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Two negative $\delta^{13}C_{org}$ excursions near the Triassic-Jurassic boundary in the New York Canyon area (Gabbs Valley Range, Nevada)

by

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Abstract.–GUEX J., BARTOLINI A., ATUDOREI V. and TAYLOR D., 2003. Two negative $\delta^{13}C_{org}$ excursions near the Triassic-Jurassic boundary in the New York Canyon area (Gabbs Valley Range, Nevada). *Bull. Soc. vaud. Sc. nat. 88.4*: 445-448.
In this paper we present a new Late Rhaetian (Crickmayi Zone) to Early Jurassic (Polymorphum-Mulleri Zones) $\delta^{13}C_{org}$ curve established in New York Canyon (Gabbs Valley, Nevada) and discuss its significance for worldwide correlations. Our curve shows two significant negative shifts of the organic carbon which are correlated to the very precise biochronological data that we have established and published during the last few years in several reports (TAYLOR *et al.* 1999, TAYLOR and GUEX 2000, GUEX 1995, GUEX *et al.* 1998).

Keywords: Triassic Jurassic boundary, Carbon Isotopes, New York Canyon Nevada.

Résumé.–GUEX J., BARTOLINI A, ATUDOREI V. et TAYLOR D., 2003. Deux excursions négatives du $\delta^{13}C_{org}$ au voisinage de la limite Trias-Jurassic dans la région du New York Canyon (Gabbs Valley Range, Nevada).). *Bull. Soc. vaud. Sc. nat. 88.4*: 445-448.
Nous présentons ici une nouvelle courbe du $\delta^{13}C_{org}$ allant du Rhétien supérieur (Zone à Crickmayi) au Jurassique inférieur (Zones à Polymorphum-Mulleri) établie dans la région du New York Canyon (Gabbs Valley Range, Nevada). Sa signification pour les corrélations à grande échelle est discutée. Cette courbe montre deux anomalies négatives significatives du carbone organique. Celles-ci sont précisément calibrées aux données biochronologiques que nous avons établies et publiées au cours des dernières années (TAYLOR *et al.* 1999, TAYLOR and GUEX 2000, GUEX 1995, GUEX *et al.* 1998).

Mots clés: Limite Trias Jurassique, Isotopes du Carbone, New York Canyon Nevada.

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Introduction

The goal of this paper is to present new data on the $\delta^{13}C_{org}$ variations in the New York Canyon area (Gabbs Valley, Nevada) and discuss its significance for worldwide correlations (Fig.1). Our curve shows the variation of the $\delta^{13}C_{org}$ from the Late Rhaetian (Crickmayi Zone) up to the Early Jurassic (Polymorphum-Mulleri Zones). It shows two significant negative shifts of the organic carbon which are correlated with the very precise biochronological data that we have established and published during the last few years in several reports (Taylor *et al.* 1999, Taylor and Guex 2000, Guex 1995, Guex *et al.* 1998, 2002).

Discussion

The beginning of the first excursion is located appproximately at the top of the last occurrence of relatively abundant Rhaetian ammonites like *Arcestes nevadanus, A. gigantogaleata, Placites, Choristoceras crickmayi, C. marshi*, and *Rhacophyllites* spp. This negative excursion terminates 4 meters below the first occurrence of undisputable Jurassic ammonites belonging to the genus *Psiloceras*, i.e. *P.spelae* and *P. tilmanni* (bed N-8).

The second negative excursion starts near the first occurrence (bed M-2) of *Odoghertyceras* and *Psiloceras marcouxi*. These forms are accompanied by rare and very tiny survivors of the genus *Choristoceras,* i.e. *C.minutum*.

It is interesting to note that the first jurassic bivalves, represented by *Kalentera* and *Palmoxytoma*, first occur just above the last typical Triassic ammonites.

In this paper, we leave open the problem of the formal definition of the base of the Jurassic: it can be drawn either at the FO of the Jurassic bivalves or at the FO of the oldest Jurassic ammonites (i.e. *P.tilmanni*: see Guex *et al.* 1998).

Three interesting $\delta^{13}C_{org}$ local curves have been published in recent years: Hesselbo (2002) in southern England, Palfy (2001) in Hungary and Ward *et al.* (2001) in western Canada.

Correlating these curves with our new isotopic data is quite obvious except for the third one.

The most complete $\delta^{13}C_{org}$ sequence around the TJB is that established by Hesselbo *et al.* (2002). The curve shows clearly two negative excursions: the first one is located within the range of the last conodonts occurring in the Cotham Member of the Lilstock Formation: it is here assigned to the Rhetian. The second excursion starts a few meters below the first local occurrence of *Psiloceras planorbis* and is interpreted as correlative of our second excursion

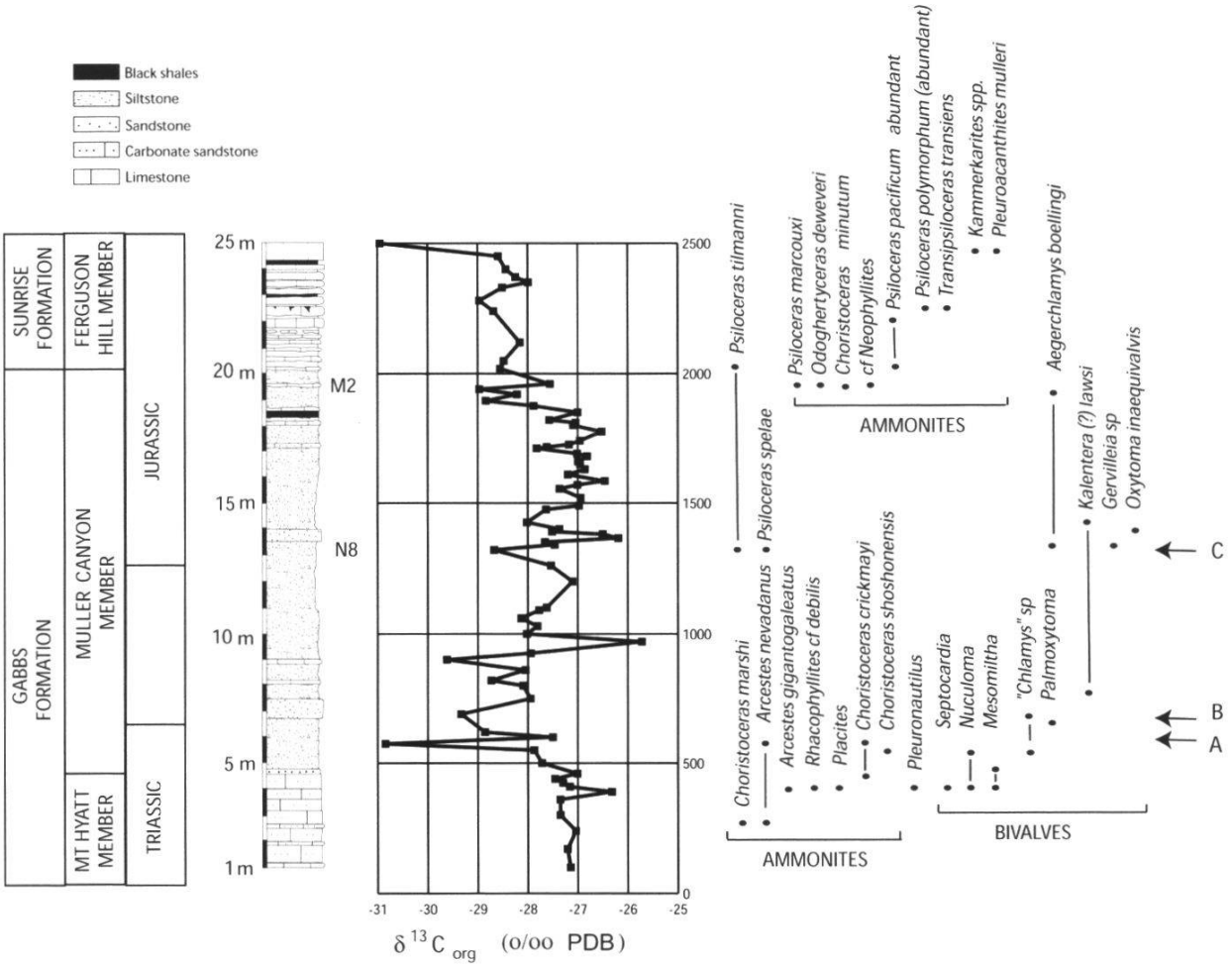

Figure 1.–Lithology, $\delta^{13}C_{org}$ variation and biochronology. A: Extinction of Triassic ammonites. B: First local occurrence of Jurassic Bivalves. C: First occurrence of *Psiloceras tilmanni*. Data from TAYLOR *et al.* 1999, TAYLOR and GUEX 2000 GUEX 1995, GUEX *et al.* 1998.

which is of lowermost Jurassic age. We note briefly that the Rhenium and Osmium anomalies described by COHEN and COE (2002) in the same section are clearly Jurassic and not Rhaetian.

The organic carbon curve published by PALFY *et al.*(2001) in Hungary also shows two negative excursions. The first one is located within the range of the last typical Rhaetian conodonts and is corrrelative with the first negative shift in England. A second negative shift is bracketed within a 20 meters stratigraphic interval located between a topmost Rhaetian (or lowermost Hettangian) *Rhacophyllites* and a *Kammerkarites* (our revised taxonomy). This second negative excursion correlates well with the second shift observed in New York Canyon, both in amplitude and chronologic position.

A third curve with only one negative shift was published by WARD *et al.* (2001) established at Kennecott Point (BC) in Canada. The biochronologic data accompanying that curve are not clear for two reasons. This negative shift overlaps the first Jurassic radiolarians and is supposedly located about 10 meters above the last occurrence of truly Triassic *Choristoceras*. This would

imply that the recorded excursion could be of Jurassic age. However we question the accuracy of these ammonite biostratigraphic data and suppose now that this shift corresponds to the first negative excursion in New York Canyon.

Conclusion

In summary our biostratigraphic observations and new isotope data show definitely two distinct negative carbon excursions close the TJB. The first one is clearly associated with the late-Triassic extinction and the second one, located in the Lower Hettangian, is concomitant with the major diversification of Jurassic ammonites, plants and radiolarians.

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Remarque:
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