2.1. Historical background

The course of historical and political developments, has invariably had its effect, on the progress of Science and Technology. In a sense, the degree of advancement made in that direction, indicates, the stage of civilization, attained in those times, and its impact, on the course of future events. An historical outline, therefore, may not be out of place here.

According to both legend, and tradition, Yadvas, were the earliest inhabitants, of the peninsula of Gujarat. They are said to have ruled Gujarat, from their capital at Dwarka, under the leadership of Lord Krishna, but of this, so far, no historical, or archaeological evidence, is forthcoming.

Mauryas (C. B.C.319-200)

The real political history of Gujarat, begins with the Mauryas, who captured the greater part of this peninsula, in about 319 B.C. A later inscription, of the Ksatrapa Rudradaman, (A.D.150) makes a clear mention, of Vaisya Pushyagupta, as Viceroy (rśhtriya) of Chandra Gupta Maurya /10/, which means, that this Emperor, ruled over peninsular Gujarat. The fourteen edicts of Ashoka, on a rock in Junagadh, and the Junagadh
rock inscription of Rudradāman, wherein a Yavana, Tuśāspha, is mentioned, as the viceroy of Asoka /11/, provide evidences, of the continuance of the Maurya rule, over Gujarat, under Asoka, the grandson of Chandragupta. It is not certain, whether Gujarat remained under Sumprati, the grandson and successor of Asoka; and there is no evidence, of the continuance of Maurya rule, over Gujarat, after Samprati (C. B.C.200).

**Sungas**

The Sungas, were the successors of the Mauryas. But owing to the absence of positive evidence, it is not possible to say, for certain, what relation Gujarat had with the Sungas.

**Early Āndhras**

As there is no positive evidence, it cannot be said, that the early Āndhras, ruled over Gujarat; but some scholars, have considered the possibility of Āndhra rule, over Gujarat, under Śrī Śātakarnī, who is known from the Khāravela inscription, as the "protector of the west", (C. 168 B.C.) /12/.

**Greeks in Gujarat (C.180 B.C. - 100)**

In about 185 B.C., Bactrian Greeks, probably occupied Gujarat, including Kutch and Surashtra, under the leadership of Apollodotus /13/; but other scholars oppose this view /14/. After the death of Apollodotus, Menander become king of the Greek provinces, in India, including Gujarat, but the exact date of this event, is not known. On the basis of his coins, discovered in Gujarat, /15/ historians suggest, that Menander
must have ruled over Gujarat, till his death in 148 B.C.; but some historians do not support this view as there is no solid evidences of his rule in Gujarat barring few coins.

**Sakas**

Sakas were invaders, who entered India from Seistan (Sakastana), after driving out the Greeks. As there is little evidence concerning this, it is difficult to suggest, who ruled Gujarat, upto C.100 A.D. after the Greeks.

**Kśaharāta Ksatrapas (A.D.119-124)**

Coins, bearing the name of Bhumaka, have been found, along the coast of Gujarat and Saurashtra, and this King, one of the earliest of the Kśaharāta dynasty, (another branch of the Sakas), must have ruled in Gujarat, in about 119 A.D. This dynasty, ruled over Gujarat, in the first quarter of the second century A.D. as indicated, in some inscriptions, found outside Gujarat /16/. According to the Nasik cave inscription No.2, of Siri Pulumāyi Vasithīputa, the Kśaharātas, were exterminated by the Satavāhana ruler, Sātakarni Gotamīputra, and thus Gujarat, including Saurashtra, came under the domination of the Āndhras, once again /17/.

**Ksatrapas (A.D.124-304)**

The Āndhras, were finally exterminated, by the second Ksatrāpa dynasty, known as the Western Ksatrāpas, which ruled over Gujarat, for about two centuries continuously from A.D. 124. A connected account, concerning these rules, has been
prepared, on the basis of a few inscriptions, and coins. Almost every ruler of the dynasty, has been mentioned in them. It is seen from this account, that Castana, Son of Ghsamotika, was the first ruling member of the family, which reached the zenith of its power, under Rudradāman I (150 A.D.) who extended the Ksatrapa dominion, to the greater part of Central India, Rajputāna, Kutch, Sind, Gujarat, Saurashtra and Northen Konkan.

Details, concerning the Ksatrapa dominion under Rudradāman I, have been given in his inscription at Girnar, and this fact, is also evidenced, by the Andhra Inscriptions, and confirmed by the distribution of coins of Rudradāman I, in this region.

There is sufficient evidence to prove, that the family of Castana, ruled over Gujarat, without a break till Śaka year 226, i.e. 304 A.D.; and that Ksatrapa Viśvasena, was its last ruling member.

Guptas (C. A.D.456-495)

Probably in C.400, Chandragupta II, attacked the northeastern frontier of Gujarat, and his successors, Kumāragupta I and Skandagupta, definitely extended Gupta rule over Gujarat; but the extent of their rule, cannot be stated definitely. It is, however, certain, that Gupta suzerainty over Gujarat, was lost after the death of Skandagupta in C.470 A.D.

Traikutakas (A.D. 455-495)

Towards the second half of the fifth century A.D., there flourished an independent small dynasty, in the Southern Gujarat, known as Traikūtakas. A few coins and inscriptions, tell the
story of this dynasty. According to these inscriptions and coins, Dahrasena, son of Indradatta, ruled over southern Gujarat (South of the Tapti) in the year 456-457 A.D. as an independent King. It is interesting to note, that "he as well as his successor, dates his inscription in his own era, known as the Traikūṭaka, later as Cedi, or Kalacuri era*. The Traikūṭaka dominions, extended further south into Konkan, (known from two undated inscriptions and coins) under Vyāghrasena, the son of Dahrasena. But in about 500 A.D., the Traikūṭaka power was crushed, by the Vākāṭaka king Harisena /18/.

In the early medieval period (C. A.D. 500 - C.950 A.D.), Lāta (Southern Gujarat) and Saurashtra as the only two divisions of Gujarat, are frequently mentioned, and hence the history of Lāta and Saurashtra has been treated separately by historians, since each division, has a distinct series of rulers.

Kataccūrīs (C.520-610 A.D.)

The Vākāṭaka rule over southern Gujarat (lāta), by Harisena, probably lasted till C.250 A.D., and after this date, Saṅgamasimha, a vassal king (Mahāsāmanta Mahārāja), is known to have governed the district, between the Tāpti and the Narmadā. Nothing is known for certain about him. He ruled from his capital at Broach in A.D.540. Thereafter, the Kataccūrī king, Kṛṣṇarāja, came into prominence. From records of his son Saṅkaragana and grand son Buddharāja, we learn, that the Kataccūrī dominion, extended from Mālwā in the north, to the modern district of
Nasik, in the South, including Broach and Baroda. The Kata-
courir rule was short, nearly of 100 years. Towards the early
7th century A.D., the western Čālukya king Maṅgalarāja, (Maṅ-
galesa) defeated the Katacocurī king Buddharājā, and converted
southern Lāṭa (the country south of the Tāpi) into a Čālukya
province /19/.

Gurjjaras

The history of the northern provinces of the Katacocuris,
is not definitely known. In about 630 A.D., a Gurjara king
Daddall is known to have ruled the country north of the Tāpti,
round about Broach. "These Gurjaras, are supposed to be a
branch and feudatories of the Gurjara-Pratiharā dynasty, of
Jodhpur" /20/. The genealogy of these Gurjara rulers, is not
clear. The northern limit of the Gurjara dominion, was the
Mahī river; the Tāpi, was the southern limit, the Saṅkhedā
and the Rewā Kānthā Agency in the east, and the gulf of
Cambay, on the west. Nāndipurī, (modern Nandod) from which
a majority of the grants were issued, seems to have been
the capital of the Gurjaras /21/. The Gurjara rule, was
perhaps ended, by an Arab raid under Junaid /22/.

Cahamanas (C. A.D.750)

The Gurjara-pratiharās of Avanti, were successful in
driving out the Arabs, from the kingdom of Broach, within a
decade or so; and the Broach kingdom, was finally placed
under the Cahamanas /23/, one of their feudatories.
Calukyas (C. A.D. 610-740)

In about 670 A.D., Calukya rule was probably established in Gujarat, and the Southern Lāta, perhaps became a Calukya province, and the capital of this kingdom, was Navasārīka (Modern Navsārī). During the closing years of the Calukya rule in Gujarat, Ārabs under Junaid, the Governor of Khalifa Hasham (A.D. 724-743) overran the contemporary kingdoms of Sindh, Kutch, Surashtra, and those of the Ĉapotakas and Gurjaras of Bhīnmāl. But Pulakesi Janāśraya (A.D. 738-9), the independent Calukya king, effectively stopped their inroads further southward into the country. After Janāśraya, South Gujarat passed into the hands of Rāstrakūtas of Mālkhed, another southern dynasty, in about A.D. 740.24.

The Rāstrakūtas (C. A.D. 740-975)

The replacement of the Calukyas by Rāstrakūtas from Deccan, brings about Gujarat's contact with the Deccan, and the South. "Their wars of conquest also bring Gujarat into relation with Central India, Madhya Pradesh, Uttar Pradesh and part of South India". The Rāstrakūtas ruled over Lāta, from A.D. 743-974.25. They were contemporaries of the Pālas of Bengal, and the Gurjara-Pratiharas of Avanti and Kanauj, with whom they were constantly at war, from the beginning.

Maitrakas (C. A.D. 500-770)

The history of the Maitraka of Valabhi, is known from their copper plate grants. From these copper plates, it is
known, that the founder of the Maitraka dynasty was Bhattarka, a general of some overlord, who established himself at Valabhi, the modern Vala, in eastern Saurashtra, 25 miles from Bhavnagar, in about A.D.480 or 490. The Maitraka rule, actually begins, with Ṣilāditya II to VII, definitely regained independence, and held it, for about a hundred years; and this fact is supported by their titles, as they called themselves 'Mahārājādhirāja' and 'Paramesvara'. From the findspots of the Valabhi plate grants, it may be surmised, that the Valabhi kingdom, comprised the whole of modern Saurashtra, and perhaps northern Gujarat also./26/. The Maitraka power, was finally destroyed, by the Arabs, under Amr-ibn-Jamal, a general of Khalif Mansur who invaded Valabhi.

Gurjara-Pratiharas

After the downfall of the Valabhi kingdom in C. A.D.770, perhaps, the Gurjara-Pratiharas of Ujjain, ruled the Surashtra or the north-eastern part of it. This fact is supported by (1) the Dharanwārāha copper plate from Haddālā, Wadhwan (A.D. 917-918); and (2) the two copper plates of Balavaran, and his son Avanivarman II from Una, Junagadh, dated in A.D.893 and 899 respectively./27/.
Before the 10th century A.D., after the Guptas in the 5th century A.D., northern Gujarat was probably under the rule of the Gurjara-Pratiharas of Jodhpur, Ujjain and Kanauj, the Maitrakas of Valabhi; and the Rastrakutas of Lata and Deccan.

Cāpotkatas

According to Gujarat chroniclers, Vanarājā of the Cāpotkata family, son of Jayasekhara of Pancāsar, the modern village of the same name in Vadhiar, between Gujarat and Kacha, founded Anahillapura, on the river Sarasvatī in A.D. 746 (V.S.802). Vanarājā and his successors, ruled this part of the country, for about 225 years from A.D.746 to 961. This account of the chronicle, is not supported by epigraphic record, or other materials. But an inscription of Kumārapāla (A.D.1152), supports the fact, that the Cāpotakas were ruling in Anhilvāda, in the 10th century A.D., and Mūlarājā occupied Anhilapāṭaka, by defeating the Cāpotkatas /28/.

Caulukyas Mainline

The copper-plate documents and chronicles, support the fact, that Mūlarājā was the son of a (king?) Rājī of Caulukya family /29/. After overthrowing the Cāpotkatas, "Mūlarājā spent much of his time, in consolidating his position, which at times, necessitated, wars of aggression"; and ruled for about 35 years, till A.D.996 /30/. His son and successor Gamunda, according to the chroniclers, retired, after ruling for 13 years; but Kumārapāla's inscription, credits him with the conquest of
Sind /31/. His son and successor, Durlabha, ruled for about 21 years; and this fact, is supported by all the sources. The successor of Durlabha, is Bhīma I. The most important event of his reign, is the sack of Somanātha, by Mahmūd of Ghaznā in A.D. 1026 /32/. His reign lasted for 42 years, according to chroniclers. His son and successor, Karna, ruled for about 30 years; and during his rule, Lātā, South of the Tāpti, was under the Caulukya sway. Siddharāj Jayasiṃha, the son and successor of Karna, is famous for his conquests of parts of Mālwa of Rajputāna, Saurashtra and Kaccha and this fact is mentioned in his own inscription from Gujarat, and by those of his successors and chroniclers. "Though the inscriptions of Jayasiṃha, cover a period of 16 years only, C.A.D.1127-1143, the Gujarat chroniclers, as well as the Muslim historians, assign him a rule of about 50 years, which seems to be probable, as Jayasiṃha, is said to have succeeded Karna, as a minor"/33/. During his rule, Gujārat saw considerable activities, in the realms of art and literature, including the building of numerous temples. After Jayasiṃha, who died childless, Kumārapāla, came to power. During the rule of Kumārapāla, the Caulukya power, was spread more widely than Jayasiṃha, and this fact is suggested by the Gujarat chronicles, and find-places, of his inscriptions. He adopted Jainism, and proclaimed an order, prohibiting killing of animals. He ruled for about 30 years, A.D. 1143-1174, as given by the chroniclers, and this fact,
is also supported, by the inscriptions of his time, C.1145-
1171 A.D. The successor of Kumarapāla, was his nephew,
Ajayapāla, who ruled for 3 years only. Ajayapāla's son and successor, Mūlarāja II, ruled for 2 years, and during his rule, he defeated a Muslim invader, probably Muizz-ud-din in A.D. 1178 /34/. Bhīma II, succeeded Mūlarāja II. He ruled for 60 years, according to his inscriptions (V.S.1235-1296); and about 63 years, according to chronicles; that is, upto V.S.1298. His rule, was full of ups and downs. According to Muslim chroniclers, he defeated Muizz-ud-din II in A.D. 1178 who attempted to invade Gujarat. Bhīma II, also suffered a severe defeat, at the hands of Qutb-ud-din in A.D.1195 and 1197 when Anhilvāda was raided, by a Muslim army. The Kadi grant of Jayantasimha, who occupied Anhilvāda in V.S.1280 (C. A.D.1124), suggests, that Bhīma II, seems to have lost the throne, for a period of a few years. Bhīma regained Anhilvāda in V.S.1283 or before; but his position was not strong and authoritative. During the life of Bhīma, the power of Anhilvāda was transferred peacefully to Lavanaprasāda, son of Arnorāja of Dholka, who assumed the reigns of Government, where Bhīma was king in name only /35/.

Caulukyas (Vāghelas)

In about V.S.1288 (A.D.1232), Lavanaprasāda, was recognised as a Maharājādhirāja, and his son Viradhavala, as Maharājā, in some place of the Caulukya empire. They are popularly known as Vāghelas, though they are called Caulukyas in their inscriptions, as well as in those of their successors /36/. During
this time, two brothers known as Vastupāla and Tejapāla, became famous, as the moving spirit of Jainism of the period, and this fact is supported by proclamation, in a number of inscriptions and monuments, at Abu, Girnār and Satrunjaya /37/. As we have the first inscription of Vīsaladeva /38/, son of Vīradhavala, in V.S.1308, it appears, that the branch line of the Caulukya family of Lavanaprasāda, was not firmly established before V.S. 1308. Vīsaladeva, who ruled till V.S. 1317 (A.D.1261), was succeeded by his nephew, Arjunadeva, in V.S.1318 /39/. The find spots, and the places mentioned in his inscriptions, suggest, that Arjunadeva, ruled over the whole of Saurashtra and Kacha for more than 10 years. According to Merutunga, and the muslim chroniclers and inscriptions of his reign, Sarangadeva, succeeded his father Visaladeva, in V.S.1331 (A.D.1275) and ruled for 20 years, from V.S.1332 to 1352 (A.D.1275-95). Sarangadeva, was succeeded by Karna, and according to all sources, he was the last ruler of Anhilvāda, and his rule lasted for about 6 years. During his rule, Karna, struggled with Muslim invaders, and he resisted Alakhan till A.D.1306 in the ghāts of Dacoan; but finally, his kingdom, was conquered by the armies of Ala'-ud-din-Khalji, under Ulugh Khan and Nasrat Khan. With the fall of Anhilvāda, Karna fled to Devagiri, under the shelter of Ramadeva. This fact, is based on Muslim accounts. With the death of Karna, Gujarat fell into the hands of Muslims, and petty Hindu kings /40/. Hence forward, Gujarat was ruled successively, by the Delhi Sultanate, Gujarat Sultanate and the Mughals. Further details of these muslim rulers in Gujarat, is not necessary, for the purposes of this study.
CHAPTER II
SECTION B

2.2. Antiquity of Indian Metal Craft

Copper and copper alloys, were used for making objects of utility and works of art, in India, from very ancient times. It has been shown by Gordon (41), that "the use of copper was introduced from the west, by the peasant communities of the agricultural type, who came into the Indus Valley, in about 2800 B.C. and succeeded a purely mesolithic people, whose remains are found, at such sites as Jungshahi hill, Ganjar Takar, and Jherruck. The copper equipment of these people, was confined to a few pins, and chisels." We do not know, whether these artifacts, were made of melted copper, or native copper (i.e. natural copper). About 2,600 B.C. the Harappa culture, provides us with adequate evidences, of a fairly large range of equipments in copper and bronze, which corroborates the existence, of a good knowledge of metallurgy. Barring the Indus Valley sites, and its contemporary or later Harappan sites at Lothal, Rangpur, Rojdi etc., in Gujarat, bearing evidences of copper and bronze tools and objects, we have stray evidence of weapons, made of copper and bronze, of the Middle Bronze Age type, 'associated with the arrival of an increasing element, of those who speak an Aryan
language'. These copper tools and weapons were found in many places in North India /42/, such, for example, as (1) copper at many sites in the upper Jamuna-Ganga Doab, the most common finds being copper flat axes, and barbed spearheads, (2) a hoard of 13 copper swords and dirks found near Fatehgarh, (3) Copper flat axes found in small numbers in Bihar. But the use of this metal, does not seem to have been introduced, in the South.

Vedic literature, makes mention of 'Ayas', which may mean copper or bronze or iron. Ayas (Presumably copper) was used in making vessels, for domestic and ritual purposes /43/. This proves the fact, that the art of working in metals, is a very ancient one in India. Although, the examples of early Indian copper and bronze works are rare, the nude dancing girl from Mohenjodaro, is an outstanding work. This indicates, that, in that period, the metallurgical techniques, including forging and casting, and the complicated lost wax process, commonly known as 'cira Perdue' was also known. Persistence of early art traditions, in metals is supported by "Jangali Bronzes" /44/, which often have a crude physiognomy, and ornamentation, that presents an applique appearance, of early Indian terracottas. A remarkable example of this familiar 'Jangali bronzes', is illustrated, by the bronze image of Pārśvanātha, in the Prince of Wales Museum, Bombay /45/.
With the exception of the 'dancing girl' of Mohenjodaro, no other example, of metal object of art, has come to light in Northern India, until the Gupta Period (4th-6th centuries A.D.). From this, one cannot surmise, that during this span of centuries, the art of metal figure casting had ceased to exist. Marshall /46/ reports, that "Cire perdu" metal casting techniques, were known, and used to produce gold and copper ornaments and other objects at Taxila; where Alexander the Great (327-325 B.C.) came before the battle with Porus. During the period between c.218-73 B.C., the Satavahana dynasty, of the Central Indian region, ushered in a Brahmanic revival, which encouraged temple art, as well as metal arts. There is a small collection of bronzes, in the Madras Government Museum, particularly the Amaravati group of Buddhist bronzes, datable to C.218-73 B.C. A few metal figures of the period of Ikshvakus, who succeeded the Satavahanas, in the Krishna Valley, towards the end of the 2nd century A.D., have come to light, as a result of the recent excavations at Nagarjunakonda.

The earliest style, in metal statuary, is that of the Gandhara (1st-6th centuries A.D.). Marshall, in his work on Taxila, has described a few Indian and Quasi - Indian figurines, and other metal objects, from Taxila. He has also discussed, the different processes of hammering, repoussé, and casting methods, from a study of the different metal objects obtained in the excavations /47/. A male copper figure, from Sirkap
(Taxila, fig.422) is noteworthy, for, it shows distinctly, Indian characteristics of the 1st century A.D. Most of the metal images belonging to Gandhara, have been described by Marshall, and are made of copper, in solid cast.

Bronze images, of the early centuries of the Christian era, are extremely rare. A group of bronzes from Chausa, near Buxur in Bihar (now in the Patna Museum) has been dated by Shah, to a period from 1st-2nd to 4th centuries A.D./48/. According to Shah, these bronzes, supply evidence, of metal work, of the Kushana age. All the images, show nude standing Tirthankaras, and they fill up a gap, in the study of North Indian metal sculptures.

"Several excellent examples of Gupta metal images, survive, and the high degree of perfection, achieved in the Sultanganj Buddha, suggests a continued period of activity, in the casting of metal images" /49/. This copper image from Sultanganj, shows a marked influence, exercised by Sarnath and Mathura Schools of art. The bronze Brahma - a colossal image (gilt bronze inlaid with silver) from Mirpur Khas, Sind, now in the Karachi Museum, is one of the earliest known examples, of the Western Indian School of Sculpture, and closely follows Gupta traditions.

References, concerning metal images, are more frequent from Gupta times. "The earliest, 'Silpasastra', that describes the lost-wax-process is the 'Madhucheshhhishthavidhanam' as
recorded in the 68th Chapter of the 'Manāsara', is believed to have been compiled in the Gupta period.

Several masterpieces of metal sculpture have been produced by the Pala School of Eastern India, in Bengal and Bihar. Metal images from Eastern India, during the period preceding the reign of Devapala, are extremely rare. The image of standing Tara, from Nalanda, assignable to the 7th century A.D., is an early example of the school of Eastern India. Early examples of the Eastern School, obtained from Kurkihar, and assignable to the 8th century A.D., have been discussed by Jayaswal, Kramrisch, and others. The Pala School, continued to produce works of art, for at least four centuries, till the latter part of the 12th century A.D., when it ended, after the Muhammadan invasion of Bihar.

References about solid and hollow cast metal images have also been given in the Vishnudharmottara Purāna. S.K. Sarasvati, has discussed Casting by the lostwax process with translation of the relevant text from Mānasollāsa or Abhilashitartha Chintāmani ascribed to the Western Chālukyan King Someśvara of the Kalyāṇī line, C. A.D.1124-25. According to it, a wax image is first made, and then fine clay coating is applied three times. The clay coating also contains, well ground charred husk, finely shredded cotton, and a little powdered salt. The wax is melted out, when the molten metal is poured in the moulds. The image is removed on cooling, after breaking the clay mould, and the image is
finally carefully finished. All these suggest, a continued period of activity, in the casting of metal images.

"The whole of India, is deservedly famous, for its bronzes; but the most prolific production, has been in the South, where some of the greatest masterpieces, have been produced. These bronzes, occur in abundance, in Tamil districts in South India". The South Indian Metal-smith of the Pallava period (5th-9th centuries A.D.) produced very few icons. Some of the finest miniature and medium sized bronzes, in the South, are the products of Pallava period. The Chola period (9th to 13th centuries A.D.), was responsible, for the most creative period of South Indian icon production, in copper and copper alloys. Many examples of this period, have survived, and all are executed by Cire Perdue solid casting method. The most popular image of this period, is Siva, especially the dancing Siva, — known as Nataraj.