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Artikel: Lower Anisian ammonoids from the northern Humboldt Range (northwestern Nevada, USA) and their bearing upon the Lower-Middle Triassic boundary

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Kapitel: 2: Stratigraphic context

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the threefold substage division of the Anisian by TOZER (1974, 1981b) gains appreciable support.

Owing to the apparent paleolatitudinal pattern of ammonoids distribution (TOZER 1982, WANG 1985, DAGYS 1988a), the Lower Anisian substage remains one of the less well understood time intervals of the Triassic period. In addition, a second major, inevitable obstacle comes from the general scarcity of low paleolatitude Lower Anisian marine deposits. The present results obtained from the northern Humboldt range contribute a great deal to the knowledge of the substage faunal content but correlations at zonal rank with other contemporaneous sequences are still a matter of conjecture. On the other hand, the whole of this unusually complete Spathian and Anisian faunal succession gives valuable insights into the Lower-Middle Triassic and Lower-Middle Anisian boundaries respectively.

2. Stratigraphic context

Block-faulting synsedimentary tectonics has been shown to play a major role during deposition of both the mainly calcareous Star Peak Group (NICHOLS & SILBERLING 1977) and the underlying volcanic Koipato Group (BURKE 1973). Lower Anisian strata, as well as the whole of the Fossil Hill pile were deposited below the wave base, in a euxinic environment. To its greatest paleogeographic extent, the Fossil Hill blanketed an area exceeding 5000 km^2 as estimated by NICHOLS & SILBERLING (1977). Subsequent Middle Triassic uplift and erosion of the central part of the basin at least partly accounts for the comparatively modest, present distribution of the oldest strata, i.e. Lower Anisian of the Fossil Hill Member. These are only known to occur in the northern Humboldt Range, that is at the northwestern limit of what is presently left of the Star Peak Basin.

On a much smaller scale and for our purpose, the effects of synsedimentary tectonics cannot be here disregarded when trying to set up a biochronologic scale of early Anisian time in the northern Humboldt Range. Because of nearly total absence of lithological markers and of variable sedimentation rates of the oldest Fossil Hill strata, partial Lower Anisian sequences of each section were linked by means of their own faunal content, in order to obtain the most comprehensive sequence as possible.

In the northern Humboldt Range, SILBERLING & WALLACE (1969) recognized two major basement highs, running more or less North-South, formed by the Koipato Group (namely the Star-Humboldt and the Arizona highs). The oldest age-diagnostic fossils found on top of both highs are of *Hyatti* Zone age, thus indicating that these highs underwent non-deposition and shallow to subaerial erosion, approximately until the Lower-Middle Anisian boundary. A third, comparatively minor high can be discerned between the Star-Humboldt and Arizona basement highs. The so-called Coyote high occurs along the same "ridge" as defined by the two former highs (Fig. 2). However, the latter differs in that its activity spanned at least the entire Lower Member deposition time (Spathian) and ceased approximately at the onset of the Anisian stage.

East of the Star-Humboldt and Coyote basement highs, the Carbonate Unit of the Lower Member is affected by sudden lateral facies changes portrayed in Figure 2. The distribution of the facies belt apparently matches the North-South trend delineated by the three basement highs. The deepest facies of the Carbonate unit are confined to the

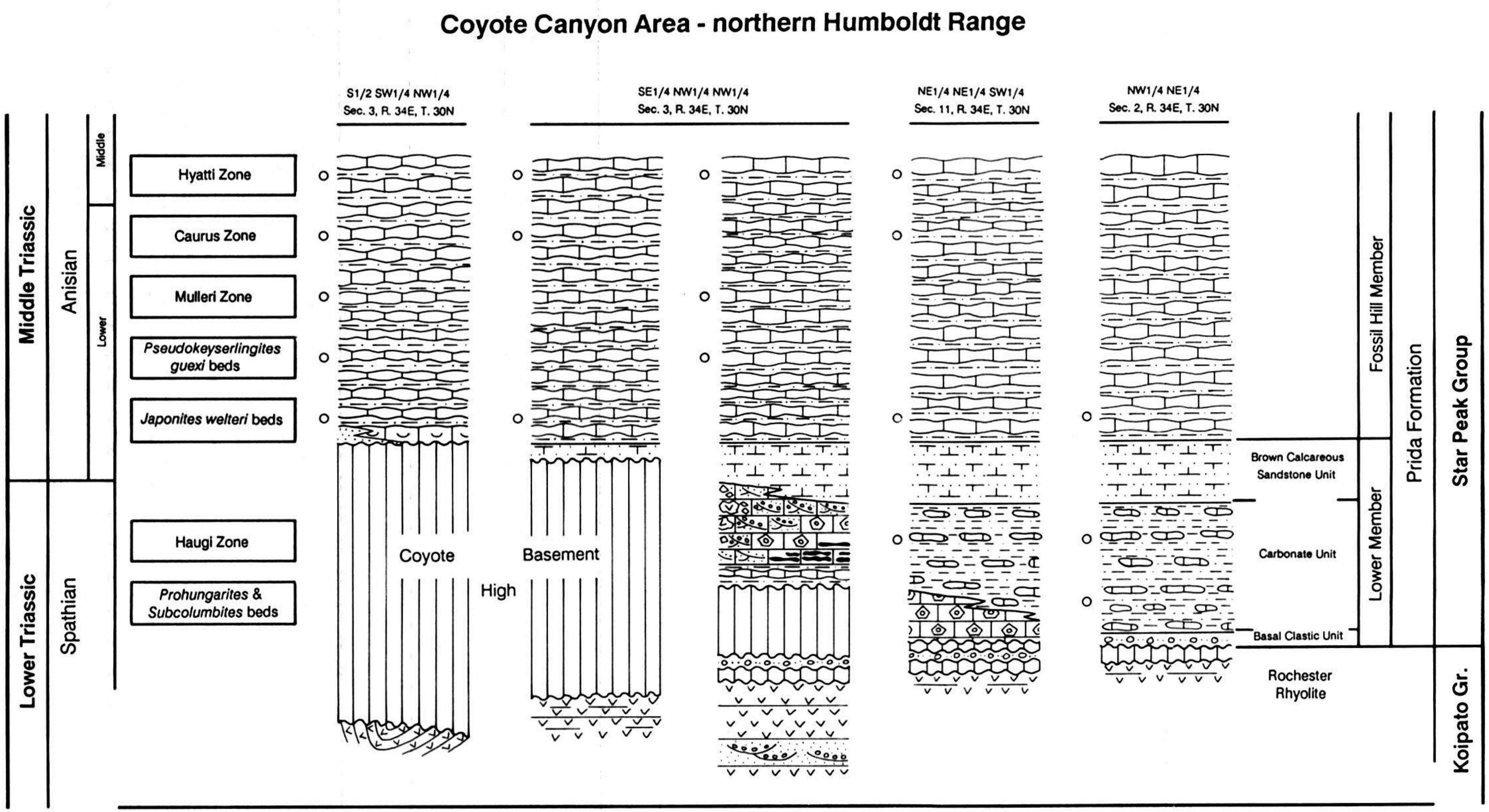

Fig. 2. Correlation chart of the lowermost part of the Star Peak Group in the Coyote Canyon Area, northern Humboldt Range. Open circles indicate occurrences of age-diagnostic fossils; vertical ruling, stratigraphic hiatuses. On top of the Coyote basement high, the very base of the Fossil Hill Member contains unusually abundant benthonic organisms (brachiopods, thick-shelled bivalves) embedded in impure limestones or beige siltstones. Transitional facies of the Carbonate Unit consist of mainly crinoidal limestones with subordinate black nodular cherts and synsedimentary breccias formed of Koipato volcanics.

easternmost part of the range where its time-span *(Prohungarites* and *Subcolumbites* beds up to *Haugi* Zone) and lithology are similar to these of the Tobin Formation. Typical exposures of the latter formation are found in the southern Tobin Range, and there are also extensive outcrops further South, in the Augusta Mountains and New Pass Range (NICHOLS & SILBERLING 1977).

The next overlying Brown Calcareous Sandstone Unit pinches out before final truncation against the three basement highs of the northern Humboldt Range. Its marine depositional environment is ascertained by the presence of extremely scarce and unidentifiable ammonoids and a few brachiopods occurring at its upper limit. The detritic character of these evenly fine-grained rocks and their uniform siliciclastic composition markedly contrast with the enclosing lithologic units and do not suggest derivation from a nearby source. The Brown Calcareous Sandstone Unit is here regarded as a shallow marine, distal equivalent of the mainly conglomeratic and partly subaerial Dixie Valley Formation which overlies the Tobin in the eastern part of the Star Peak Basin (southern Tobin Range, Augusta Mountains and to a lesser extent in the New Pass Range). The Brown Calcareous Sandstone and the Dixie Valley Formation are both thought to record the same major detritic input which originated at the eastern edge of the Star Peak Basin, at the close of the Lower Triassic.

Strata deposited during early transgression of the Fossil Hill here locally escaped later uplift and erosion, which did not occur in central part of the Star Peak Basin. In the northern Humboldt Range, most of the preexisting topography was drowned, except for the Star-Humboldt and Arizona which were then residual basement highs. The former pronounced depositional trend which prevailed during Spathian time did not subsist later on, as inferred from the comparatively much more evenly deposited Fossil Hill Member. Though much more uniform, sedimentary rates of the Fossil Hill nevertheless vary from block to block. In such circumstances, lithostratigraphic thickness are not of much help and may even be somewhat misleading in that lowest rates as inferred from faunal sequences are not necessarily to be found above a formerly emerged basement high (reversion).

A Lower Anisian age can reasonably be assumed for the Lower Member of the Favret Formation which conformably rests upon the Dixie Valley Formation in the eastern part of the basin (NICHOLS & SILBERLING, 1977). No more accurate age-diagnostic fossils than coiled nautiloids and brachiopods could be obtained from this limited shallow carbonate platform. Its upper limit is rather well age-constrained by the overlying Fossil Hill, the basal strata of which may be either of Lower or Upper Hyatti age depending on various synsedimentary faulted blocks (BUCHER, 1988, Pl. 7).

3. The latest Spathian and Lower Anisian ammonoid sequence from Nevada

The basic biochronologic scheme was produced by SILBERLING & TOZER (1968), SILBERLING & WALLACE (1969) and SILBERLING & NICHOLS (1982). The biochronologic procedure employed both by the workers mentioned above and in the present note are all consistent with concurrent-range-type units.

Three newly recognized biochronologic units are fitted into the Lower Anisian succession (Tabl. 1). They are intercalated between the formerly known *Haugi* Zone (late Spathian) and *Caurus* Zone (Lower Anisian). The forthcoming attempt in correlating