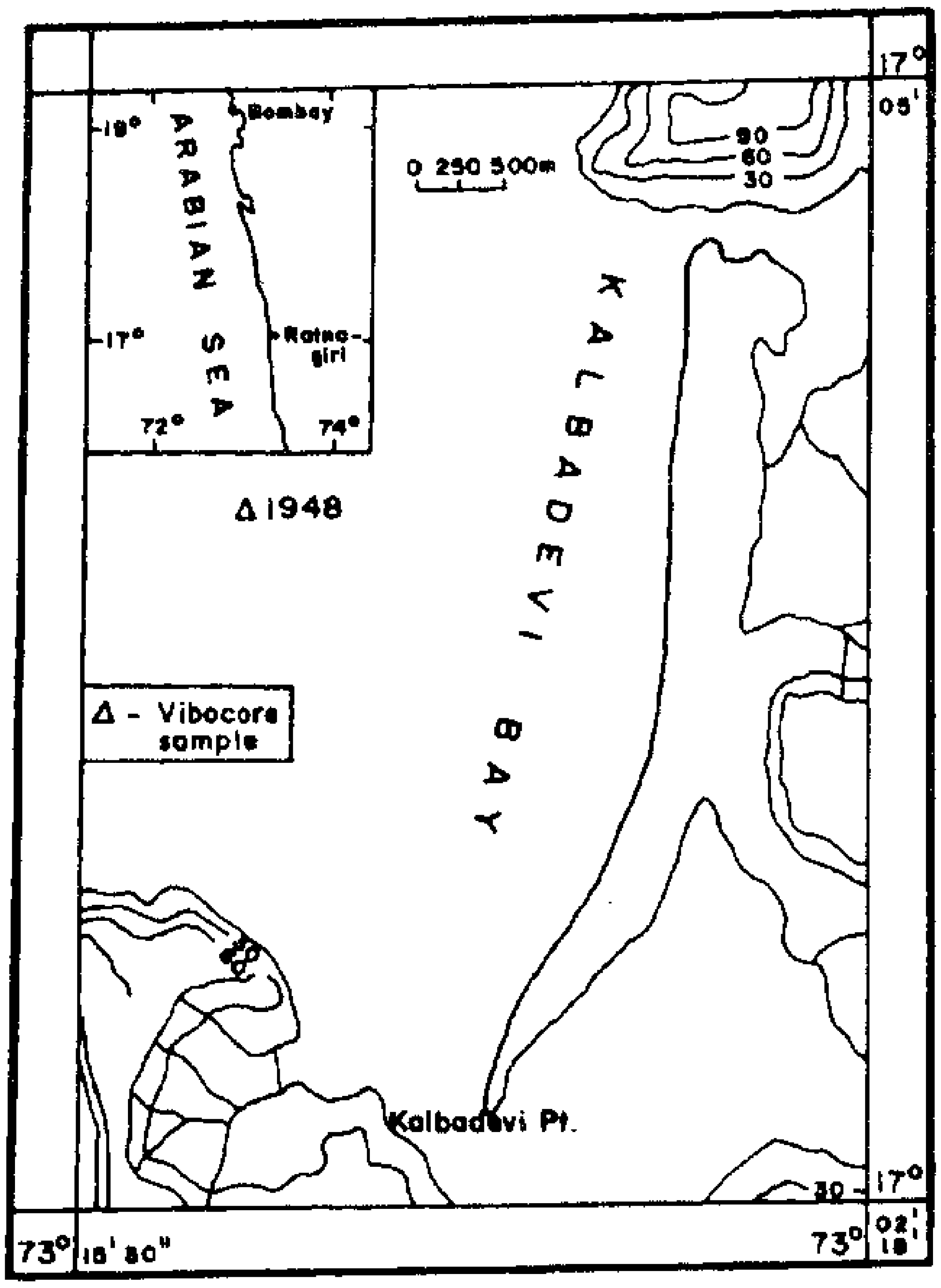

Figure 1. Map of Kalbadevi bay showing the location of vibrocore.

fied. An entirely different mode of quartz characterized by well-rounded grains in contrast to the texture of other minerals, which however is numerically very rare, was also observed. Shells and shell fragments were completely absent in this zone.

Gypsum crystals are distributed in fine sediments of >1 ϕ size, the largest grain observed being 1.7 × 0.45 mm in size. Two types of crystals are present. One is euhedral and transparent with excellent clinodome (011), prism (110) and clinopinacoid (010) faces. The other one is a tabular, platy transparent to milky white crystal, generally anhedral. Both types have impurities on the surface and enclose fine detrital grains of opaque minerals and quartz.

The euhedral shape, association with carbonate and absence of typical diagenetic features like displacive nature, overgrowth on grain margins, solution and erosion features and deformation structures[1] tend to suggest that these gypsum crystals are of evaporitic origin formed possibly in isolated ponds of seawater disconnected from the open sea as evidenced from the total absence of shells in this zone. And such isolated pools of seawater can occur in bay areas when the sea level is lowered both locally and eustatically. Geophysical evidence from the bay indicates a basement ridge at the mouth of the bay (A. Bagchi, 1989, personal communication). During times of lowered sea level (in the Holocene) the bay could have formed almost a closed basin of saline water turned ultrahaline for gypsum to precipitate under conditions of arid to semiarid climate. The semidesertic conditions in the hinterland are also indicated by well-rounded quartz grains which could represent aeolian influx. The conclusions of Hashimi and Nair[6] that India experienced climatic aridity during the late Pleistocene–early Holocene are also supported by the occurrence of possible evaporite gypsum in the sub-bottom nearshore sediments of the western continental shelf of India. Its restriction to littoral sediments is a point to be reckoned with the fact that it is the nearshore areas where seawater gets isolated during sea level fluctuations. Further, there is no evidence of rounding or dissolution on the gypsum crystals indicative of transportation.

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Pollen tube growth and site of incompatibility reaction in niger (*Guizotia abyssinica* Cass.)

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Self-incompatibility studies have been made out on *Guizotia abyssinica*. No seed set was found to occur in a plant grown in isolation. In such cases germination of pollen grains on the stigma surface is very poor and pollen tubes show twisting and coiling over the stigmatic papillae.

Guizotia abyssinica of the tribe Heliantheae, family Compositae, is a short day plant. A single plant when put in isolation does not set seeds[1]. The present communication deals with scanning electron microsopic (SEM) studies on stigma structure, pollen tube growth and site of incompatibility reaction.

Upper surface of stigma shows numerous papillae (Figure 1*a*, *b*) covered with uniformly thickened cu-

Figure 1. Scanning electron micrographs of *Guizotia abyssinica* stigma. ***a***, Stigma after compatible pollination; ***b***, germinated pollen grain and pollen tube entering between the papillae; ***c*** and ***d***, twisting and coiling of pollen tubes on stigma of isolated plants (p, papillae; pt, pollen tube; g, germ pores).

ticle overlaid with a layer of pellicle; no surface secretion is present on the stigma which is thus of 'dry type'[2, 3]. Unpollinated, cross-pollinated and self-pollinated stigmas of this taxon were examined to see whether SEM would provide any evidence regarding the site of incompatibility reaction or show any difference in growth of compatible and incompatible pollen tubes before they penetrate the stigma.

In niger, much before anthesis, the stigmatic papillae are short and closely appressed to one another, but at the time of anthesis these papillae become longer, swollen and more widely spaced, presumably due to water uptake. Pollen grains are lodged on the papillae and the pollen grains have three germinal furrows.

In compatible pollination, pollen grains get hydrated and germinate on the stigma surface producing a pollen tube which goes down between the papillar cells and penetrates the basal portion of the papilla[4]. The place of penetration cannot be seen in the photograph (Figure 1*b*) owing to swollen papillae.

In incompatible pollination, pollen germination is usually inhibited but in some cases a few pollen grains do germinate, producing a pollen tube that twists over the surface of the papillae (Figure 1*c*,*d*), a characteristic reaction usually seen in a single plant of niger grown in isolation.

The reaction of incompatibility in flowers of *G. abyssinica* involves (i) low percentage of germination of pollen grains on the stigma, and (ii) twisting of pollen tubes over the stigmatic papillae. From the present study it is suggested that self-incompatibility in niger is homomorphic and of sporophytic type.

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Requirement of protein synthesis during ripening of abscisic acid-treated mangoes

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Abscisic acid (ABA) at 10^{-6} M enhances ripening in mangoes as evident from the increase in individual free sugars (not glucose) and total carbohydrates with a concomitant decrease in acid content. This is associated with increase in gluconeogenic enzymes like glucose-6-phosphatase (EC 3.1.3.9) and fructose-1,6-diphosphatase (EC 3.1.3.11) and also in cytosolic malate dehydrogenase (EC 1.1.1.37). Cycloheximide treatment inhibits the ABA-induced incorporation of radiolabel during ripening, suggesting that ABA action is mediated via protein synthesis.

MANGO is an important crop of India. Studies related to the regulation of the ripening process are essential for a better understanding of this phenomenon and to yield substantial economic gains. The naturally occurring plant hormones are known to regulate the process of ripening[1]. Ethylene, a key hormone, is known to trigger ripening in fruits such as apples, pears and bananas[2, 3]. Indoleacetic acid delays the onset of climacteric in pears and bananas[4], while gibberellic acid and cytokinins have been reported to delay the ripening of tomatoes and mangoes[1, 5]. Abscisic acid (ABA) has been shown to promote ripening in tomatoes[6], mangoes[1, 7] and grapes[8]. Earlier observations from this laboratory showed that post-harvest treatment of mangoes with ABA at 10^{-6} M concentration induces ripening[7]. The present investigation was undertaken with a view to examining the mode of action of ABA during ripening of mangoes.

Mangoes (*Mangifera indica* L. cv. *alphonso*) were purchased from the Bulsar district of Gujarat State and treated with ABA as described earlier[7]. Saccharides and acids were extracted and estimated as described by Palejwala *et al.*[8] Cell-free extract was prepared as reported earlier[9]. Glucose-6-phosphatase (G6Pase, EC 3.1.3.9) was assayed by the method of Swanson[10], fructose-1, 6-bisphosphatase (FDPase, EC 3.1.3.11) as described by Rao and Modi[11] and cytosolic malate dehydrogenase (MDH, EC 1.1.1.37) as described by Ochoa[12]. Bradford's method[13] was employed for estimating protein. Protein synthesis in mangoes was studied by following the incorporation of [^{14}C]-chlorella protein hydrolysate into proteins as described by Palejwala *et al.*[14]

Sugars are an important constituent of the fruits. The maintenance of appropriate sugar-to-acid balance contributes mainly to the appealing flavour[15]. The levels of total acids during ripening decrease with a concomitant increase in the total sugar content of mangoes. The involvement of gluconeogenic process is evident during ripening of mangoes[11]. Cell-free extracts of the fruit tissue have shown to convert organic acids to sugars[16]. Citric acid and malic acid are the major acids of the mangoes[16]. The metabolism of malic acid takes place faster than that of citric acid[16]. As shown in Table 1, ABA-treated mangoes showed higher content of sugars and lower acids compared to