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SILURO-DEVONIAN REEF COMPLEX OF GHUNDAI SAR AND VICINITY, JAMRUD, KHYBER AGENCY

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A Siluro-Devonian 'reef complex', striking east-west, and dipping in a northward direction, is exposed to the north of Jamrud Fort along the Warsak Canal (Fig. 1). The 'reef complex' forms the entire Ghundai Sar hills and comprises four distinct units:

4. Gray and yellowish-gray dolomitized quartzites
3. Reef breccia and talus
2. Reef core
1. Phyllites and crinoidal limestone

Units 2 and 3 represent the characteristic structural layers of a reef.

1. Phyllites and crinoidal limestone:

This unit is the oldest exposed formation. It comprises mainly phyllites, chloritic phyllitic-schist, and crinoidal limestone, interbedded at various stratigraphic levels. The entire unit is yellowish-gray in colour, except where chloritic schists occur. The chlorite-bearing phyllitic-schist is grayish-green in colour. The thickness of the unit is approximately 300 to 400±ft.

The phyllites (originally shales), along with the interbedded crinoidal limestone, provided a sea bed upon which reef growth took place. The same type of formation occurs in the Nowshera reef complexes (mainly on either side of the Nowshera-Risalpur Road and in the main ridge north of Akora Khattak. Stauffer (1968) and Teichert and Stauffer (1965) have named this formation the Kandar Phyllite.

On the basis of lithological and palaeontological evidence, the writer equates this formation wth the Kandar Phyllite and accordingly assigns it a late Silurian age. The characteristic brachiopods, rugose corals, and tabulate corals found in the overlying 'reef core' are conspicuously absent from the limestone strata interbedded with the phyllites. Although tabulate and rugose corals are not usually associated with argillaceous facies, such organisms would, if present, be found in the limestone strata, as well as the crinoids. As they are lacking in the limestone strata also, the writer firmly believes that the Kandar Phyllite here, as at Nowshera, is older than the main reef limestone; the contact between them could be an unconformity.

2. The reef core:

The 'reef core', the next oldest formation, overlies the Kandar Phyllite, from which it differs both in lithology and palaeontology.

The 'reef core' comprises pink to grayish-pink and dark gray siliceous crystalline limestone, dolomitic limestone, and dolomite. It is characterized by encrusting and interlocking fauna, mainly stromatoporoids, tabulate corals, rugose corals, brachiopods, and abundant crinoid stems and columnals. Large orthoconic nautiloids are also present.

Although most of the fossils have been destroyed or obliterated either by recrystallization or dolomitization, some are still well preserved and can be readily recognized. Among the best preserved are massive and dendroid *Favosites*, *Cladopora*, and crinoid stems and columnals. Stromatoporoids and orthoconic nautiloids are almost entirely recrystallized. Skeletal details are almost always obliterated. White patches and grayish-white conical bodies represent the stromatoporoids and nautiloid cones.

The original granular texture and the cavernous spongy nature of the reef core seem to have been connected with the destruction of many of the fossils. Without exception, every reef core was originally a cavernous and spongy body, extremely vulnerable to the dolomitization and recrystallization responsible for destroying most of the fossils.

Cavities filled with clayey, silty, and sandy material are abundant within the reef core as in the cores of the Nowshera reef complexes (Ali and Anwar, ibid). Stringers of quartzite of gray colour are abundant within it; their occurrence is not confined to a particular straigraphic level.

The reef core has been converted to marble at various levels. The frequency of occurrence of marble increases towards the north with increase in grade of metamorphism. The marbles are of better quality than those of the Nowshera complex.

Soapstone deposits (Abbas *et al.*, 1967, pp. 300-303) occur associated with igneous intrusions of doleritic composition; these intrusions cut across both the Kandar Phyllite and the reef core.

3. The reef breccia and talus:

The youngest formation within the 'reef complex' is the reef breccia. It is composed mainly of angular fragments of carbonate rocks and fossil debris derived from the reef core.

On the basis of lithological and palaeontological similarities and stratigraphic disposition, the writer equates units 2 and 3 with the Nowshera Formation and accordingly assigns it a Devonian age.

4. Gray and yellowish-gray dolomitized quartzites:

The reef breccia is conformably overlain by gray and yellowish-gray dolomitic quartzites; these are finely laminated and rarely ripple-marked.

In the writer's opinion these quartzites represent the Misri Banda Quartzite (Teichert and Stauffer, 1965; Stauffer, 1968) which is prominently exposed in Kandar village, and north of Akora Khattak. Their relationship wth the 'reef core' and 'reef breccia' appears to be diachronous (Ali and Anwar, ibid).

Conclusion.

In the writer's opinion, the Siluro-Devonian reef complex at Ghundai Sar is part of a reef belt which formerly extended over a much larger area, perhaps into adjacent countries (Durkoop *et al.*, 1967). The reef complexes of the N.W.F.P. region may correlate with the Muth Quartzite, of Siluro-Devonian age (Ali and Anwar, ibid).

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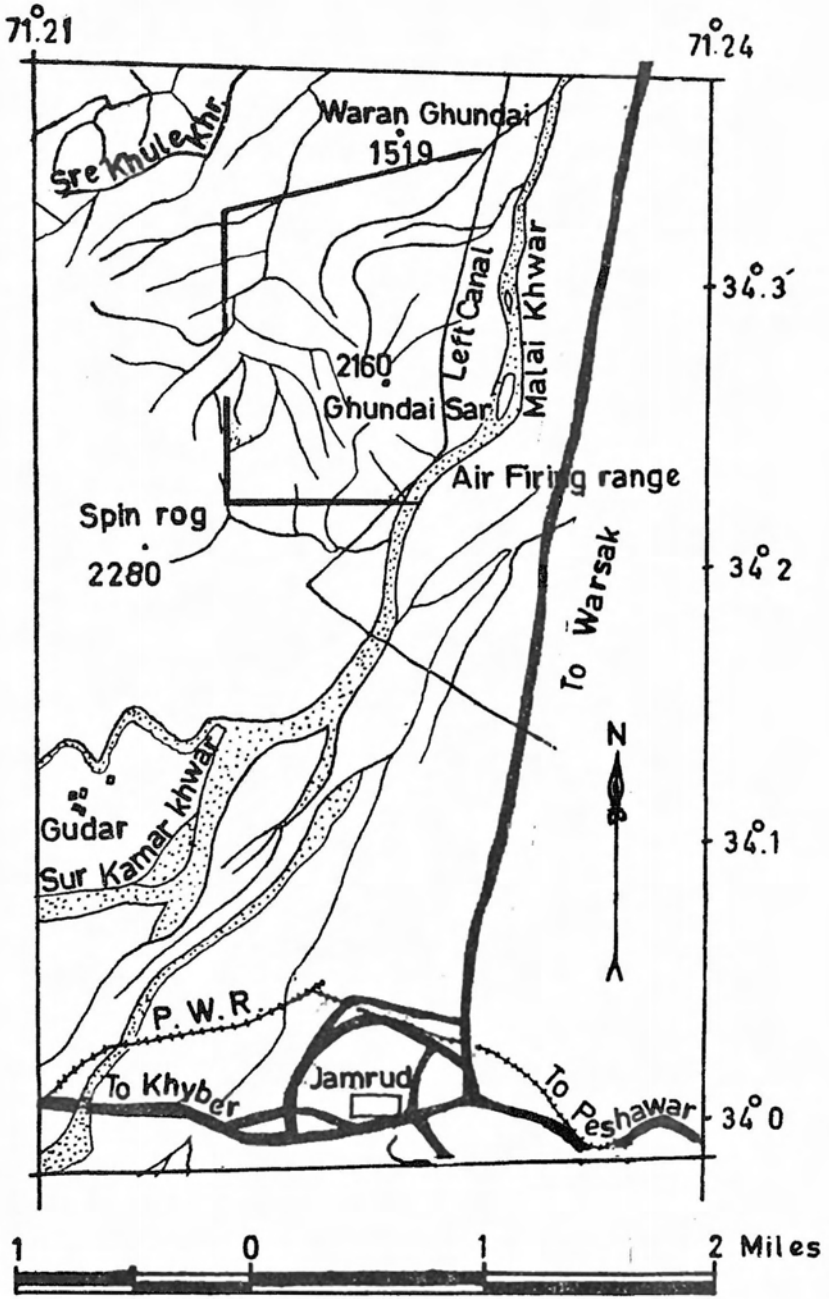

Fig. 1. Map showing location of Ghundai Sar and vicinity where Silurian Devonian : Reef Complex exposed.