

EARLY PENNSYLVANIAN, BASHKIRIAN, ECHINODERMS FROM EASTERN IRAN

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Carboniferous echinoderms were first reported from eastern Iran, northwest of Tabas, near Shirgesht by Flugel [1966]. Additional echinoderms were discovered in eastern Iran by Yazdi [1996] and briefly discussed by Webster et al. [2001]. Additional collection in 1998 by the members of the UNESCO_IGCP Project 421 and in 2000 by Yazdi, Maples, and Webster of three localities in the southern part of the Shotori Range near Howz-e-Dorah and the northwestern end of the Shotori Range at a locality near Shirgesht yielded an abundance of new specimens, including many microechinoderms in the Early Pennsylvanian, Bashkirian, Sardar Formation. These new collections are discussed herein.

In the southeastern part of the Shotori Range near Howz-e-Dorah the Bashkirian part of the Sardar Formation is nearly 100 m thick and consists of shallow shelf carbonates interbedded with shales and minor clastics. It was dated using conodonts by Yazdi [1996, 1999]. To the northwest, near Shirgesht, the Sardar Formation is a clastic deltaic sequence including one thin marine band. The marine band yielded the blastoid *Iranoblastus* Flugel, 1996 and was initially considered of Early Carboniferous age. The marine band and the crinoidal rich horizon near Howz-e-Dorah are considered essentially coeval based on some of the same macrocrinoids, microcrinoids, and a microblastoid occurring in both areas. Additional articulated echinoderm taxa are only recognized in one of the areas. Disarticulated echinoderm ossicles are common elements in washed residues and include some specimens common to both areas and other specimens known only from one of the areas.

The Howz-e-Dorah fauna is the most diverse and includes at least 1 blastoid, 6 camerates, 2 disparids, 8 cladids, 2 flexibles, and 1 echinoid in the megafauna and 1 blastoid and 5 crinoids in the microfauna. In addition to these taxa an estimated additional 40 genera of crinoids, and an asteroid are present in the Howz-e-Dorah fauna based on loose radial and other cup ossicles found in the residues. The Shirgesht fauna is less diverse and includes 1 blastoid, 2 camerates, 1 disparid, 1 cladid, and 1 flexible in the megafauna and 1 blastoid and 5 crinoids in the microfauna. In addition another 25 taxa are estimated to be present based on loose radial and other cup ossicles.

Genera in the megafaunas common to both areas include *Synbathocrinus*, *Platycrinites* and *Camptocrinus*. Columnals of the latter two genera are common in the washed residues, but cups are rare and known only from the Howz-e-Dorah area for *Synbathocrinus* and *Platycrinites*.

Radial plates in the residues are common and diverse. In the specimens from the Howz-e-Dorah area there is a moderately high percentage of specimens with the angustary and peneplenary radial facets on short to long protrusions on the distal part of the plates. These types of radial facets are not found in the Pennsylvanian cladid megafaunas. Although some late Paleozoic cladids have radial facets on short protrusions, most are flush and most are plenary. These specimens are not recognized as belonging to any of the identified megacrinoids in the fauna and are thought to probably be juvenile stages of taxa with flush or only slightly protruded radial facets of uncertain radial/facet ratios.

Specimens of *Amphipsalidocrinus* and *Passalocrinus* in the microfaunas of the Shirgesht area are thought to be the juvenile stages of *Platycrinites* and *Iranoblastus*, respectively. *Iranoblastus* has not been found in the Howz-e-Dorah area, but *Passalocrinus* specimens are present in the microfaunas. It is uncertain if these *Passalocrinus* specimens are the juveniles of *Iranoblastus* or an unidentified taxon.

Table 1

**Comparison of identified echinoderms from Howz-e-Dorah and Shirgesht localities,
Shortori Range, Iran**

	Howz-e-Dorah	Shirgesht
Blastoids		
<i>Iranoblastus</i>		x
<i>Passalocrinus</i> *	x	x
Crinoids		
<i>Platycrinus</i> spp.	x	x
<i>Culicocrinus</i> n. sp.	x	
<i>Camptocrinus?</i> sp.	x	x
Dichocrinid indet.	x	x
<i>Anphipsalidocrinus</i> *	x	x
<i>Synbathocrinus</i> n. sp.	x	x
<i>Epithalysiocrinus</i> n. sp.		x
<i>Catillocrinus</i> n. sp.	x	
<i>Alcimocrinus?</i> n. sp.	x	
Blothrocrinid indet.		x
<i>Dichostreblocrinus</i> sp.*	x	
<i>Desmacrocrinus</i> sp.	x	x
<i>Lampadosocrinus</i> sp.*	x	
<i>Litocrinus</i> sp.*	x	
<i>Trophocrinus</i> sp.*	x	
Allagecrinid 1	x	x
Allagecrinid 2*	x	x
Allagecrinid 3*	x	
ØBarycrinid indet.	x	
Ø <i>Rhysocamax</i> n. sp.	x	
Echinoids		
<i>Archaeocidaris?</i> sp.	x	

Asterisk (*) following name indicates microcrinoid. Ø — preceding name indicates columnal taxon

Several new species are recognized within these faunas and the range of *Culicocrinus* is extended upwards from the Late Devonian into the Early Pennsylvanian, whereas the range of *Epithalysiocrinus* is extended downward from the Early Permian into the Early Pennsylvanian. Most genera are reported for the first time from Iran extending their paleogeographic ranges.

References

- Flügel H.W.** *Iranoblastus*, a new Lower Carboniferous blastoid from Iran // Geological Survey of Iran Report 6. 1966. No 3. P. 55–57.
- Webster G.D., Yazdi M., Dastanpour M., Maples C.G.** Preliminary analysis of Devonian and Carboniferous crinoids and blastoids from Iran // Travaux de l'Institut Scientifique, Rabat. Séries Géologie et Géographie Physique (2000). 2001. V. 20, P. 227–232.
- Yazdi M.** Late Devonian–Carboniferous conodont biostratigraphy of the Tabas area. Unpublished Ph.D. dissertation, Macquarie University, Sydney, Australia, 1996. 200 p.
- Yazdi M.** Late Devonian–Carboniferous conodonts from eastern Iran // Rivista Italiana di Paleontologia e Stratigrafia. 1999. V. 105, P. 167–200.