

## MESOZOIC AMMONITES FROM THE SPONG VALLEY, ZANSKAR, N. W. INDIA

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### Abstract

A Callovian-Oxfordian sphaeroceratid, (?) *Prograyiceras*, proves for the first time, the presence of Jurassic flysch in the allochthonous Spongtang Klippe. A berriasellid, ?*Kilianella*, similarly proves the presence of probable Valanginian in the autochthonous shelf sequence of the Zanskar range, and supports the presence of the (upper) Spiti Shale hitherto recognized in the area on lithological grounds.

Despite much recent work on the Ladakh area, few ammonites have been recorded from the Mesozoic sediments. Though the presence of Triassic and Cretaceous has been well established, not only for the Mesozoic carbonates but also for the Mesozoic clastic units (Fig. 1, Gupta and Kumar, 1975; Shah *et al.*, 1976; Frank *et al.*, 1977; Fuchs, 1979), evidence for Jurassic units has been meagre.

Within the carbonate sequence of Zanskar, Mesozoic units from Triassic to Lower Jurassic have been well-established (Nanda and Singh, 1976; Fuchs, 1979). However, Upper Jurassic and younger units have been described as Spiti Shale, etc. purely on lithological analogy to apparently similar units in Spiti to the east (e.g. Fuchs, 1979). Upper Cretaceous has also been widely recognized (Bassoulet *et al.*, 1978a; Gaetani *et al.*, 1980). The only Upper Jurassic record is a 'possibly *Perisphinctes*' from the Lach-lung pass, near Gya, east of Leh (Gupta *et al.*, 1970).

Within the flysch units, Upper Triassic (Norian) is represented by one ammonite, possibly *Tibetites*, found just south of Lamayuru by Fuchs (1979), and by mid-to late-Cretaceous microfaunas recorded from limestone interbeds and cherts of the Dras volcanics and ophiolitic melanges of the Indus Suture zone (Mamgain and Rao, 1965; Shah and Sharma, 1977). Bassoulet *et al.* (1978b) described early Scythian (Lower Triassic) ammonites associated with an exotic limestone block within the melange north of Lamayuru.

Two ammonites, found loose in the Spong river valley in 1979, extend the record of Jurassic sediments in the Zanskar area, and confirm the presence of Spiti Shale (inferred by Fuchs 1979, to be present on lithological grounds) and the presence of Jurassic flysch in the Spontang Klippe (Fig. 1, Fuchs, 1979). The Valanginian (or ?Tithonian) berriasellid ?*Kilianella* was found loose in a stream bed draining a syncline of Kioto Limestone, overlain by shale and limestone referred to the Spiti Shale. The Oxfordian (or ?Callovian) sphaeroceratid (?) *Prograyiceras*, was found loose on the side of a small valley cut into flysch units of the Spongtang Klippe. The specimens do not appear to have been moved far, since they have angular edges and have lithologies that are identical to those of the rocks surrounding the sites where they were found.

The ?*Kilianella* supports the earlier, reasonably established correlation on lithological grounds with the Spiti Shale and indicates the youngest part of that formation. The (?) *Prograyiceras* is of more interest, as being the first undoubted Jurassic ammonite recorded from the allochthonous flysch of the Spongtang Klippe, and the Indus Suture zone.

In view of the extreme rarity of ammonites from the Zanskar area, it seems worthwhile describing them below. Palaeontology of Ammonitina by G. E. G. Westermann.

Family: SPHAEROCERATIDAE Buckman, 1920

(?) Subfamily: MAYAITINAE Spath, 1928

(?) *Prograyiceras* sp. indet. ♂ [microconch]

Plate I, Fig 1.

*Material*: One medium-size body chamber (103 mm max.) of about 3/4 whorls crushed and slightly distorted, right side largely destroyed. Matrix of poorly sorted, fine-grained quartz sandstone ('graywacke'). From locality B.

*Description*: This is almost certainly a complete adult body chamber of a microconch because of its length (3/4 whorls) and modification in coiling and ornament.

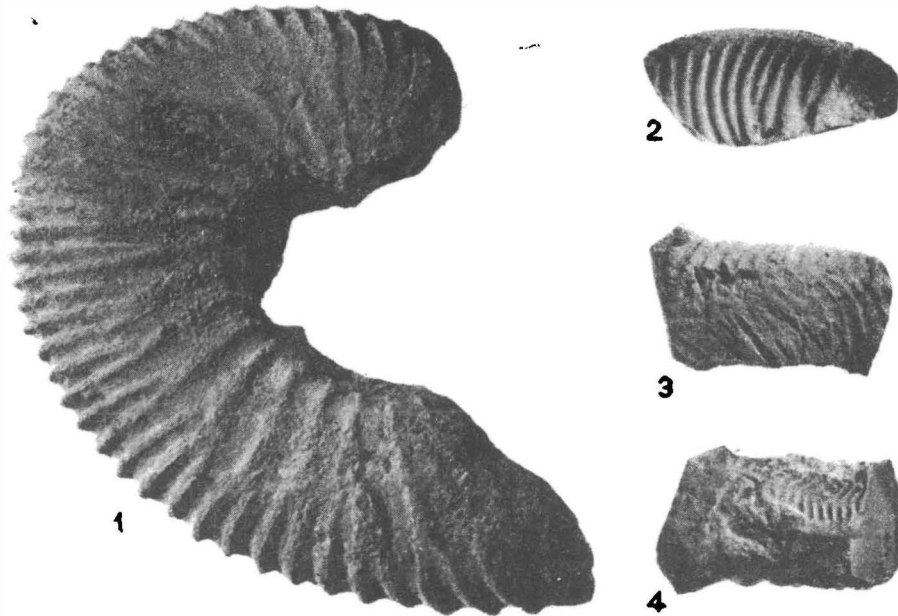
The original whorl section was probably somewhat compressed ovate. The coiling of the body chamber changed from rather involute to evolute with the marked elliptic possibly owing to, or enhanced by, deformation and/or crushing. The ornament consists of approximately rectiradiate costae with mid-lateral bifurcation, some irregular fasciculation and a few intercalatories of uneven length, without tubercles. The primaries and secondaries are of similar prominence and become more widely spaced and broader toward the aperture where the secondaries surpass the primaries. The secondaries increase in prominence toward the venter which they pass markedly convex, at least toward the end of the body chamber (the ventral curvature on the first half whorl may partly, or perhaps entirely be due to deformation during crushing).

*Discussion*: This is a microconch of either the Early Callovian Macrocephalitinae or the Middle to Late Oxfordian Mayaitinae. While these taxa can rarely be distinguished with certainty without preserved septal suture (or predetermined age), the coarse and highly prominent and projected secondaries and the occurrence of irregular fasciculation indicate the latter subfamily.

The mayaitine microconch *Prograyiceras* Spath 1928, type species *P. grayi* Spath from the Dhosa Oolite of Kachchh ('Kutch') in Gujarat State, strongly resembles our specimen; and the same is true for the fragmentary holotype of '*P. traumanense*' Spath. The taxonomic position of *Prograyiceras*, however, hardly deserves generic rank, since it appears to intergrade with the more compressed and more finely ornate *Paryphoceras* Spath 1928 and (?) *Grayiceras* Spath, 1924 on the one hand and the more depressed and ornate ('coronate') *Dhosaites* Spath 1924, on the other. All appear to be of approximately the same age, i.e. middle to late Oxfordian, and comprise the microconchs to the associated macroconch taxa *Mayaites* Spath 1924 and (? subgenus) *Epimayaites* Spath 1928. Although there is a good possibility that all belong to a single, closely interrelated and dimorphic species group of the genus *Mayaites*, much new taxonomic work on stratigraphically controlled collections is needed to synonymize the existing genus-group names. Spath's over-split classification is therefore retained here.

Mayaitinae are a common element in the Middle and Late Oxfordian of the Indo-West Pacific province, from East Africa and Madagascar in the southwest to the Attock district near Salt Range and the Spiti-Niti area in the Himalayas in the Northwest to the Moluccas and New Guinea in the east (cf. Arkell, 1956). While the Kachchh record is extremely rich (Spath 1924, 1928-33), previously identified

PLATE I



BROOKFIELD: MESOZOIC AMMONITES, ZANSKAR

Figure 1. — (?) *Prograyiceras* sp. indet. ♂ [microconch]. Adult body chamber from locality B. Lateral view,  $\times 1$ .  
Figures 2-4. — ? *Kilianella* sp. indet. Whorl fragment from locality A. Lateral, ventral and dorsal views,  $\times 1$ .

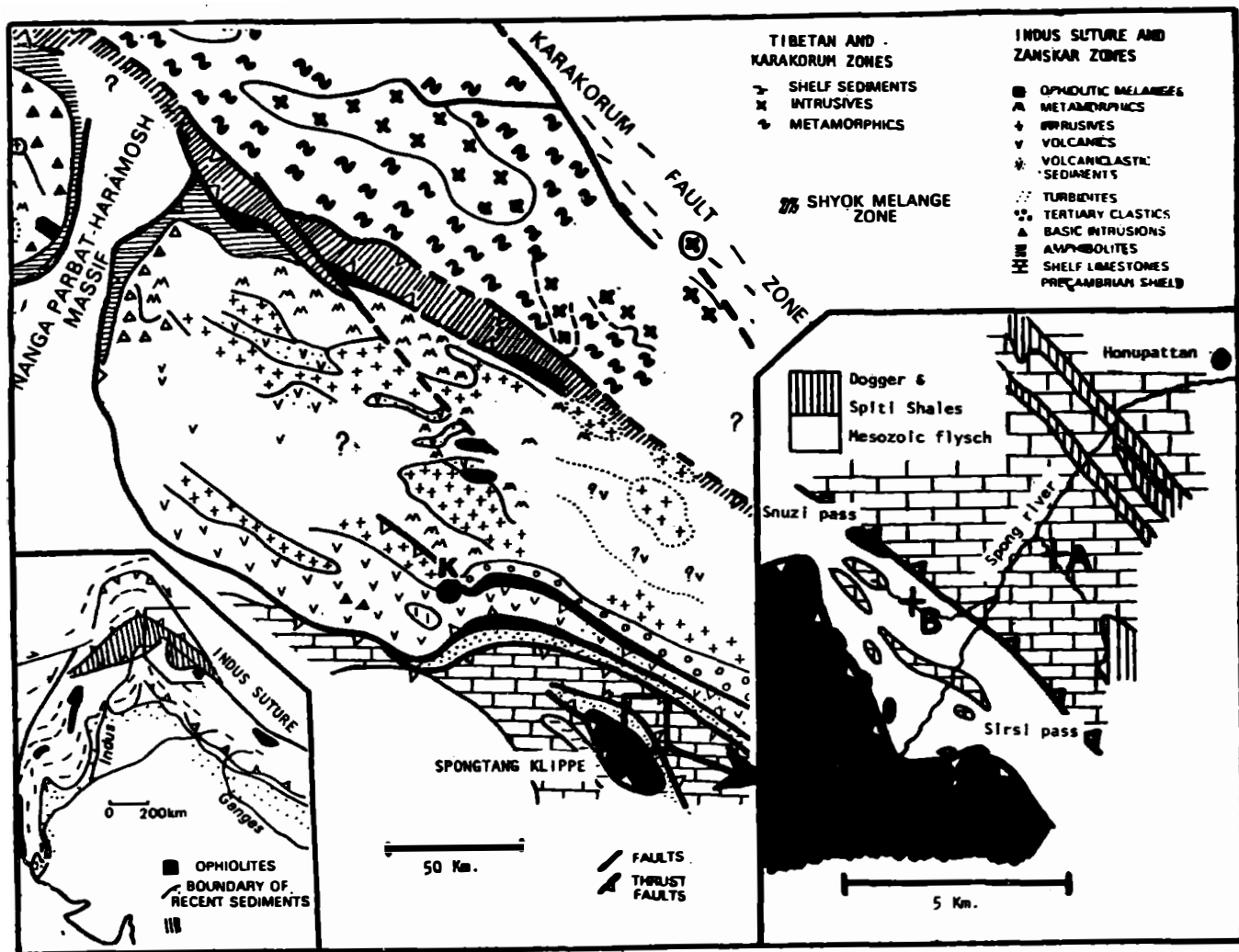


Figure 1. Geological map and location of specimens. Right inset - detailed map of Spong valley area. A and B are specimen locations. K - Kargil village.

Himalayan mayaitines are usually relatively rare and based on incomplete specimens or nuclei with poor stratigraphic record. These include typical *Mayaites* (Spath, 1934); the type species with holotype of *Grayiceras* (Uhlig, 1910, pl. 46A, figs. 1a, b) which closely resembles specimens from the *Mayaites* assemblage of the Sula Islands (cf. *M. cocosi* (Boehm), (unpublished); and the incomplete, probable Oxfordian '*Macrocephalites*' [*Mayaites?*] *waageni* Uhlig and *kitcheni* Uhlig (1910, pl. 77; cf. Spath 1933, p. 804) from the basal Spiti Shales which one of us (G.W.) was able to reexamine at the Geological Survey of India.

*Prograyiceras* was recorded in two unique specimens and species (!) from the Upper Oxfordian Kantkoote Sandstone (usually included in the upper part of the Dhosa Oolite) of Kachchh (Spath, 1928, p. 719).

The other record, but without stratigraphy, of a similar coarsely ornate micro-conch is from the Sula Islands, Indonesia, i.e. *P. bambusae* (Boehm, 1907, pl. 25, figs. 1a, b). The recent reexamination of the type section of Wai Galo, however, did not yield this species *in situ* (Sato *et al.*, 1978).

*Age*: (? Early Callovian or) Middle to late Oxfordian.

Family: BERRIASSELLIDAE Spath, 1922

? *Killianella* sp. indet.

Pl. I, Figs. 2-4.

*Material*: One small whorl fragment (36 mm max.) with ventral impression of penultimate whorl; left side crushed and inner flanks (whorl overlap) missing; septal suture and ontogenetic stage unknown. Matrix is a silty sparse biomicrite (calci-lutite). From Locality A.

*Description*: The whorl section appears to have been ovate with rounded venter; the coiling is unknown. The ornament has the outer remnants of prorsiradiate bullae-like fasciculations at and below mid-flank and of secondaries some of which divide again higher on the flank (i.e. 'ataxiocerid' ribbing). The secondaries prescribe an adorally concave curve so that the overall ribbing was sinuous or falcoid. The secondaries project gradually and markedly toward the venter where they are interrupted and alternating. No ventro-lateral tubercles or grooves are developed. The same ventral ornament is present on the penultimate whorl.

*Discussion*: This fragment belongs to the Late Tithonian to Valanginian Berriasellidae. Dr. A. C. Riccardi, presently at the Geological Survey of Canada, informed us that this is perhaps a *Killianella* and that the true tubercle-like bullae on the inner third of the flank are reminiscent of the Valanginian *K. surriatica* (Spath, 1939) from the Salt Range, Pakistan.

*Age*: (? Late Tithonian to) Valanginian.

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