

**SPIRULA (SEPIOIDEA: CEPHALOPODA) FROM THE
LOWER MIOCENE OF KAIPARA HARBOUR, NEW
ZEALAND (NOTE)**

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ABSTRACT

A six-chambered segment of a broken *Spirula* phragmocone collected from lower Miocene rocks of the Kaipara Harbour (N28), northern New Zealand, provides the first confirmed fossil record of this cosmopolitan genus of squid.

Class CEPHALOPODA

Subclass COLEOIDEA

Order SEPIOIDEA

Superfamily SPIRULACEA

Family SPIRULIDAE

Genus *Spirula*

Spirula sp. Fig. 1

The crystalline cast of a 12-mm segment of a gyroconic cephalopod shell was collected by the author from Hukatere Peninsula, Kaipara Harbour, in August 1974. The fossil section consists of six chambers separated by concave septa which are pierced by a ventral, marginal siphonal tube (Fig. 1). It appears to be identical to fragments of the phragmocone of the present-day squid, *Spirula spirula*.

LOCALITY: N28/f633A*; AU 2376*; N28/728332*. In a 1-m-thick, massive, fossiliferous, coarse volcanite. Cliffs, 100 m north of Paparoa Point, west Hukatere Peninsula, Kaipara Harbour, northern New Zealand.

LITHOSTRATIGRAPHIC UNIT: Within a sequence of terrestrial, freshwater, and neritic volcanoclastic sediments (Arlidge 1955; Brothers 1954), of the Hukatere Subgroup, Waitakere Group (Hayward, "Lower Miocene stratigraphy and structure of the Waitakere Hills: Waitakere Group (New)", in prep.).

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*Fossil locality number recorded in the New Zealand Fossil Record file; Auckland University collection number; grid reference based on the thousand-yard grid of the 1:63 360 topographical map series (NZMS 1).



FIG. 1—Lateral and ventral views of the 12-mm-long fossil segment of *Spirula* (C1239, AU 2376).

ASSOCIATED FAUNA AND PALEOECOLOGY: N28/f633A contains a diverse macrofauna including gastropods, bivalves, scaphopods, serpulids, and scleractinians, many of which have relatives living today in coarse sands and fine shelly gravels at mid neritic depths (30–120 m). The benthonic foraminiferal fauna is diverse with many abraded forms suggestive of pre-burial current transport. The fauna is mixed, but generically similar to assemblages dredged from mid neritic coarse sands in present-day seas.

Spirula spirula is a cosmopolitan tropical to subtropical squid, that lives today at depths of 300–2000 m. After the death of the animal, the internal phragmocone tends to float, and is transported by currents and winds. It can be found washed up on Northland's west coast beaches in considerable numbers. This lower Miocene phragmocone was possibly also transported by on-shore winds and currents before finally coming to rest in these mid neritic sands.

AGE: Lower Altonian, Pl (Burdigalian, lower Miocene).

N28/f633A contains the following age-significant macrofossils:

Leptastrea sp.

Caryocorbula nitens (Marshall)

Opella subfimbriata (Suter)

Vaginella torpedo Marshall

New Zealand Stage Symbols

Po–Pl

Po–Pl

Po–Pl

upper Po–lower Pl

Two planktonic foraminiferal species are age-significant (Scott 1972; Hayward in prep.):

Globorotalia zealandica incognita Walters

Globigerinoides trilobus trilobus (Reuss)

Po–lower Pl

Pl–Wn

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DISCUSSION: *Spirula* has no previous confirmed fossil record (Davies 1971, p. 478) although one specimen from the Miocene of Italy resembles *Spirula* in its lack of a guard or proostracum. It has been argued, however, that this Italian specimen is a *Spirulirostra* (Eocene-Miocene) that has lost the guard and proostracum during post-depositional solution (Roger 1952, p. 732; Muller 1960, p. 275). There is no trace of a guard in this New Zealand fossil nor any sign of straightening of the phragmocone (a character of *Spirulirostra*). Its remarkable similarity to living *Spirula* leaves little doubt that this genus had evolved by the lower Miocene, possibly as a branch of the Spirulirostridae (Easton 1960, p. 476). This New Zealand Miocene record adds support to the original identification of the Italian specimen as a *Spirula*, since many of the arguments against this relied heavily on the absence of any other fossil *Spirula*.

ACKNOWLEDGMENT

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