

GEOLOGICAL MAP OF IRAN
1:100.000 SERIES
SHEET6851-KAMRUD

The northern border of the quadrangle is 100 km south of Yazd. Most of the sheet area is flat. With altitudes between 1500 and 1700 m. Only the northwestern and southeastern parts are of moderately high relief. The highest peak is kuh-e-Allah (2120 m.). Accessibility of the terrain is easy by vehicles, although the road pattern is poor. One important motorable track traverses the sheet from south (Marvast, out of sheet) to north. Reaching the Shiraz- Yazd road. The only inhabited area is in the southern most part of quadrangle.

REVIEW OF FORMATION

A small volume of PALEOZOIC-MESOZOIC? Rocks occur in the extreme southwestern corner of the quadrangle. They are grey-greenish meta-greywackes with small lenses of grey crystallized limestone. COLOURED MELANGE appears as a large belt crossing the sheet from SE to NW. The character of this peculiar assemblage of rocks is essentially the same as in other parts of the Kerman region.

The oldest rock unit is sporadically occurring exotic basement blocks, mostly from the permo-Carboniferous complex. One block of quartzitic sericite schist and several smaller blocks of calc schists occur in the northern and central parts of this belt. They are somewhat tectonized, but the strike of the schistosity remains the same as the trend of the belt itself.

Tuffitic sandstones have been distinguished only in two areas where they are predominating over other rocks, but at many other places they also crop out. In the very fine-grained, mostly unidentified matrix, chlorite, epidote grains with opaque powdered material, then angular particles of quartz and feldspar (albite) have been immersed. Some are of fine bedded structure with alternating sandstone and chert, containing radiolaria.

Interbedded in this sequence are dark red layers of radiolarites 2- 10 m thick. They are composed of crypto- crystalline ferruginous siliceous material with remnants of radiolaria. The great majority of these fossils are confined to spherical forms. According to Y-shaped skeletal fragments assigned to *Meyenella meyeri*, only tertiary age can be excluded. Other forms of *Nassellina*- type can be recognized, probably belonging to the genera *Distyomitra* and *Stichocapsa*. Indicating probable senonian age.

Limestones are very conspicuous and are distributed throughout the belt. In the southern part of the belt large elongated masses are present measuring up to 25 km in length. they are light grey, greenish-grey, pink. and yellowish in colour . In one sample from the extreme southeastern part of the zone the following microfauna, san-tonian-Campanian in age, has been determined: *Globigerina* sp., *Heterohelix* sp., *Globotruncana lapparenti tri-carinata* (Quer.). *G. lapparenti lapparenti*.

Spilites, diabase-splites, and their pyroclastics are very common. these usually massive rocks are black to grey-greenish in colour, being not readily distinguishable from other rock units of the magmatic sequence. the diabase- spilite is of intersertal texture, with rare phenocrysts of albitized basic plagioclase. Interspaces between the laths of feldspar are filled with chlorite.

Some grains of zoisite are present also. Agglomerates are composed of coarse angular particles of diabase-splite and phenocrysts of highly altered feldspar, immersed in a recrystallized glassy groundmass. Many cavities filled with chlorite are also present.

Ultrabasic rocks constitute one of the most widespread magmatic units. Serpentinized occur along the northeastern border of the zone. These are highly serpentinized harzburgites, containing relicts of rhombic pyroxene.

A dense network of veinlets filled with calcite and huntite (Ca, Mg carbonate) marks a later episode of alteration. Thus, it is supposed that these serpentine masses form the oldest rock unit in coloured Melange. On the map are shown only two distinctive masses of serpentinite injected by thousands of small gabbroic bodies. Dykes or small intrusive masses of dunite, which, are not presented in the map, are confined to a later magmatic event (gabbrodiorite sequence). They are massive rocks, olive-grey in colour, with anhedral- granular texture, composed mostly of slightly serpentinized olivine, then of hypersthene, and fine lamellar diallage.

Quartz-keratophyre occurs as a single mass in the central part of the zone (southwestern border). This is a massive rock, greenish in colour, with porphyritic texture. The metaspherulitic groundmass, composed of fibrous albite, contains phenocrysts of euhedral albite and corroded quartz.

Rocks of the gabbro-diorite- plagioclase-granite sequence cut all other rock units of the coloured Melange. In hard specimen, the gabbros and diorites are not distinguishable from one another. They are massive rocks, dark grey to light grey in colour, with subhedral-granular texture. The gabbro is

composed mostly of basic plagioclase and slightly uralitized diorite. The rock is highly prehnitized. The diorites are fine-grained and composed mostly of altered plagioclase and hornblende. Plagioclase granite occurs only in the southeastern part of the belt. It is a medium-grained light-grey rock, composed of albite-oligoclase, biotite, and hornblende. Rocks of this magmatic succession, which includes some ultrabasic members as well as transitional types of all other rocks, appear mostly as small intrusive bodies. Bigger masses were noted in the extreme northeastern parts of the zone.

THE EOCENE SEDIMENTARY VOLCANOGENIC COMPLEX occupies the northern part of the quadrangle. It consists mostly of marls, tuffitic sandstone, and conglomerates, with rare interlayers of lava flows and agglomerates.

The lowest member of the series consists of marls with interlayers of sandstone, which contains grains of feldspar, biotite, and quartz, derived from rocks of coloured Melange. In this unit the following microfauna has been found: *Globigerina cf. boweri*, *G. cf. parva*, *G. triloculinoides*, *cf. Globigerinoides*, *truncorotalia pseudotopilensis*, *T. crassata*, *T. crassiformis*, and *cibicides cf. truncates*. This fossil assemblage ranges from the upper part of the lower Eocene to the lower part of the middle Eocene.

The marls are overlain by a flow of trachyandesite 50m thick. Anhedral phenocrysts of highly sericitized acidic to intermediate plagioclase are immersed in a cryptocrystalline groundmass. The mafic constituents are completely altered. Chlorite and sericite, as secondary minerals, are abundant.

The thick overlying series of sandstone, conglomerates and marls contains at the base one layer of andesite-basaltic lava flow with agglomerate, the whole being several hundred meters in thickness. The essential constituents of the andesite-basalt are chloritized euhedral phenocrysts of basic feldspar, and are augite. The sandstone is coarse-grained, composed mostly of feldspar and fragments of andesite rocks, with much carbonate in the matrix. Conglomerates occur within the sandstone as interstratified bodies having no sharp limits. They are composed of rounded pebbles, 5-10 cm in diameter, mostly of andesitic rocks, at some places limestone, derived, from the coloured Melang. The series grades up into a thick sequence of marls with layers of tuffitic sandstone, 0.2 -1 m thick. It is virtually barren of fossils, but one redeposited nummulite (*N. cf. globules*) was found in the lower part of conglomerate sequence, is stratigraphic range extending from lower to Middle Eocene.

The thickness of the Eocene complex is assumed to reach some 2000 m. in the extreme NW of the quadrangle, the sediments of this complex are cut by several diorite-porphyrite dykes with northerly strike, the rock is composed of feldspar laths (intermediate in composition) and hornblende, with are phenocrysts of augite.

Along the northern border of the sheet occurs a NEOGENE series of red grey conglomerates. Red mudstones in the bottom of the series include layers of red sandstone and gypsum with salt. The mudstone gradually passes upwards into well-bedded grey conglomerates and sandstone, the beds range in thickness from 0.5 m to 5 m. intercalations of gypsum are also present. The beds dip gently to moderately steeply to the southwest. Almost horizontal beds of similar sandstones and conglomerates overlie them unconformably. All of these clastic sediments are composed of well or partly rounded pebbles, derived from the coloured mélangé, mostly from the gabbro-dioritic rocks.

In the Northwestern corner of the sheet are peculiar PLIO-PLleistocene sediments. At the bottom crop out strata composed of angular or poorly rounded fragments of reddish andesite-basalt or red marl derived from the Eocene sedimentary volcanogenic complex and cemented by clay and gypsum. Whitish breccia-like sediments, consisting of angular fragments of plio-pleistocene dacite-andesitic rocks, conformably overlie them. They form a plate, some 50 m thick, dip very gently towards the south.

Both the Neogene Plio-Pleistocene sediments are covered by tuff-like loose sandstones and conglomerates cover both the Neogene and plio-pleistocene sediments with semi-rounded pebbles cemented by whitish soft carbonaceous material.

In the eastern part of the quadrangle, an isolated hill of pinkish dacite-andesite rises out of the dasht. The rock contains euhedral phenocrysts of opacitized hornblende, and sporadic anhedral phenocrysts of quartz. It was confined strictly to plio-pleistocene volcanic activity of Aj-type, whose products are widespread in the neighbouring dehaj sheet.

Aeolian silts (loess), yellow in colour, are found in the extreme southwestern corner of the quadrangle. They incorporate also intercalations of poorly lithified conglomerates, cemented by soft carbonaceous material.

Most of the mapped area is covered by QUATERNARY and RECENT dasht-type sediments, including salt flats (kavir) as well as sand flats with more or less stabilized dunes.

TECTONICS

The most important tectonic feature in the large zone of coloured mélangé which constitutes a distinct geotectonic unit. Rocks of this unit were initially deposited in a deep oceanic graben, which being later strongly compressed, was reducing in width to some 20 km. the zone was affected by rejuvenated longitudinal faulting of regional magnitude. Most strata, as well as some of the faults, dip to the southwest. Blocks of competent rocks were mostly tilted and broken apart. These features could exemplify the thrust-fault structure of coloured mélangé.

The Eocene sedimentary volcanogenic complex is separated from the coloured mélangé by high-angle faults. Processes of compressions, which have produced minor folds of NW-SE trend, have also affected it. Neogene sediments show monoclinial structure.

MINERAL OCCURRENCES

On the northern border of colored Melange (Kuh-e-Bafti) there is a very extensive superficial deposit of soft white Mg-Ca carbonate-huntite.