

ON THE STRATIGRAPHIC POSITION OF THE SIMLA SLATE AND CHAIL OF THE SIMLA AREA

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IN the areas to the north of Simla, Pilgrim and West (1928) mapped the slates occurring above the Naldera limestone and below the Chail thrust as Simla slates. The limestone-slate alternations, underlying the Naldera limestone with an 'apparently normal contact' and above the Shali thrust, were considered to be of the lowest stage of Chail series. These authors assigned a Purana age to the Chail, and Lower Paleozoic to Pre-Cambrian to the Simla slate.

In 1939 in his paper on the 'Structure of the Shali Window' West observes: "Very careful examination of the zone of rocks that forms the base of the Simla slates and the top of Lower Chails, right across sheet 53 E/4, has failed, however to reveal any break in the sequence....., it is therefore tentatively concluded that the two are one and the same series, the Simla slates at and north of Simla representing the Middle and Upper Chails" (*Rec. Geol. Surv. India*, Vol. 74, Pt. 1, p. 161).

Recent examination of this area by the authors, while confirming the above conclusion reached by West, brought another important geological fact into light, namely, the whole sequence rests in normal superposition over a considerable thickness of Trap. This is well exposed on the Bhal Ki Dhar to the northwest of Tattapani ($31^{\circ} 15' : 77^{\circ} 05' 30''$). Here the basal part of 'Chail' is separated from the Trap by a boulder bed with thickness varying from 2 ft. (as on the Tattapani-Karsog road one mile from Tattapani) to nearly 50 ft. as

near Bui ($31^{\circ} 18' 20'' : 77^{\circ} 0' 40''$), suggesting an unconformity at the top of the Trap. The boulders are well rounded and chiefly consist of white quartzite with trap detritus as matrix. West (1938, *Rec. G.S.I.*, Vol. 73, p. 96) considered that this Trap is a representative of the Panjal Trap of Carboniferous age.

At the top, the Simla slate is unconformably overlain by Nummulitics in several small erosion outliers between Halog and Subathu. Preliminary faunal studies have indicated an Upper Paleocene age to the Nummulitics of this region. This would mean, that, what has been mapped as Simla slate and Chail below the Chail thrust to the north of Simla, constitute a single group of rocks and are intermediate in age between the Trap (? Panjal Trap-Carboniferous) and the Nummulitics (Upper Paleocene). It is of interest to note here that the Kakarhatti limestones show collenia-type growths and on this basis have been correlated with Shali Limestone by Misra and Valdiya (1961, *Journ. Geol. Soc. Ind.*, Vol. 2, pp. 78-90). If this data is reliable, it is possible that the Trap below the Simla slate may not be time equivalent of the Panjal Trap but older to it.

The sequence between the Trap and the Nummulitics can be divided into four mappable rock-stratigraphic units on the basis of vertical variation and horizontal persistency in lithology. Table I gives the stratigraphic and tectonic sequence established by the authors along with the one given by Pilgrim and West (1928) and West (1939).

TABLE I
Authors: Pilgrim and West (1928); West (1939)

Chail of Simla Klippe		Chail Series
Chail Thrust	Paleocene	Chail Thrust
Nummulitics		Nummulitics
Unconformity		Unconformity
Simla slate	Shales with minor quartzite	Simla slates
Kakarhatti formation	Limestones and shales	? ?
Bui formation	Shales and gritty quartzites Boulder bed	Lower Chail
Unconformity		
Samana formation	Trap with intertrappean quartzites	
Shali Thrust		Shali Thrust
Shali Group		TRAP Shali Group

On the basis of the above observations, it is suggested that the usage of the term 'Chail' should be restricted only to the more metamorphosed rocks; talcose quartzites, quartzschists and phyllites of the Chor area where Pilgrim and West first recognised them as a separate unit. With the existing status of geological mapping in this part of Himalaya,

it is not possible to say whether or not what has been mapped as Simla slate in the Chakrata area and further east are time equivalents of the Simla slate of Simla.*

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RARE CHIMAEROID AND ELASMOBRANCH FISHES FROM THE CONTINENTAL SLOPE OFF THE WEST COAST OF INDIA*

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ABSTRACT

During exploratory trawling from the upper continental slope in depths between 180 and 450 metres off the West Coast of India, specimens of the Chimaeroid fish *Neoharriotta pinnata* (Schnackenbeck) and the rare elasmobranchs *Echinorhinus brucus* (Bonnaterre) and *Atractophorus armatus* Gilchrist have been obtained. All three are new distributional records for Indian Seas and they are described and illustrated.

DURING exploratory trawling from the upper continental slope in depths between 180 and 450 metres carried out by R.V. VARUNA and other vessels, several interesting fishes and invertebrates hitherto unknown from Indian Seas have been brought to light. Three such interesting finds are: a chimaeroid fish *Neoharriotta pinnata* (Schnackenbeck) (Subclass Holoccephali, Family Rhinochimaeridae) and two deep-water sharks, namely *Echinorhinus brucus* (Bonnaterre) (Family Dalatiidae), and *Atractophorus armatus* Gilchrist (Family Squalidae). Specimens of *N. pinnata* have hitherto been caught only from the equatorial coast of West Africa and South-West Africa (Smith, 1961). An egg case suspected to be of this species was reported from the southwest coast of India (Balakrishnan, 1963). We have been able to obtain two such egg cases and the present definite record of adults of *N. pinnata* from this area helps to confirm the identification of the egg cases.

E. brucus is known to inhabit deeper waters in the warm seas (Bigelow and Schroeder, 1948; Smith, 1961), while *A. armatus* is known to occur in the deeper waters off Natal Coast and Mozambique (Smith, 1961). Brief diag-

nosis of each species accompanied by outline drawings are given here to facilitate identification.

Neoharriotta pinnata (SCHNACKENBECK, 1931), FIG. 1a

Two adult females from 12° 17' N, 74° 13' E, depth 360 m, on 24-5-1968; and five juveniles (2 males and 3 females) from 12° 12' N, 74° 10' E, depth 396 m, on 24-5-1968, both during R.V. VARUNA Cruise 128; two empty egg cases from 10° 53' N, 75° 08' E, depth 180-206 m, on 27-4-1968 during R.V. VARUNA Cruise 127.

Diagnosis of Adults.—Total length 1125 and 1240 mm. respectively. Head 32.7-33.5, trunk height 33.3-33.7, snout length in front of eye 21.3-23.2, and in front of mouth 18.7-21.1, oblique diameter of eye 3.1-3.6, inter-orbital distance 4.6-4.9, width of gill-opening 5.7-5.8, first predorsal distance 32.6-33.9, second predorsal distance 50.7-51.2, prepectoral distance 33.2-34.6, prepelvic distance 50.1-50.2, preanal distance 71.2-73.0, height of first dorsal fin 11.1-11.5, length of pectoral fin 14.2-14.9, length of pelvic fin 9.9-10.0, length of anal fin 5.7-6.1, length of upper caudal lobe along caudal base 22.1-22.7, and lower caudal base 22.6-22.9% of total length. Weight 3.4 and 4.75 kg. respectively.

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