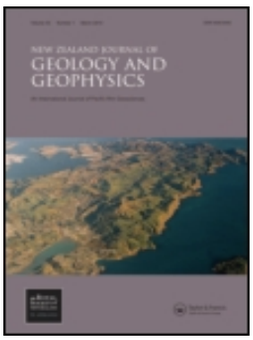

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Halobia (Bivalvia, Triassic) and a gastropod from Torlesse Supergroup rocks of Wellington, New Zealand

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Abstract *Halobia lilliei* Marwick is recorded from a stream boulder in the Hutt River, probably of local origin. It indicates an Oretian (Karnian) age and confirms a Late Triassic age determination for at least some Torlesse Supergroup rocks in the Wellington–Hutt Valley area. An indeterminate gastropod is described from another locality within the same rocks.

Keywords Bivalvia; *Halobia lilliei*; Gastropoda; Torlesse Supergroup; Wellington; Hutt Valley; Triassic; Karnian; Oretian

INTRODUCTION

The basement "greywacke" rocks of the Wellington–Hutt Valley area are typical of Torlesse Supergroup (Suggate et al. 1978) and in terms of original detrital mineralogy of the sediments, they fall within the quartzofeldspathic Canterbury Suite (Andrews et al. 1976). They consist of a structurally complex, well-indurated, weakly metamorphosed (prehnite–pumpellyite facies) suite of dominantly quartzofeldspathic sedimentary lithotypes and minor basic volcanic rocks and cherts (Brodie 1953; Reed 1957; Kingma 1967; Grant-Taylor 1974). They are monotonous in lithology, colour, and in their apparent lack of mappable stratigraphic or structural continuity. Only a few rare marker horizons have been recognised (Grant-Taylor 1974, pers. comm.). For these reasons, and also because they are considered to be so sparsely fossiliferous (Webby 1967; Speden 1976), Torlesse rocks in the Wellington–Hutt Valley area have been subject to only a few localised studies (Wellman 1949; Brodie 1953; Webby 1959a, b; Grant-Taylor 1974). By comparison, the gross structure and fault pattern of these rocks are well documented (Stevens 1974).

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A structural model for the Wellington Torlesse is presented in Grant-Taylor (1974, fig. 1) involving tectonic stacking and subsequent metamorphism of fault-bounded packets of steeply dipping, westward younging rocks. In a gross sense, however, the succession of packets appears to young eastwards, as is evident from attempts to map Torlesse rocks in terms of faunal zones and age (Speden 1976).

Fossils other than tube fossils (*Torlessia, Titahia*) and trace fossils are of rare occurrence. A list of the total known biota from Torlesse rocks of the Wellington–Hutt Valley area is as follows (from Webby 1967; Speden 1976, and herein):

wood and plant fragments
Radiolaria (of *Spumellaria* group)
Foraminiferida
Gastropoda indet. (described herein)
Halobia lilliei Marwick (described herein)
Torlessia mackayi Bather
Titahia corrugata Webby
Vertebrata ?reptilian bone
?amphicoelous vertebra
Ichnofossils *Urohelminthoida.*

The discovery of the Late Triassic bivalve genus *Halobia* is important because of its considerable value in both local and international dating and correlation, owing to its cosmopolitan distribution and short stratigraphic range. Of the limited fossil biota listed above, only *Halobia* provides firm age control.

Over the years there has been considerable debate on the age significance of *Torlessia* and *Titahia* (Campbell & Warren 1965; Webby 1967; Andrews et al. 1976) and although the general concensus of opinion is that they indicate a Late Triassic age (Oretian–Warepan; Karnian–Norian), their total stratigraphic range is still unknown, and the hypothesis that they are non-age-diagnostic, facies-controlled fossils has not been refuted.

HALOBIA LOCALITY Fossil Record No. R27/f82, metric grid ref. 779053 (N160/542396)

The fossil was collected by Mr T. Ritzema and a party of school children in May 1980, from an angular float block (0.8 m long) of argillite, in the bed of an old, dry course of the Hutt River, on the true right-hand side, c. 700 m north of Silverstream Bridge, Hutt Valley (Fig. 1).

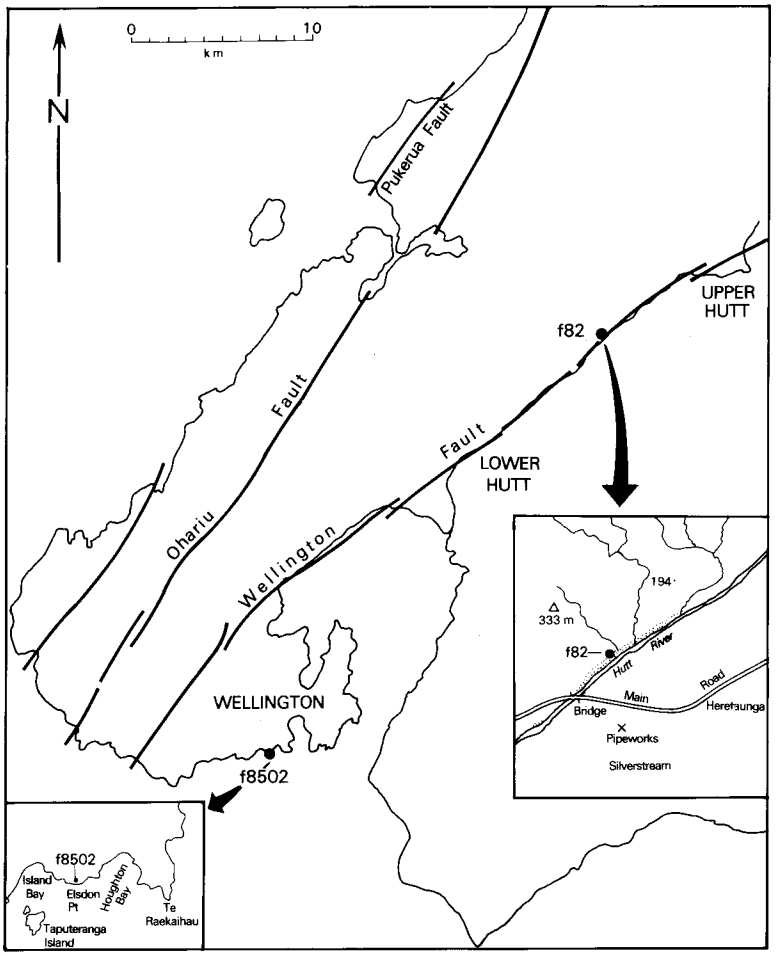

Fig. 1 Simplified map of the Wellington–Hutt Valley area with active faults shown and insets showing fossil localities R27/f82 and R27/f8502.

Subsequent field investigations were carried out in an attempt to establish whether the fossiliferous block could have been derived from outcrops and streams in the area to the west of the Hutt River and in the immediate vicinity of the fossil find, or have been dumped as waste or fill and therefore derived from an unknown source well outside the area proximal to the find.

Numerous angular to subrounded cobbles and pebbles and some larger blocks of argillite, identical to that of the fossil block, were found in the dry river channel north of Silverstream Bridge. Notably, the distribution of the larger cobble and boulder sized material appears to be restricted to aprons down river of the mouths of small streams.

No further specimens of *Halobia* were found, but several specimens of *Torlessia mackayi* and numerous woody plant fragments were collected from cobbles of argillite comparable to the *Halobia*-bearing block.

The dry river channel is separated from the Hutt River by a man-made levee fashioned from bulldozed river gravels. Incorporated within the levee is considerable clay brick, pipe, and tile material derived from the local Silverstream tileworks, but there is nothing to suggest that rockfill or quarry material derived from outside sources has been dumped there.

It is therefore concluded that the fossil block could have been derived from a source area to the immediate west of the find. The size and angularity of the block certainly suggest that it had not travelled very far. It may possibly have been derived from the stream to the immediate north (Fig. 1).

DESCRIPTION OF THE FOSSILS

GASTROPODA

Gastropoda indet. Fig. 2.

OCCURRENCE: R27/f8502, grid ref. 588831 (N160/339146); collected by W. Ward (27 August 1950) from a thin, grey argillite horizon, 0.5 m on seaward side of road, Elsdon Point, between Island Bay and Houghton Bay, south coast, Wellington; Sinclair Formation, Torlesse Supergroup.

REPOSITORY: TM5795; GS5175; New Zealand Geological Survey, Lower Hutt.

MATERIAL: A single, poorly preserved, partially pyritised, small gastropod; split in 2 so that steinkern is revealed in 1 piece and its external counterpart in the other half.

DESCRIPTION: Small, slender, cyrtoconoid, sinistral; with 6 whorls, aperture and sutures preserved; hint of spiral carina preserved on periphery of last whorl; sutures shallow, whorls high, flat to gently convex; ornament indeterminate due to poor preservation.

DIMENSIONS: Height 9 mm; apical angle 15°.

REMARKS: The apparent absence of recognisable ornament renders this gastropod indeterminate. However, it is an important find (recently rediscovered in collections of the New Zealand Geological Survey, Lower Hutt) as gastropods have not been recorded from Torlesse rocks of the Wellington area before, and it is unusual in being sinistral.

Sinistral coiling may be a family character (e.g., Triphoridae), a character only of certain genera of families in which most genera are dextral, or a specific character in genera in which most species are dextral (Cox 1960), but in general it is rare. Some individuals of normally dextral species may be sinistral, but this case is even rarer.

The gastropod is non-age-diagnostic, but if Sinclair Formation (Brodie 1953; Webby 1967; Kingma 1967) is Triassic–Jurassic, as is usually accepted, then this provides a platform from which an argument for tentative taxonomic affinity of the specimen can be made. One of the most widespread and dominant groups of Triassic and Jurassic gastropods is the cenogastropod family Zygopleuridae (Wenz 1938) which includes the genera *Zygopleura, Allocosmia*, and *Raha*, all of which are represented in New Zealand. Knight et al. (1960) record 2 sinistral genera of Zygopleuridae: *Allostrophia* and *Virgella*. Perhaps the specimen described is related to this group.

Attempts have been made to find further gastropod fossils at Elsdon Point, but without success. However, numerous *Torlessia mackayi* and trace fossils were found in most of the thin argillite beds exposed on Elsdon Point.

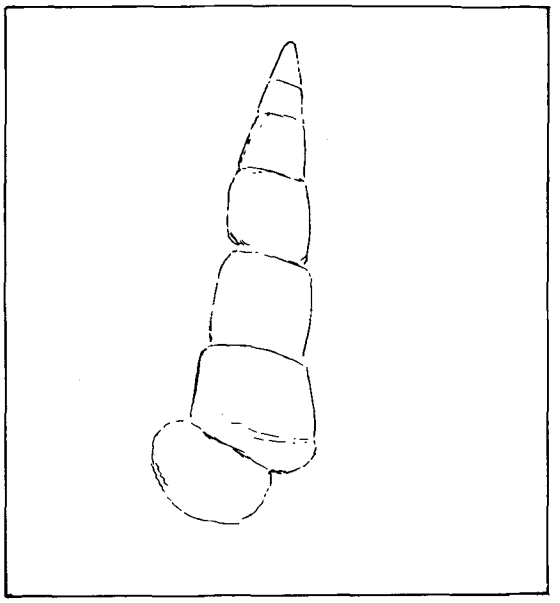

Fig. 2 Gastropoda indet. TM5795; sketch of internal mould; height of shell, 9 mm; ×7.

BIVALVIA

Family **POSIDONIIDAE** Frech, 1909

Genus ***Halobia*** Bronn, 1830

TYPE SPECIES: *Halobia salinarum* Bronn, 1830; Karnian, Northern European Alps.

DISCUSSION: *Halobia* is a cosmopolitan genus known from rocks of Anisian–Norian age (Encheva 1978) and is the only representative of the Posidoniidae known for extreme diversity of species (about 110 species). Kittl (1912) introduced a phylogenetic classification of 11 morphological groups based on outline and ribbing characters. This scheme has subsequently been modified by Krumbeck (1924) and most recently by Encheva (1978) who recognises 9 groups.

Only 3 species of *Halobia* have been described from New Zealand: *H. hochstetteri* Mojsisovics (Trechmann 1918; Marwick 1953) from the Oretian and Otamitan Stages (Karnian–Norian), *H. lilliei* Marwick (Marwick 1953) restricted to the Oretian Stage, and *H. zealandica* Trechmann (Trechmann 1918; Marwick 1953). Of these, *H. zealandica* is of uncertain status and is probably synonymous with *H. hochstetteri*, as discussed by Marwick (1953, p. 56). Other forms of *Halobia* have been recognised but are as yet undescribed.

Halobia lilliei Marwick, 1953. Fig. 3.

DIAGNOSIS: (Marwick 1953). *Halobia* of moderate size, subcircular, only slightly oblique; sculpture of rather broad, flat, relatively straight radial ribs with narrow interspaces numbering about 25, a few divided and even subdivided; many bearing 4–6 fine radial threads. Ribs very weak or absent near posterior margin. Anterior ear rather small.

OCCURRENCE: R27/f82, Hutt Valley, North Island. Undifferentiated Torlesse Supergroup.

REPOSITORY: TM5796; GS12697, New Zealand Geological Survey, Lower Hutt.

MATERIAL: Internal and external moulds of a single articulated specimen; well preserved in argillite (fine, dark-grey silty mudstone) with left valve incomplete and right valve almost entire.

DESCRIPTION OF THE SPECIMEN: Shell medium sized, semicircular to slightly oval; with distinct, orthogyrous to slightly prosogyrous umbo situated at or slightly anterior of mid-hinge; length greater than height. Hinge line straight, shorter than shell length and rounded at extremities. Anterior ear not well preserved; appears small, bipartite with hint of concentric rugae ornament on dorsal zone; smooth ventral zone bearing fine growth lines showing presence of byssal notch, separated from disc by weak, shallow groove. Ornament of 50 simple, almost straight, strong, broad, flat-topped radial plicae with narrow interspaces, originating 1–2 mm from umbo; slight concave-forwards flexure in mid-disc; about 10 costae bifurcate once and 2 bifurcate twice; posterodorsal region of disc smooth but for fine radial threads. Ribbing crossed by fine concentric growth striae and 19 irregular, concentric rugae, crowded in umbonal region, becoming less common through ontogeny.

DIMENSIONS: (mm) of right valve only

		Ratios
Length	(18.0)	L/H = >1.20
Height	15.0	
Hinge length	(12.0)	[L(hinge)]/L = (0.66)
Umbo to anterior (length)	8.0	
Anterior ear length	5.5	
Umbonal angle	110°	

Rib number: 50 total (at shell margin)
46 at 10 mm from umbo
38 at 5 mm from umbo

Concentric fold number: 19 total
17 within 10 mm from umbo
13 within 5 mm from umbo

REMARKS: The specimen described agrees closely with Marwick's description of *H. lilliei* (Marwick 1953), in all characters except plicae number. However, from examination of the type material available in New Zealand Geological Survey collections, it is apparent that plicae number is variable within the species. According to my counting, the holotype (TM2237, N.Z. Geological Survey, Lower Hutt) has 35 plicae and the 5 paratypes examined have 33–48. It therefore seems reasonable to determine the specimen described here as *Halobia lilliei*, subject to a more thorough statistical appraisal of the species.

Fig. 3 *Halobia lilliei* Marwick. TM5796; internal mould of articulated shell, LV incomplete, RV almost entire; specimen coated with ammonium chloride; ×3.5.

Halobia lilliei falls within the *Halobia styriaca* group (Encheva 1978) which is characterised by rounded or oval outline, smooth posterodorsal area, and distinct, simple radial ribs which occasionally bifurcate once and rarely twice. Forms allied to this group include *Halobia styriaca* Mojsisovics, 1874; *H. areata* Kittl, 1912; *H. arthaberi* Kittl, 1912; *H. beyrichi* (Mojsisovics, 1874) and many others. All of these forms are Karnian and of wide occurrence in Europe and Asia (Encheva 1978).

Halobia lilliei differs markedly from *Halobia hochstetteri* Mojsisovics (and *Halobia zealandica* Trechmann) in outline, size, and ribbing character. *H. hochstetteri* is a moderate to large shell with a greater length to height ratio, numerous, round-crested radial plicae, and very distinctive undulating bend in ribbing at mid-disc. It falls within the *Halobia rugosa* group of Encheva (1978) which is characterised by obliquely ovate and strongly asymmetric outlines and undulating pattern of the radial ribbing. The *Halobia rugosa* group is perhaps the most widespread *Halobia* grouping, containing more species than the other 8 groups and ranging from Ladinian to Norian in Europe and Asia.

DISCUSSION OF AGE SIGNIFICANCE

Halobia lilliei is considered to be restricted to the Oretian Stage (Marwick 1953; Campbell 1955) in Murihiku Supergroup rocks (Suggate et al. 1978) and there is no reason to suggest that it indicates a different age in Torlesse Supergroup rocks even though paleobiogeographic relationships between these 2 rock suites (respresentative of 2 tectonic domains, the Hokonui Domain and Alpine Domain respectively) are not well established (Andrews et al. 1976).

Irrespective of local stage placing, *Halobia lilliei* indicates a Karnian age and therefore confirms, for the first time, a Late Triassic determination for at least some Torlesse rocks in the Wellington–Hutt Valley area. To date, the nearest Torlesse fossil locality to Wellington which provides a firm Triassic age is in the Otaki River, Tararua Range (Grant-Taylor & Waterhouse 1963). The Otaki fauna includes *Monotis* of Norian age and is therefore younger than the *Halobia*-bearing strata in the Hutt Valley.

In terms of faunal zones (Speden 1976; Andrews et al. 1976) *Halobia lilliei* falls within the *Halobia* Zone, and the Gastropoda indet. falls within the *Torlessia* Zone.

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