DISCOVERY OF UPPER LADINIAN AMMONOIDS AT THE TYPE LOCALITY
OF THE LOWER CARNIAN DESATOYENSE ZONE
(SOUTH CANYON, NEW PASS RANGE, NEVADA)

MARCO BALINI

Dipartimento di Scienze della Terra “A. Desio,” Università degli Studi di Milano, Via Mangiagalli 34, 20133 Milano, Italy, <marco.balini@unimi.it>

INTRODUCTION

South Canyon, located in the New Pass Range in central Nevada (Fig. 1), is one of the most important localities for Upper Triassic marine invertebrates in North America. This site yields very rich ammonoid faunas, as well as cnidarians (Muller, 1936; Stanley, 1979; Roniewicz and Stanley, 1998), foraminifers (Gazdzicki and Stanley, 1983), bivalves (Waller and Stanley, 1998), 2005; Hopkin and McRoberts, 2003), and brachiopods.

The significance of South Canyon, however, derives largely from its ammonoid faunas, since it is the type locality of the Desatoyense Zone of the North American Standard Triassic Scale (Fig. 2), currently the best-defined time scale for the Triassic System. Knowledge of the South Canyon ammonoid fauna is largely based on the work of Johnston (1941) who described a rich collection containing thirteen genera, seventeen new species, two varieties, and five taxa in open nomenclature. Johnston interpreted these as a single new fauna, recognized for the first time in North America. Although he noted its strong affinities to Tethyan faunas of the Lower Carnian “zone of Trachyceras aon,” Johnston nevertheless designated his South Canyon fauna as a new bionzone, the Joannites Zone, which he dated as Early Carnian by correlation with the Aon Zone. The Joannites’ Zone was subsequently renamed the Trachyceras Zone by Silberling (1956), and later the Desatoyense Zone (index Trachyceras desatoyense Johnston, 1941) by Silberling and Tozer (1968). They further demonstrated the position of the Desatoyense Zone with respect to the Upper Ladinian ammonoid succession of British Columbia by the discovery of a fauna with elements of the Sutherlandi Zone at South Canyon, “some hundreds of feet” below the Desatoyense Zone. More recently, Tozer (1994) constrained the position of the Desatoyense Zone with respect to the Lower Carnian ammonoid succession of Canada by documenting elements of the Desatoyense Zone at Clearwater Lake (British Columbia), below the Obesum Zone.

Despite its proven biostratigraphic significance, the South Canyon ammonoid record has not been reexamined in detail for nearly 50 years. In particular, it has never been investigated with a bed-by-bed sampling approach. The preliminary results of such an approach are presented herein.

STRATIGRAPHIC SETTING

The stratigraphic succession at South Canyon was described and illustrated by Silberling (1956; Fig. 3). South Canyon lithostratigraphy and lithostratigraphic correlations were discussed by Nichols and Silberling (1977) and a geological map of the area was produced by MacMillan (1972). Following Silberling (1956), the late Middle to early Late Triassic Augusta Mountain Formation is subdivided into three members. The Lower Member (Coral Zone of Johnston, 1941) consists of thick-bedded to massive coral-dominated limestones with intercalations of conglomerate in the lower part and interbedded shales in the upper part. The lithofacies of the topmost part of the Lower Member is very peculiar, and consists of coquina-like brachiopod limestone beds which record the drowning of the carbonate platform. The brachiopod beds are overlain by alternating marls and limestones of the Middle Member (Joannites Zone of Johnston, 1941), which are, in turn, capped by massive limestones of the Upper Member (Red Rock Limestone of Johnston, 1941), which record the onset of carbonate platform conditions.

Two ammonoid faunas (Fig. 3) have been reported from South Canyon. The older fauna occurs in shaly intercalations in the upper part of the Lower Member (Silberling, 1956, fig. 1; Silberling and Tozer, 1968, p. 36; Roniewicz and Stanley, 1998, fig. 2). This fauna was considered to be “equivalent to Sutherlandi Zone” by Silberling and Tozer (1968). The younger fauna occurs in the lowermost part of the Middle Member (Johnston, 1941, p. 448; Silberling and Tozer, 1968, p. 35) and represents Johnston’s (1941) classic fauna on which the Desatoyense Zone was based. The new field investigations concentrated on the lower part of the Middle Member, i.e., on the Desatoyense Zone.

OUTCROPS AND SECTIONS

The Middle Member of the Augusta Mountain Formation is best exposed on the north side of South Canyon. Here, the morphology of the slope is rather gentle and the beds dip with the slope. Debris is very common and only the thickest beds crop out from the scree. The thick-bedded Lower Member is better exposed, and its topmost part, in particular, is very easily recognized by its abundant brachiopods. These brachiopod beds can be followed along strike, and make an excellent marker by which to fix