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J. Keith Rigby
Brigham Young University

Michael Murphy
University of California, Riverside

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HINDIA SPHAEROIDALIS DUNCAN FROM THE DEVONIAN OF NEVADA (PORIFERA)

J. Keith Rigby¹ and Michael Murphy²

ABSTRACT.— The small, spherical, lithistid sponge, *Hindia sphaeroidalis* Duncan, 1879, is reported from the Devonian and Silurian of the Great Basin for the first time. Devonian specimens came from the Emsian Bartine Member of the McColley Formation from near Roberts Creek, Roberts Mountains, and from the Eifelian part of the Nevada Group near Bishops Creek, north of Wells, Nevada. The Silurian occurrence, questioned because of poor preservation, is from the Laketown Dolomite, on Tunnel Spring Mountain in western Millard County, Utah.

Hindia sphaeroidalis was described and named by Duncan (1879:91) for specimens collected from Lower Devonian rocks in New Brunswick. Since that time, the genus has been recognized in rocks as old as Ordovician and as young as Devonian, and the sponge is geographically widespread. To date, however, the spherical sponge has not been reported widely in western North America, and to our knowledge these are the first published records of *Hindia sphaeroidalis* Duncan in Lower and Middle Devonian and in Silurian rocks of the Great Basin.

OCCURRENCE

Specimens of *Hindia* occur with some commonness in the limestone and dolomite of the upper part of the Bartine Member of the McColley Canyon Formation in the Roberts Creek Mountains, northwest of Eureka, Nevada (Fig. 1). Some of these specimens are preserved as chert in siliceous limestone beds, and others are preserved as relatively coarse-textured calcareous replacements. Sponges occur with moderately common rugose corals, brachiopods, and a broad variety of bryozoans.

The McColley Canyon Formation was initially differentiated as a member of the Nevada Formation in the Sulphur Springs and Pinyon Ranges by Carlisle et al. (1957:2181-2182) and equated to the Beacon Peak dolomite member of the Nevada Formation as exposed in the Eureka District and described by Nolan, Merriam, and Williams (1956:41-42). Johnson (1962:544) raised the various members of the Nevada Formation, as proposed by Carlisle et al., to formation rank within the Nevada Group. Gronberg (1967) sub-

divided the McColley Formation into members in the Lone Mountain and Table Mountain areas, west of Eureka, and extended his nomenclature into the Roberts Mountains area. Murphy and Gronberg (1970) formally published the member nomenclature, with the type sections of the Kobeh, Bartine, and Coils Creek Members established at Lone Mountain, west of Eureka. The Emsian Bartine Member contains the *Eureka-spirifer pinyonensis* fauna and is the most abundantly fossiliferous part of the McColley Canyon Formation. It is in this somewhat recessive argillaceous limestone that *Hindia* occurs in the Roberts Creek area of the Roberts Mountains.

A second collection of *Hindia sphaeroidalis* was made from Devonian limestone in the Metropolis-Bishop Canyon area 9 miles north of Wells, Nevada. These sponges were collected by W. L. Stokes of the University of Utah in 1951 and were kindly loaned to us for study.

Brachiopods associated with the sponges north of Wells, Nevada, were identified by J. G. Johnson, (letter to Stokes, 3 March 1967) and include: *Vallomyonia devonica* (Walcott), *Schizophoria* sp., indet. hynchonellid sp., *Cassidirostrum* sp., *Anatrypa* sp., *Spinatrypa* (*Invertrypa*) sp., *Warrenella kirki* (Merriam), *Echinocoelia* cf. *denayensis* Johnson, and *Leptathyris* sp. These brachiopods are indicative of the *Leptathyris circula* or *Warrenella kirki* zones of the Eifelian Middle Devonian part of the Nevada Group in central Nevada.

In the Roberts Mountains and at Lone Mountain in central Nevada where these brachiopods are best known (Johnson 1966), Eifelian faunas first occur in the

¹Department of Geology, Brigham Young University, Provo, Utah 84602.

²Department of Earth Science, University of California—Riverside, Riverside, California.

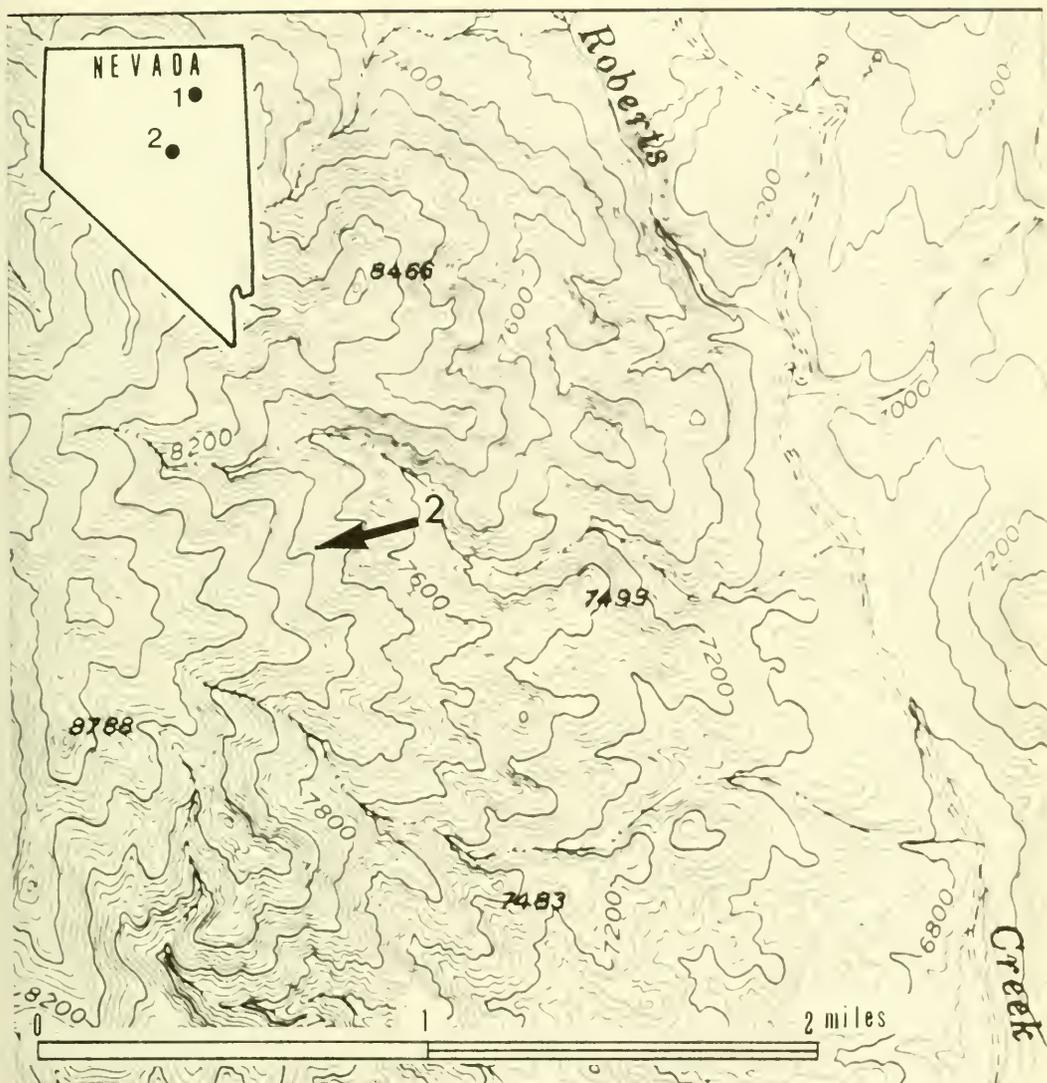


Fig. 1. Index map to localities where specimens of *Hindia sphaeroidalis* Duncan have been collected in northern and central Nevada. On the inset map locality 1 is near Bishops Canyon, north of Wells, Nevada. Locality 2, in the inset map, is in the Roberts Mountain area and is also shown on the enlarged map of the Roberts Creek area. Sponges from near Wells came from the lower part of the Middle Devonian and those from the Roberts Creek area from the upper part of the Lower Devonian.

lower part of the Denay Limestone or its equivalents which overlie the McColley Canyon Formation. Eifelian age beds are to be expected in the lower part of the Simonson Dolomite of eastern Nevada and western Utah.

In addition to the fossils from central and northeastern Nevada, a single specimen of *Hindia*, presumably *Hindia sphaeroidalis* Duncan, was collected from

what is considered to be Upper Silurian upper Laketown Formation in the Tunnel Springs Mountain area, near Tunnel Springs, in western Millard County, Utah. This single specimen is poorly preserved so that only the straight radiating canals are clearly shown. The spicule structures have been masked by recrystallization and dolomitization. In canal size and overall dimensions, however, it appears similar

to the Nevada Devonian material. This single specimen was collected by George Young, in 1970, as a float specimen on the slope of the formation.

NEVADA MATERIAL

The Nevada specimens of the species are all nearly spherical and have the characteristic radiating canal pattern and spicule structure of the genus. Sponges in the collections range from 12 to 27 mm in diameter. In general they have weathered into relief and show the canal-pocked exterior, well known from other localities. In some specimens there is an inversion of the original morphology, for now the canals stand as the high points and the skeletal net is weathered into reticulate depressions. Lowest points on the exterior are triangular depressions which mark the position of the tricanoclone spicules. In these specimens, the net is commonly calcified and the matrix is now silicified.

The nearly straight radiating canals, which are well defined by stacked spicule series, appear to be of two sizes on the exterior and in the outer part of the interior of the sponge. The relative size differences are not apparent in the interior of the sponges. The smaller canals are approximately 0.2 to 0.25 mm in diameter at the exterior of a sponge 16 mm in diameter and gradually decrease in size toward the center of the sponge. The larger canals range from 0.3 to 0.5 mm in diameter on the exterior and decrease uniformly in diameter toward the center of the sponge so that in the inner third of the sponge differences in canals are small and most are 0.1 to 0.2 mm in diameter.

Small canals, even at the exterior, are outlined by 6 stacked series of spicules. These series are arranged in alternating fashion so that only three spicules are evident at any surface tangential to the sponge exterior. The larger canals at the exterior may have up to 18 stacked series surrounding the radiating canals, and in some of these the shape of individual spicules may be altered by abortion of one ray or by changes in lengths of the rays.

Spicules are moderately well preserved in some of the specimens and are typical tricanoclones, in which three sweepingly curved rays, the cladomes, are directed

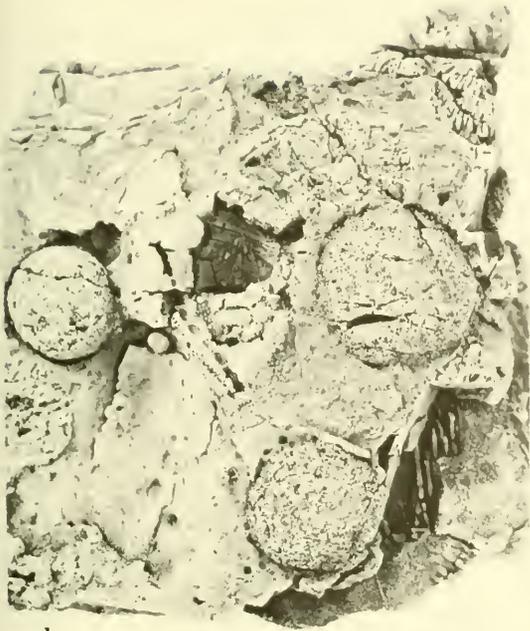
proximally and the fourth, the brachyome, is directed distally. The entire skeletal net appears like stacked series of distally gradually enlarging three-legged stools, placed so that the proximal rays of one level articulate with the center of the stool (the distal ray or brachyome) of the immediately interior or lower level. The spicule pattern for the genus has been well described and illustrated by Rauff (1894:335, pls. 15-17).

Tricanoclones of the Nevada specimens are characteristic of the sponge. Details of sculpture of particularly the normally nodose dorsal surface of each of the proximal rays is obscured by the two- or three-generation replacement preservation of the spicules. Separation of the rays of joining spicules is also difficult because of the preservation, which in most specimens is one of ghosts in chert or of variations in crystallinity in calcareous ones.

In the interior of the sponges, rays are up to 0.05 mm long from the spicule center to the flared ray termination. Some of these rays have maximum diameters of 0.03 mm, where they are thickest near their common origin but thin to less than 0.02 mm before flaring to meet the next interior series of spicules.

LOCALITIES.— Sponges from the Roberts Mountains were collected from the Emsian Bartine Member of the McColley Canyon Formation from a locality 4800 feet N 82°W from hill 7499, at elevation approximately 7,980 feet, in the east central part of Sec. 8, T. 22 N, R. 50 E, (unsurveyed) on the ridge between tributaries to Roberts Creek, northwest of the mouth of the canyon, on the Roberts Creek Mountain quadrangle, Eureka County, Nevada. The collections were made by Michael Murphy.

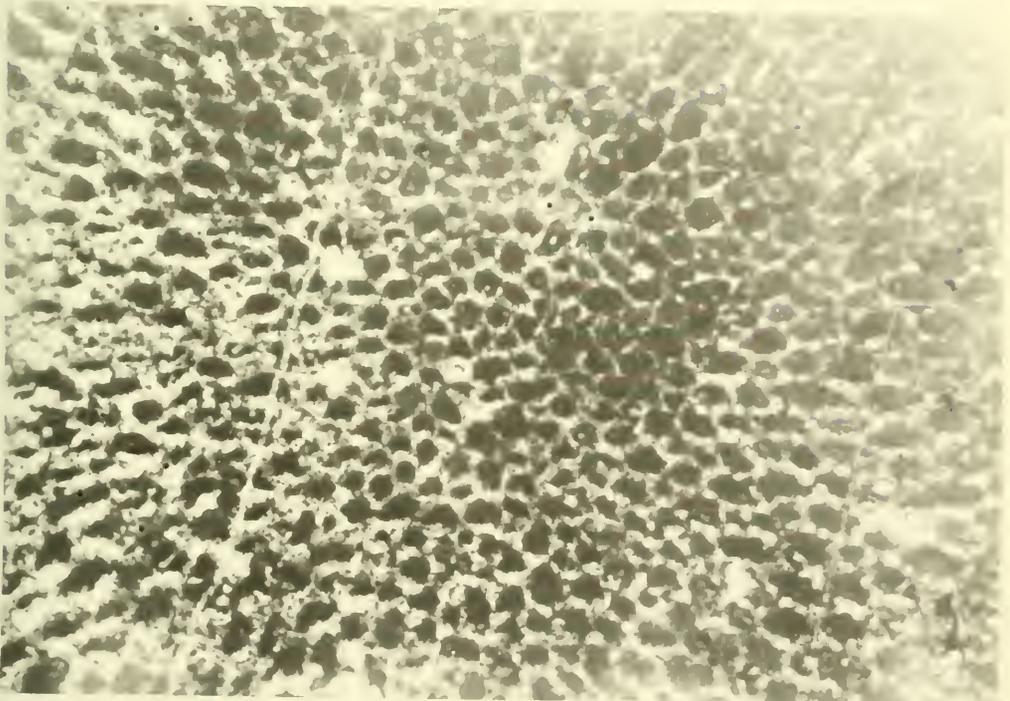
The other collections of Devonian *Hindia* came from Eifelian limestone exposed in the first canyon north of Bishops Canyon, approximately 2 miles and 2.5 miles northeast of Metropolis, and approximately 9 or 10 miles north of Wells, Nevada. The old site of Metropolis is shown on the Wells, Nevada 1:250,000 quadrangle sheet as approximately 4 miles west of where the road to Antelope Peak area crosses Bishops Creek, but the new location is near the crossing. The sponge localities occur in the central part



1



2



3

Fig. 2. *Hindia sphaeroidalis* from the Devonian of Nevada: (1) Hand specimen including three complete specimens of *Hindia sphaeroidalis* Duncan from the Emsian Bartine Member, locality 2. The spherical sponges are in a siliceous limestone; natural size. BYU 1377. (2) Photomicrograph of poorly preserved spicules of *Hindia sphaeroidalis* Duncan, as seen on a polished surface. The spicules are preserved as three-dimensional calcified ghosts in milky, translucent chalcidony; X40, BYU 1378. (3) Photomicrograph approximately through the center of a spherical *Hindia sphaeroidalis* Duncan, showing spicule tracts surrounding dark matrix-filled canals. The straight radiating canals are shown in transverse section in the central area but in diagonal section around the periphery; X10. BYU 1378.

of Sec. 22, T. 6 N, 4. 52 E, in Elko County, Nevada. The collections were made by W. Lee Stokes in 1951.

The Silurian specimen was collected by George Young from debris on a slope of Laketown Dolomite on Tunnel Spring Mountain, in Sec. 33, T. 23 S, R 17 W, or Sec. 4, T. 24 S, R 17 W, Burbank Hills quadrangle, Millard County, Utah.

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