CHAPTER 4

PROFILE STUDIES

The Rann sediments play an important role in the transfer and movement of water over the Rann surface. The sediments are such that they almost totally inhibit water percolation and in addition, the hygroscopic absorption during monsoons augments to the already high field moisture capacity. It was therefore most essential that a systematic study of the profiles from the different geomorphic facets be made. Such a study is of special significance as it not only gives an insight to the variation along a profile but also the nature of distribution of moisture with depth.

The author in the course of his two years' field work investigated a large number of profiles. The following description includes an exhaustive information of the sediments with special reference to their colour, size,and textural and structural variations. Special features as the presence of shell fragments, development of gypsum crystals and the presence of various minerals such as mica etc. are also taken into account.

In all cases the pit conditions during various seasons were carefully observed for groundwater fluctuation and seepage from the sides.

PROFILES OF FACET A

Profile No. 1

Location : North-east face of Dharamshala bet.

Vegetation : Bushes and stunted trees on bet surface.

Description : The north-eastern face of the Dharamshala bet presents a very interesting geomorphic feature. It comprise a sheer vertical cliff rising 350-450 cm above the Rann surface seen from a distance. Distinct layerings are seen on this vertical cliff-like bet face (Plate 4.1). The individual layers indicate depositional periods. The bet sediment is lighter in colour to that of Rann sediment

PLATE 4.1

Dharamshala bet-face profile.
Location: East face of Dharamshala bet

in being buff-white, with a grain size varying from fine sand to coarse clay. In comparision to the Rann sediment, the clayey fraction is less. Grain-size gradually diminishes towards the base of the bet, finally becoming almost clayey in line with the Rann surface. The cliff face shows distinct etching by wind. Shells of gastropods are seen all along the profile. The soil is compact and firm with a veneer of salt crust. In the top part of the profile, the sandy aggregates could be distinguished with the naked eye or with a hand lens as fine rounded particles. On the face of the wall a clear waterline (about a metre above the Rann surface) was seen indicating the level of standing water during periods of flooding.

The lighter colour of bet sediment reflects a depositional environment chemically different from that of the Rann sediment. Whereas the dark brown to black Rann sediment indicate exhumic conditions with an appreciable quantity of organic content, the lighter coloured bet sediment indicates a paucity of organic remains and deposition under non-exhumic condition.

The surface of this bet supports adequate vegetation. Water-logging is almost absent.

Pit condition : Pit dug at this site upto a depth upto 4.6 metres revealed no ground water, nor any rise of water-table was observed even after a rainy period.

Profile No. 2

Location : Rann surface, west of Dharamshala bet.

Topography : Flat

Vegetation : Nil

Description : The profile observed just 100 metres north of the eastern cliff face of the Dharamshala bet, with a view to compare the Rann and the bet sediment. This sediment differs considerably from that of the nearby bet. A systematic account of the profile with increasing depth is given below:

0-1.25 cm Salt crust, very crisp and crumbly; easily grounded underfeet.

1.25-15 cm Dark grey silty clay; more or less moist; high amount of organic matter; compact; mottled; contaminated by wind blown sand that has entered the profile through cracks developed in the clayey sediment during dry season; as a result gives a feeling of fine sand.

15-45 cm — Sediment colour becomes darker; wetness at this intermediate level slightly less; clay proportion definitely increases; soils show prismatic structures; are firm and sticky when wet; react with hydrochloric acid and hydrogen peroxide.

45-90 cm — Sediment very compact; augering is very difficult; appreciably wet; clayey with prismatic structure; iron streaks (lemon yellow) observed at haphazard intervals; observable organic matter like roots and fossil shell fragments not seen; no development of gypsum crystals as the moisture content is high enough to prevent its crystallisation.

90-170 cm — Sediment very dark brown in colour; more moist; almost pure clay; very sticky; could be regarded as 'heavy clay'; with hydrogen peroxide shows brisk effervescence indicating a high content of organic matter.

Below 170 cm — Sediment type same as above; Clayey, moist and compact; becomes more moist with depth due to the proximity of the ground-water

level; hand augering becomes almost impossible below 2 metres on account of the intense stickiness of the clay.

Pit condition: No observable rise in ground water level even in rainy season. After rains, the top 30 cm of the profile showed increased moisture content pointing to a limited percolation of water upto that depth.

Profile No. 3

Location : 1.6 km south of Bedia bet.

Topography: Slightly depressed inter-bet region.

Vegetation: Scanty, scattered shrubs.

Description: The profile was observed in the month of January just after heavy rains, when the surface was quite wet and standing water was observed to the east of the bet.

Thin veneer of salt crust on the surface intermingled with clays, silts and fine-sand; development of the salt crust not complete on account of the wetness of the top surface.

Upto 2.60 m Sediment nature uniformly identical throughout the depth comprising very clear laminations (Plate 4.2); the laminations or bandings give the impression of 'varved' deposits and persist

PLATE 4.2

Bediya bet profile

Location: 1 km south of Bediya bet.

upto the base of the pit; laminations clearly indicate deposition of the sediments under water, each lamination indicating a single cycle of deposition; the individual laminations seen composed of two layers, one silty in nature and the other rich in clay; most striking feature of the profile is the presence of mica in appreciable quantity with the flakes arranged parallel to the laminations; the sediment on the whole, compact and firm; moisture content increases with depth; nature of sediment sticky and plastic; some iron streaks of lemon-yellow colour observed along the profile; maroon streaks probably indicate presence of manganese; microscopic observation of the sediment shows presence of heavy minerals like mica (biotite and muscovite), hornblende, tourmaline, zircon and iron-ores (probably magnetite); reacts with hydrogen peroxide and hydrochloric acid.

Pit condition: The pit base, which was observed just after the rains showed no effects of water level rise in spite of standing water observed hardly 0.5 km east of it. Profile showed some increased wetness as a result of surface percolation due to prolonged rain.

Profile No. 4

Location : Between Chota and Bada Sarbela.

Topography: Slightly depressed area.

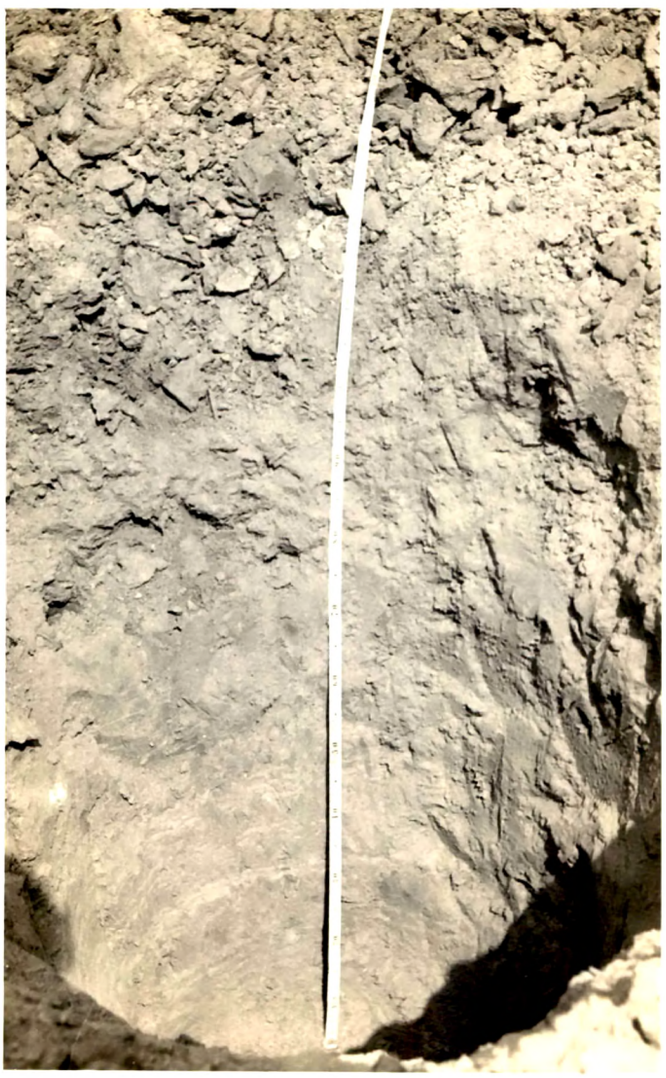
Vegetation: Very scanty, consisting of scattered stunted bushes.

Description: The profile was observed in January just after the water had receded from this region.

0-5 cm This layer strictly speaking cannot be regarded as a part of the profile as it is of aeolin origin; it is fluffy, powdery and soft; white or yellowish white in colour; remains of recent gastropods and formanifers seen indicating that these animals breed during periods of inundation. A little bit of this powdery mass was taken and a few drops of water added; it turned plastic indicating the presence of some clay-sized sediment.

Upto 170 cm Coarsely laminated sediment (Plate 4.3); clayey in nature; appreciably moist; development of salt crystals quite extensive upto a depth of 45 cm; gypsum and halite both developed, the latter being more common; proportion of

PLATE 4.3



Chota and Bada Sarbela profile.

Location: Between Chota and Bada Sarbela.

these crystals decrease with depth and with increasing moisture content.

The crystals precipitated in the clays are found to occur in three distinct forms. Just beneath the surface, fine acicular crystals in vertical position and holding a small quantity of clayey matter are seen. Another form is the development of irregular or incomplete crystals. These occur round about 15 cm depth. The best development was observed at about 30 cm when cubical crystals with hopper like faces are seen. Mica content not as appreciable as in Profile No.3 but enough to be distinguished with naked eye; iron oxide stain of lemon yellow colour seen at irregular intervals; effervescence with hydrogen peroxide indicating organic content in the sediments.

Below 170 cm Laminations become more prominent; sediment firm, compact very sticky and moist; sediment colour dark brown to black; diffuse lemon yellow streaks of iron oxides; effervescence with hydrogen peroxide and hydrochloric acid indicates the presence of both organic matter and carbonate.

Pit condition: Conditions almost identical to that of Profile No.3; no observable rise of ground water level even after rains; top 2.5 cm became more wet during rains.

Profile No. 5

Location : In the Great Rann on the road to Dharamshala.

Topography: Flat.

Vegetation: Nil.

Description: Surface extensively mud-cracked showing spectacular circular and radiating patterns; surface salt crust not visible except in isolated patches.

0-15 cm — Brown clay very slightly moist; not laminated; crushes easily between fingers; can be regarded as unconsolidated.

15-45 cm — Clay colour changes to a darker shade of brown, probably due to the increase in moisture content with depth; distinctly laminated; compact and firm; has a soapy feel; possesses a waxy sheen.

45-76 cm — Dark-brown clay; moisture content increase stricking; laminated; rust like iron streaks observed; waxy sheen of sediment persists; extremely compact; augering difficult; sediment when rubbed between fingers possess a soapy feel; clay plastic in nature.

76-105 cm Dense, dark brown clay; compact and laminated; not much change in profile characteristics; sediment at this depth shows markedly higher plasticity and moisture content.

105-135 cm Blue green or bottle - green clay; plenty of brown rusty streaks running more or less along the profile; water starts oozing out below this depth; effervescence with acid all along the profile; sediment becomes very hard on drying and disperses into an amorphous mass on adding water; drying of this soil artificially, produced cracks which points to the intense shrinkage coefficient of these clays; swelling effect is very prominent when water is added to the dry soil, which is accompanied by a slight hissing sound.

Pit condition: On account of the blue to blue green highly impervious clay horizon(at about 105 cm depth) the percolating water is trapped and starts oozing out at that depth.

PROFILES OF FACET B

Profile No. 6

Locality: In the depressed area near Kuar bet in facet B3.

Topography: Depressed patch.

Vegetation: Nil

Description:

0-5 cm	Very thick salt crust.
5-15 cm	Just below the salt crust, dark coloured clayey soil (Plate 4.4); highly plastic in nature; in the field state it is sticky, spongy and appreciably wet; on drying, needle-like salt crystals, are seen to develop; dry sediment has very high dry strength; no reaction on shaking indicating high percentage of fines ; the sediment possesses a waxy sheen.
15-60 cm	Dark colour persists, though the shade is less dark and the moisture content is slightly less; possibly organic clay deposited under stagnant conditions; high plasticity; on drying, salt crystals develop in the form of slender needle-like aggregates; a large number of fossil shell fragments observed in the top 20 cm.
60-107 cm	Clayey sediment lighter in colour; higher plasticity.
Below 107 cm	Augering not possible due to increasing soil plasticity and stickiness; sediment becomes more and more compact with depth.

PLATE 4.4

Salt encrustations overlying organic clays.
Location: Depressed area west of Kuar bet in Sub-Facet B_3.

High salt content in sediments throughout the profile; iron content also high; clays in this profile (especially upto the 60 cm) possess properties characteristic of the types formed under exhumic conditions; lamination not observed in this profile. Fossil fragments of recent organisms indicate that standing water conditions were prevalent for some period. Effervescence with dil hydrochloric acid all along the profile.

Pit condition: This region being a part of the shallow trough-like depression, holds sea water for quite some months after rains. Oozing of trapped sea water was observed from the various organic clay horizons at different depths.

Profile No. 7

Location: About 17 km west of Khavda near the road leading to Dhorada Wandh.

Topography: Flat

Vegetation: Nil

Description:

0-5 cm Thick salt crust; very hard in nature; could be broken with difficulty by a hammer; at certain places the crust folded and buckled

PLATE 4.5

Salt crusts overlying black clay
Location: About 17 km west of Khavda,
near Dhorada Wandh
(Southern edge of Sub-Facet B_3)

on account of expansion; secondary growth of salt crystals seen in the cracks.

5-45 cm — Soft, moist, oozy, dark green to bottle green clay (Plate 4.5); plastic and organic with typical decaying smell; soapy feel; laminations absent; sticky and impervious.

45-140 cm — Not much variation in the profile; similar dark-green to bottle-green clay; moist; sticky and impervious; scattered reddish-brown streaks of iron oxide; at lower depths, clay becomes appreciably moist and more sticky; lamination observed at depth; water starts oozing below 140 cm.

Pit condition: Same as that observed in Profile No.6. Sea water stagnates for quite some months after the rains. Similar oozing of water was observed from the organic clay horizon below.

Profile No. 8

Location: In Facet B3, shown as Site No. 8 on (Fig.4.1).

Topography: Flat

Vegetation: Nil

Description:

0-40 cm — Clayey sediment; forms very hard lumps when dried; under field conditions, the sediment below 2.5 cm is moist with a slightly soapy feel; the upper 30 cm of the profile, the top 15 cm 20 cm show dark green patches on the profile face indicating partly decayed organic debris. Yellow to lemon yellow streaks indicate occasional concentration of iron-oxides; the top layer 2.5 cm though externally dry still retains a wet interior; small shell fragments are noticed in this horizon. The dark looking field sediment shows a lighter hue with green and yellow patches, on drying; salt crystals develope when soil is artificially dried; the high field moisture capacity prevents the crystallisation of salt crystals.

40-90 cm — Clayey sediment with silt intermixed; lighter in colour and appreciably less moist; salt crystal development absent along the profile; limonitic streaks indicate presence of some iron; not as firm as the average Rann sediment;

PLATE 4.6

Transition zone sediment profile
Location: Transition zone near
Rann and Banni

plasticity of clay conspicuously less with intermediate plasticity and intermediate dry strength values.

90-140 cm — Silty clay sediment; buff coloured; open faces show thin veneer of salt coating; on scraping this surface, reddish-brown colouration is revealed beneath; this surface possesses a waxy sheen; on addition of even a small quantity of water it produces a soapy feel; the sediment is loose-textured, especially so when dry; limonite streaks quite prominent; gives effervescence with dil. hydrochloric acid all along the profile.

In many respects this profile differs from the normal profiles of the Facet B. The sediment here lack the usual lamination (Plate 4.6), possess lower plasticity value, lower organic content and have a more or less open texture. This sediment marks the transition from the Rann to Banni.

Profile No. 9.

Location: In the Facet B3, about 13 km WSW of Pachham island in the Banni area.

Topography: Flat.

Vegetation: Sparse; Camel bush-type

Description:

0-20 cm — Black compact clay; friable at the top; gives effervescence with hydrochloric acid indicating carbonate content; evidence of plant roots.

20-65 cm — Dark brown clay, moist, with laminar structure; clods break on drying to prismatic shapes; salt encrustations sporadic; gives effervescence with hydrochloric acid.

65-155 cm — Grey brown sediment; silty clay; moist; laminar structure; compact; friable; give effervescence with hydrochloric and; water begins to ooze out below 155 cm.

Profile No.10

Location: About 15.2 km WSW of Pachham island in the Great Rann.

Topography: Flat

Vegetation: Nil

Description:

0-4 cm — Black clay, hard, compact; cloddy; possesses very high dry strength; thin loose layer of sediment at the top; gives slight effervescence with hydrochloric acid.

4-40 cm — Yellowish, light coloured sediment; comparatively sandy and moist; structureless; at the bottom thin streaks appear parallel to the ground surface; effervescence to hydrochloric acid noticed.

40-100 cm — Black clay with crystals of salt varying in size upto 1 cm of irregular shape near the top, but lower down, due to increased moisture content, crystals absent; clay in top few cm granular; rest of the profile structureless; effervescence to hydrochloric acid.

Pit condition: Water oozes out slowly at 90 cm depth and rapidly at 105 cm depth (in dry periods). During wet periods, water oozes out from 6 cm depth itself.

Profile No. 11

Location: South of Kuar bet and west of India bridge in the region near the mainland.

Topography: Flat

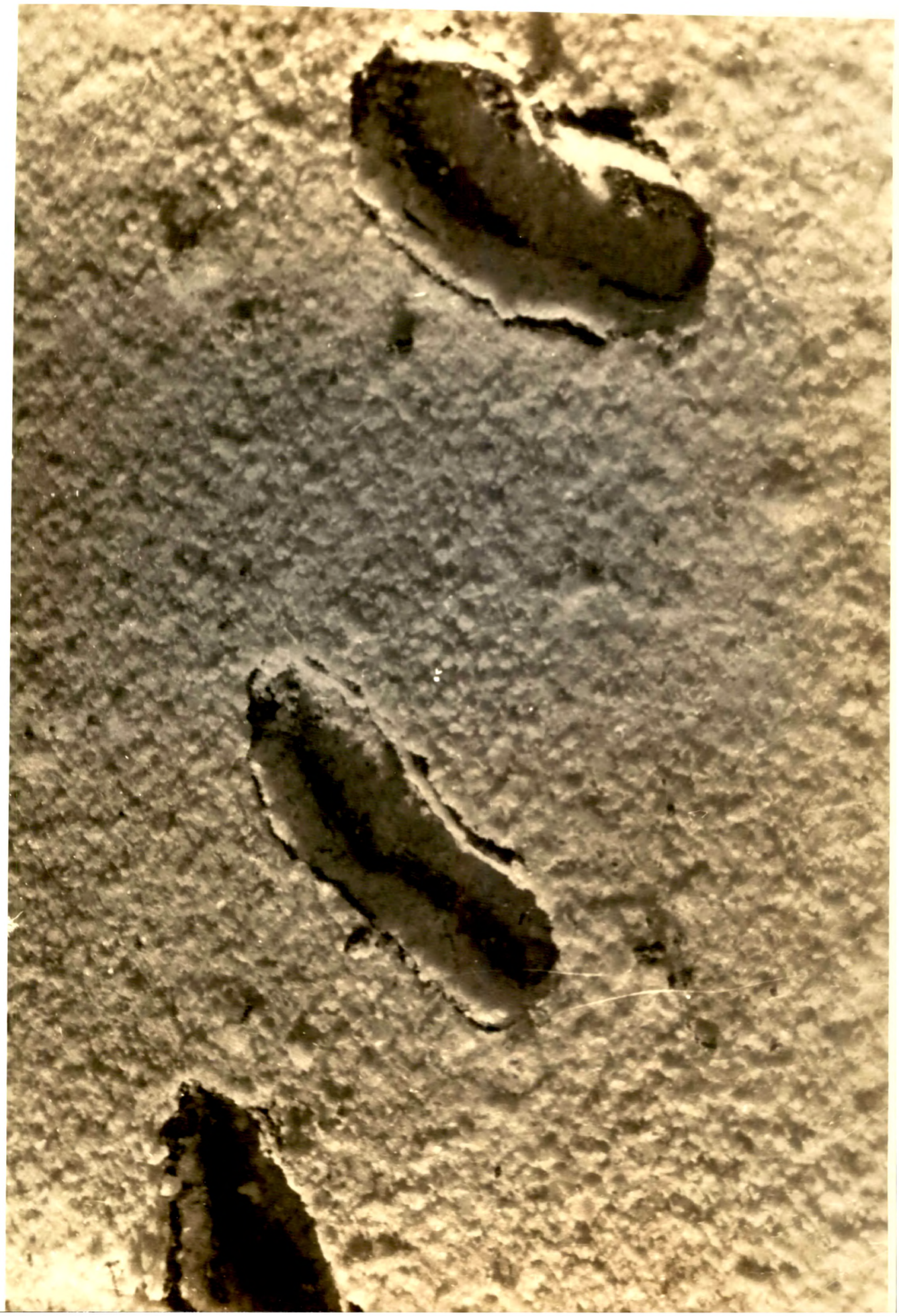
Vegetation: Nil

Description: Top consisting of a thin veneer of salt encrustation.

PLATE 4.7

Soft oozy mud

Location: South of Kuar bet and west of India bridge



0-25 cm — Beneath the salt veneer, is a horizon consisting of a heterogeneous admixture of various size fractions which have definitely been derived from the streams debouching from the mainland. This coarse horizon is a peculiarity of the profiles near the rocky mainland junction.

25-30 cm — Organic layer (Plate 4.7); black to brownish black clay peaty in nature; highly plastic and extremely moist; reflects a period of water stagnation leading to the development of organic material; growth of gypsum crystals not observed.

30-45 cm — Clayey horizon but not organic; plasticity high and extremely moist; no gypsum crystals or presence of fossils.

45-55 cm — Black organic clay layer repeated; properties same as that of the layer encountered in the upper horizon.

55-80 cm — Clayey inorganic horizon; clay appreciably more moist and plastic.

80-85 cm Thin horizon of black organic layer.

Below 85 cm Inorganic clayey layer repeated; plastic and extremely wet; augering below this becomes very difficult, as water begins to ooze out.

Pit condition: Pit dug during the driest season in January 1970, revealed a very wet bottom condition with water oozing out at depth of 85 cm. In other seasons, especially after the recession of sea tides, the water oozes out even at much lesser depths viz. 35 cm. The author has observed that this water is in fact the trapped water percolated from above resting over the impervious clay horizons.

Profile No. 12

Location: South of Kuar bet away from the mainland.

Topography: Flat

Vegetation: Nil

Description:

0-2.5 cm Thick salt crust with a buckled appearance stretching for miles westward from this region, formed due to evaporation of stagnating tidal sea-water.

2.5-20 cm — Black organic layer similar to that encountered in Profile No.11, except that the thickness of this organic horizon, on account of the depressed nature of the region, is more; plasticity high and appreciably wet; being away from the mainland, the top coarse layer encountered in Profile No.11 is absent here.

20-45 cm — Horizon of inorganic clay; plasticity is high; very moist; water starts oozing out from below and augering becomes difficult; the pit wall collapsing at this depth.

Pit condition: Pit condition indicates more wetness than in profile 11, owing to the depressed nature of this region. During the driest period of January 1970, water oozing was observed at a shallow depth of only 45 cm. During rains or subsequent to inundation, the author observed water oozing out from the black organic layer even at a depth of 15 cm. During this period digging below that depth was difficult on account of the soft and highly plastic peaty horizons.

Profile No.13

Location: 2.4 km NNE of Lakhpat in the Rann.

Topography: Flat

Vegetation: Nil.

Description: A very thin veneer of salt crust on the surface during dry period, imparting a whitish appearance to the Rann surface in this region.

0-15 cm	Clay horizon; very compact; plastic and moist; (augering was very difficult) gypsum crystals observed in the top 7.5 cm of this horizon which disappear below 15 cm.
15-105 cm	Similar clay; increasing in compactness and plasticity.
Below 105 cm	Brackish water starts oozing out, on account of the nearness of the sea.

Pit condition: During dry period of December and January, the water level was encountered at a depth of 1.15 m. Pit walls were sufficiently wet though no seepage was observed. During monsoon and high tide, this region is full of standing water from the overflowing creeks and rain-water brought down by the streams of the rocky mainland.

Profile No. 14

Location: SSE of Kuar bet in the Great Rann.

Topography: Flat

Vegetation: Nil.

Description: A very thin veneer of salt crust observed which invariably crumbles under pressure with a thin unconsolidated and heterogeneous layer just below it; probably a wind blown deposit.

0-30 cm — Silty clay layer; yellowish brown in colour; plastic and moist; development of gypsum crystals along the profile that decreases with depth and disappears below 30 cm.

30-105 cm — Similar clayey horizon; clay is plastic in nature, slightly more moist; columnar structure; some iron oxides stains seen; no development of crystals of any kind.

105-230 cm — Clay slightly darker in colour owing to the greater proportion of moisture content; with depth, compactness of sediment increases very conspicuously and augering becomes difficult.

Pit condition: Pit dug upto 230 cm revealed no presence of water nor any appreciable wetness in the soils as encountered in profile No.11 and 12. Even after monsoon, no water-level rise was observed in the pits in this region. This rules out any likely connection between water logging and the rise of water level.

PROFILES OF FACET C

Profile No. 15

Location: Within the Great Rann, close to the junction of the Little and the Great Rann near Adesar Piprala crossing.

Topography: Flat

Vegetation: Nil

Observations were made in February 1970 when the Rann condition was extremely dry. In fact, there was no rainfall in this region for the past 3 years.

Descrption: Extensively mud-cracked region stretching for considerable distance; cracks extend upto 45-60 cm in depth at places and approximately as much as 8 cm in width.

0-15 cm Top layer unique in the sense that it has a striking banded appearance; dark yellow with faint shades of green and a lighter yellow bands (Plate 4.8); profile face has mottled appearance upto a depth of 15 cm; sediments are slightly clayey and very compact; moisture content low.

PLATE 4.8

Top 50 cm of the profile in the Rann
Location: Near Adesar-Piprala crossing
of Little and Great Rann.

15-75 cm — The banding disappears and the sediment is dry, yellowish and compact; when hit very hard, it breaks up into angular clods; the insides of the clods are more wet; closer examination reveals the presence of fine needle-like crystals of selenite.

Below 75 cm — Digging become very difficult; sediment is more clayey and the addition of water renders it plastic; deep mud-cracks and high dry strength proves that the clay is of the 'heavy clay' variety - one which has a great ability to shrink on drying and to swell on wetting; the deep cracks often filled with wind borne fine sand; the sediment upto the depth of 45 cm (depth of the mud-cracks) contaminated and intermixed with the wind blown sand due to the cracks closing down during the rainy season.

Profile No. 16

Locality: About 10 km north of Piprala crossing in the Great Rann, subject to flooding by river water. This spot could not be visited by the author hence the account is based on the work of Satyanarayana (1947).

Topography: Flat

Vegetation: Nil

Description:

0-8 cm	Black, silty clay; interspaces between cracks varying from 1/2 to 1 cm; no effervescence with hydrochloric acid; soil appreciably plastic.
8-30 cm	Black silty clay; prismatic structure; no effervescence with hydrochloric acid.
30-54 cm	Blue-green clay with tongues of black clay; appreciably moist; columnar tops and waxy surface; gypsum occurs in irregular and lens shapes at 10 cm to 20 cm distances and width of 15 cm to 30 cm extending downwards in hexagonal pattern; soil plasticity high; compactness and moistness increases with depth; no effervescence with hydrochloric acid.
54-90 cm	Blue green or bottle green, heavy clay appreciably moist; shows columnar structure; gypsum more abundant; yellowish brown and brown rusty streaks present at lower depths indicating local concentration of iron; no

effervescence with hydrochloric acid but pockets of calcium carbonate existing as yellow white friable mass; crumbling to powder under finger pressure with thin pores of rusty channels occuring at intervals of 20 cm to 23 cm at 79-81 cm depth.

90-110 cm — Blue green or bottle green, silty clay; moist; cloddy; plenty of brown rusty streaks running more or less down the profile; no effervescence with hydrochloric acid.

110-215 cm — Reddish brown; clayey; sticky in nature; rusty brown channels and streaks, channel filled by greyish white soil; gypsum 1.25 - 2.50 cm diameter occur at regular 8 cm to 10 cm interval and occur as irregular glassy plates and selenite as rod shapes of over 1 cm; moisture increases with depth; soil structure in the profile is cloddy (0-8 cm), columnar (30-90 cm) and cloddy (94-109 cm).

Profile No.17

Locality: About 8 km north of Bela island on the Bela-Nagar Parkar crossing of the Great Rann.

Topography: Flat

Vegetation: Nil. Barren.

Description:

0-2.54 cm Salt crust.

2.5-10 cm Black boggy clay; with a thin film of brown layer on top; gives effervescence with hydrochloric acid.

10-75 cm Bronish black clay changing to silty clay with depth; moist; laminar structure; brown iron streaks present in patches; gives effervescence with hydrochloric acid; the brownish black clay very plastic; semi viscous and rich in organic content; gives smell of decayed matter.

75-90 cm Bottle green or blue green clay; very much impervious; highly moist; extremely sticky; structure tends to be laminar on slight drying; mollusc shells present throughout this part of the profile; laminar structure upto 90 cm.

90-145 cm Black, silty clay; very moist, field moisture coefficient almost at saturated value; a general increase in moisture content observed with

depth; gives effervescence with hydrochloric acid probably indicating the presence of micro fossil shells.

Pit condition: Trapped water appears and begins to fill-up at 150 cm depth.

Profile No. 18

Location: About 3.2 km north of Pachham island.

Topography: Slightly depressed.

Vegetation: Nil.

Description:

0-2.5 cm Salt crust, hardened surface.

2.5-10 cm Underlying the salt crust is a layer of organic peaty clay mud; very plastic and appreciably moist.

10-60 cm Soft muddy sediments become more compact; brownish black in colour with some silty clayey layers at depths; structure is laminar and occasional brownish iron streaks present; clay has a typical smell of decayed matter.

60-90 cm — Clay is dark coloured brownish black; very moist and sticky; lamination observed between 10 cm to 90 cm; extremely impermeable; walls collapsed on many occasions; on drying structure tends to be laminar.

90-155 cm — Black, sily clay; very moist and sticky, with depth a very conspicuous increase in moisture content observed and at 155 cm water started oozing out and augering become difficult.

Pit condition: The above profile condition was observed during a dry phase in January 1970. Subsequent visit to the region was not possible owing to inaccessibility on account of inundation. However, it can be stated that it is a region of prominent water stagnation indicated by the presence of peaty clays.

LITTLE RANN

Profile No. 19

Location: In the Little Rann near its junction with the Great Rann (Adesar-Piprala Crossing).

Topography: Flat

Vegetation: Nil

Description:

0-1.25 cm — Friable, biscuity and essentially salt encrusted layer intermixed with silt and clay; it peels off from the lower surface revealing small needle-like crystals on the under surface.

1.25-16 cm — Clayey; bronish in colour; the development of needle-like crystals of selenite is very conspicuous; the top part when broken reveals an appreciably moist interior.

This layer does not possess the characteristics of the clayey layers encountered in the Great Rann in general. It is lighter in colour (indicating a paucity of organic matter) and is far less moist.

16-45 cm — In contrast to the layer above, this horizon is an agglomeration of particles of various sizes, ranging from pebbles to coarse sand grains; sub-rounded nature of pebbles indicate a certain degree of transportation; smooth surfaces of pebbles indicate that the media

of transportation was water; this layer, very uncommon in the Great Rann region, is corase-grained, open-textured and free from the development of salt crystals; probably deposited during periods of heavy rain; fragments of chert and fossils indicate the heterogeneity of this layer.

Below 45 cm — The clay content conspicuously increases; the top 10 cm show some admixture; apart from the needle-like selenite crystals, cubic halite crystals also observed; after a certain depth augering becomes very difficult owing to hard, dry nature of the sediment below.

Fig. 4.1

LOCATION OF PROFILES