Two Pleistocene Volutes from the New Hebrides

(Mollusca : Gastropoda)

BY

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(2 Plates; 1 Text figure)

INTRODUCTION

In 1973, during a search for road surface materials on the island of Santo[1] in the New Hebrides, D. I. J. Mallick and David Greenbaum of the New Hebrides Condominium Geological Survey made extensive collections of mollusks and other fossils from a series of loosely consolidated dark marls (SM242) lying about 70 m (230 feet) above sea level on the Kere River about 5 km inland. Mr. Mallick had previously located similar beds outcropping on the Navaka River (SM43) about 12 kms to the southwest at an altitude of 50 m (165 feet). Both localities are shown on Figure 1. The deposits appear to represent off-shore beds laid down at depths in excess of 50 m.

Some of the molluscan and crustacean fossils that were sent to the National Museum in Washington for identification proved so interesting that Thomas Waller of the Museum staff and Warren Blow of the U.S. Geological Survey decided to visit the sites to collect bulk samples. The first of the two new Lyrias here described was obtained by Dr. Mallick on the Kere River and is named for him. The second *Lyria* was collected by Waller and Blow from both the Kere River and the Navaka River outcrops.

LOCATION

SM43 Navaka River, Santo, New Hebrides
166°51.04′E, 15°36.08′S
Altitude 50 m (165 feet)
D. I. J. Mallick
(U.S. Geological Survey Cenozoic locality No. 25742 collected from boulders at north end of outcrop by Thomas Waller and Warren Blow, June 1974).

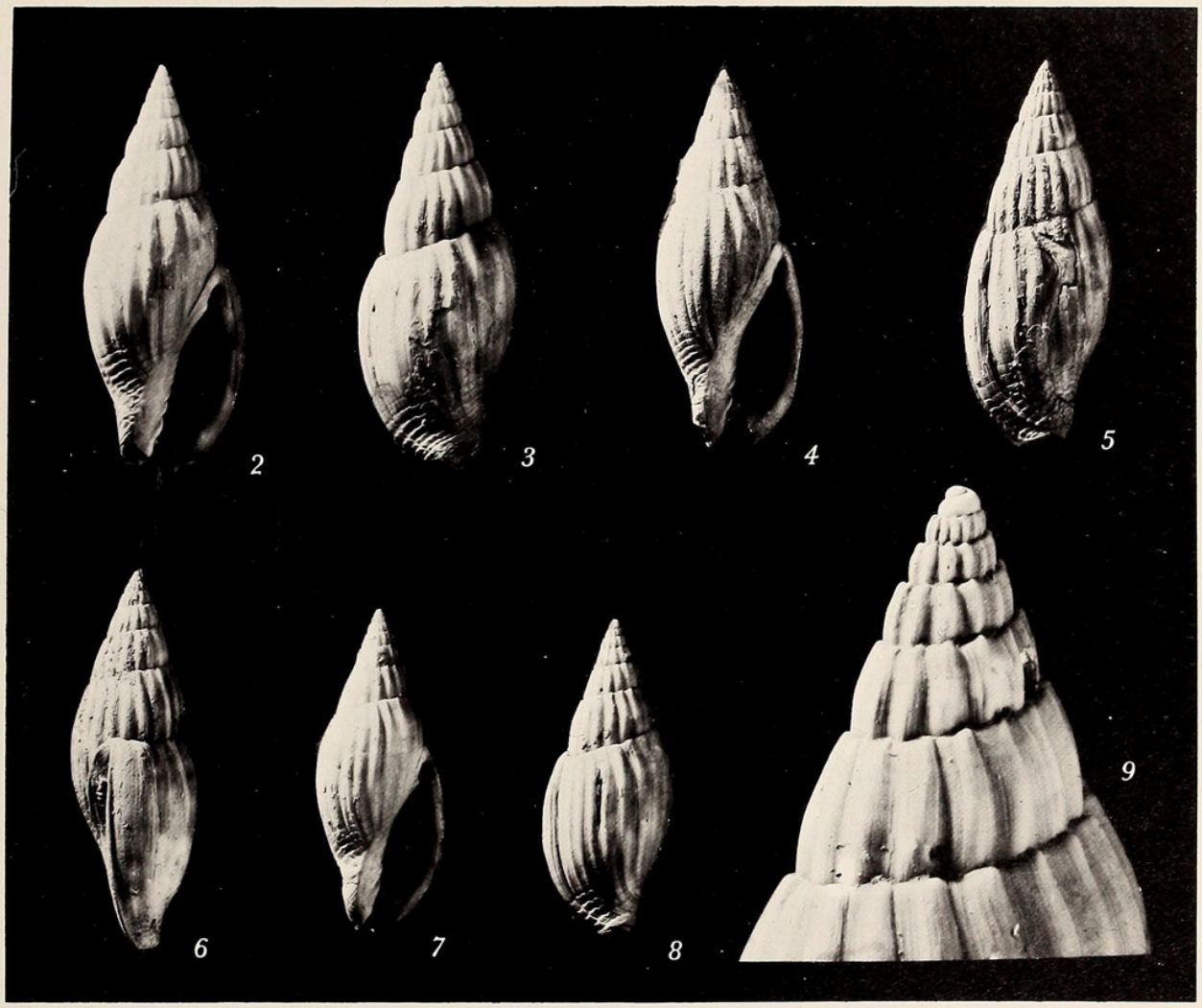
SM242 Kere River, Santo, New Hebrides
166°56.74′E, 15°34′S
Altitude 70 m (230 feet)
D. I. J. Mallick (U.S. Geological Survey Cenozoic locality No. 25715 collected by Thomas Waller, John Bolango and Warren Blow, June 1974).

PALEOECOLOGY

The outcrops on the Kere and the Navaka Rivers have a number of molluscan species in common and are believed to be of essentially the same age. Detailed faunal analyses are as yet incomplete but it is apparent that the Kere River fauna contains a much higher percentage of large mollusks than the outcrops on the Navaka. Many of the large shells are species that live intertidally or at very shallow depths. The shells from both areas are exceedingly well preserved. They exhibit a natural polish and many from the Kere retain clear traces of their original color patterns. The total number of molluscan species exceeds one hundred. Ecologically both faunas are somewhat mixed.

The thousands of larger shells obtained by Messrs. Waller and Blow on the Kere River include more than 20 species of *Conus* and the cypraeids are also abundant. Many of the latter, like the cones, are thick shells. Numerous examples are heavily encrusted, both outside and inside, with barnacles, bryozoans, and a variety of calcareous tubes. Other shells are pierced by bore holes and some of the shallow water species have segments of *Halimeda* or other calcareous grains tightly wedged in their apertures. Neritids are represented in the Kere River collections by at least two species but all the shells are badly worn and/or fragmentary. With the robust shallow water types are fragile shells, including those of *Phenacovolva longirostrata*

[1] Formerly known as Espiritu Santo; the first word was officially dropped recently



Lyria mallicki Ladd, spec. nov.

Figures *2*, *3*: Holotype USNM 175096	× 1
Figures *4* to *6*: Paratype A USNM 214226	× 1
Figures *7*, *8*: Paratype B SM242-185A	× 1
Figure *9*: Paratype B SM242-185A apex	× 5

All specimens except *2* and *4* coated with ammonium chloride

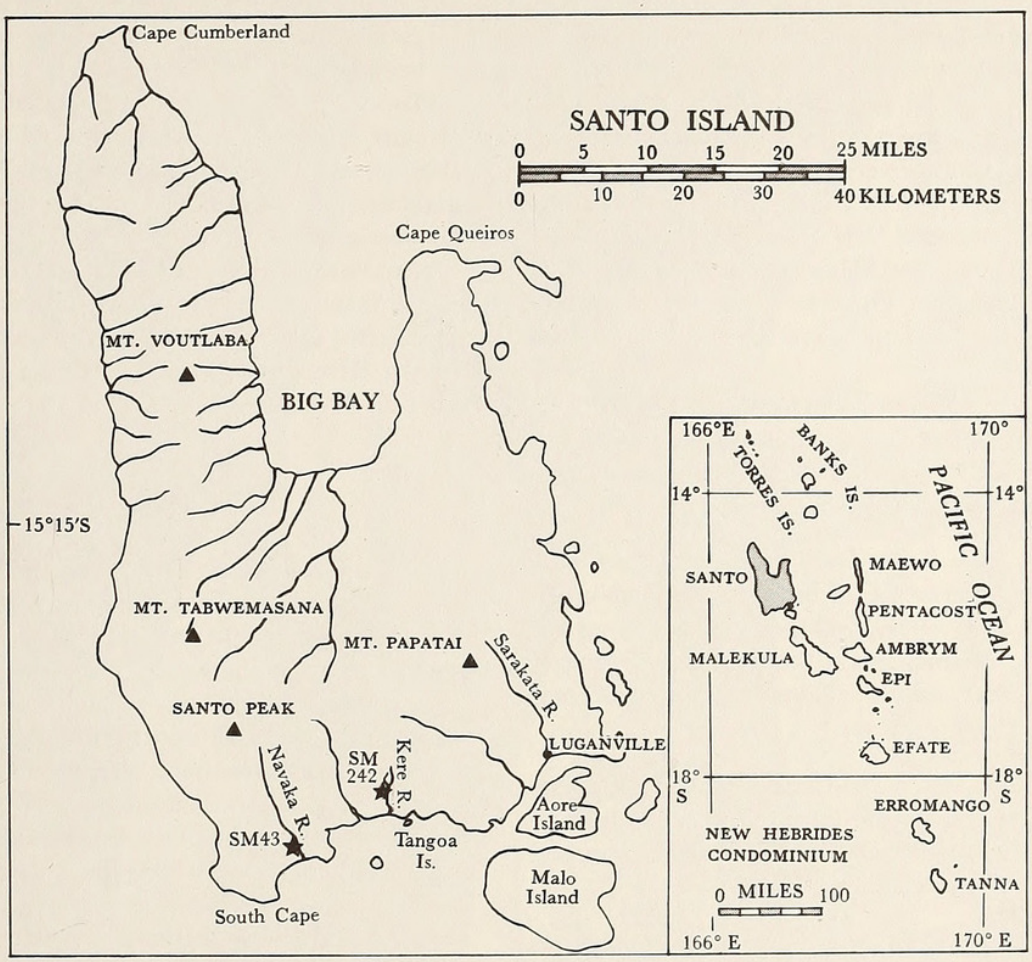


Figure 1

Locality Map of Santo (base from Robinson, 1969)

(Sowerby)—curved elongate spindles exceeding 50 mm with acicular ends. This species lives off Japan at depths from37 to more than 100 meters (Cate, 1973: 107). There is also an abundance of pelagic mollusks, delicate pteropods and heteropods. Their presence clearly indicates access of the open sea. In this connection, among the rare fossils from the Kere outcrops are two shells of a large barnacle, *Coronula,* a type that lives attached to cetaceans. The genus is known from the Miocene to the present and has a cosmopolitan distribution (Newman, *et al.,* 1969: R289). The New Hebrides fossils exceed 40 mm in diameter. Such large barnacles must have been attached to a whale whose body drifted in from the open sea.

The marl beds on the Kere that produced so many large mollusk shells yielded a number of species of still-living cones and cowries, some of them not previously found in the New Hebrides and known to be exceedingly rare elsewhere. Examples are: (1) *Conus gloriamaris* Chemnitz with its high spire and distinctive color pattern is represented by one complete shell (Mallick, 1973) and identifiable fragments of four other individuals. (2) *Conus excelsus* Sowerby, reportedly a New Caledonian species with a spire that is even higher than that of *C. gloriamaris.* It is exceedingly rare today[2] but is represented by five complete shells and one fragment from the Kere River. Incidently, a shell described from the New Hebrides in 1895 and not now available may represent this species. (3) *Conus recluzianus* Bernardi, another rare cone, is represented by 20 specimens in the Kere River collections. The

[2] A number of specimens was dredged by Tucker Abbott in the Bay of Bengal (written communication, February 1975)

type of this species came from the China Seas and the species has been reported living in moderate numbers off the Queensland coast in depths of 60-75 fathoms (110 to 140 m) (GARRARD, 1966: 11). At present the Kere River fossil specimens of this species may outnumber the known Holocene shells. (4) Another very rare species is the cowry, *Cypraea guttata,* described by Gmelin in 1791 and known to live from Japan to the New Hebrides. Deeply pitted marginal grooves above and below differentiate *C. guttata* from all other cypraeids. Three nearly perfect examples have been collected from the Kere River and one from the Navaka.

Several groups of non-molluscan fossils from the Navaka (SM43) were examined and reported upon by specialists (MALLICK, 1972). The reports included estimates of probable depths of deposition, as given below:

Foraminifera: Miss Ruth Todd (U.S. Geological Survey) found at least 150 species of benthonics and about 18 species of planktonics. The planktonics suggested an age no older than Pleistocene, the benthonics a depth in excess of 30 fathoms (55 m) and probably more than 80 fathoms (145 m).

Bryozoa were examined by Alan Cheetham (U.S. National Museum of Natural History). He noted at least 26 cheilostomes along with some cyclostomes, the former suggesting a depth of 60 to 100 meters.

Decapod crustaceans: An unusually rich assemblage was examined by Warren Blow (U.S. Geological Survey) who suggested a depth in excess of 50 m.

Barnacles were examined by William A. Newman (Scripps Institution). They suggested a depth of 100 to 200 meters.

In both areas gastropods far outnumber pelecypods in numbers of species and numbers of individuals. Exceptionally large pelecypods—arcids, spondylids, venerids—were found only on the Kere and there in small numbers.

The molluscan fauna from the Navaka contains greater numbers of pteropods and heteropods than the fauna obtained from the Kere River outcrops. Small solitary corals occur in both areas. John Wells (Cornell University) recognized 15 scleractian ahermatypic corals and one hydrocoral in the Kere River collections. Massive reef corals are absent. Among the mollusks there are shells of *Pedicularia,* small ovulids that live on the branches of corals in offshore waters. At SM43 a single shell of *Septaria,* a river snail, was found. The minute specimen is nearly flat, and is light enough to have been moved by the weakest current. It could be Holocene in age.

From the fossiliferous beds on the Kere River, Waller and Blow collected a number of large black pods. These are being studied by F. R. Fosberg of the Smithsonian Institution. They appear to be the fruits of a species of *Garcinia,* a tree that occurs in lowland forests in the New Hebrides and Fiji. The fruits could easily have fallen into a river and been washed to the sea but their preservation in numbers seems remarkable.

In summary: the absence of typical reef corals, the presence of many pelagic organisms and other types that live at moderate depths suggest that the beds on the Kere and Navaka Rivers were accumulated on an off-shore shelf at depths in excess of 50 meters.

AGE

The fossiliferous marls exposed on the Navaka and Kere Rivers of Santo lie several kilometers from the sea at altitudes of 50 or more meters. They are partially consolidated and the beds on the Kere dip downstream at an angle greater than the gradient of the river. These features suggest an appreciable age. All of the fossils, including the corals, are exceedingly well preserved. A Uranium/Thorium age determination on coral from SM242 was made by Barney Szabo of the U.S. Geological Survey. The test yielded a figure of 14 000 years, a date at approximately the Pleistocene-Holocene boundary. In view of the field relations and the occurrence of undescribed molluscan species, the figure seemed small and, at Mr. Szabo's suggestion, a carbon 14 test of the same sample was made by Robert Stuckenrath of the Radiation Biology Laboratory of the Smithsonian Institution. This gave a figure of 25 280 ± 460 years. This date would place the marls clearly into the Pleistocene. A second Uranium/Thorium test is planned.

SYSTEMATICS

The fossil lyrias described below appear to be the first representatives of the family Volutidae to be found in the New Hebrides. Many volutids are rare and comparatively little intertidal collecting or dredging has been done in the New Hebrides group. According to CERNOHORSKY (1972: 169) only five volutids are known to live on islands of the tropical Pacific, the eastern most of which are New Caledonia and Île des Pins. Fossil lyrias have been described from the western Pacific and the commoner of the New Hebrides species seems related to Tertiary species from Indonesia and Okinawa.