PALYNOSTRATIGRAPHY AND PALAEOGEOGRAPHY OF THE GORGAN SCHISTS IN SOUTHERN GORGAN CITY (SOUTHEASTERN CASPIAN SEA), EASTERN ALBORZ RANGE, NORTHERN IRAN

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SUMMARY

The low-grade metamorphic rocks of the Gorgan Schists form high Mountains in the area to the southeast of the Caspian Sea. The Radkan study area is located, approximately 25 km to the south of Kordkuy city where the Gorgan Schist is well exposed. The Gorgan Schist is a green schist facies (prehnite-pumpellyite with temperatures 250°C). These low-grade metamorphic rocks have been considered Precambrian in age. The writer sampled a traverse in the Radkan area, in order to verify the exact age and palaeogeographic position of this part of Iran. All samples contain abundant acritarchs and chitinozoans as well as scolecodonts. In this study, 55 palynomorph taxa were recovered, consisting of 30 acritarch species assigned to 20 genera, and 25 chitinozoan species assigned to 15 genera. Based on the presence of well-known chitinozoan and acritarch species, a Late Ordovician (Caradoc-Ashgill) is assigned to the Gorgan Schists in the study area. The encountered chitinozoan species are assigned to the *Belonechitina robusta, Armoricochitina nigerica, Ancyrochitina merga, Tanuchitina elongate and Spinachitina* ***oulebsiri*** chitinozoan biozones which have been established for the North Gondwanan Domain. These chitinozoan biozones clarify affiliation of the southeastern Caspian Sea to the Gondwanan palaeo-provinces.

Keywords: Gorgan Schists, Late Ordovician, Northeastern Iran, acritarchs, chitinozoans

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The low-grade metamorphic rocks of the Gorgan Schists form high mountains in the area to the southeast of the Caspian Sea. These mountains are covered by dense forests on their northern flanks, whereas the southern flanks have sparse tree coverage. Therefore, geological observations are difficult on the northern flanks. The Radkan study area where the Gorgan Schists are well exposed, locating approximately 25 km southern Kordkuy. The Gorgan Schists cover an area approximately 110-125 km long and 2-10 km wide, and extends from Gorgan to Behshahr and Aliabad.

In general, the metamorphic rocks of Iran have not been properly studied and there is very little data available regarding the age of their protoliths as well as the metamorphic age. The metamorphic rocks consist mainly of phyllites, sericite-chlorite-schists, and quartzite. These low-grade metamorphic rocks have been considered Precambrian in age. However, the Gorgan Schists have been a puzzle and mystery in geology of Iran since the early days of its reporting (Afshar-harb, 1979; Delaloye, et al., 1981; Gansser, 1951; Hubber, 1957; Salehi-Rad, 1979; Stahl, 1911; Stampfli, 1978; Stöcklin, 1971; Tietze, 1877).

The Gorgan Schists are unconformably overlain by the nonmetamorphic and fossiliferous Jurassic limestone of the Lar Formation, but its lower contact is not clear because of the Radkan fault. The apparent thickness of the Gorgan Schist (considering folding and trusting) varies from place to place and ranges from 1800 to 2445 m. The author measured and sampled a traverse of the Gorgan Schists, in the Radkan area, in order to verify the exact age and palaeogeographic position of this part of Iran. One hundred ninety three surface samples were collected throughout the entire thickness of the Gorgan Schists. All samples contain abundant acritarchs and chitinozoans as well as scolecodonts. In this study, 55 palynomorph taxa were recovered, consisting of 30 acritarch species assigned to 20 genera, and 25 chitinozoan species assigned to 15 genera.

The identified acritarch taxa are geographically widespread and support the cosmopolitan nature of acritarch assemblages during the time interval representing by Gorgan Schists. Numerous diagnostic chitinozoans, including *Belonechitina robusta*, Armoricochitina *nigerica*, *Armoricochitina iranica*, *Ancyrochitina merga*, *Spinachitina bulmani*, *Hercochitina spinetum*, *Spinachitina oulebsiri*, *Tanuchitina elongata*, *Desmochitina minor*, *Plectochitina sylvanica*, and *Caplpichitina lenticularis* are present. Therefore, based on the presence of well-known chitinozoan and acritarch species, a Late Ordovician (Caradoc-Ashgill) is assigned to the Gorgan Schists in the Radkan area. Thus, there is a major hiatus between the Gorgan Schists and the non-metamorphic, fossiliferous limestones of the Lar Formation? encompassing the Late Paleozoic and Triassic strata.

This study marks for the first time chitinozoans and acritarchs from the Gorgan Schists. The encountered chitinozoan species are assigned to the *Belonechitina robusta, Armoricochitina nigerica*, *Ancyrochi-*

tina merga, *Tanuchitina elongate* and *Spinachitina oulebsiri* chitinozoan biozones which have been established for the North Gondwanan Domain (Paris, 1990; Paris et al., 2000). Based on these chitinozoan biozones, the northeastern Alborz Mountain Range (southeastern Caspian Sea) has been part of the Gondwanan supercontinent during the Late Ordovician.

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