

A NEW AMMONITE WHICH THROWS ADDI-
TIONAL LIGHT UPON THE GEOLOGICAL
POSITION OF THE ALPINE RHÆTIC.

BY WILLIAM B. CLARK.

ART. X.—*A new Ammonite which throws additional light upon the geological position of the Alpine Rhætic*; by WILLIAM B. CLARK.

IN a paper* upon the geology of a part of the northern Tyrol, published in Munich in February, 1887, I described among several new forms a species of ammonite of the genus *Arcestes*, which is of some considerable importance, as pointing to the probable position of the Rhætic beds.

In the region above mentioned this much debated formation consists of the three typical divisions of *Haupt Dolomit*, *Kössener Schichten* and *Dachstein Kalk*, the lower or *Haupt Dolomit* being plainly subdivided into a zone of dolomite of somewhat over 1,000 feet in thickness, overlaid by a thinner zone of limestone, the so-called *Platten Kalk* of Gumbel. The lower zone is probably unfossiliferous, with the exception of some interstratified beds of asphalt which contain ganoid scales; while the upper, although containing numerous ill-defined gasteropods, doubtless of the genus *Rissoa*, affords no distinctive forms that would of themselves demand a close union either with the underlying Trias or overlying Jura. The *Kössener Schichten*, in contradistinction to the lower division, are very fossiliferous and present the chief ground of discussion. The rock is a dark limestone, often of a marly, schistose character, with frequent interstratified beds of marl, that grades down insensibly into the *Platten Kalk*. The fossils show numerous affinities both with Triassic and Jurassic forms, but for the most part appear to be of the former character. They are largely corals, brachiopods and lamellibranchs, and the example here cited is the first case of a well-defined ammonite. The genus *Choristoceras*, so commonly encountered, is a degenerate form placed with the *Ceratitidæ*, and has small value in this connection. The third division, the *Dachstein Kalk*, is of white limestone, and contains almost exclusively lithodendron-like corals, though the large *Megalodon triqueter*, the characteristic bivalve of this zone, is frequently encountered. It is without doubt of coral-reef origin, as many physical facts along its contact with the Lias give proof.

Facts seem to indicate that these different divisions, certainly so far as the *Kössener Schichten* and *Dachstein Kalk* are concerned, are only facies, and may under suitable conditions be interchangeable.

* Ueber die geologischen Verhältnisse der Gegend nordwestlich von Aachensee mit besonderer Berücksichtigung der Bivalven und Gasteropoden des unteren Lias. 8°. 45s., 2 taf., 1 Karte. München, 1887. (Inaugural Dissertation).

When we examine the stratigraphical relation of these beds to the underlying Trias we find that no unconformity exists, but that an insensible gradation often takes place from one to the other; while toward the Lias, on the other hand, although unconformity does not exist, yet the break is so marked and clearly defined that we are unprepared to admit an intimate connection between the Rhætic and Lias.

Stratigraphical and paleontological evidence in the Eastern Alps is, then, strongly indicative of a close affinity of the Rhætic to Trias; and the *Arcestes* species, which we will now describe more in detail, adds another important proof to this more or less generally accepted fact.

ARCESTES RHAETICUS, n. sp.*

The ammonite in question, to which, from its important occurrence, I have given the name of *Arcestes rhæticus*, has the following dimensions:

Diameter.....	70 ^{mm}
Height of last whorl.....	40
Thickness.....	50
Umbilicus.....	14

The shell is involute, with rounded dorsal surface, and the cast shows upon the last whorl two depressions, which run in a straight line over the convex back, and which were occasioned by successive contractions or interior thickenings of earlier mouth-edges. The sutures form regularly decreasing series of lobes and saddles from the dorsal siphuncle toward the interior. These lobes and saddles are finely branched, the latter containing upon the outside 4-5, upon the inside 3 obliquely diverging divisions. Beyond the dorsal and the two lateral saddles there are only two auxiliary saddles present. The dorsal lobe is divided by a median saddle into two points, which are very considerably deeper than the lateral lobes. The latter are by means of small branches two- or three-pointed.

This species belongs to the group of the *Galeati*, and shows close affinities to *Arcestes giganto-galeatus* Mojs., from the Hallstädter Kalk.

We have thus a form which belongs to a family and genus most characteristic for the Trias and until now never found above that formation. The Lias has not a single representative. The interest in this particular species is greatly heightened from the very close similarity in outward form and minute division of the lobes to *Arcestes giganto-galeatus*. This fact, if we were to consider the Rhætic beds as belonging to the Lias, would be without a parallel, for on account of the ex-

* Figured in the paper before mentioned, Plate I, fig. 3, a, b, c.

treme variability of the ammonites, the most marked changes are shown from stratum to stratum. Hence it is scarcely possible that a well-marked form could be preserved through any considerable extent of time or any marked change in the conditions of life. In other classes of animals many cases can be cited where forms have continued unchanged for long periods of time, but when such is observed among the ammonites it is certainly a proof of the faunal affinity of the formations considered and a strong reason for uniting them most closely in the geological system.

Before closing this brief contribution it will not perhaps be irrelevant to refer in a word to the general positions held by geologists of different countries upon this question, as shown in their reports to the Committee for the Unity of Nomenclature at the Geological Congress at Berlin. In this report the opinion of French and English geologists was decidedly in favor of according a closer relationship of the Rhætic beds to Lias than to Trias, while the weight of evidence obtained from German sources plainly pointed to the opposite conclusion. The inability and folly of endeavoring to correlate the strata of widely separated regions is thus most forcibly shown, since facts which in certain localities warrant the close association of conformable beds, in others preclude the union of apparently synchronous horizons.

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