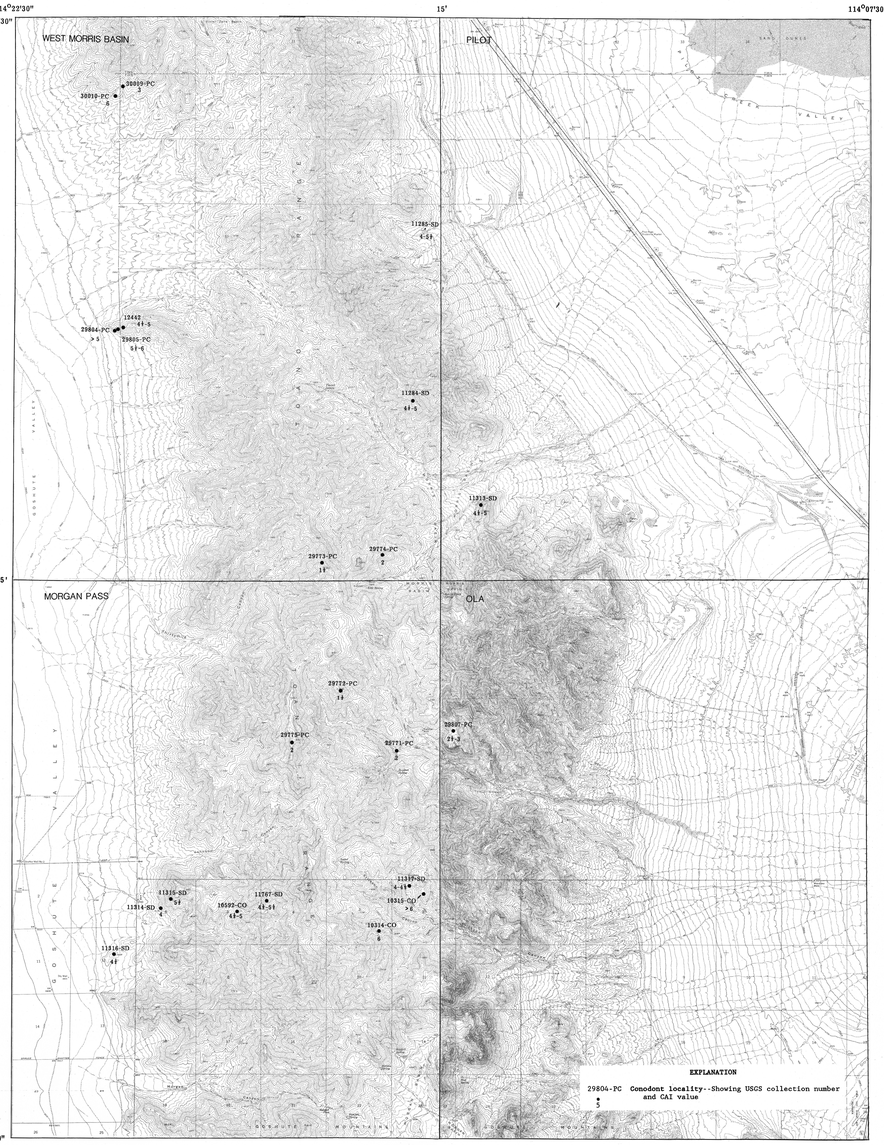
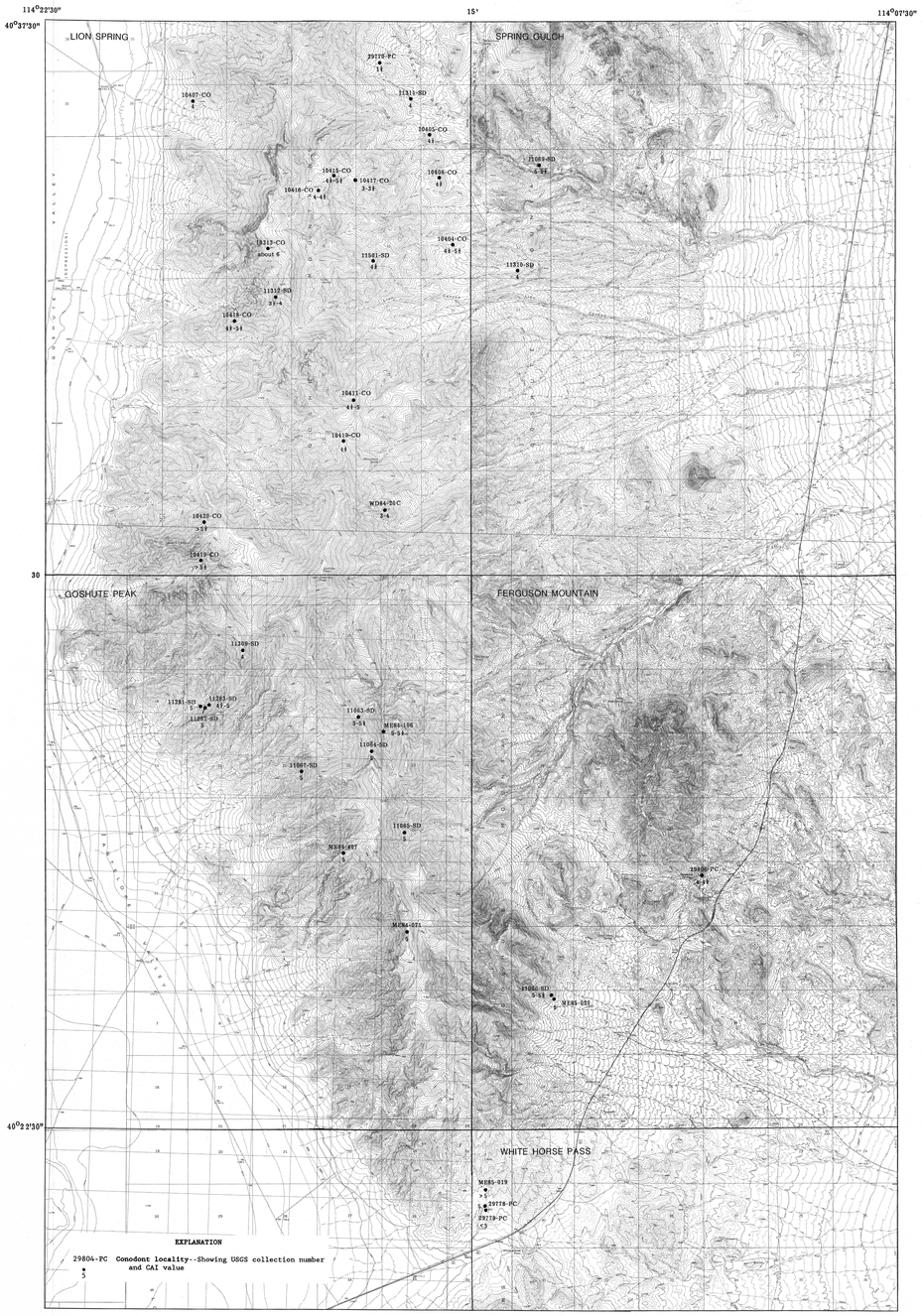


Base from U.S. Geological Survey, 1:24,000
Pilot, West Morris Basin, 1971; Morgan Pass,
Ola, 1972

SCALE 1:50 000
CONTOUR INTERVAL 20 AND 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP A. SELECTED CONODONT LOCALITIES IN THE WEST MORRIS BASIN, PILOT, MORGAN PASS, AND OLA 7 1/2-MINUTE QUADRANGLES



Base from U.S. Geological Survey, 1:24,000
Ferguson Mountain, Lion Spring, Spring Gulch,
White Horse Pass, 1972; Goshute Peak, 1982

SCALE 1:50 000
CONTOUR INTERVAL 10 METERS AND 20 AND 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Manuscript approved for publication October 18, 1988

MAP B. SELECTED CONODONT LOCALITIES IN THE LION SPRING, SPRING GULCH, GOSHUTE PEAK, FERGUSON MOUNTAIN, AND WHITE HORSE PASS 7 1/2-MINUTE QUADRANGLES

INTRODUCTION

Geologists of the U.S. Geological Survey mapped the Goshute Mountains and Toano Range in 1983-1985 as part of an investigation of the mineral potential of the Bluebell and Goshute Peak Wilderness Study Areas made at the request of the U.S. Bureau of Land Management (Day and others, 1987; Ketner and others, 1987).

The Goshute Mountains and the Toano Range are in northeastern Nevada near the town of Wendover, Nev. (fig. 1). Geomorphically and geologically, they constitute a single mountain range which, for the sake of brevity, is herein referred to as the "Goshute-Toano Range." This range, like so many in northern Nevada, extends nearly north-south and is flanked on both sides by broad, flat valleys. The Goshute-Toano Range is composed mainly of marine carbonate formations of the Cordilleran miogeocline ranging from Cambrian to Mississippian in age. Nonmarine Tertiary sedimentary and volcanic rocks are also present.

To the extent that time permitted, conodonts extracted from Paleozoic limestone and dolostone samples were examined in order to confirm the field identifications of the map units and to determine the maximum temperatures attained by the various stratigraphic units. Information on the thermal history of the rock units can be used to determine the petroleum potential of the area (Epstein and others, 1977) and is also helpful in understanding certain aspects of the regional structural history.

This report summarizes the information on the genera and species of biostratigraphically diagnostic conodonts, their ages, their color alteration indices (CAI), and the relation between stratigraphic position and color alteration of the conodonts. The samples yielded conodont elements of 112 species referred to 61 genera. Tables 1 and 2 list the conodont collections by quadrangle and give the CAI values of each collection. Maps A and B show the localities from which the conodonts were collected and their CAI values.

STRATIGRAPHIC DISTRIBUTION AND CAI VALUES OF THE CONODONT COLLECTIONS

Thirteen collections are from the Notch Peak Formation and Pogonip Group in the Lion Spring and Morgan Pass quadrangles. In the Lion Spring quadrangle, ten collections of conodonts from the Pogonip Group range in age from Late Cambrian to early Middle Ordovician. These collections contain conodonts representative of North American Midcontinent conodont Faunas A through E (Late Cambrian to Early Ordovician) of Ethington and Clark (1971, 1981), and of Repetski (1982) (=*Cordylodus proavus* through *Oepikodus communis* Zones; see Ethington and Repetski, 1984). They also contain Faunas 2 through 4 (Whiterockian, Middle Ordovician) of Sweet, Ethington, and Barnes (1971) and of Sweet and Bergström (1976). In the Morgan Pass quadrangle, strata included in the Pogonip Group yielded a collection of diagnostic conodonts of Faunas A and B (Latest Cambrian to earliest Ordovician). A collection from the unit mapped as Notch Peak Formation and Pogonip Group, undifferentiated (Day and others, 1987), contains representives of Faunas B and C (Early Ordovician), and an unnamed unit in the Lion Spring quadrangle yielded a collection of Late Cambrian to Early Ordovician age. Conodont-based maximum ages of the Notch Peak Formation and Pogonip Group range between CAI 5 and 6 (310-400 °C).

Rocks assigned to the Upper Ordovician Fish Haven Dolomite were sampled at two localities in the Lion Spring quadrangle. At one locality the Fish Haven contains conodonts representative of Edenian and Maysvillian age (Late Ordovician) as used by Sweet and Bergström (1976), and at another locality indeterminate conodont element fragments of Middle Ordovician- to Middle Devonian-age morphotypes. Conodont CAI values range from 3 to 4.5 (110-220 °C).

The Laketown Dolomite was sampled in the Morgan Pass and Lion Spring quadrangles. In the Morgan Pass quadrangle, three collections of conodonts are of early Silurian age. In the Lion Spring quadrangle, the Laketown yielded only indeterminate fragments of conodont elements of Early Ordovician- through Devonian-age morphology. CAI values for the Laketown Dolomite are 3-5.5 (110-350 °C).

Rocks assigned to the Simonson Dolomite were sampled at three localities in the Goshute Peak quadrangle. The conodonts indicate a range of late Middle Devonian to early Late Devonian age. CAI values for the Simonson are 4.5 or 5 (200-300 °C).

The Guilmette Formation is widely distributed in the Goshute-Toano Range and was sampled at several localities. These collections indicate an age range for the Guilmette of late Middle to early Late Devonian. In the Goshute Peak quadrangle the Guilmette Formation contains conodonts of late Middle Devonian to early Late Devonian age at two localities and Late Devonian at three localities; it contains wide-ranging collections of indeterminate conodont element fragments at three other localities. In the Lion Spring quadrangle, conodonts are of early Late Devonian age at one locality and of Devonian age at another. In the Morgan Pass quadrangle, the Guilmette contains conodonts of Late Devonian age that appear to be of Frasnian (Late Devonian) age, and at another indeterminate elements are of Silurian to Devonian age. In the Ferguson Mountain quadrangle, the Guilmette yielded conodonts of middle Late Devonian age at one locality and indeterminate elements of indefinite age at another. In the Pilot quadrangle the Guilmette yielded one collection of Late Devonian age; in the West Morris Basin quadrangle one collection of late Middle Devonian age, and in the Spring Gulch quadrangle one collection of Middle and Late Devonian age. Conodont CAI values range from 3.5 to 5.5 (150-350 °C) for the Guilmette Formation, but the CAI of only one collection was estimated to be possibly as low as 3.5.

A sample of the Pilot Shale from the West Morris Basin quadrangle contains conodonts of Middle or Late Devonian age, and a sample from the Spring Gulch quadrangle is of Late Devonian age. CAI values are between 4.5 and 5.5 (200-350 °C).

Six collections of conodonts obtained from the Chainman Shale indicate a Late Mississippian age. In the West Morris Basin quadrangle one collection from an unnamed limestone unit in the Chainman indicates an age of Late Mississippian to Pennsylvanian, and another collection indicates an age of Mississippian to Pennsylvanian. A collection from the Ferguson Mountain quadrangle is middle Meramecian to Chesterian (Late Mississippian) in age. Two collections from the White Horse Pass quadrangle are of Late Mississippian age. Strata assigned to the Needles Siltstone Member of the Chainman Shale yielded a collection of indeterminate conodont element fragments that ranges from Silurian to Permian. CAI values for the Chainman range from 4 to >5.5 (175-300 °C).

In the West Morris Basin quadrangle a map unit designated as undifferentiated Ely Limestone and Diamond Peak Formation yielded a single reworked conodont element of Late Devonian age. Its CAI value is 4-4.5 (175-200 °C).

Rocks assigned to the Ely Limestone were sampled in the West Morris Basin, Ola, and Lion Spring quadrangles (collections from the Ely Limestone and from overlying Permian units were identified by Bruce R. Wardlaw). One collection from the West Morris Basin quadrangle is Early Pennsylvanian. A collection from the Ola quadrangle is diagnostic of Morrowan and Atokan age (Early and Middle Pennsylvanian), and one in the Lion Spring quadrangle could be Pennsylvanian or Permian. A collection from the Morgan Pass quadrangle from very low in the Ely yielded conodonts of Late Mississippian to Pennsylvanian age. With a single exception (30010-PC), conodont CAI values for the Ely Limestone, in contrast to those for older units, are very low, ranging from only 1.5 to 3 (50-110 °C). We suspect the exceptional collection may have been heated by a small intrusive body.

An unnamed limestone unit above the Ely Limestone in the West Morris Basin quadrangle and in the Morgan Pass quadrangle yielded five collections of Permian age. Conodonts from the Permian unit have very low CAI values, ranging from 1.5 to 3 (50-110 °C).

CONCLUSION

Regardless of geographic location within the Goshute-Toano Range and regardless of geologic age, the CAI values (fig. 2) of conodonts from the Cambrian to Mississippian units are high (ranging from 4 to more than 6), whereas those of Pennsylvanian to Permian age are low (ranging from 1 to 3). Based on the data at hand, the transition from high values below the Mississippian-Pennsylvanian boundary to low values above the boundary is abrupt, not gradational as would be expected if the values depended primarily on depth of burial. We tentatively conclude that the base of the Ely Limestone everywhere within the Goshute-Toano Range is a low-angle fault and that the Pennsylvanian and Permian sequence is distinctly allochthonous with respect to the older units. Future efforts in the area will be directed toward a test of the validity of this conclusion.

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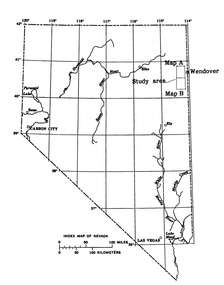

Figure 1.--Index map of Nevada showing location of the study area.

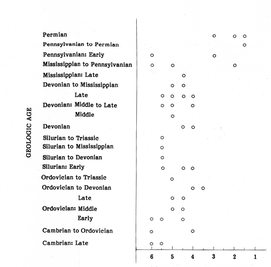

Figure 2.--Distribution of conodont color alteration indices (CAI) in Late Cambrian to Permian rocks at selected localities in the Goshute-Toano Range, northeastern Nevada.

Table 1--Distribution of Late Cambrian and Ordovician conodonts and their color alteration indices at selected localities in the Goshute-Toano Range

EXPLANATION

Estimate of recovered conodonts -- a, abundant; c, common; u, uncommon; r, rare.

Counts of individual elements assigned to each taxon--1,2,3...

| 7½-MINUTE QUADRANGLE | LION SPRING | | |