

STRATIGRAPHIC CORRELATION IN THE GULF COAST

HUBERT C. SKINNER¹

ABSTRACT

Stratigraphic correlation is the process of establishing order or succession in the geologic section. Further, accurate correlations are essential in interpreting the structural attitudes of strata. Subsurface geologists are especially dependent on correlation techniques for they are not privileged to examine directly or "walk out" the rock record but must use indirect methods to achieve their purposes — and, always with too few structural and stratigraphic data. In the Gulf Coast province the task is yet more difficult as the quite rapid accumulation of sediments resulted in numerous discontinuities in lithology both laterally and vertically. As a result of these facies and lithologic changes, correlation by means other than lithology as interpreted from electrical logs is essential to effect reliable regional correlations.

There are two general types of correlation: 1) synchronous, or time-stratigraphic; and, 2) lithologic (or, perhaps, paleoecologic). The former is the commonplace goal of stratigraphers — working on surface or subsurface problems. However, the delineation of specific lithologic provinces or paleoecologic zones may be of more value to the petroleum industry where "sands" are sought as potential producing horizons. The location of a precise time horizon such as the "base of the Miocene" is convenient and useful but locating the trace of the hinge line or shelf edge may be of greater economic importance.

Traditionally, stratigraphic correlation is accomplished through plotting paleontological data in the form of index fossils (which have a definite range or life span) onto a log or range chart. These may be correlated from place to place establishing time horizons or faunal zones which are in turn used as stratigraphic subdivisions. This is synchronous correlation and depends upon the recognition of valid index fossils which do not transgress time lines. Various methods and techniques of synchronous correlation are discussed: first occurrence tables, range charts, proportional interval correlation, etc.

Recently, the attention of paleontologists and geologists has been drawn more and more to applying the principles of ecology to stratigraphic interpretation. As a result, paleoecology, the study of fossils in relation to their environment and the enclosing sediments, has arisen as a new area of specialization. This is a difficult field requiring exacting and skilled application of the information known about the habits and habitats of Recent organisms to the interpretation of paleontologic assemblages from the geologic record. With paleoecological information it is possible to correlate lithologic intervals or biostratigraphic zones which may not correspond to time zones but rather may cross time boundaries at an angle — generally, rising in the section downdip with time in a province like the Gulf Coast.

Paleoecologic and biostratigraphic techniques are presented and illustrated: biostratigraphic charts, biostratigraphic maps and cross sections, faunal distribution maps, etc. It is stressed that correlation in much of the Gulf Coast region (especially in sediments younger than Oligocene) is exceedingly difficult at best and should be attempted with the full advantage of all available data and techniques properly and exactly applied to the interpretation. The geologist who attempts regional or downdip correlations without utilizing all such data available is depriving himself and his employer of the best in modern, thorough and competent stratigraphic procedure.

¹Tulane University, New Orleans, Louisiana