confidence interval on the mean (thick vertical line), and one standard deviation (thin vertical line for each of the 15 variables (ordinates) on each of the 6 groups (abscissas). Invariant characters are indicated by circles.

TABLE 12. SPECIES DESIGNATIONS

THIS PAPER		PREVIOUS PAPERS		
GROUPS	SPECIES	PHLEGER, 1960	PARKER <u>ET AL.</u> , 1953	KORNFELD, 1931
1	E. GUNTERI	E. GUNTERI	E. GUNTERI E. GALVESTONENSE	E. GUNTERI GALVESTONENSE
2	E. POEYANUM	E. POEYANUM E. DELICATULUM	E. POEYANUM E. TRANSLUCENS	
3	E. GALVESTONENSE	E. GUNTERI E. GALVESTONENSE	E. GALVESTONENSE	E. GUNTERI GALVESTONENSE
4	E. DISCOIDALE	E. DISCOIDALE E. ADVENA	E. DISCOIDALE	E. DISCOIDALE
5	E. INCERTUM MEXICANUM	E. INCERTUM MEXICANUM E. MATAGORDANUM	E. INCERTUM MEXICANUM E. MATAGORDANUM	E. INCERTUM MEXICANUM NONION DEPRESSULA MATAGORDANA
6		E. INCERTUM MEXICANUM E. MATAGORDANUM	E. INCERTUM MEXICANUM E. MATAGORDANUM	E. INCERTUM MEXICANUM NONION DEPRESSULA MATAGORDANA