

THE PALEONTOLOGICAL LITERATURE OF ARIZONA: A REVIEW

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INTRODUCTION

Approximately 80 papers have been published that deal mainly with the invertebrate paleontology of Arizona. In addition to these, more than 40 stratigraphic papers containing either important lists, new occurrences, or stratigraphic or geographic ranges of invertebrate fossils have also been published.

No complete monographic studies of the faunas of any Arizona formations have yet been published. Stoyanow's Lower Cretaceous Stratigraphy (1946b), dealt only with part of the fauna of the Bisbee group. Other workers, to select a few at random, such as Hill (1959), discussed only Ordovician corals, Zeller (1957) in a regional paper dealt only with endothyroid foraminifers and Chronic (1952) with Kaibab formation mollusks. The Smithsonian Institution, however, has recently issued a series of monographic reports on the paleontology of the Caborca area in northern Sonora, Mexico. Cooper, Dunbar, Duncan, Miller, and Knight (1953), described the Permian fauna of the El Antimonio region. Easton Sanders, Knight, and Miller (1958) described the Mississippian fauna from near Caborca, and Cooper, Arellano, Johnson, Okulitch, Stoyanow, and Lochman (1952) described the Cambrian fauna from near Caborca.

REGIONAL DIVISIONS

If we divide Arizona into northern (the Colorado Plateau) and southern (the rest of the state) portions, we find a ratio of approximately 4 papers published on the northern region to 1 paper published on the southern region. Thus most of the paleontologic work has been done in northern Arizona, especially in the Grand Canyon area.

A few of the papers, such as Stoyanow's (1926) Notes on Stratigraphic Work, Zeller, (1957) on Endothyroid Foraminifers, Miller, Furnish, and Clark (1957) and Miller and Youngquist (1949) on cephalopods, and Lochman (1956) relate to the entire state, or larger more regional areas.

NORTHERN ZONE

Resser (1941) described the Cambrian fauna of the Grand Canyon, and papers on more specialized groups or smaller faunal assemblages are those by Chronic (1952) on Permian mollusks, Easton and Gutschick (1953) on Redwall corals, Snow (1945) on Kaibab trilobites, and Stoyanow (1948) on Island Mesa mollusks. Shorter papers on paleontology have been written by many people. McKee has contributed several (1935, 1936, 1941, and 1947). In addition to this, many stratigraphic papers containing incidental paleontologic information have been published.

Little strictly paleontologic work has been done on the Cretaceous faunas of northern Arizona. Reagan (1926) discussed the occurrence of *Exogyra* and *Gryphaea* species. Repenning and Page (1956) made a largely stratigraphic study of the Black Mesa area, and Young (1957) described some new species of ammonites. Much work remains to be done with these faunas.

At the present time Norman Newell is studying the Permian pelecypods of Northern Arizona, and William Furnish is describing a new Permian nautiloid discovered by L. F. Brady. The University of Illinois has conducted several studies of the fusulinids of northern Arizona as graduate theses. To the writer's knowledge, these are as yet unpublished.

SOUTHERN ZONE

Very few papers have been published on the invertebrate paleontology of

southern Arizona. More than half these papers were published by one man, Alexander Stoyanow. However, Stoyanow (1949b) only published one large paleontologic paper on this area, his description of part of the Bisbee group fauna. Other major papers on faunas of this area include Herson (1935) on the Paradise formation and its fauna, Girty (1904) on Carboniferous fossils from the Bisbee area, Hill (1959) on Ordovician corals, Stainbrook (1947) on Percha shale brachiopods, and Williams (1904) on Devonian fossils from the Bisbee area.

Several of the mainly stratigraphic papers have provided useful information concerning the occurrence and ranges of fossils. Sabins (1957), for example, discussed the occurrence of fusulinids, conodonts, and ammonoids, in the Chiricahua Mountain section. Tyrrell (1957) reported the presence of a primitive *Parafusulina* in the Permian, and the presence of a *Trigonia*, identified by Stoyanow as of Bisbee group age, in the Cretaceous sections of the Whetstone Mountains.

The writer is not acquainted with any paleontologic studies presently being conducted with fossils from southern Arizona other than some Cenozoic invertebrate fossils being examined in conjunction with the University of Arizona's "Arid Land Project", and some Cretaceous invertebrates from southern Arizona being examined by the writer.

PROBLEMS FOR RESEARCH

There is a need for paleontologic and stratigraphic studies of Arizona formations. The fauna should be studied as a unit, and the study should not be confined to a single mountain range. In addition to this, many faunal groups should be studied as a unit, either separately or in conjunction with larger studies.

Projects under consideration at the University of Arizona include a study of the fusulinids of the Pennsylvanian and Permian rocks of southern Arizona and northern Sonora, a study of the fauna of the Bisbee group (that part not covered in Stoyanow's (1949b) paper) and a study of the largely nonmarine Cretaceous shales and sandstones in southern Arizona.

The Devonian fauna of southern Arizona should be restudied, and the Cambrian and Mississippian faunas could be restudied and compared with those of Sonora. The Pennsylvanian fauna of southern Arizona and the Cretaceous fauna of the Deer Creek coal basin could be redescribed. Work could also be done with the Cenozoic nonmarine mollusks and ostracods of the valley fill deposits, and the brackish-water (marine) fossils reported from the lower Gila River area could also be studied in detail.

In northern Arizona the most open field seems to be Cretaceous paleontology. The distribution of various ammonite genera and species, and *Inoceramus* species can be further investigated, as well as the taxonomy of the various other fossil groups. Many new or previously unrecorded species are undoubtedly present in those rocks.

Although the Permian rocks of northern Arizona seem to be the subject of several studies at the present time, the older Paleozoic rocks provide suitable subjects for study. The Cenozoic rocks may also provide minor subjects in the form of non-marine mollusks.

Perhaps a study of arenaceous foraminifers, collected from outcrops, would provide a useful tool for correlation within the northern part of Arizona. These fossils may be recovered from insoluble residues, and could prove useful for petroleum exploration.

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