AN OCCURRENCE OF *ARCHIMEDES* IN SOUTHERN NEVADA

N. GARY LANE
University of California, Los Angeles

The genus *Archimedes* is reported here for the first time from the state of Nevada, occurring in rocks judged to be late Mississippian in age. A single screw without attached frond has been found recently in basal beds of the Bird Spring Formation (Indian Springs Member) in Clark County, Nevada. This represents an extension of the known geographic range of the genus in the United States south from northern Utah and west from southeastern Arizona.

The specimen (Univ. Calif., Los Angeles, Dept. Geology No. 32560) was found approximately 80 feet above the Indian Springs-Monte Cristo contact in a coarse-grained ferruginous shaly limestone that weathers dark red. The locality is as follows:

> SE¼ NE¼ Sec. 5, T.19S., R.63E., Dry Lake Quadrangle, Clark County, Nevada. The bed is exposed a few feet below the top of the red-weathering Indian Springs Member on either side of major northwest trending gully that is interrupted upstream by a 100-foot high cliff of dark gray limestone.

The specimen was collected by Terry Cadi, a graduate student in the U.C.L.A. geology department.

ARCHIMEDES cf. A. SWALLOVANUS Elias, 1957
Text-fig. 1

Archimedes swallovanus ELIAS, 1957, Jour. Paleontology, v. 31, no. 2, p. 415, pl. 47, figs. 11,12.

Description.—The screw consists of 17 volutions and is 68 mm. long. The flange is mechanical or V-shaped, with upper slope more steeply inclined to the axis than lower slope. Average height of volution is 4.0 mm. with a range of about 3.5 to 4.3 mm. The flange diameter averages 7 mm. with a range of 6.2 to 7.3 mm. and shaft diameter is approximately 2 mm. with a range of 1.4 to 2.3 mm. The volution height and shaft and flange diameters remain essentially constant through the 17 preserved volutions, and the range of measurements is at least partly due to indifferent preservation.

The three lower volutions were carefully ground down in the hope of establishing the meshwork formula within the flange. Because of poor preservation no meshwork could be seen in polished or thin sections of the lower volutions. The outer surface of the screw is preserved as a dark brown iron oxide coating and the interior is largely recrystallized.

Discussion.—The dimensions of the screw of *Archimedes pseudoswallovanus* given by Elias (1957, p. 415) are 3½ to 5 mm. for height of volution with an average of 4½ mm., flange diameter of 7 mm., and shaft diameter of 2 mm. These measurements agree closely with the dimensions cited above. In shape and size of screw *A. pseudoswallovanus* is similar to *A. swallovanus* Hall and the two species are distinguished by different kinds of fronds. Because the frond is not known for the specimen under discussion it can be only tentatively assigned to *A. pseudoswallovanus*, although it

TEXT-FIG. 1—*Archimedes* cf. *A. pseudoswallovanus* Elias. Univ. Calif. Los Angeles Dept. Geology No. 32560. Specimen prior to grinding down lower three volutions. XI.

agrees more closely to published dimensions of that species than it does to the screw dimensions of *A. swallovanus* (Condra & Elias, 1944, p. 132) which commonly has a somewhat thicker shaft.

Fenestella expanses are absent from the bed in which the *Archimedes* was collected. The slab on which the fossil was found was carefully ground and polished on both sides in the hope of finding isolated fragments of *Fenestella* but none was discovered. Other samples of the bed also failed to yield *Fenestella*. The screw is surrounded by isolated fragments of crinoidal material, brachiopod shells, and echinoid spines. It is not part of a clast within the ferruginous limestone matrix. The length of the specimen and fragility of the screw argue against the fossil's having been transported any great distance or reworked from preëxisting beds.

Associated Fauna.—One of the most interesting aspects of finding *Archimedes* in lower Bird Spring rocks is its occurrence within the *Rhipidomella nevadensis* zone. Dott (1955) established this zone in northeast Nevada and considers it to be Springeran in age. He reports *R. nevadensis* to be rare in the upper part of his Tonga Formation and common to abundant in the lower member of the overlying Moleen Formation. The *Archimedes*-bearing bed in the Indian Springs contains abundant *Rhipidomella nevadensis* and seemingly should be correlated with the lower part of the Moleen Formation farther north. In northern Clark County the Indian Springs Member also yields well preserved specimens of *Flexaria* and *Inflatia*, both typically Chesteran productid brachiopods; a large *Schizophoria* quite unlike described lower Pennsylvanian species of the genus that occur in higher beds in the formation; and a large, coarsely plicate new species of *Punctospirifer* that is confined to the *R. nevadensis* zone. This brachiopod fauna of the lower Bird Spring is under study.

If Elias' conclusions are accepted, that the Redoak Hollow fauna of the Springeran is late Mississippian and correlative with the Kinkaid Limestone of the type Chesteran, then the *A.* cf. *A. pseudoswallovanus* reported here provides evidence that the *Rhipidomella nevadensis* zone is Late Chesteran in age and that the Mississippian-Pennsylvanian boundary should be drawn at the top of that zone. Beds immediately overlying the red-weathering Indian Springs Member in northern Clark County contain a typically Morrowan fauna and correlate with lowermost Bird Spring beds in southern Clark County (Goodsprings area; Spring Mountains), where the *Rhipidomella nevadensis* zone is missing and rocks yielding typical Morrowan fossils overlie the Monte Cristo Limestone of lower and middle Mississippian age.

Correlative beds that are Springeran in age include the basal rocks of the Oquirrh Formation in northern Utah, and the uppermost beds of the Great Blue Limestone and Chainman shale. All of these rocks contain *Rhipidomella nevadensis* and seemingly should be regarded as uppermost Chesteran in age.

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