Innate ambiguities built into biomarker ratios

ALBERT HOLBA[1]

[1]Albert Holba Consulting, 7923 Fall Hollow Drive Houston TX 77041

Chemical fossils, biomarkers, have become a standard tool of geochemists in the petroleum industry and the geosciences. Various "processes" serve as drivers of biomarker indicators: depositional environment type, lithology, geologic age, thermal maturity, or degree of alteration. These indicators have become widely used to constrain petroleum source facies and the conditions at deposition. Ideally, indicators are specific to a particular process, but often, more than one factor make a significant impact on indicator response. For example, 24-norcholestanes have been noted to be present in relatively high amounts in diatomaceous source rocks and the oils derived from them. Increases in 24-norcholestane ratio are in general parallel to diatom evolution. Moderate amounts are observed in the Cretaceous and much higher amounts in Tertiary sediments and oils making the ratio useful as an age diagnostic biomarker. However, despite geologic age, select environments do not promote strong flourishing diatom growth, e.g., equatorial and warm ocean environments like the Mesozoic Tethys. Extended Tricyclics Ratio (ETR) is generally an indicator of intense algal productivity, usually marine upwelling environments. The occurrences of high ETR are not equally distributed through geologic time (Precambrian through Tertiary). Strong ETR response is most commonly observed in periods of high global temperature or warming global (ocean) temperatures. Other geologic age and depositional environment indicators will also be discussed.