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LATE PRECAMBRIAN-EARLY CAMBRIAN STRATIGRAPHIC AND FAUNAL SUCCESSION OF EASTERN CALIFORNIA AND THE PRECAMBRIAN-CAMBRIAN BOUNDARY

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Late Precambrian and Early Cambrian strata in eastern California and Nevada can be divided into three facies (Fig. 1). The eastern Craton facies, confined to southeastern California and southern Nevada represents a thin succession of strata lying above crystalline basement rocks of early Precambrian age. This facies is principally terrigenous, relatively poorly fossiliferous, and is represented by only the youngest of Early Cambrian faunas.

The White-Inyo facies and the Death Valley facies, on the other hand, represent principally terrigenous marine geoclinal strata of late Precambrian and Early Cambrian age in a conformable sequence more than 6,000 m in thickness. This succession is widely exposed in the Basin Ranges of the White-Inyo Mountains area, in western Nevada, and in the area surrounding Death Valley. Detailed lithologic analysis and faunal studies allow correlations of some precision between the two facies. The more abundantly fossiliferous White-Inyo strata represent the upper two-thirds, the Death Valley succession the lower one-third, of a complete American stratotype for this important transitional succession.

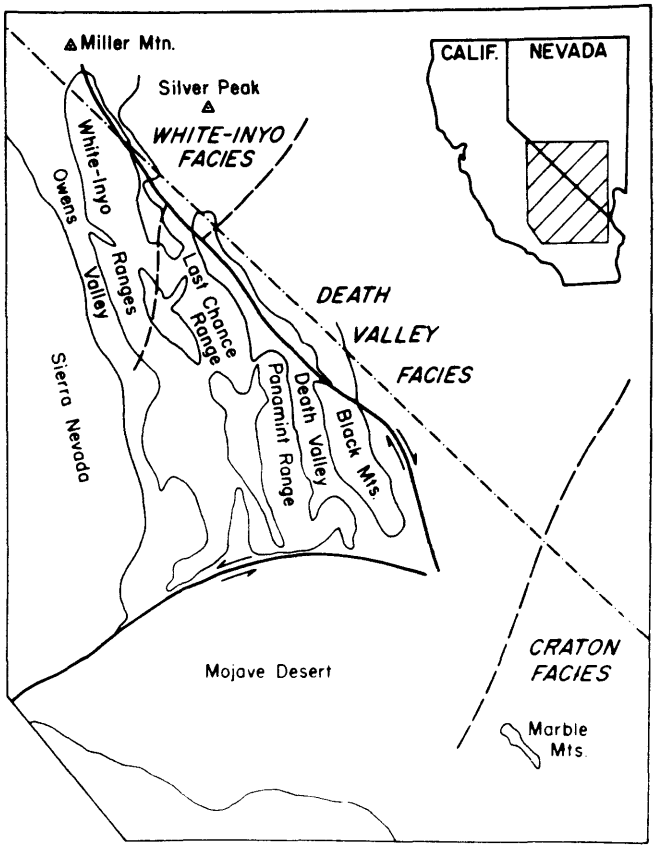

Figure 1

The undoubted Early Cambrian portion of this succession is represented by abundant trilobites in the White-Inyo strata. Three trilobite zones, the Fallotaspis, Nevadella, and Bonnia-Olenellus zones of Fritz (1972) are recognized, from base to top (Fig. 2). The Fallotaspis zone falls within the Campito Formation, from its middle portion to within 250 m of its top. The basal part of the zone is poorly fossiliferous and is represented by forms similar to Fallotaspis tazemourtensis (Plate 1). The upper part of the zone is abundantly fossiliferous, containing Fallotaspis cf. F. longa, Daguinaspis, and Judomia (Plate 2). The Judomia fauna also occurs in the upper middle part of the Wood Canyon Formation in the Death Valley region.

The overlying Nevadella zone, extending from the upper Campito to the upper middle part of the Poleta Formation is characterized by a lower faunule of Nevadia, Holmia, and a uniquely large (20 cm) Holmiella (Plate 3), and an upper faunule of Nevadella and Helicoplacus (Plate 4). Nevadella occurs also in the upper part of the Wood Canyon Formation in the Death Valley region.

The Bonnia-Olenellus zone extends from the upper Poleta through the overlying Harkless and Saline Valley Formations to the top of the Mule Spring Limestone. It is represented by the following faunules.

(1) A basal Olenellus faunule, with Olenellus, Laudonia, and ptychoparids (Plate 5).

(2) A lower Ogygopsis faunule, with Ogygopsis, Olenellus, Edelsteinaspis, and a unique "Protolenid" characterized by a Protolenus-like cephalon and an Ogygopsis-like pygidium (Plate 6). This form occurs only at Miller Mountain, Nevada, although a closely similar form has been reported by Fritz (1972) from the same biostratigraphic horizon in the Mackenzie Mountains, Northwest Territories, Canada.

(3) An upper Ogygopsis faunule, with Ogygopsis, Olenellus, Bonnia, Olenoides, Onchocephalus, Zacanthopsis, Syspacephalus, and Goldfieldia (Plate 7). This is the "unusual Lower Cambrian fauna" described by Palmer (1964). The two Ogygopsis faunules are interpreted as exotic incursions of a deeper water facies into the shallower water facies of the normal White-Inyo succession.

(4) The Bristolia faunule, containing Bristolia, Fremontia, Olenellus, Fremontella, Peachella, Onchocephalus, and Crassifimbra (Plate 8). This faunule occurs also in the Carrara Formation of the Death Valley region and in the Craton facies of southeastern California.

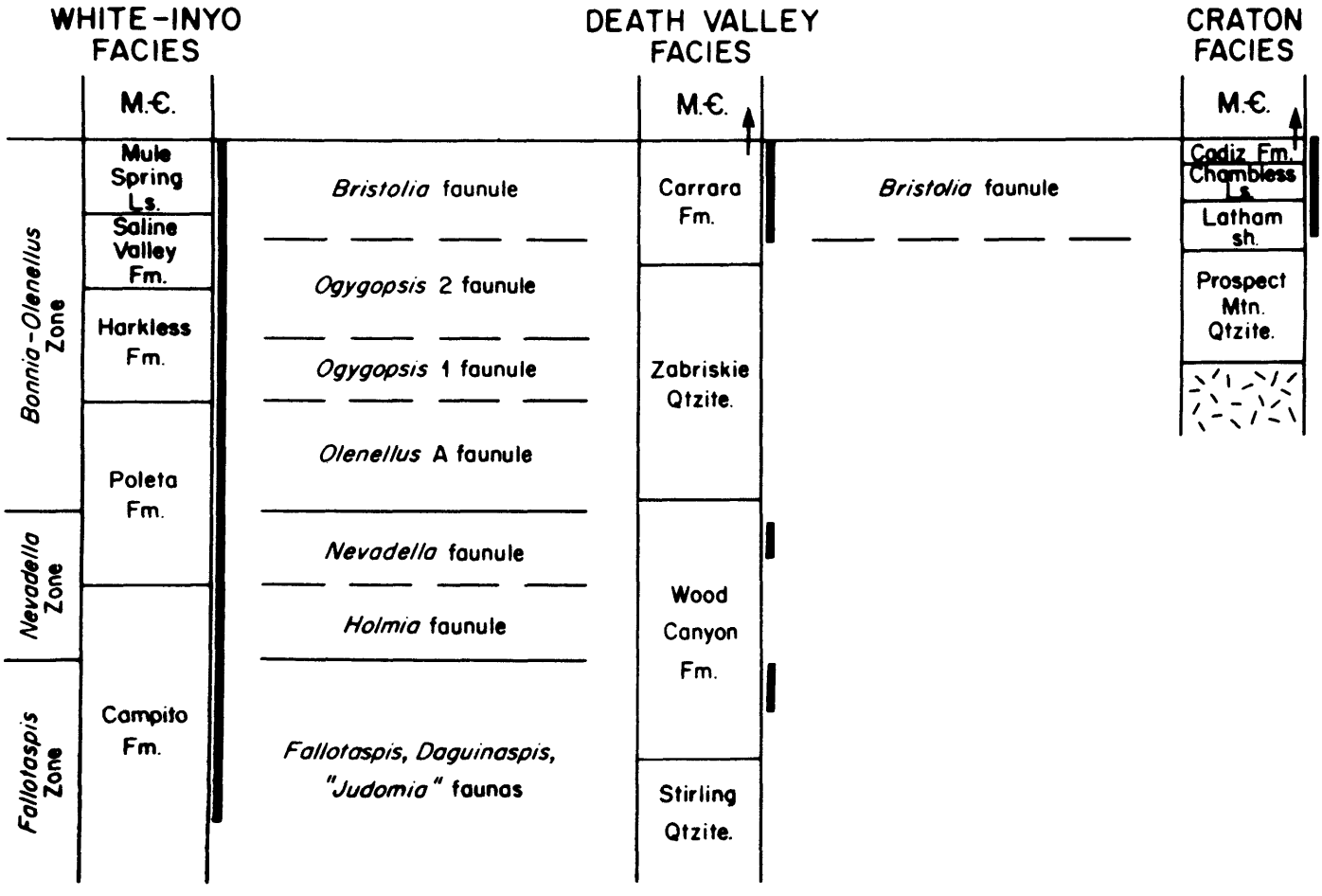

Figure 2

In the White-Inyo succession, archeocyathids occur in abundance in carbonates from the lower third of the Bonnia-Olenellus zone downward to the base of the Nevadella zone. Trace fossils are abundant throughout the succession, and trilobite traces (Rusophycus and Diplichnites), together with Skolithos and Monocraterion, occur as low as the base of the upper member of the Deep Spring Formation. Figure 3 illustrates the detailed faunal distribution (by genera) in the White-Inyo succession. Figure 4 represents the faunal and lithologic correlations of the White-Inyo and Death Valley facies.

In the composite White-Inyo and Death Valley succession, the Precambrian-Cambrian boundary has in the past (Fig. 3) been placed at: (1) the occurrence of Fallotaspis within the Campito Formation; (2) the earliest occurrence of trilobite trace fossils; (3) the base of the occurrence of the "mollusc" Wyattia; and (4) the base of the conformable succession below the Noonday Dolomite in the Death Valley region. All but the last are viable interpretations.

Comparisons by Rozanov and Debrenne (1974) and by Gangloff (1975) of the archeocyathids of the California succession with those of the Siberian platform suggest that all the trilobite and archeocyathid strata of the White-Inyo Range can best be correlated with the Upper Atdabanian Stage of the Siberian platform. Rozanov (1974) suggests further that the beds containing Wyattia may represent the Tommotian Stage. Consequently, it is suggested that the Precambrian-Cambrian boundary be placed, with considerable uncertainty, within the beds of the upper Reed Dolomite in the White-Inyo Range. Lithologic correlation, not supported by faunal data, would place the "boundary" within the Stirling Quartzite in the Death Valley succession.

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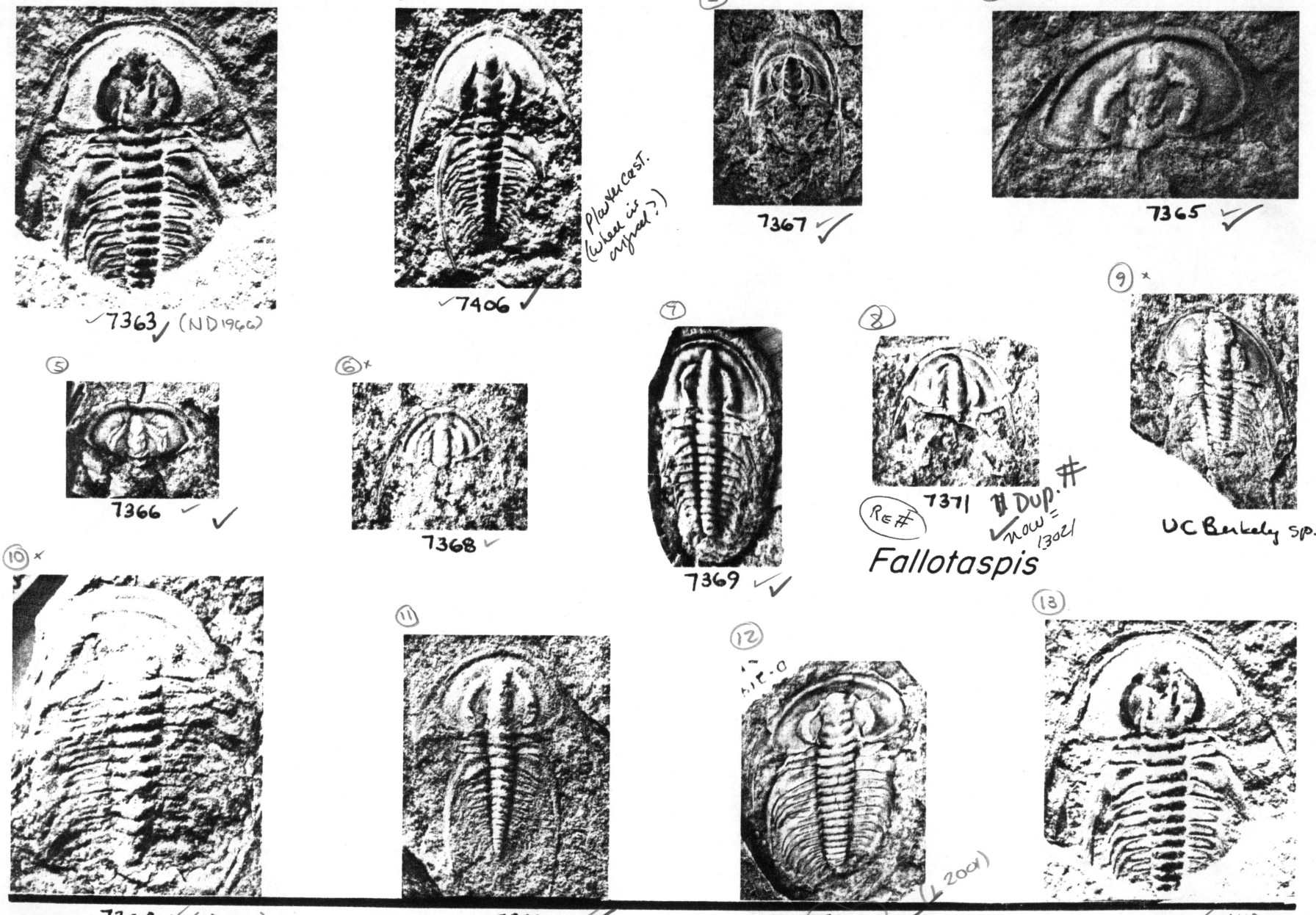

PLATE 1

[LACMIP type #s in black]