MAPS FOR AFRICA

Compiled by
Marijke Cosser,
assisted by
Oakley West.

ALBANY MUSEUM * RHODES UNIVERSITY

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INTRODUCTION

Opening address by Oakley West at exhibition: *Maps: Knowledge and Power - A Teaching Exhibition* at the Albany Museum, November 1992.

Maps, like art, reflect man's perception of the world in which he lives. Often they are coloured both by the known and unknown, by fact and fancy, myth and mystery.

Maps are not just merely bits of paper. They are, and have been, important instruments in conquest and empire building. They reflect not only the perceived glory of war and occupation, but survival under siege, the protection or defence of people, property and resources, and, believe it or not, the accidental inheritance of territory, like India. Maps reflect the build-up of nations bent on expansion, resulting in the dreadful years of trench warfare in 1914 - 1918. And who of us can honestly admit that we knew *exactly* where Kuwait was before that conflict began?

Thus in many cases lands were often first claimed on paper before they were effectively occupied. It has been said that no place is truly discovered until it has been mapped and as much as guns and warships, they have played significant roles in manifesting the realities of conquest and empire building.

Maps are storehouses of knowledge and information and often it is in that very knowledge that lies the power to conquer, control, defend, divide or develop, to govern or administer or even mislead or misinform.

This exhibition attempts to trace almost 2 000 years of cartography. It starts with the great insights of Claudius Ptolomy and his *Geographia*, continues through the retrogressive perceptions of the Church fathers and their decrees that Jerusalem was the centre of the world, to the perception of a flat Earth and a rather whimsical look at modern "upside-down" cartography which has proved to be only 300 years late in its conception.

One can explore the opening up of the dark continent of Africa with its myths and mysteries, the source of the Nile, Mountains of the Moon and the mythical kingdom of Monomatapa. One can "see" the gradual growth of knowledge as first the coasts and later the interior was discovered and made known by men like Diaz, Da Gama, Livingstone, Stanley and Andersson. The discoveries of these explorers were recorded in the great maps of cartographers like John Arrowsmith and Henry Hall, the former incidentally never ever having visited Africa.

A quantum leap takes us to some of the newest techniques, the satellite image, which still reflects the historical heritage in the shapes and patterns formed, in what has become known as *Settler Country*, from as early as the 1800s. By these images one is still able to appreciate the ravages of drought, overgrazing and perhaps the mismanagement of natural resources.

Maps show us a different Grahamstown, a Graham's Town lit by gaslamp light. They help us to "see" prison gangs building the Queen's Road to Fort Beaufort, or appreciate the scramble for river frontage farming land. We see the early conceptualization of a harbour scheme at the mouth of the Kowie River, dreamed of by those intent on opening up a gateway to the Eastern Frontier through its wide waters. (A scheme, incidentally, which finally found a different, but nonetheless effective, realisation in the Marina built in the 1990s). Dreams were dreamed of a wide-spread colonial administration, though not without its nostalgic overtones: King William's Town would be the principal town in the county of Middlesex and Komga that of the county Cambridge in British Kaffraria!

One can trace in maps the expanding horizons of the colonial powers as they appropriated land in the name of civilisation. As the church and the courts moved in to replace tribal customs and laws, maps reflected the more tangible results of expansion - telegraph, road and rail networks, as well as the more abstract and intangible - the spread of violence.

On the other hand, we can follow the development of a great city, the city of London, though almost 400 years, witnessing the growth of its urban sprawl, the depiction of the famous bridges over the Thames and who could

not but be thrilled by the panoramic sweep of London from the Houses of Parliament through St Pauls to the sailing ship harbour, cartography *par excellence* which evidences the birth of a rail system with engines looking distinctly more akin to Stevenson's rocket than the locomotives we are used to seeing.

An exceptionally fine relief model of the Western and Southern Cape coastal area serves to highlight the unending struggle of cartographers to portray that troublesome third dimension, *height,* on flat pieces of paper. Such struggles are revealed both in maps of topographic landscape as well as the urban complex - some successful, some not so.

Finally, the exhibition touches lightly on the wonders of satellite imagery and the coming of the computer to cartography, as in all things. An attempt is made to explain in simple terms the art, science and technology of the cartographer in the production of the multicoloured maps we are all so familiar with.

PREAMBLE

Throughout time maps have served a multitude of purposes. They have been the instruments of rulers and conquerors, of entrepreneurs and of hunters of game or fortune. They have not only guided man's passage on the earth, but beneath it, around it and over it. The exhibition *Maps: knowledge and Power - a Teaching Exhibition* (for which this handbook was prepared), focused mainly on historical maps and aimed to show the progress over time of cartography as a science, as well as an art. By no means does the compiler profess the handbook to be all-inclusive; however, it is hoped that it will, nevertheless, be an inviting introduction into this many-faceted art...or science?

CARTOGRAPHY - ART OR SCIENCE?

Cartography has been described as a meeting place of science and art. The cartographic process involves many of the intellectual activities that are scientifically based. For example, logic must be applied to projections; scientific measurements are of vital importance to accuracy - in this respect cartographers are much like engineers.

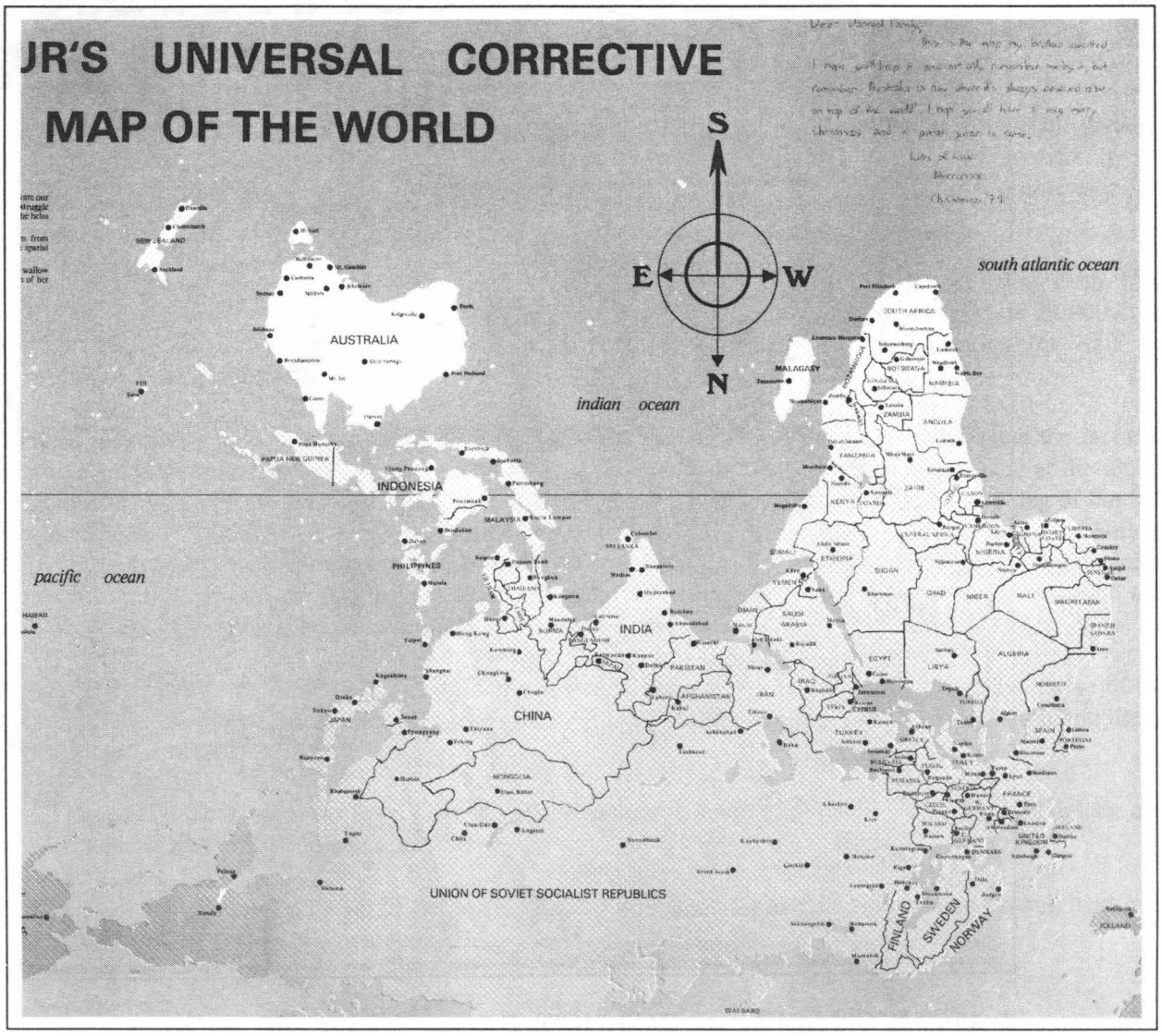
Of equal, and sometimes greater importance, are the visual relationships inherent in this form of expression. People or map readers react to certain aesthetic and visual structures in the selection of lettering sizes and styles, colours and tones which conform to principles of visual perception.

Before the last century, the question of whether cartography was an art never arose, for it very definitely was. This is evident when maps were embellished with all sorts of imaginative scrollwork, lettering or intricate compass roses. Even as late as the mid-19th century, the colouring of some of Germany's greatest maps was done by German society ladies. Throughout the history of cartography, great emphasis has been laid on fine pen and brush skills, the aim being to make something look good. Now the concern is less for aesthetic appeal than it is for the efficiency with which the objective is obtained.

MAPS AND THE PERSPECTIVES OF BELIEF

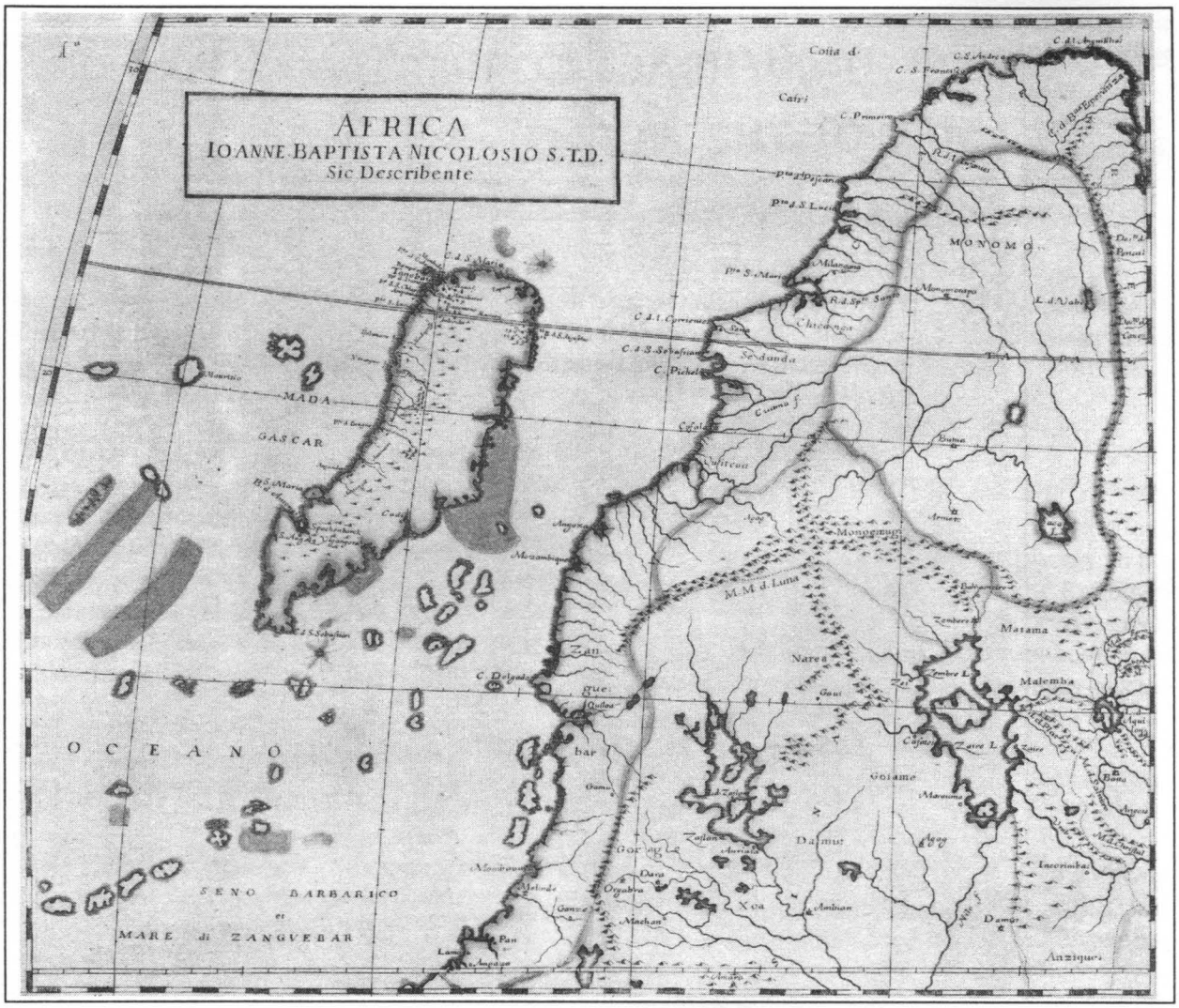
Although Polynesians and Micronesian societies had no written language but navigated the Pacific Ocean with maps of sticks and shells, the art and science of cartography has no doubt been practised for at least as long as there has been communication by written language. The history of map making is a record not only of the human struggle to understand the environment, from the immediate surroundings to the whole earth, but is also reflects peoples' **attitudes, beliefs and priorities** at different times.

Maps thus not only oriented man in geographical space: they also indicated how man *thought* and *felt* about the world. In fact, man's belief so implicitly informed the young art of cartography that it was actually to influence its actual form and content for at least one thousand years.



1 *Universal Corrective Map of the World* by S Mc Arthur. 1979.
Geography Dept., Rhodes University.

Consider, for example, the modern map of Australia "upside-down" - with the southern hemisphere at the top of the world! Its Australian cartographer light-heartedly proclaims it to be the "first step to elevate our glorious nation from the gloomy depths of anonymity in the world power struggle...to its rightful position...reigning at the helm of the universe!". Weary of "down-under" jokes, McCarthy believed his nation to be worthy of being seen from a much worthier perspective. His ideas, however, are not new, as Giovanni Battista had thought of the same idea in 1595, depicting Africa as it might be viewed from Europe.



2 *Africa* by Giovanni Battista (1610 - 1670). Between 1660 and 1670.
Albany Museum

MAP-MAKING - ITS EARLY BEGINNINGS

Chinese literature tells us that maps were being used in the East as early as the 7th century BC. The earliest surviving examples of maps are clay tablets found at Nuzi, in northern Iraq. Believed to be from the period ca. 2 300 BC, they show rivers, settlements, land holdings and hills.

Maps of a kind, on clay tablets, have survived from ancient Assyria, but it was really the Greeks who made the first scientific maps. Indeed, it was Herodotus who made the first written reference to a map. It was also in Greece that the theory that the Earth was a sphere was first propounded by followers of Pythagoras. (It was usually, both in those days and later, represented on paper as a disc.)

No one knows when the contemplation of the character of other lands or even the nature of the whole earth took place. We do know that by the time of Aristotle (304 - 322 BC) the Earth was recognised as being spherical from evidence such as differences in the altitudes of stars at different places; from the fact that shore-lines seem to "come over" the horizon as one moves across the sea and even from the assumption that the sphere was the most perfect form.

LATITUDE AND LONGITUDE, EAST AND WEST - AND A DANGEROUS MISTAKE

By the 2nd century BC the system of describing positions on the earth by **latitude and longitude** and the division of the circle into 360 degrees had become well established. Estimates of the size of the Earth were made by the ancient scholars Erastosthanes (ca 276 - 196 BC) and Posidonius (ca 130 - 50 BC) from angular observations on the sun and stars in the eastern Mediterranean area.

Erastothanes' figure of 44 800 kms for the circumference of the earth was remarkably accurate; being within 14% of the truth. Unfortunately 400 years later Posedonius recalculated the measurement and arrived on 29 000 kms, this figure being used by Ptolomy. It was through this that Columbus mistook America for Asia by underestimating the size of the earth!

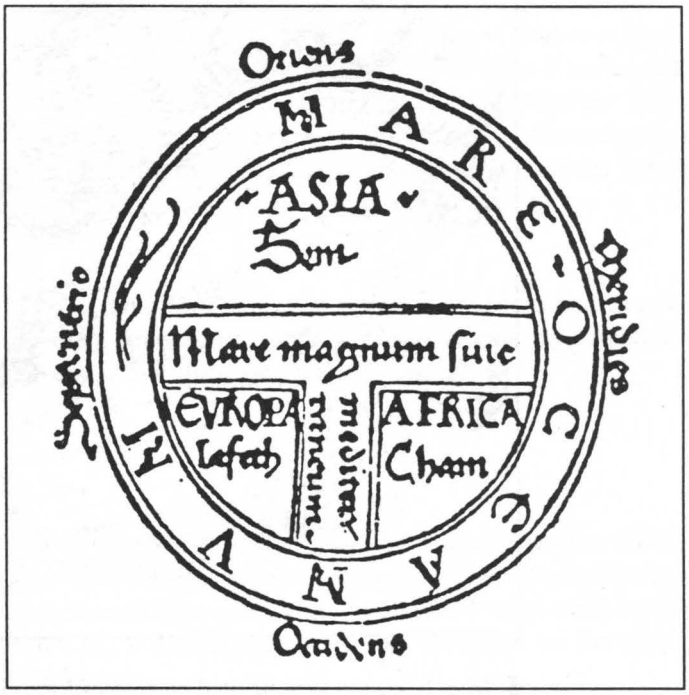
A form of map which had been most popular in Roman times was the **T-in-O map**, so called from the fact that the three continents were symbolically shown by a "T" within an "O". In this, the east was placed at the top of the figure, the outline of the "O" representing the boundary of the world, while the perpendicular leg of the "T" represented the centre-line of the Mediterranean and its horizontal arm, the meridian stretching from the Nile to the Don. This type of map was also popular in medieval times, and its form was sometimes varied by having a "Y" instead of a "T" within the "O", or a "V" within a square. These maps, however, were purely symbolic and had no practical geographical significance.

After the 2nd century AD, maps became a teaching device to illustrate scriptural theory about the nature of the Earth, and objective geographical thinking about faraway places was replaced by fanciful speculation and literal interpretations of biblical passages:

> Ezekiel 5: Thus saith the Lord God; this is Jerusalem: I have set it in the midst of the Nations and countries that are round and about her.

Jerusalem was depicted as the centre of the world, which illustrates the significant power the Church held over all matters - even geographical.

This illustration of a **T-in-O** map shows Jerusalem at the centre of the world and Paradise in the top central section, named *Oriens*; the term "to orient" comes from this. The known world was surrounded by the river *Oceanus*.

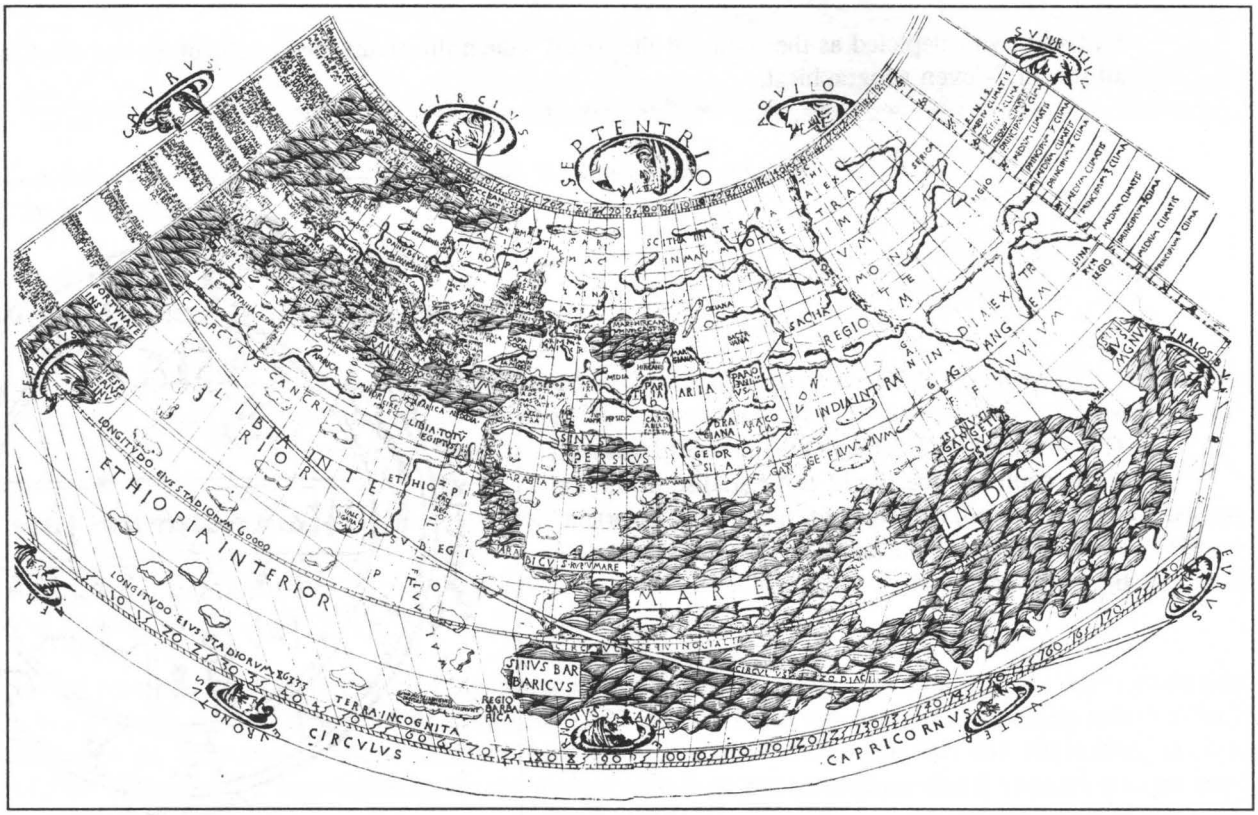


3 The T-IN-O map of Mediaeval times.
Copy: Albany Museum.

CLAUDIUS PTOLOMY

The most influential figure in the history of cartography is **Claudius Ptolomy**, who lived in the first half of the 2nd century AD. He was an African-born Egyptian astronomer and geographer of Alexandria, Egypt and author of several works but noted chiefly for his *Geographia*, a work in eight volumes, illustrated by maps. *Geographia* was first printed (without maps) in 1475, and with 26 regional maps and a **Mappa Mundi** in 1477.

4 Claudius Ptolomy.



5 Map from the first printed edition of Ptolomy's *Geographia* with maps which appeared in Bologna in 1477.

The geographical work attributed to this remarkable man remained for some centuries the standard among Arab geographers, although he had little influence on western geography until the 15th century.

Ptolomy's cartography, although significant for the time in which it was conceived, was far from accurate according to modern standards. However, many of his errors were attributable to the fact that exploration was in its infancy. What was still unknown was often filled in by guesswork, a tendency still apparent as recent as the 19th century.

THE HEREFORD *MAPPA MUNDI* by Richard of Haldingham, ca 1300s.

The Hereford **Mappa Mundi** *(illustration 6)* was preserved in Hereford Cathedral since the early 14th century. The original map is drawn on a single skin with the neck at the top. An inscription in Norman-French in the lower left-hand corner ascribes the map to Richard of Haldingham and Lafford: "Let all who have this history, pray to Jesus in God for pity on Richard of Haldingham and of Lafford who has made and drawn it..."

It is circular in form, centred on Jerusalem, with the East at the head. Around the outer circle are inscribed the names of four cardinal points - Oriens, Meridiens, Occidens and Septentrio. These are marked by grotesque dwarfs within circles. The supplementary points, two equally spaced in each quadrant, are marked by circles containing an animal's head. The points thus make up the twelve winds according to the system associated with the Greek admiral, Timosthenes.

This map, the original being more than three metres wide and which was drawn in the 13th century, illustrates the degree to which cartography had degenerated from the time of Ptolomy 1 000 years earlier. The map is oriented with east at the top and Jerusalem as the centre of the world.

It must be remembered that the Hereford map is exceptional among surviving maps for its size. These maps owed their survival to their preservation in ecclesiastical libraries, whilst others of similar type are often small and crudely drawn, but it is not improbable that they are reduced versions of large contemporary maps, whose main features they preserve.

PORTOLAN CHARTS

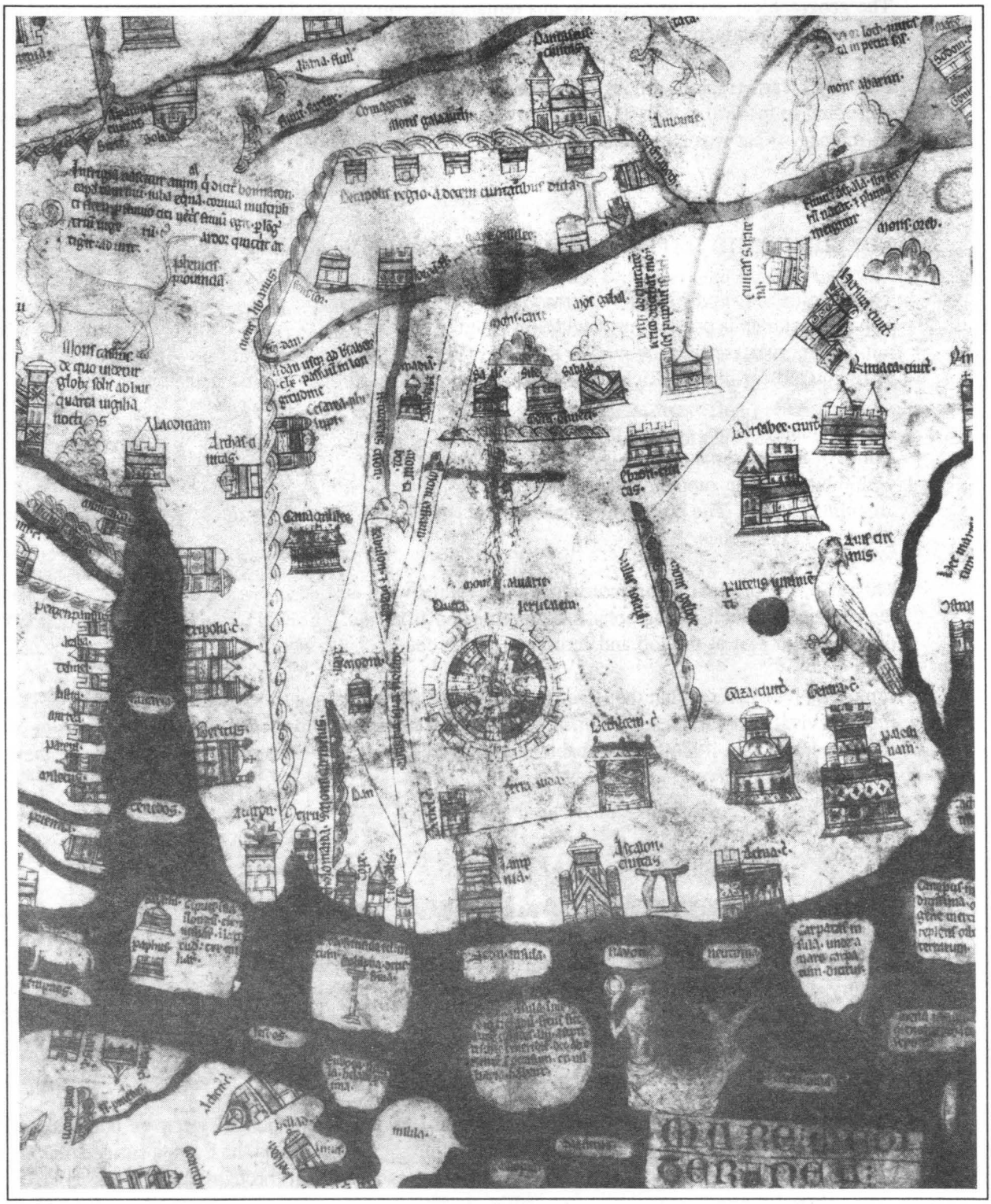
At the same time that the ecclesiastical cartographers depicted an imaginary world, a new type of map emerged, surpassing in accuracy everything that had preceded it. This group of maps was called the **Portolan Charts** and appears to have been created by admirals and captains of the Genoese fleet during the second half of the 13th century. It is suggested that these charts may have come into use as a consequence of the use of the magnetic compass around 1200. The oldest surviving specimen is the *Pisan chart* which was copied for almost three centuries; as late as 1620 it was still regarded as adequate for the purpose of practical navigation in the Mediterranean.

Perhaps the most important feature of the Portolan Charts is the elaborate system of compass roses and rhumb lines which criss-cross the entire surface. (Rhumb lines being a circle on the Earth's surface making a given angle with the meridian of the place, marking the direction of any object through which it passes).

THE 15TH CENTURY

The re-discovery of Ptolemy's *Geographia* began a revival in the art of cartography. This included amongst others, a treatise on cartography. Ptolomey's writings were lost to the Western world for more than one thousand years, but fortunately were preserved in the Arab world and later came to light again in Europe in the fourteen-hundreds. From his descriptions the Ptolomeic maps were reconstructed and they had a profound influence on European geographical and cartographical thinking during the Renaissance.

Cartographers were not content to be slavish copyists of the Ptolemaic maps and began to try to correct them. Consequently we find new maps the so-called *Tabula Moderna* as supplements to the regular Ptolemaic maps.



6 Section of The Hereford *Mappa Mundi* by Richard of Haldingham. Ca. 1300s. Formerly in Hereford Cathedral, now sold.

REVOLUTIONS IN MAP-MAKING

The invention of the **printing press** by Gutenberg was to revolutionise map-making. In 1472, the first map was printed. Significantly, also around this time, cartography began developing as a serious science. With the introduction of printing, thousands of copies could be produced from a single plate and the price of maps sank to a fraction of what it had been before.

The three major technological developments which most profoundly influenced cartography up to the 1950's, therefore, may be summed up as follows:

a) The woodcut technique of the 15th and 16th centuries;
b) Copperplate engraving from the late 16th to the 19th centuries, and
c) Lithography in the late 18th and 19th centuries.

AFRICA - THE MYSTERIOUS CONTINENT

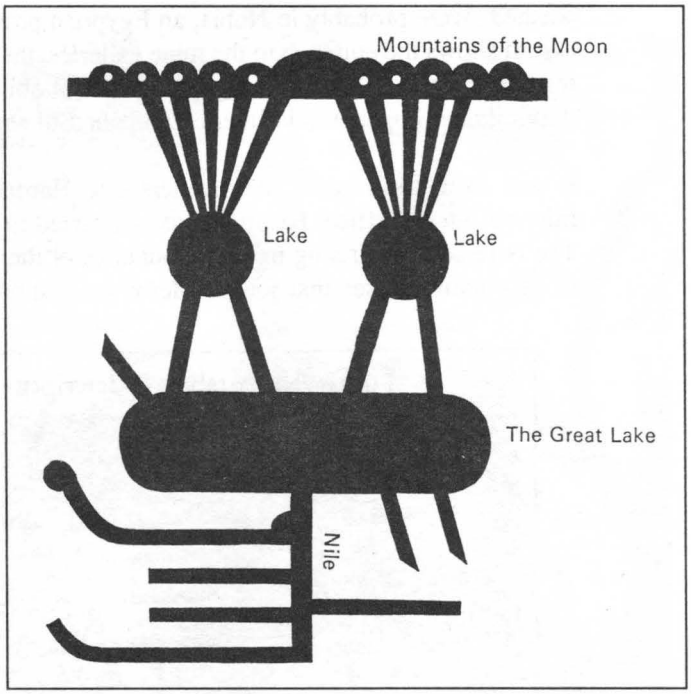
One of the oldest maps in the world records a gold mining region in Africa - these "mountains where gold is washed" were probably in Nubia, an Egyptian province when the map was sketched on papyrus over 3 000 years ago. It shows the entrance to the mine galleries, the features of the surrounding countryside, where there are "roads leading to the sea". Despite Egypt's practical abilities, and those of the Greek and Roman conquerors, Africa's dark, almost impenetrable interior remained in shadow as late as the 1880s.

It was from the reports of travellers like Herodotus that Ptolomy (himself African-born) drew much of his information on Africa. His maps, reconstructed in his *Geographia*, show Africa much as Herodotus described it. The Nile is shown rising in the "Mountains of the Moon" and discharging into a pan of lakes, from which it runs in two main courses that join at Meroe (near modern Kabushia, Sudan).

7 *Totius Africanae Tabula* by Ptolomy, edited by S Münster. Ca. 1540
Copy: Albany Museum.

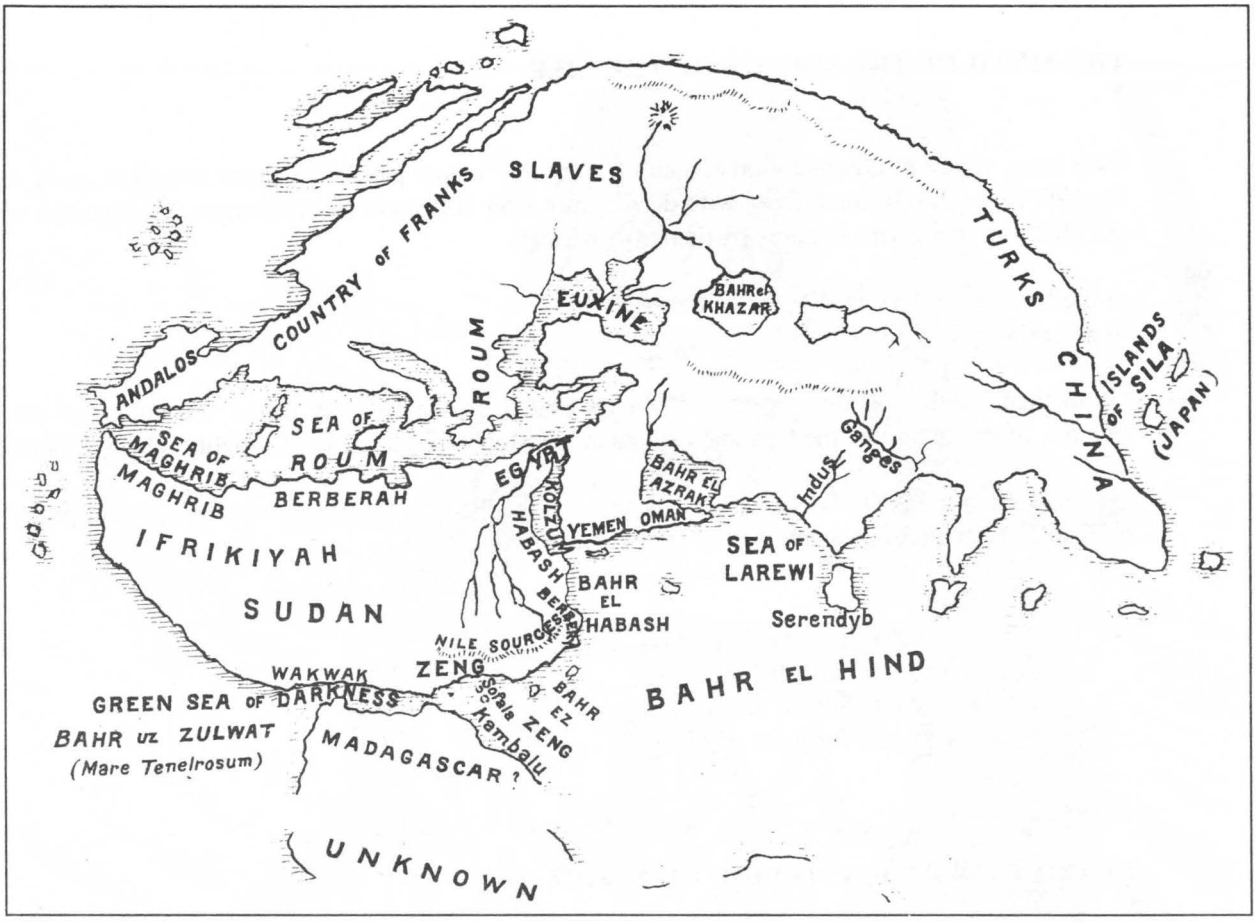
A handful of similar reports was circulating at this time, but not one of the stories were assailable. The truth was that no ancient geographer was certain just what lay to the south of the desert, not even Herodotus, otherwise so confident in his descriptions of the parts of northern Africa he had himself travelled.

These aspects of the depiction of Africa cartographers generally accepted until the end of the 16th century. But even before the 1500s Ptolomy's maps were supplemented and amended by the **Portolan Charts** and **Mappa Mundi,** which included more recent information. Some of this was derived from the reports of Moslem traders and travellers.

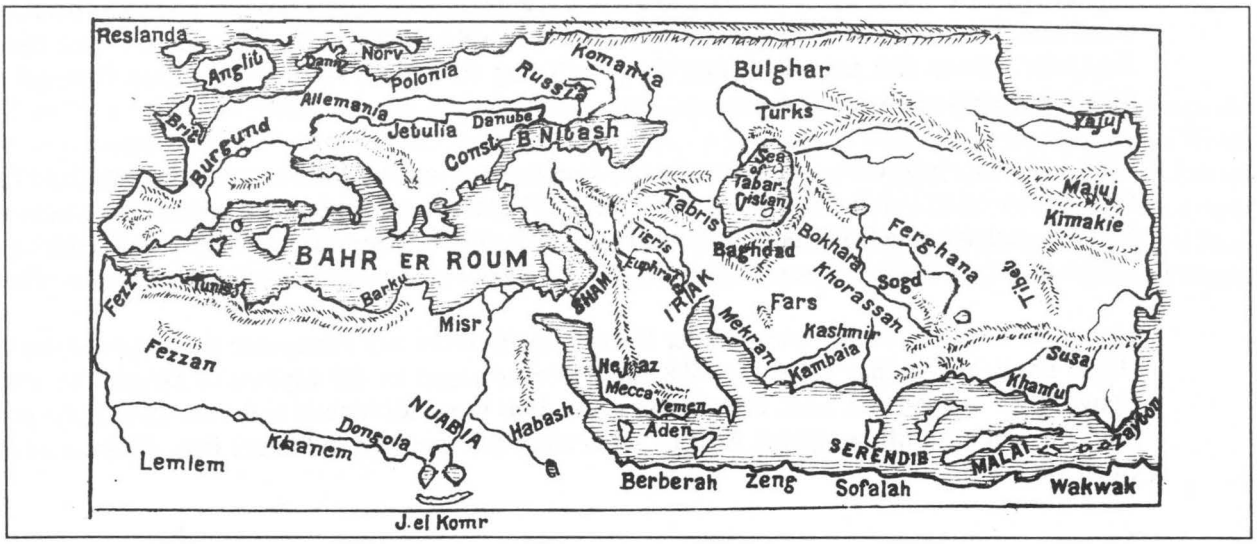


8 On Arab maps the Nile rose in Ptolomy's "Mountains of the Moon", as this detail shows, copied from the 11th century maps (with south at the head). (Bricker, 1969).

It was the writings of the 12th century Moorish Scholar, Al-Idrisi, one of the Arab custodians of Ptolomey's *Geographia*, that provided Europeans with one of their first glimpses of what Arab travellers knew about the Sahara, the Sudan and eastern Africa. *(see illustrations 9 & 10).*



9 *The World According to Al'Masudy, an Arab Historian.* 943 AD.
Albany Museum.



10 *The World According to Al'Idrisi*, a Moorish writer of the 1100s.
Albany Museum.

THE MYTH OF THE SOURCE OF THE NILE

Over time, voyages of exploration caused many of the "empty gaps" that characterised maps of Africa as late as the 19th century to become filled with detail. Only after 300 years of exploration, for example, was man able to establish two important features particular to Africa:

a) the true location of the source of the Nile, and
b) the existence of the Great Lakes system.

Up to then, myth held that the location of the source of the Nile lay in the "Mountain of the Moon" *Lunae Montes*, in the region of the legendary kingdom of Monomatapa, situated roughly where Zimbabwe is today.

Jonathan Swift in his *On Poetry* (1733) ably put the predilection for filling Africa's "empty spaces" with animals, trees or indigenous scenes into words :

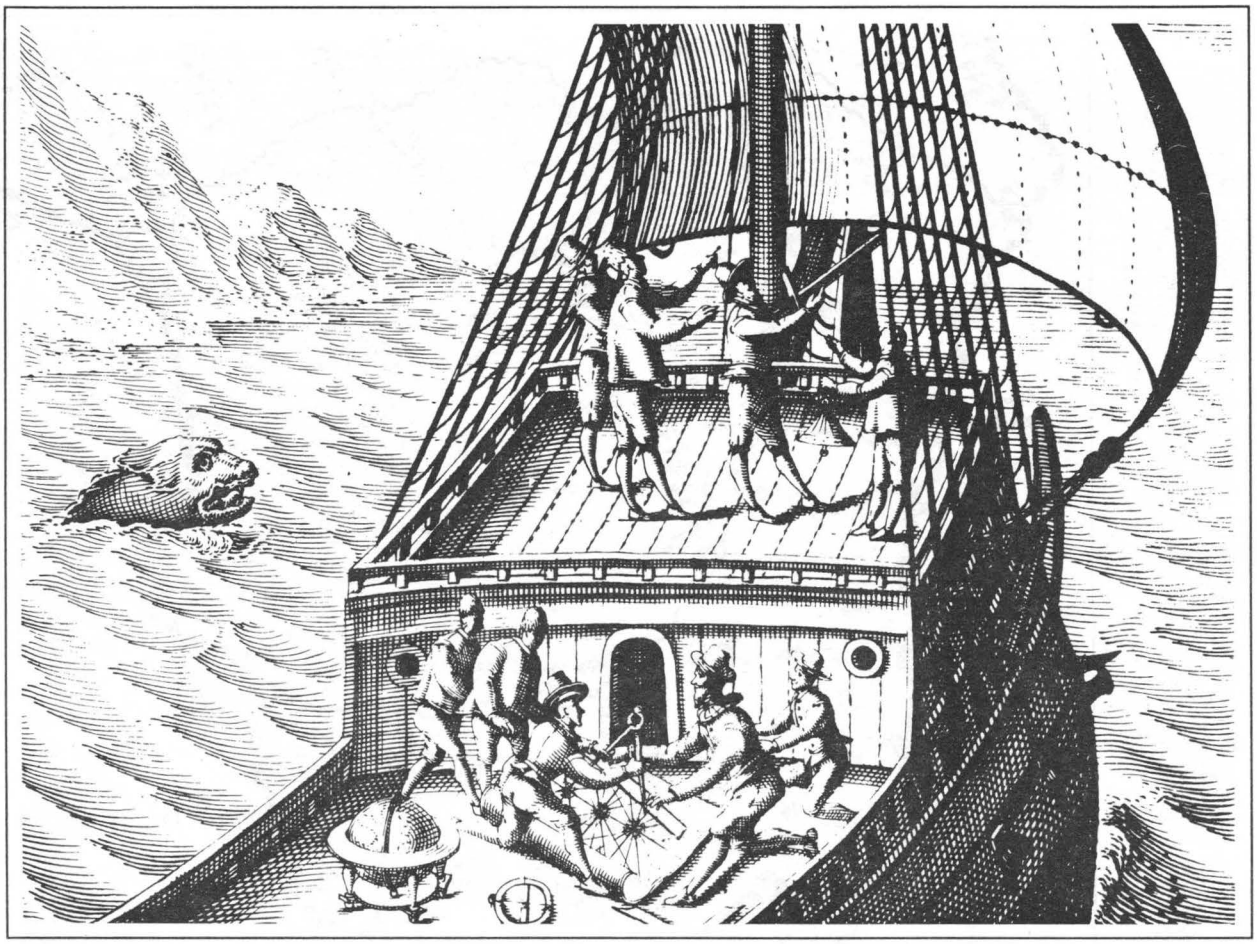
> "So Geographers in Afric' maps
> with Savage pictures fill their gaps
> and o'er uninhabitable downs
> Place elephants for want of towns."

DISCOVERING THE INTERIOR OF AFRICA

In the earlier classical era when Ptolemy was at the height of his activity, (around 150 AD), Egypt, the Sudan and Barbary and the lower Nile valley were known and mapped. West Africa was vague. Information became less precise the farther south the map attempted to describe. However, in the 1470s, sixty years before the Ptolemaic maps came into print, men from a small nation whose own coasts looked out onto the Atlantic, had begun to explore Africa's west coast by sea. Within a century, Portuguese seafarers brought into focus nearly all of Africa's coastlines. The man who gave impetus to Portuguese exploration was the Portuguese Prince Henry called *The Navigator*. Henry first helped to plant his party's flag on African soil in 1415 when Portugal took Ceuta, a Moorish seaport opposite Gibraltar.

Until 1421 the southernmost point reached by Europeans was Cape Nun on the Moroccan coast (at latitude 28° north), rounded by two Italians, Ugolino and Guido Vivaldo. Beyond this point, sailors feared there was 'nothing'. Henry's captains eventually provided exciting proof to the contrary as their ships made their way farther and farther down Africa's west coast.

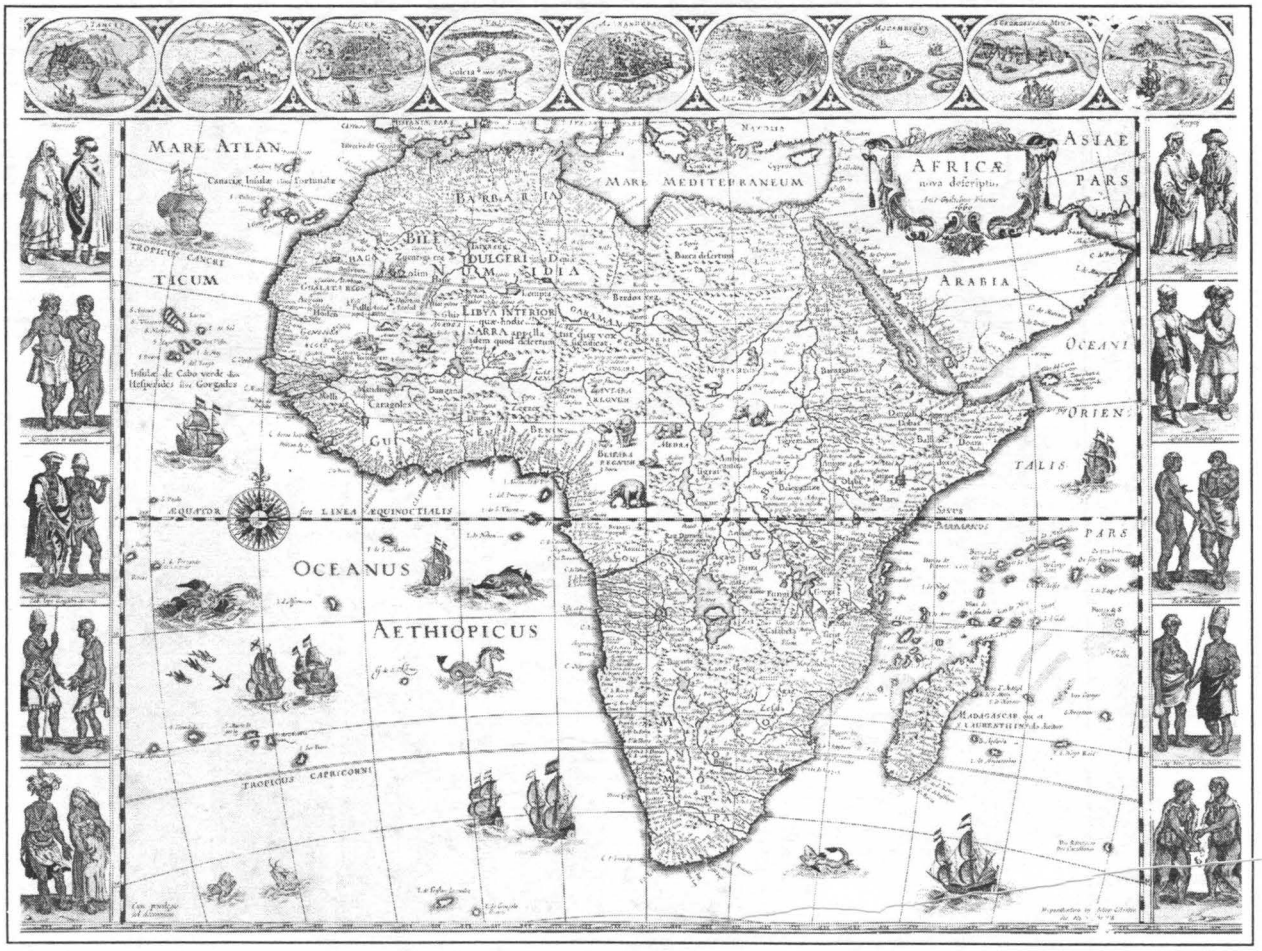
More than a quarter century passed after Henry's death before any Portuguese ship rounded the Cape of Good Hope. Bartholomeu Dias did so in 1488. He was encouraged by the exploits of Diogo Cão who reached the Congo River in 1484 and, later, even farther south. Dias went still farther: to the entrance of the present Luderitz Bay. He continued till he sighted Africa's south coast and anchored in Mossel Bay, 400km east of the Cape of Good Hope.



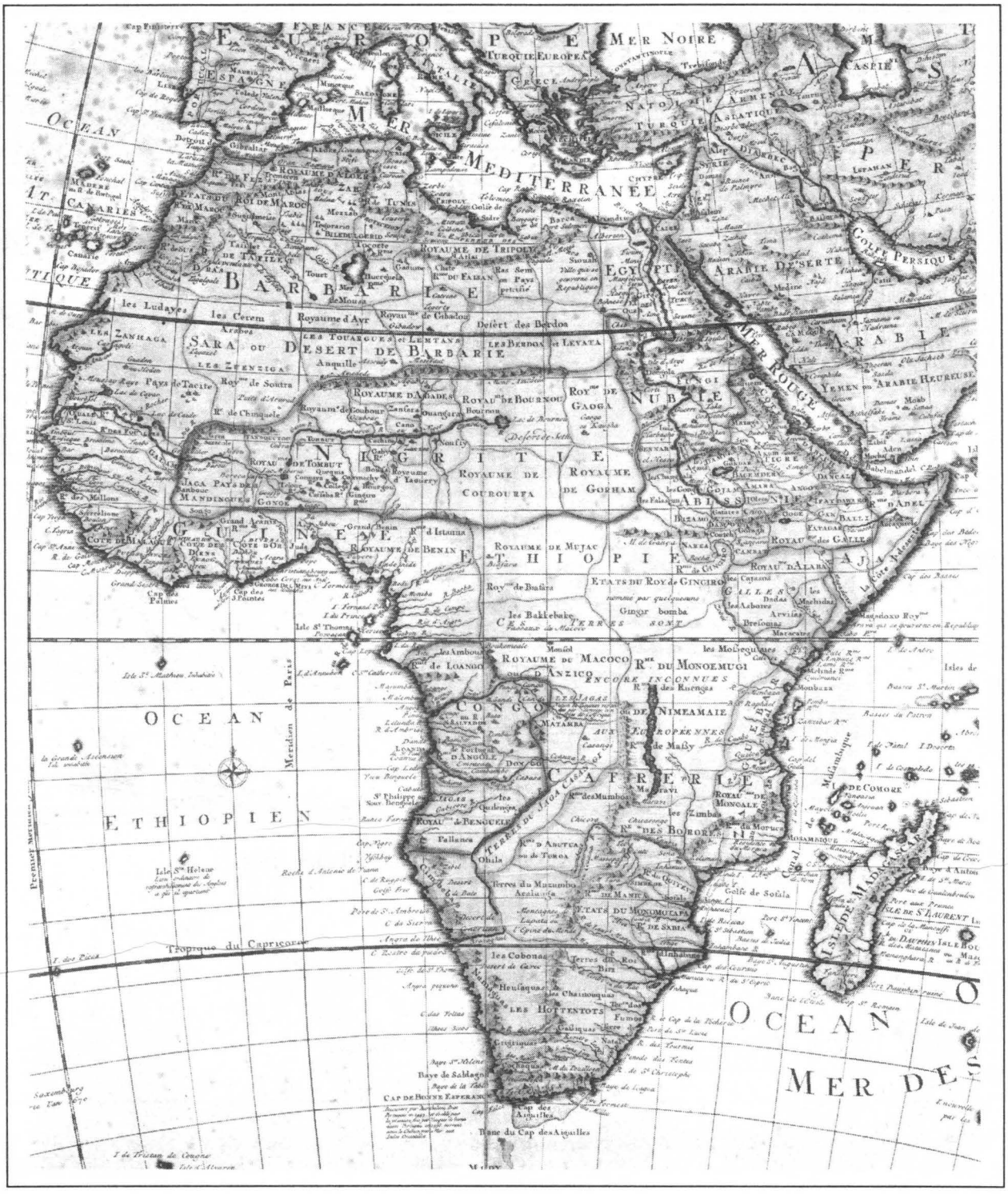
11 An Early Cartographer.
(Acknowledgment: Crone, 1966).

He kept to the eastward-trending coast, reaching a bay that sailors later called *Algoa* ("towards Goa", so-called because it became a regular stopping place for Portuguese ships on their way to India). Near the Bushman's River, on Point Dias, he set up a *Padrao* (a stone marker inscribed with the arms of Portugal and the date) and claimed the land for King John II. He coasted as far as the **Great Fish River** (near Port Alfred), before he sailed west again to the Cape he had rounded without seeing it. He named it *Cabo Tormentoso*, The Stormy Cape. When King John II realised the implications of its discovery, he renamed it *Cabo do Boa Esperanca*: the **Cape of Good Hope**.

12 *Nieuwe Caarte van de Kaap de Goede Hoop en 't Zuyderdeel van Afrika* by Balthazar Lakeman. 1727. Albany Museum.

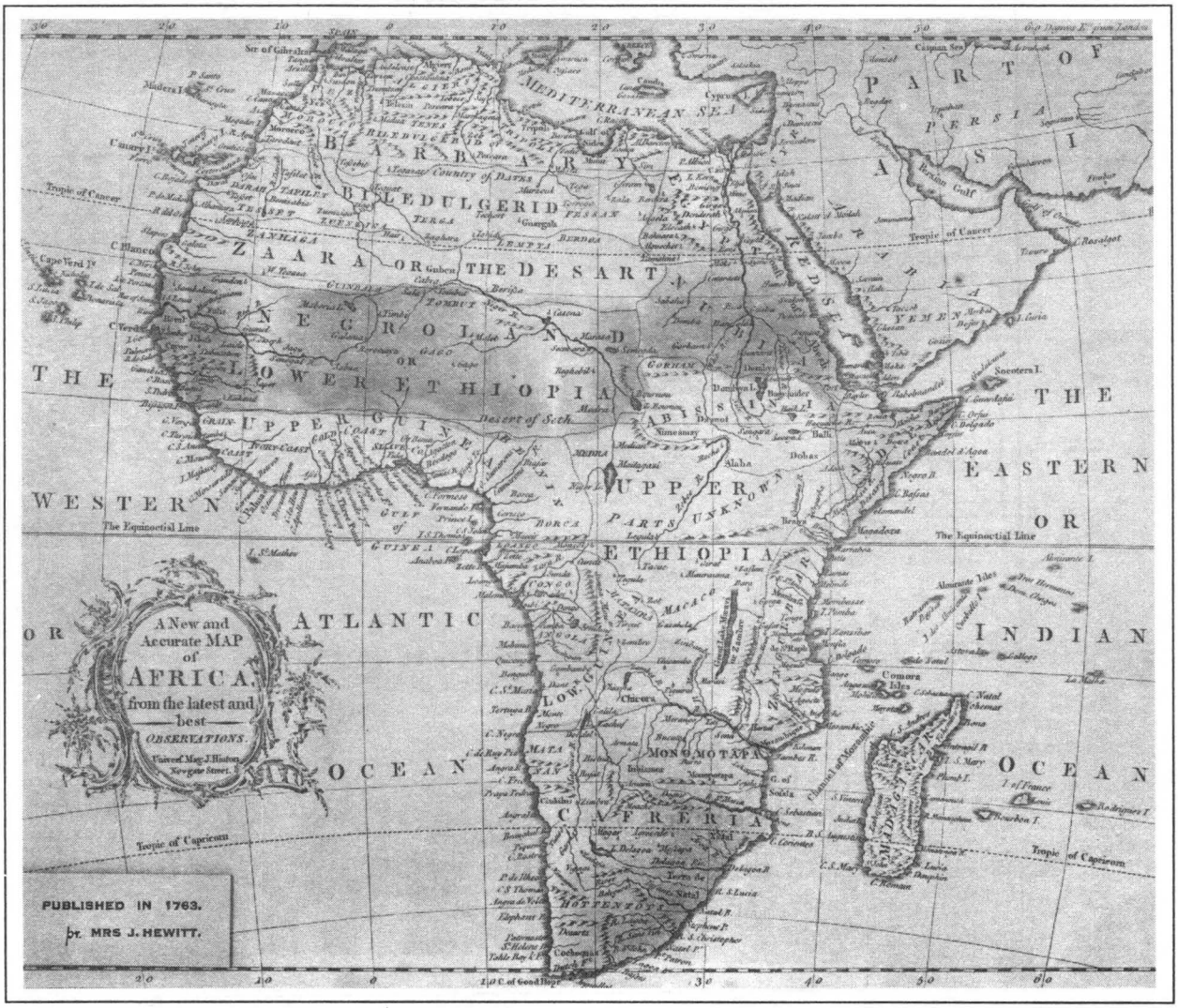


13 *Africae - Nova Descriptio* by William (Guiljelmo) Blaeuw. 1660.
Albany Museum.



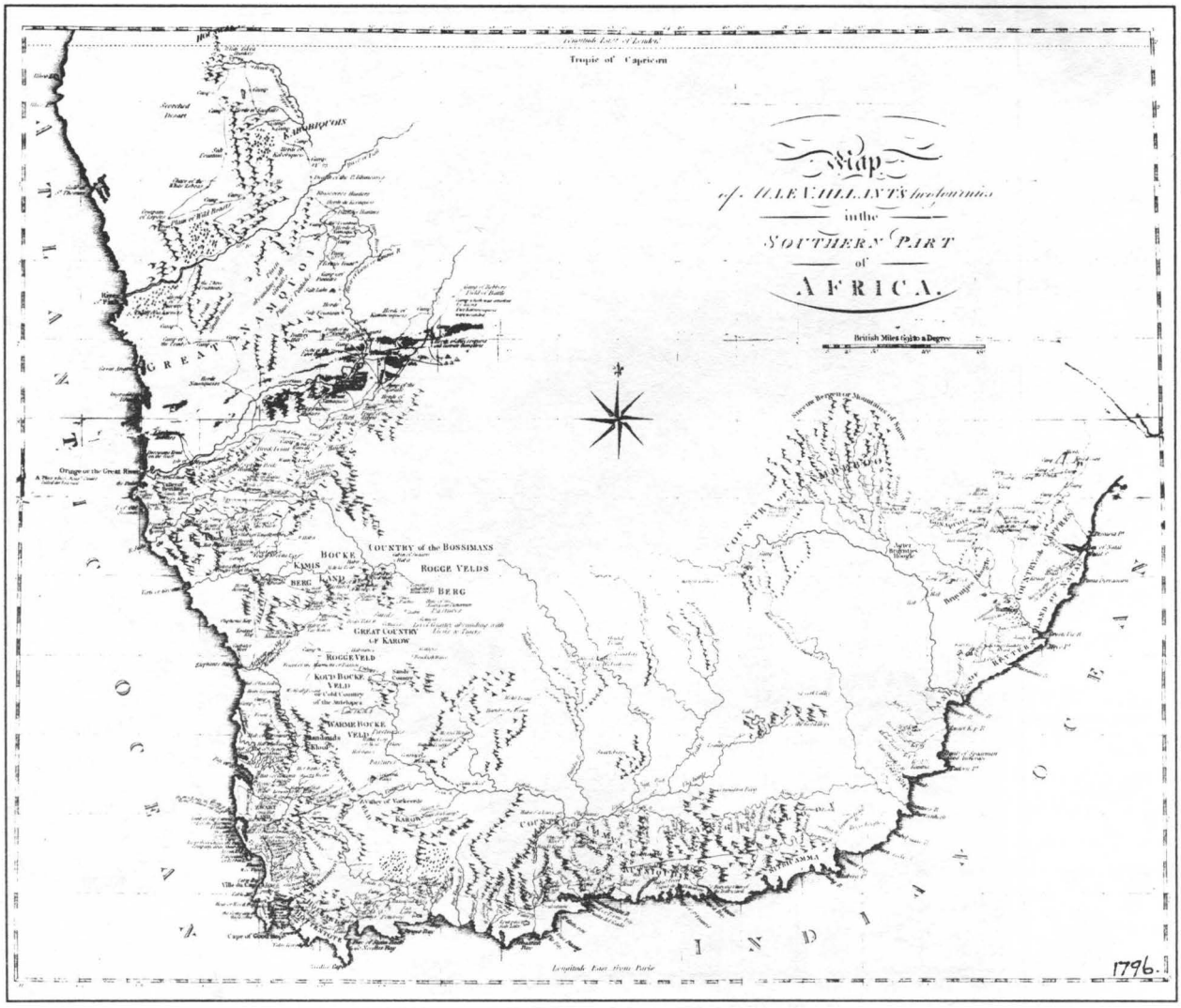
14 *Africa - Accurate im Emperia Regna Status etc* by Guillaume Delisle. Ca. 1740. Albany Museum.

Delisle's name ranks after Ptolomy in importance with regard to the mapping of Africa. He was known for having pruned "dead wood" and discarding long believed, but incorrect, information and destroying geographical myths. In his revised map he was the first to show Lake Nyassa (Moravi). Delisle cleared the ground for the scientific and painstaking mapmaking which began towards the end of the 18th century.



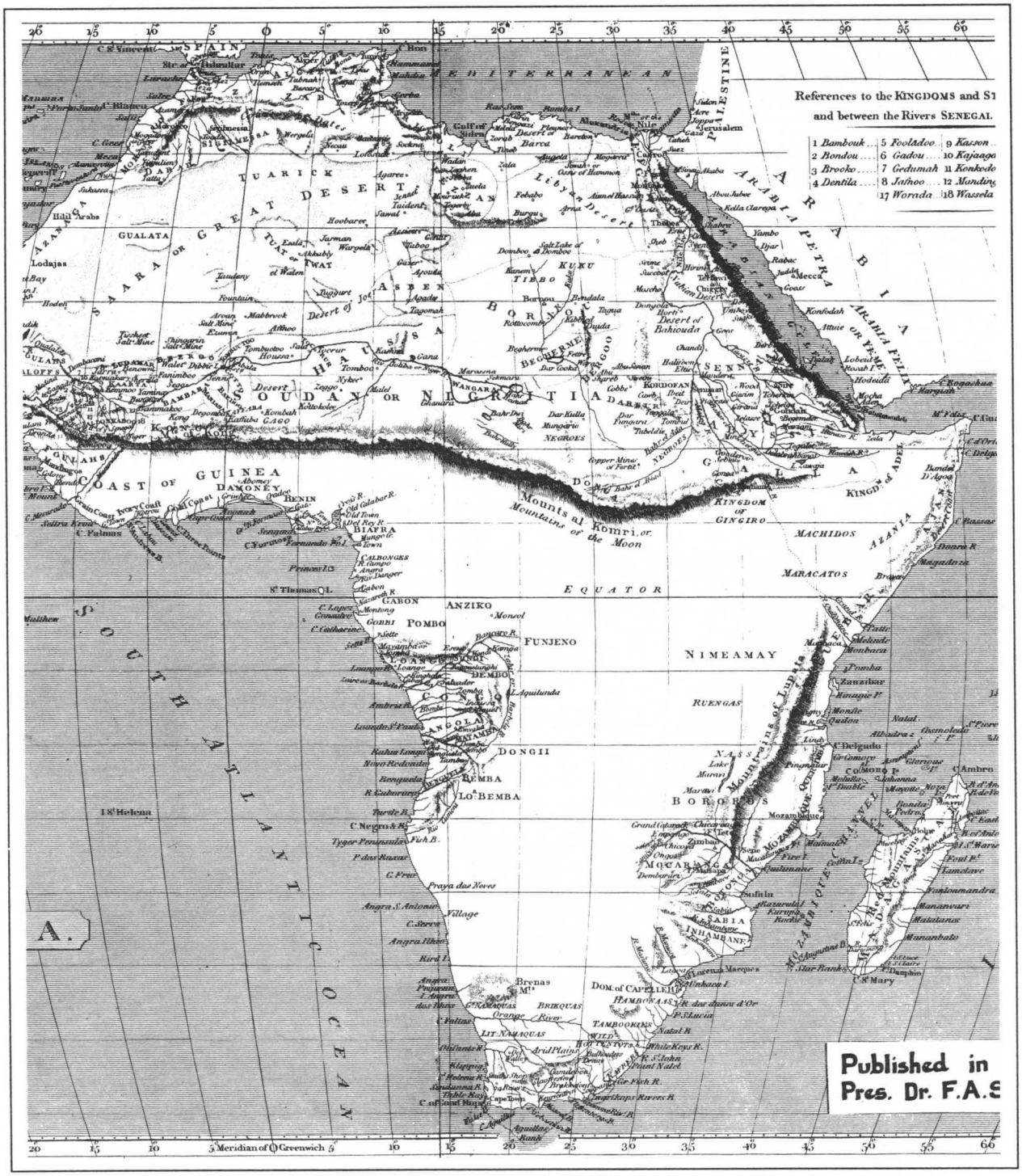
15 *A New and Accurate Map of Africa from the latest and best Observations* by J Hinton. 1763. Albany Museum.

It took a long time before the information gained by travellers and explorers appeared on printed maps. The tenacity to which people hung on to their old beliefs and the effort involved in re-engraving costly metal plates, all contributed to long delays in up-dating information. Although Cape Town, for instance, was founded in 1652, it was not named as such on maps for another 100 years.



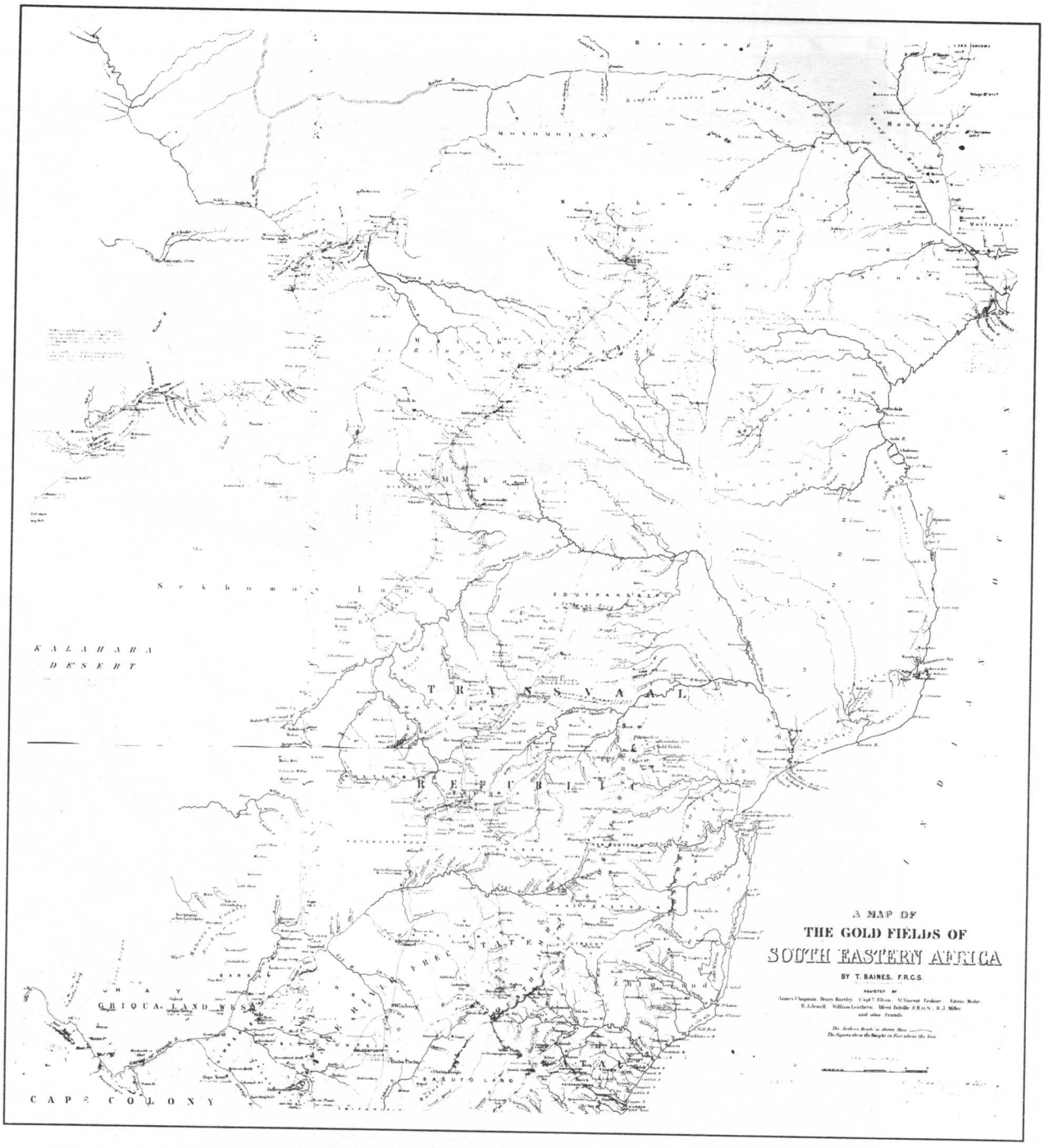
16 *Map of Mons. F Le Vaillant's two journies in the Southern part of Africa* by F Le Vaillant. 1796. Albany Museum.

Explorers like Francois Le Vaillant, who was born in Paramibo, Dutch Guiana in 1753, assisted in "opening up" the interior of Africa. In 1795 he arrived in the Eastern Cape where he undertook an expedition as far as the Great Fish River. His journey was described in his books, amongst them: *Voyage dans l' Interieur de L'Afrique par Le Cap de Bonne Esperance*, published in 1798.



17 *Map of Africa* by John Arrowsmith. 1807. Albany Museum.

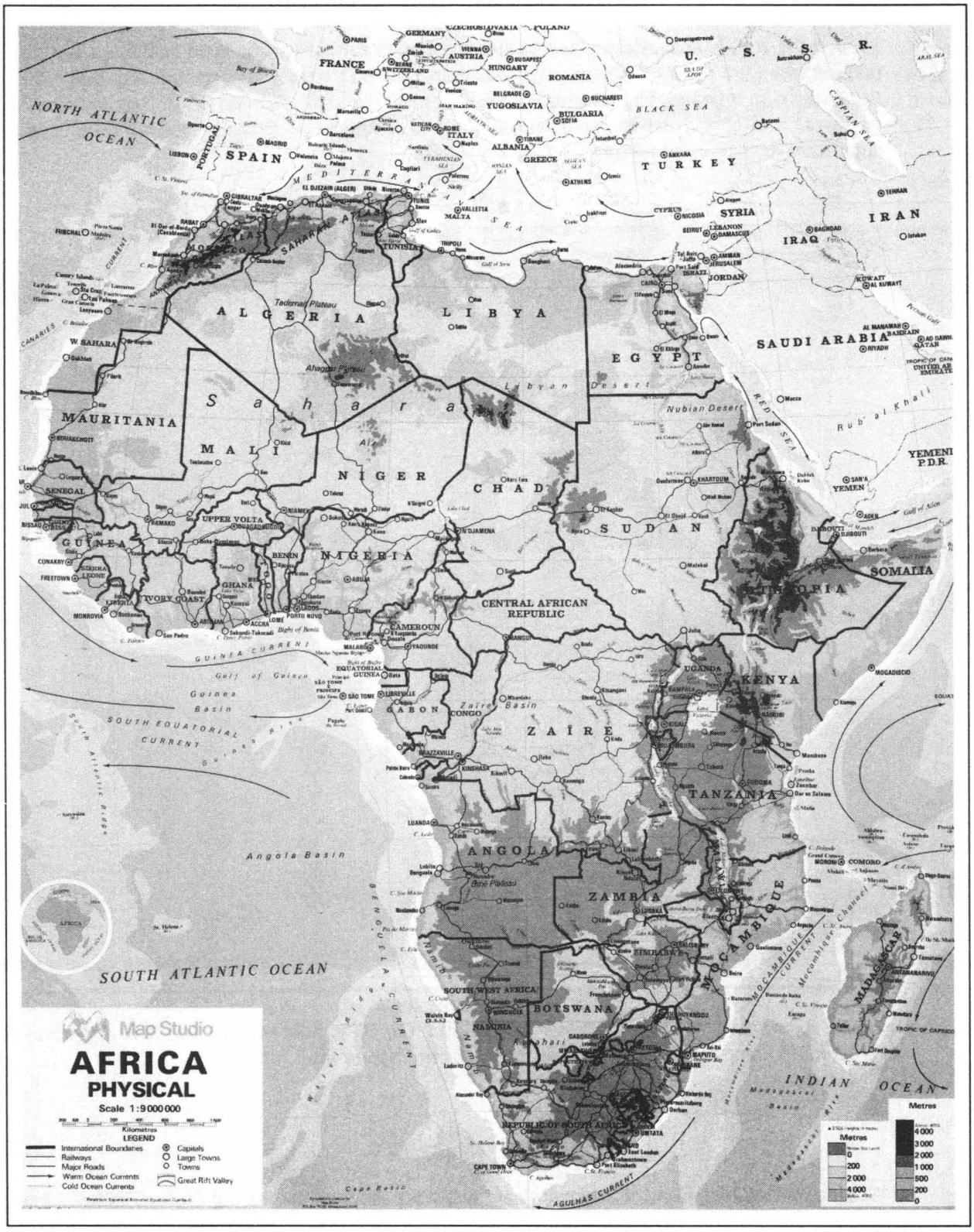
Note the "novel" position of the Mountains of the Moon.



18 *A Map of the Gold Fields of South Eastern Africa* by Thomas Baines, FRGS. 1870. Albany Museum.

Thomas Baines is well known for his travels well into the interior of Africa. An astute geographer, he painstakingly mapped his travels in his journals as well as for the Royal Geographical Society.

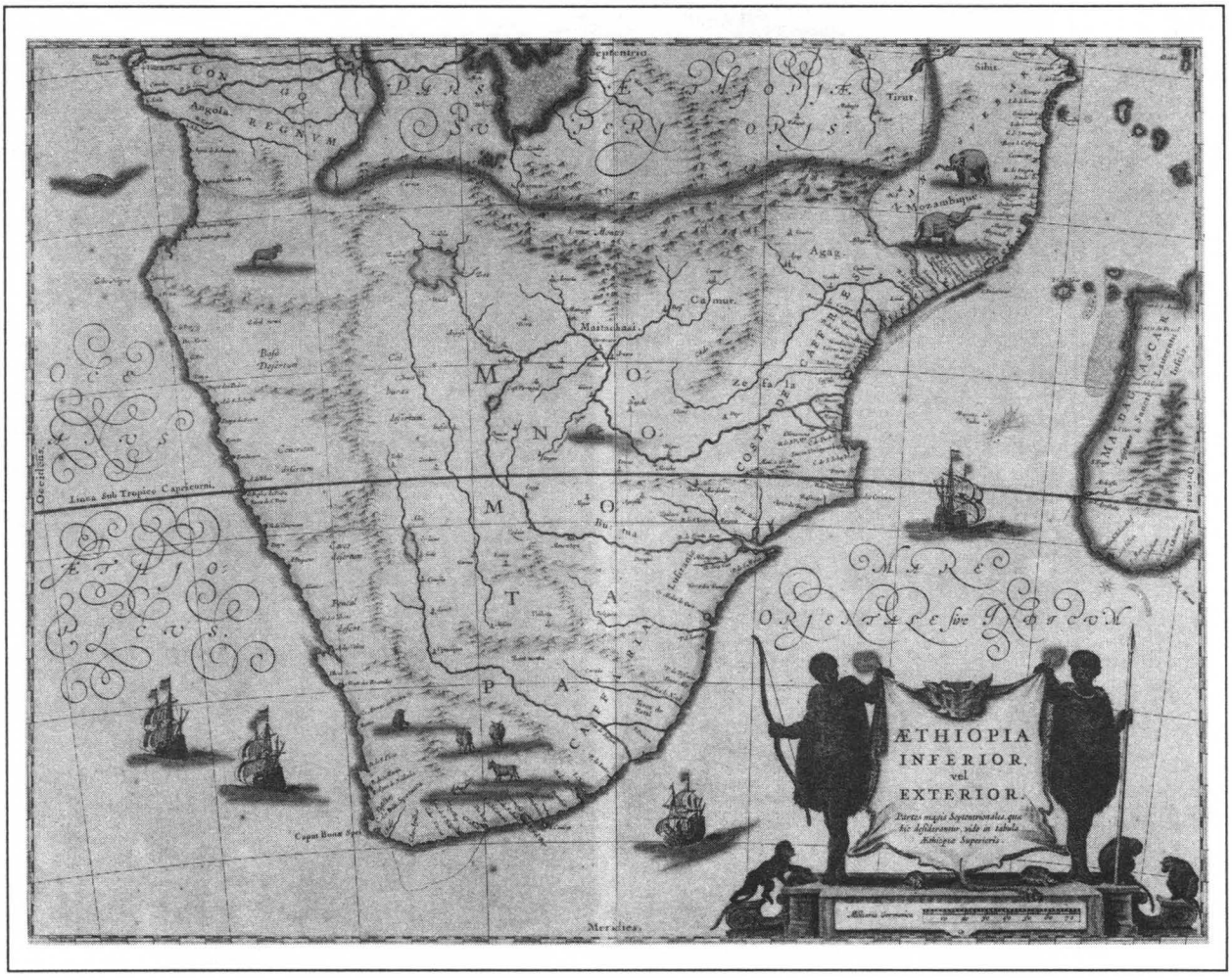
To show how rigorously the myth of *Monomatapa* persisted, however, the words *Monomatapa of the Medieaval Geographers* appear in the northerly sectors of this map!



19 *Africa Physical* published by Map Studio Productions. Ca. 1980s.
Geography Department, Rhodes University.

Compare past attempts at establishing the source of the Nile, with this more recent (and accurate) rendering.

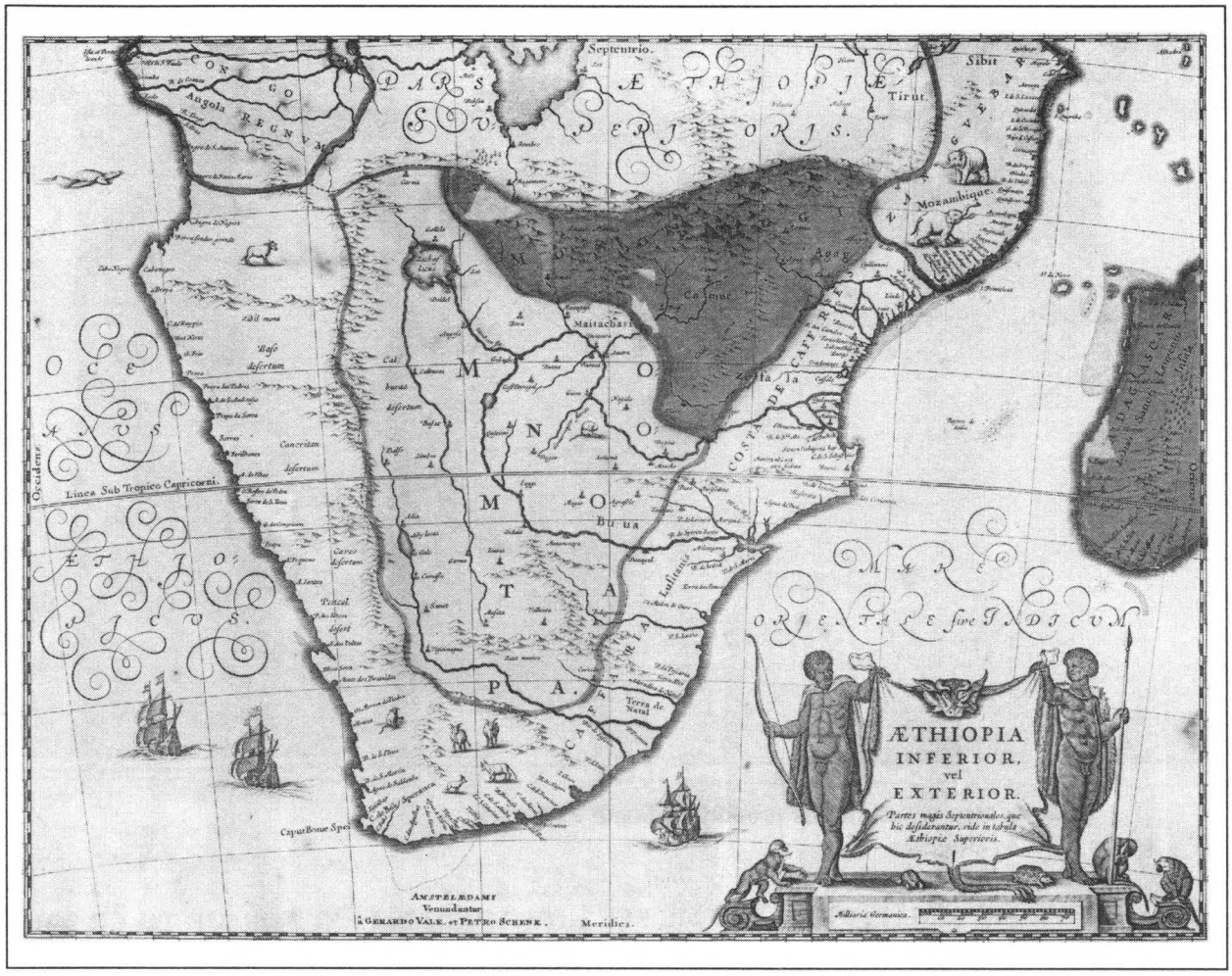
Around the 1600's, map-making was primarily a family enterprise. The head of the family may have done the main drawing but details were later coloured in by other members. These details may have varied according to the buyer's specifications or new discoveries. The cartographer, like the artist, was also at the mercy of the engraver, who copied the cartographer's original. Unwittingly, the engraver might have been responsible for significant deviations and errors!



20 *Aethiopia Inferior Vel Exterior* by W Bleau. Ca. 1630. Sold by Valk and Schenk. A hand-coloured map which became the standard map of the Southern Cape in the 17th century.
Geography Dept., Rhodes University.

W Bleau's map of *Lower, or outer Ethiopia* was the partner of the map of *Upper Ethiopia*. For *Ethiopia* read *Southern Africa*. About two-thirds the size of the United States, the arrangement of place names, mountain ranges and animal drawings makes distance appear much smaller. The lake out of which the "Zambere" (the Zambezi) flows is probably based on reports of Lake Ngami, undiscovered until 1849. Then some 80 kms long, it is today marshland.

Compare the first map of "Ethiopia" with the second. Notice the variations of the dotted line in the top left corner of both maps, a "missing" sailing ship, a broken line following the range along the west of Africa present in the first, but not the second. Notice how the *strapwork* (linework) is superior in the second map - the superior drawing of the monkey, the fur animal skin and the shape of the head.

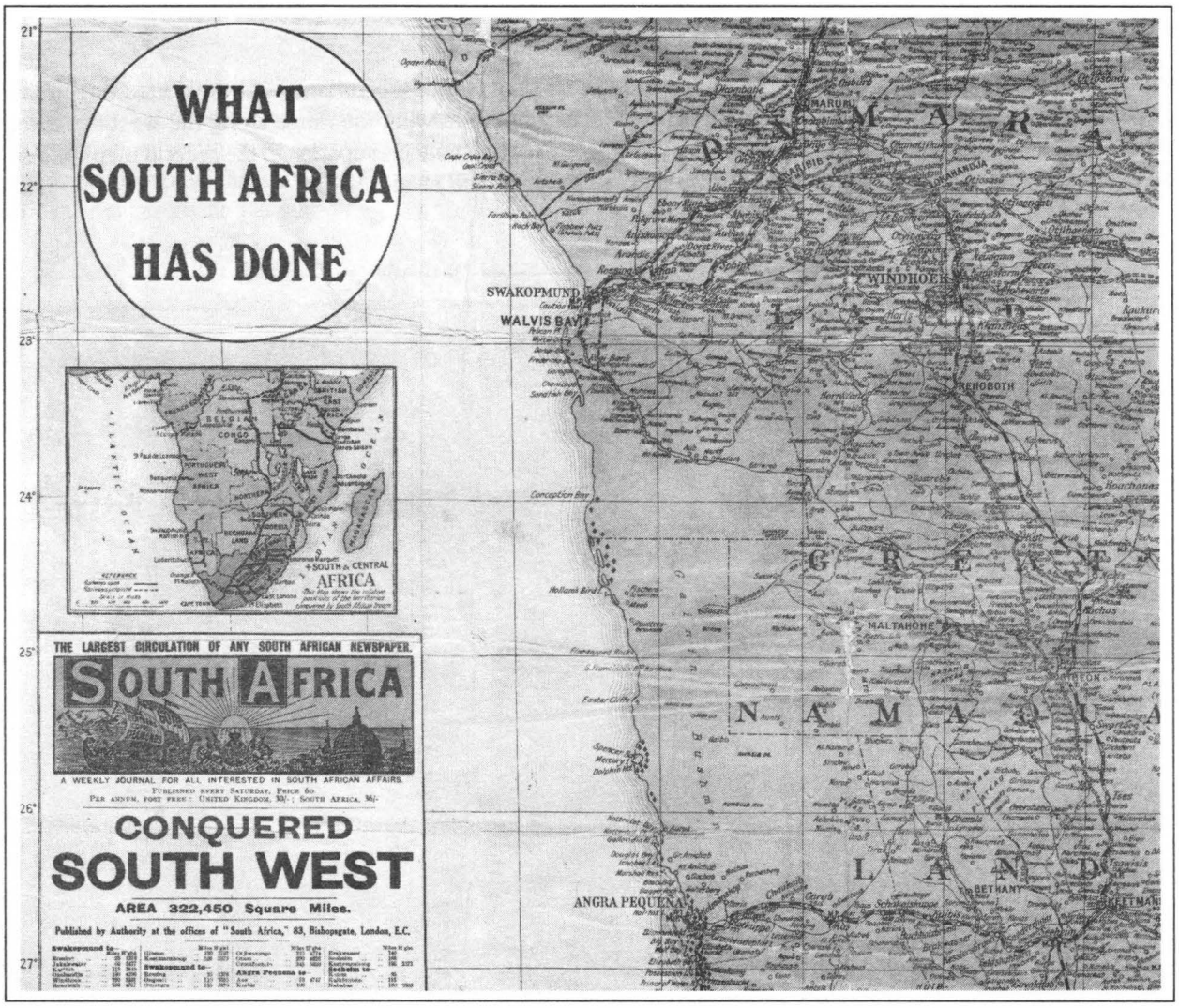


21 *Aethiopia Inferior Vel Exterior* by W Bleau. Ca. 1630.

MAPS OF CONQUEST

Maps are not merely representations of the Earth's surface; as much as guns and warships, they have been instruments of conquest, portraying the stark realities and rewards of war. Political power is often reproduced, communicated or experienced as symbols in maps.

Maps also served as a graphic inventory, a codification of information about ownership, tenancy, rentable values, and agricultural potential, enabling landowners to see their estates as a whole, thereby rendering them easier to control.



22 A map which boasts proudly of South Africa's conquests.
Albany Museum.

"GIVE ME A MAP; THEN LET ME SEE HOW MUCH IS LEFT FOR ME TO CONQUER ALL THE WORLD...

Here I began to march towards Persia
Along Armenia and the Caspian Sea,
And thence unto Bithynia, where I took
the Turk and his great empress prisoners.
Then marched I into Egypt and Arabia
And here, not far from Alexandria
Whereas the Terrene and the Red Sea meet,
Being distant less than full a hundred leagues
I meant to cut a channel to them both
That men might quickly sail to India
From thence to Nubia near Borno lake,
And so along the Ethiopian sea,
Cutting the tropic line of Capricorn,
I conquered all as far as Zanzibar."

Christopher Marlowe sets out a somewhat timeless scenario in the drama of life: that of conquest. Nowhere on Earth has man not lived under domination or dominion of one group by or over another. The struggle for power is a phenomenon familiar to man as he receives daily news of it or is even himself victimised by such struggles.

WELL-KNOWN CARTOGRAPHERS

23 *The Kingdome of Irland* by John Speed. 1610.
Copy: Courtesy Mr W Jervois.

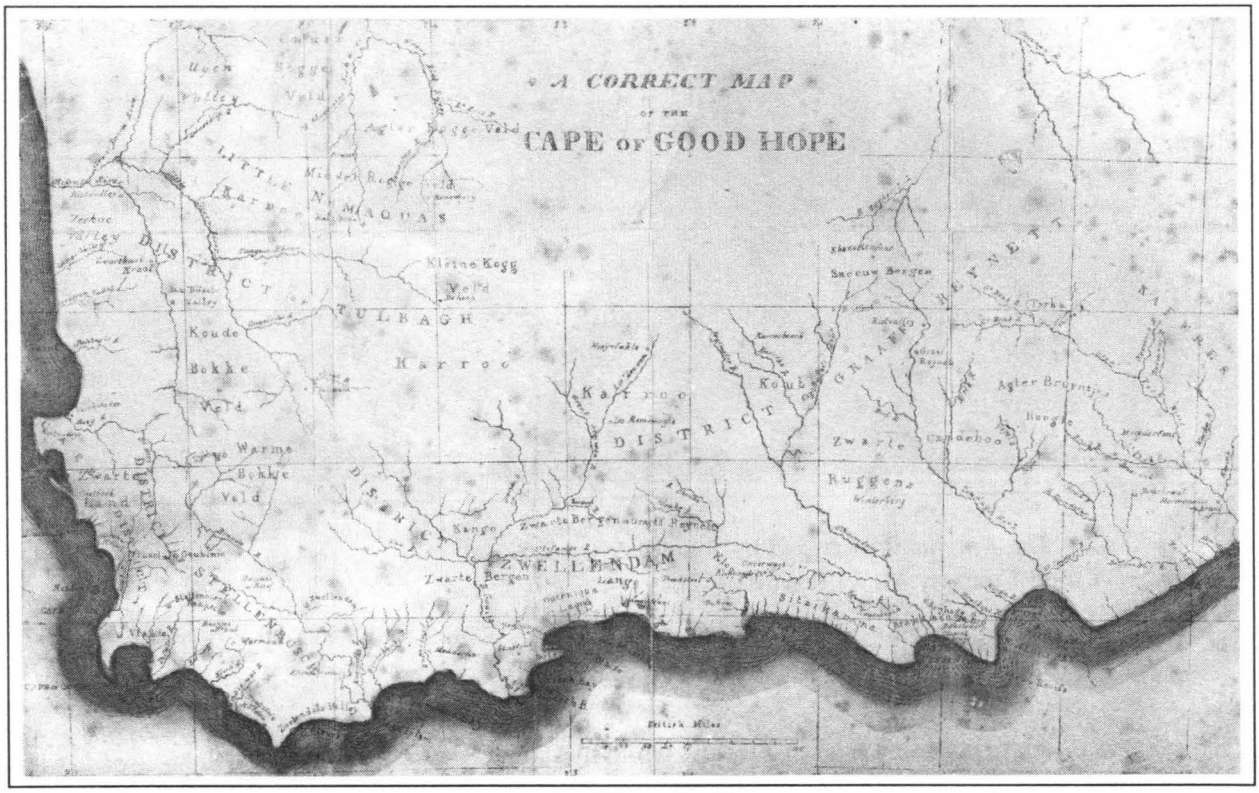
Note : Embellishments of figures in traditional dress.

One of the best-known map-makers the world has known was the Englishman, John Speed, who died in 1629. Speed himself was not a cartographer and was known to have said: "I put my sickle in other men's corne". His maps are nevertheless notable for their wealth of historic detail and their highly decorative appearance. They are rich with heraldry, decorative borders and cartouches. He is best known for his *Theatre of the Empire of Great Britain*. No less attractive is his general map of Ireland with six figures in national costume. Monsters, figures and ships appeared regularly on maps from early times. It seems that ships were used as conventional signs to denote stretches of ocean, for they occur on maps right up to the beginning of the 19th century. Monsters become less fanciful as time passes, and the great sea-monsters in the maps of some cartographers give way to naturalistic whales, flying fish and other species, used decoratively rather than as statements of fact.

Cannibals, tritons, warriors, gods, goddesses, heroes, natives of every kind and hue are among the vast assembly of actual and mythological figures represented in maps from the earliest times right into the 19th century.

PROJECTIONS

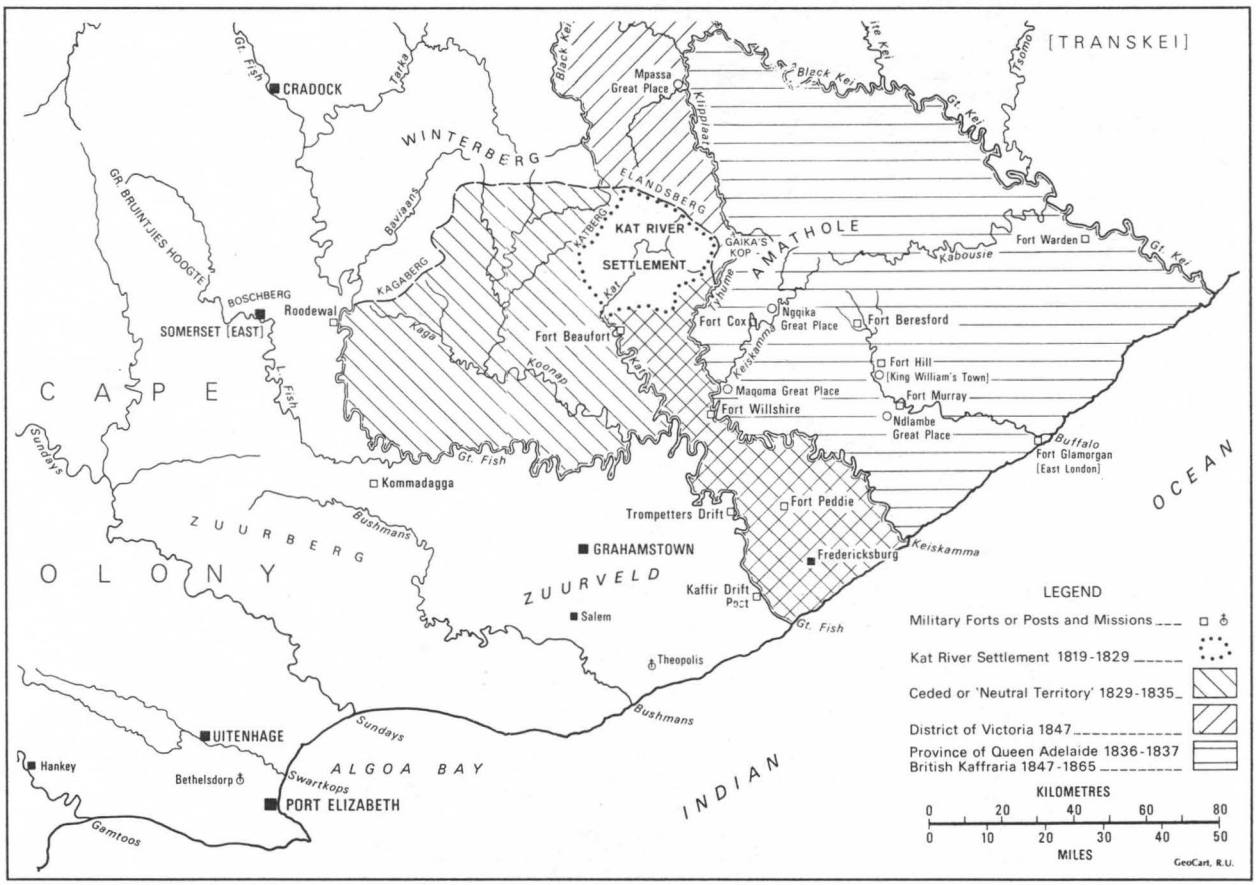
A map projection is a means of depicting a curved surface on a flat sheet of paper. Any such representation is called a projection. Our Earth is a spheroid and as maps are flat it is impossible to make a sheet of paper rest smoothly on a sphere, so it is impossible to make a correctly proportioned image of a sphere on a sheet of paper. An inspection of a good atlas will show that there are several different kinds of projections. In some, the lines of latitude and longitude are straight, in others curved, and yet again, the meridian may be straight and the parallels curved. Mercator, whose real name was Gerhard Kramer, was born in Flanders in 1512. The special feature of Mercator's projection is that the parallels are at increasing intervals away from the Equator, proportional to the increasing distances between the Meridians. For this the parallels were known as "waxing latitudes". This projection was first used by Mercator on his world map published in 1569.



24 *A Correct Map of the Cape* by Henry Warner, 1820 Settler. Ca. 1830s.
Albany Museum.

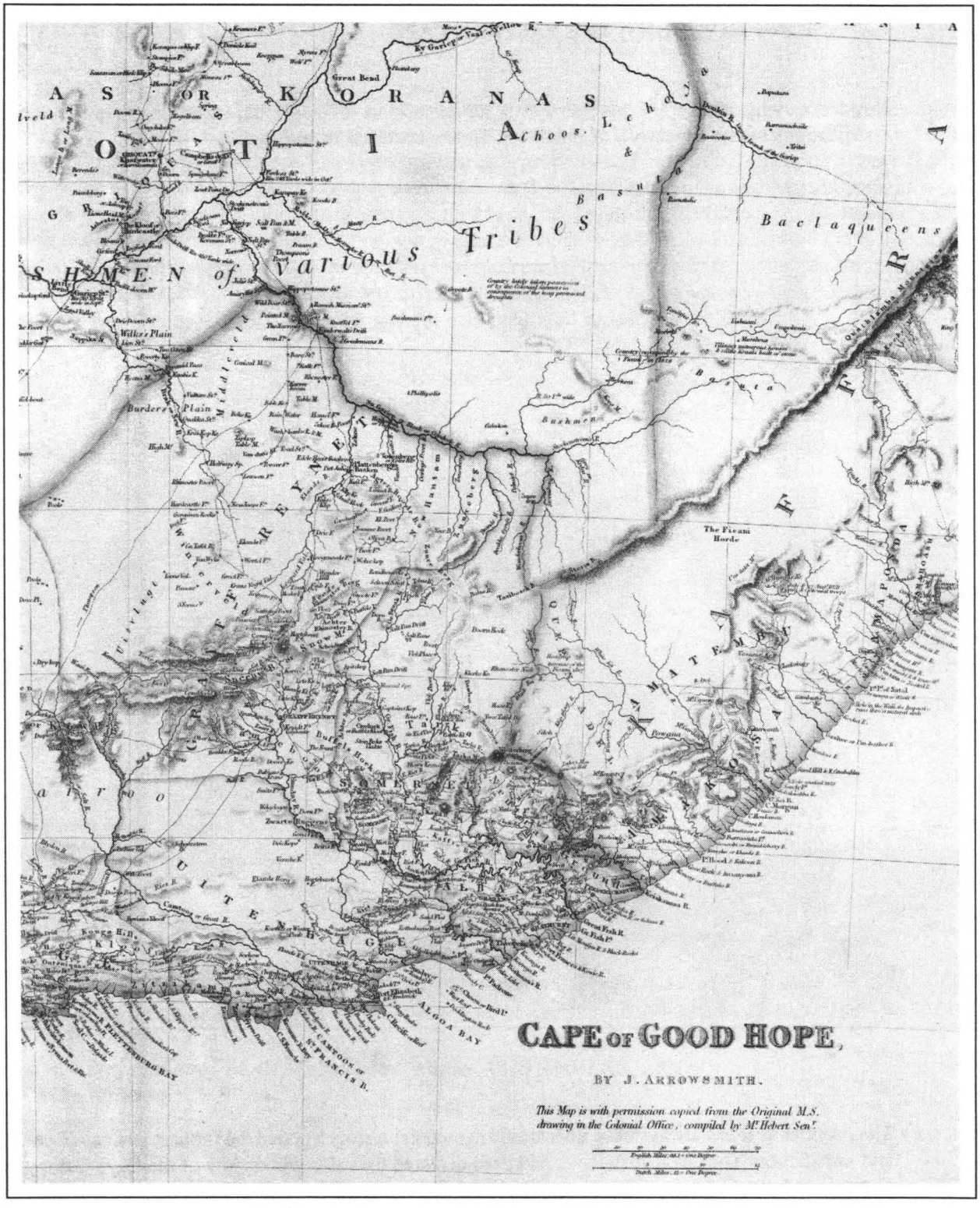
EXPANDING HORIZONS: THE EASTERN CAPE

Besides serving as graphic inventories of the expansion of man's terrestrial space, maps serve as effective codifications of the expansion of man's enterprise, conquest or jurisdiction.



25 *Map of the Frontier* by Oakley West. 1989.

The Frontier as it has always been understood in colonial history implied the farthest reaches of colonial enterprise and jurisdiction. The Great Fish River had been declared the eastern boundary of the Cape Colony in 1780 during Dutch East India Company rule. Around 1812 the Eastern Cape Frontier, comprising of land between the Sundays and Great Fish Rivers was also known as *the Zuurveld*, after its sour-type grasslands. In 1819, the Kat River Settlement (the areas between the Katberg and Tyume river) expanded the Frontier still farther. This Settlement lasted till 1829. The British Government then annexed territory onto this region from 1829-1835. The District of Victoria was formed in 1847 and the Province of Queen Adelaide (now comprising the Border regions) in the years 1836-1837. British Kaffraria was founded in 1847 and by 1865 was no longer called by this name. The final *Eastern Cape* then eventually ended at the Great Kei River.



26 *The Cape of Good Hope*, by John Arrowsmith. 1836.
Albany Museum.

Note the various peoples inhabiting the Cape of Good Hope in 1836.

MISSIONARIES AT THE CAPE

It has been said that the activities of the 19th century Colonial missionaries were so closely linked to the British civilisation and education ethic, that few potential converts saw the difference between religion and education.

In 1850, for instance, Bishop Merriman wrote that he encountered a black South African who claimed himself to be "too stupid to become a Christian"; another he said had claimed it "was too hot to become a Christian", referring to the missionary's insistence that he wore European clothes.

27 *Sketch map of the boundary between the Kei and Umzimkulu rivers or the Transkeian territories* by Gustav Henkel. 1901
Albany Museum.

Note the close proximity of the various mission stations in the Transkei.

The first European missionary sent to minister to the indigenous people at the Cape was the Moravian (Lutheran) George Smidt (1709-1795), who began work at Genadendal, east of Cape Town in 1737. The most well-known of the early missionaries was Johannes van der Kemp (1747-1811) of the interdenominational London Missionary Society, who arrived at the Cape in 1799.

Van Der Kemp first worked among the amaXhosa of the Eastern Cape, but when unsuccessful, he turned his attentions to the Khoikhoi, for whom he established the most famous of the Cape mission stations, Bethelsdorp, now within Port Elizabeth. His plea for equality for the Khoi aroused the anger of the colonists, who feared that his stations would draw labourers away from their farms. But the London Missionary Society persevered and throughout the first half of the 19th century, had more missionaries in the field than any other society.

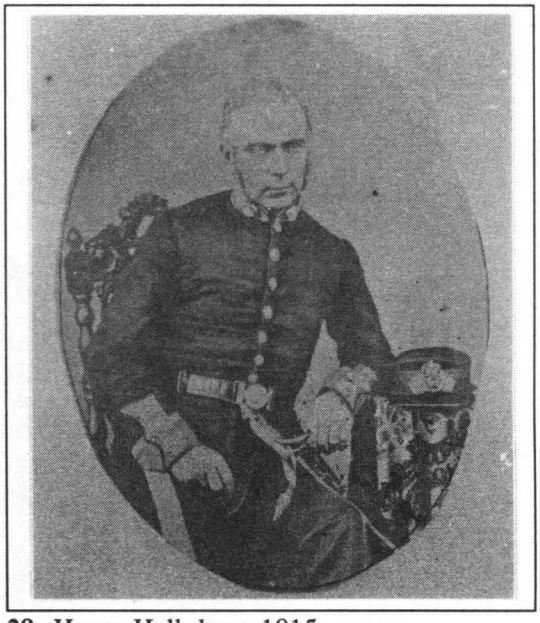
Amongst the great missionaries active in the Eastern Cape was the Wesleyan, William Shaw (1798-1872) who arrived with the 1820 British Settlers. He was responsible for establishing a chain of mission stations beyond the Cape's Eastern borders, stretching almost to Natal.

The Scottish missionaries were most active in what became the Ciskei, where they founded the Lovedale Mission in 1824. The Berlin Missionary Society (Lutheran) began work in the Eastern Cape in the 1830's but its mission stations were destroyed in the War of the Axe in 1846-1847. It was not until the 1850's that the Anglicans began mission work on the Eastern Frontier. The Roman Catholic mission work entered it's main age of expansion in this century.

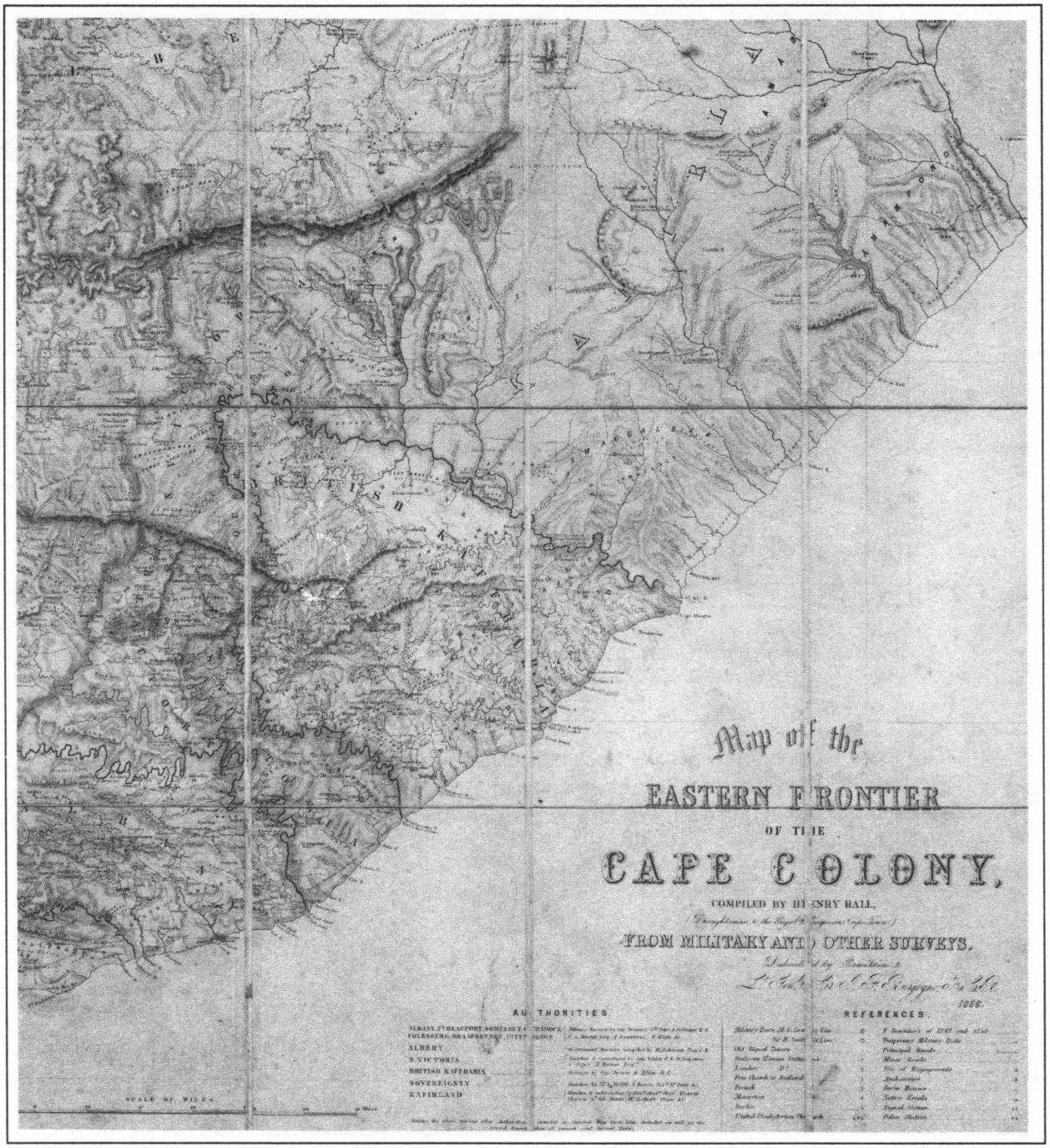
By 1850, some 10 000 Africans lived on mission stations in the Eastern Cape, but not all were converts. The first converts were often fugitives, rebels or social outcasts. However, it was estimated that by 1982 the number of practising black South African Christians had risen to 13 million.

GREAT EASTERN CAPE CARTOGRAPHERS: HENRY HALL

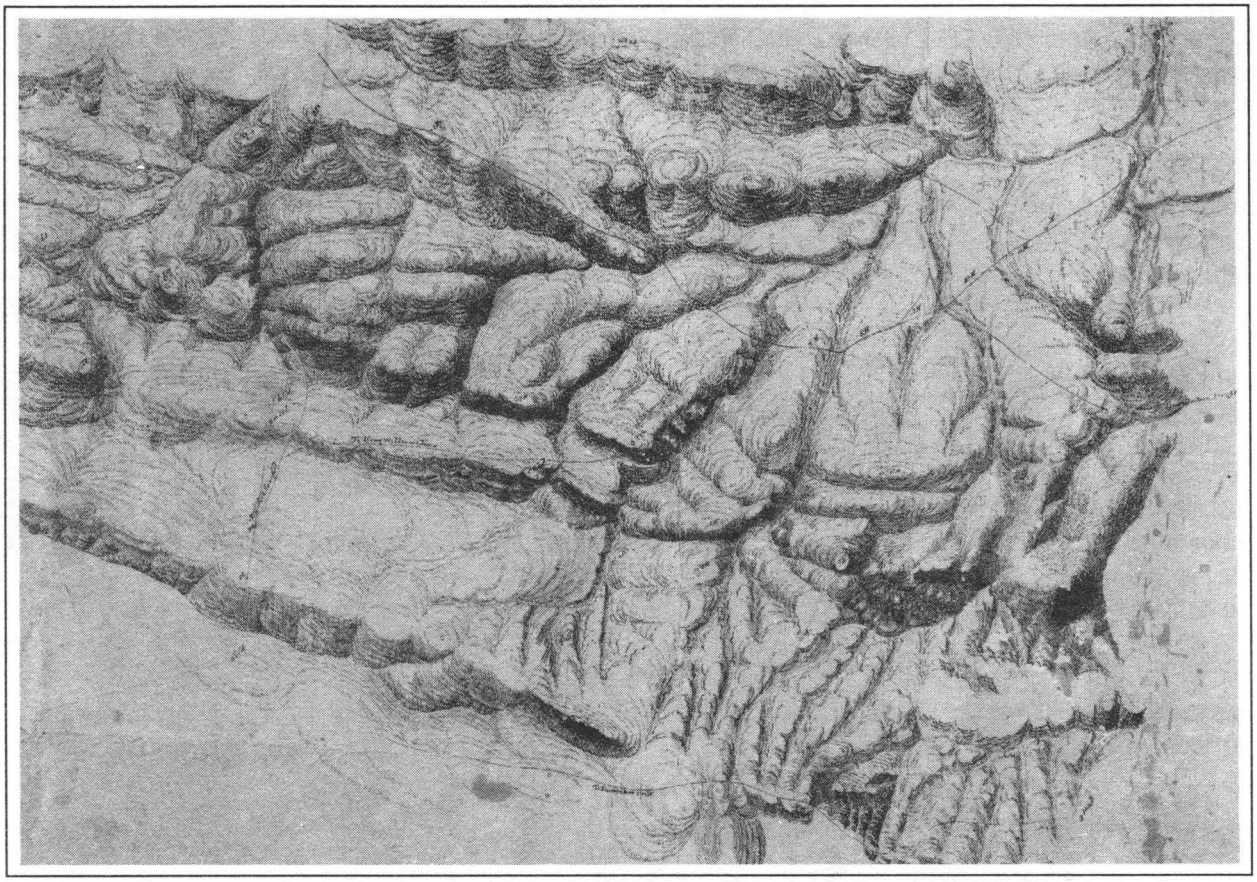
Humorous and ingenious in character, Henry Hall was destined to become one of the foremost pioneers of South African cartography. Born in Dublin in 1815, his first intention was to study at Dublin University, but the death of his father impelled him to seek work to support his financially embarrassed family. In 1839 he entered the British Government Service in the Royal Engineers and in 1842 was ordered to the Cape. He became energetically engaged in the erection of fortifications on the line of the Great Fish and Kat Rivers.



28 Henry Hall, born 1815.
Acknowledgment: Cory Library, Rhodes University.



29 *Map of the Eastern Frontier of the Cape Colony* by Henry Hall. 1852.
Albany Museum.



30 *Map showing the Queen's Road to Fort Beaufort* by Henry Ford. ca. 1850s.
Albany Museum.

This map, showing exceptionally fine craftsmanship in pen-and-ink, shows part of the road now incorporated in the Ecca Pass on the Fort Beaufort road from Grahamstown. The road was built by the great civil engineer, Andrew Geddes Bain, who was also responsible for other feats of engineering such as Bain's Kloof, near Swellendam.

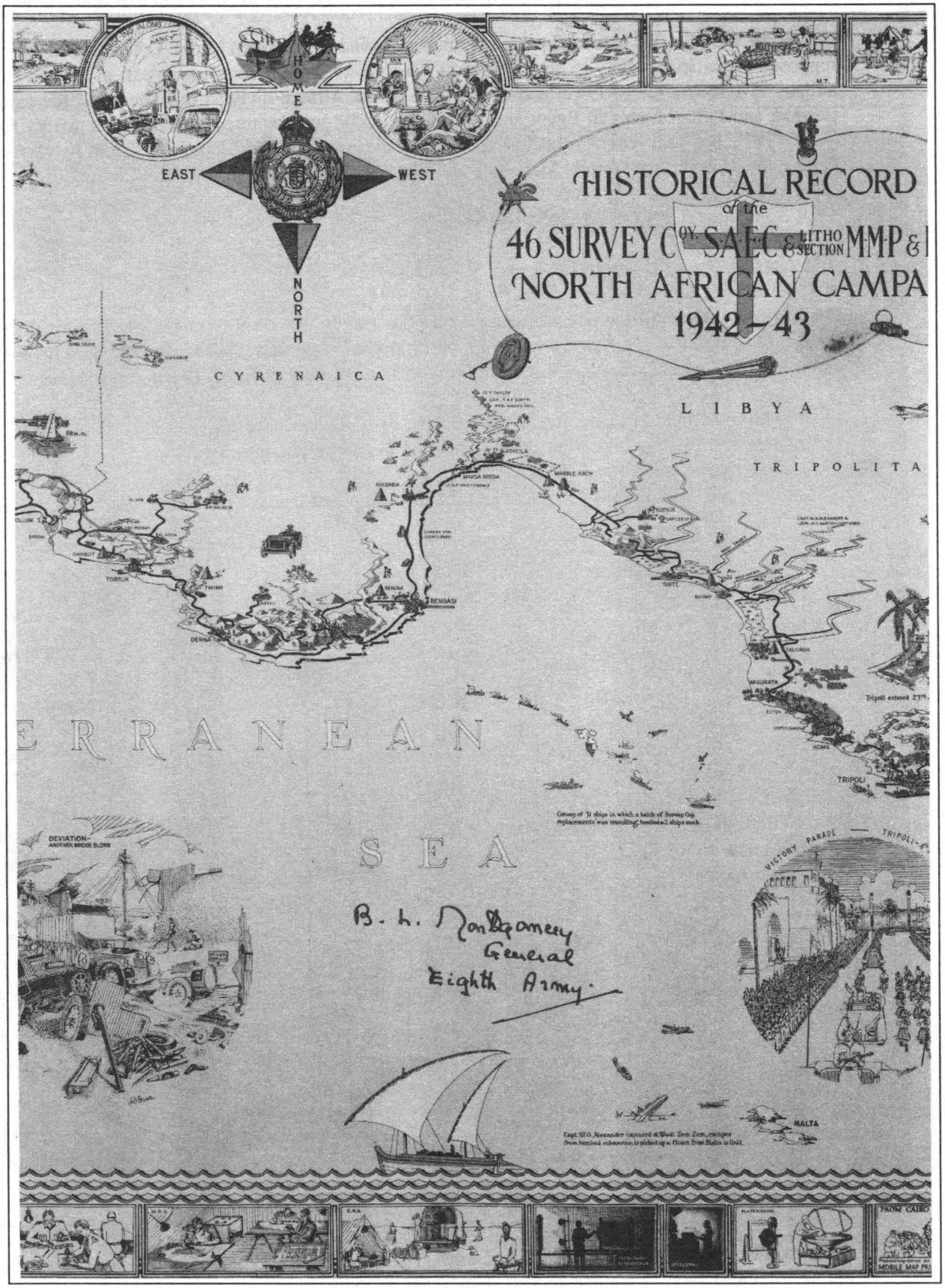
THE THEATRE OF WAR

WORLD WAR I

On 4 August 1914 South Africa automatically found itself, as part of the British Empire, at war with Germany. Louis Botha and Jan Smuts both supported the war and the latter became a member of the Imperial War Cabinet. They suppressed the Afrikaner Rebellion after Botha agreed to a British request that South African forces seize German South West Africa (Namibia). Over 20 000 South African troops fought under Smuts' command in German East Africa (then called Tanganyika) and 4 648 South Africans lost their lives serving in Europe. A further 12 452 South Africans died on active service during the war.

WORLD WAR II

When Britain declared war on Germany in 1939, the South African Cabinet divided 6 to 7 in favour of neutrality. Hertzog and the other former National Party members who had entered into alliance with him believed that South Africa should assert its independence of Britain. As parliament was sitting, the issue was put to the House of Assembly. The vote was 80 to 67 in favour of South Africa entering the war. Hertzog then asked Duncan, the Governor General to call a general election. He refused and Smuts became Prime Minister for the second time, at once declaring war on Germany.



31 *Historical Record of the 46 Survey Co. North African Campaign.* 1942 -43.
Geography Dept., Rhodes University.

Please note the *vignettes* of camp life depicted along the borders of the map and that South is indicated as *home.*

Please note the *vignettes* of camp life depicted along the borders of the map and that South is indicated as *home.*

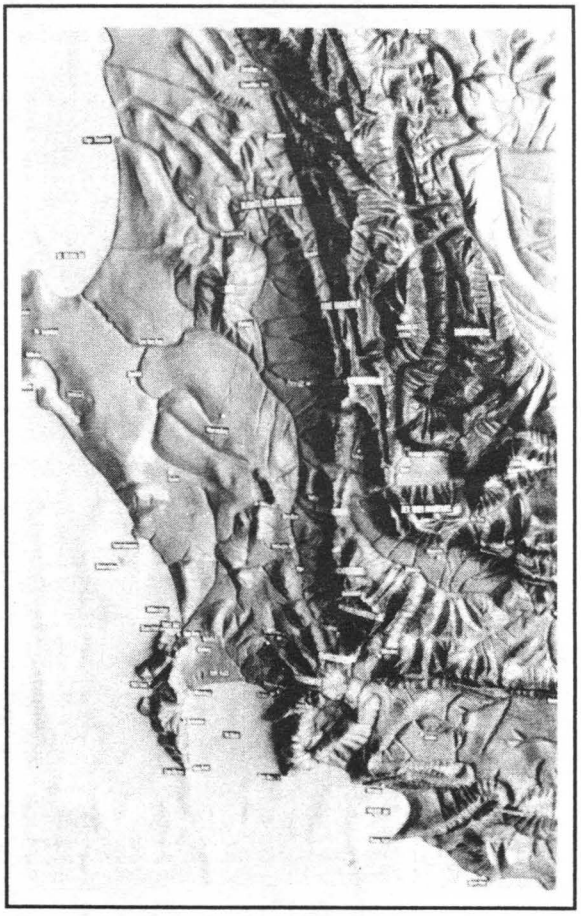
During the war 386 000 men and women volunteers served in the armed forces. Coloured and African troops were supposed to participate only in non-combatant roles. South African forces took part in the campaign against the Italians in Ethiopia (1940-1941) and of the three South African division that fought in the campaigns against German and Italian forces in Egypt and Libya, the second was captured by Rommel's Afrika Korps at Tobruk (June 1942). A South African division landed with the Americans in Sicily and fought its way up the Italian Peninsula. Almost 9 000 South Africans were killed in action during the War.

THE TECHNIQUES OF MAP-MAKING

Relief

One of the greatest difficulties the cartographer has had to overcome was the problem of depicting the third dimension - **height** - onto a flat piece of paper. Relief may thus be described as the **height** dimension of cartography which includes the hills, valleys, mountains of land surfaces. Relief can include

a) How high the land is above sea level - *altitude*;
b) Relative relief - how high the land is in relation to nearby plains and valleys;
c) Average slopes, and
d) Texture - the spacing of small rivers and the less important features of the topography or, the *lay of the land.*

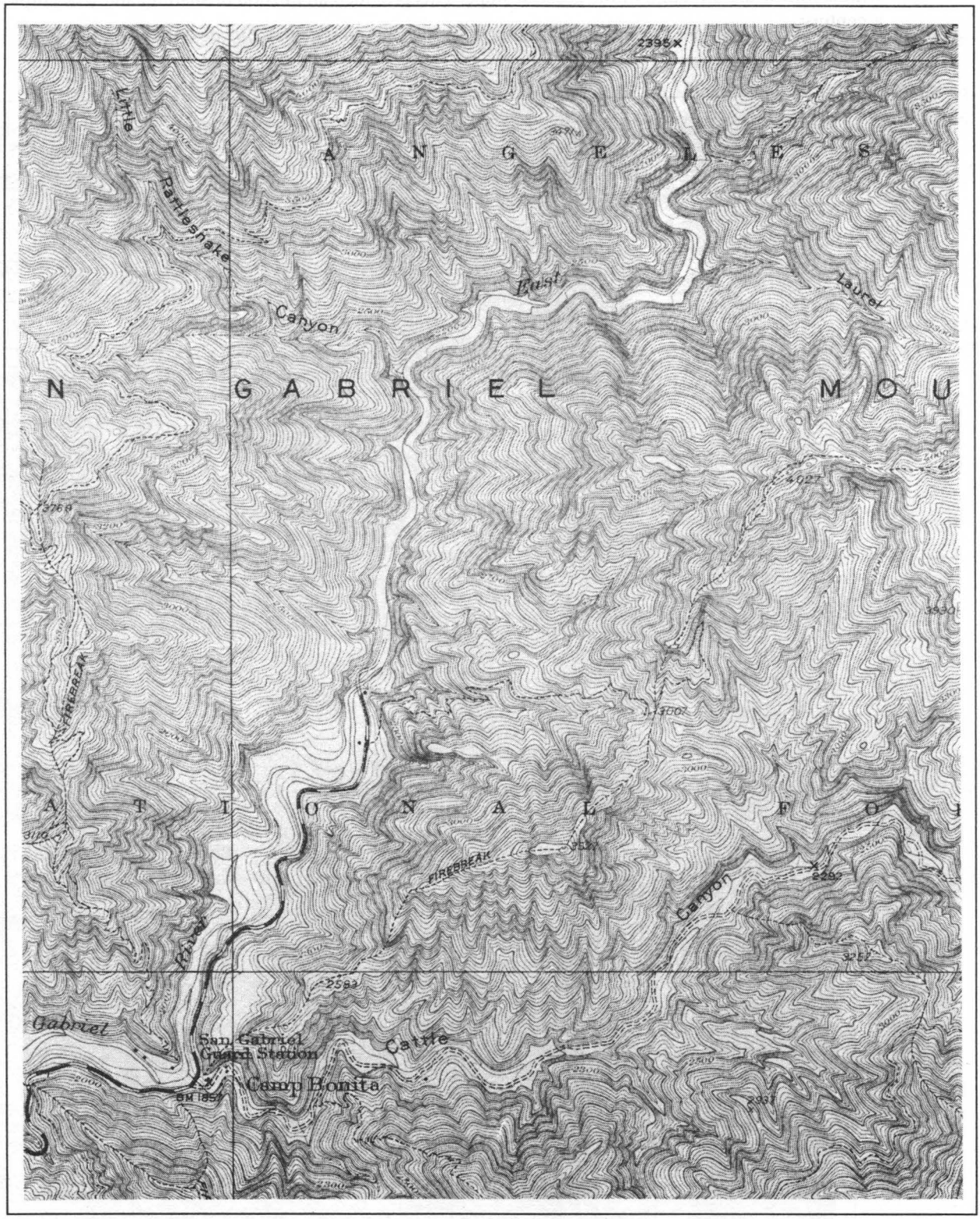


32 Model of relief map of South Africa. By Prof E. H.L.Schwartz. 1916.
Albany Museum.

Cartographers can show height in different ways. These include contour lines, differences in shading and colour tinting. Methods such as *hachuring* also show relief on maps.

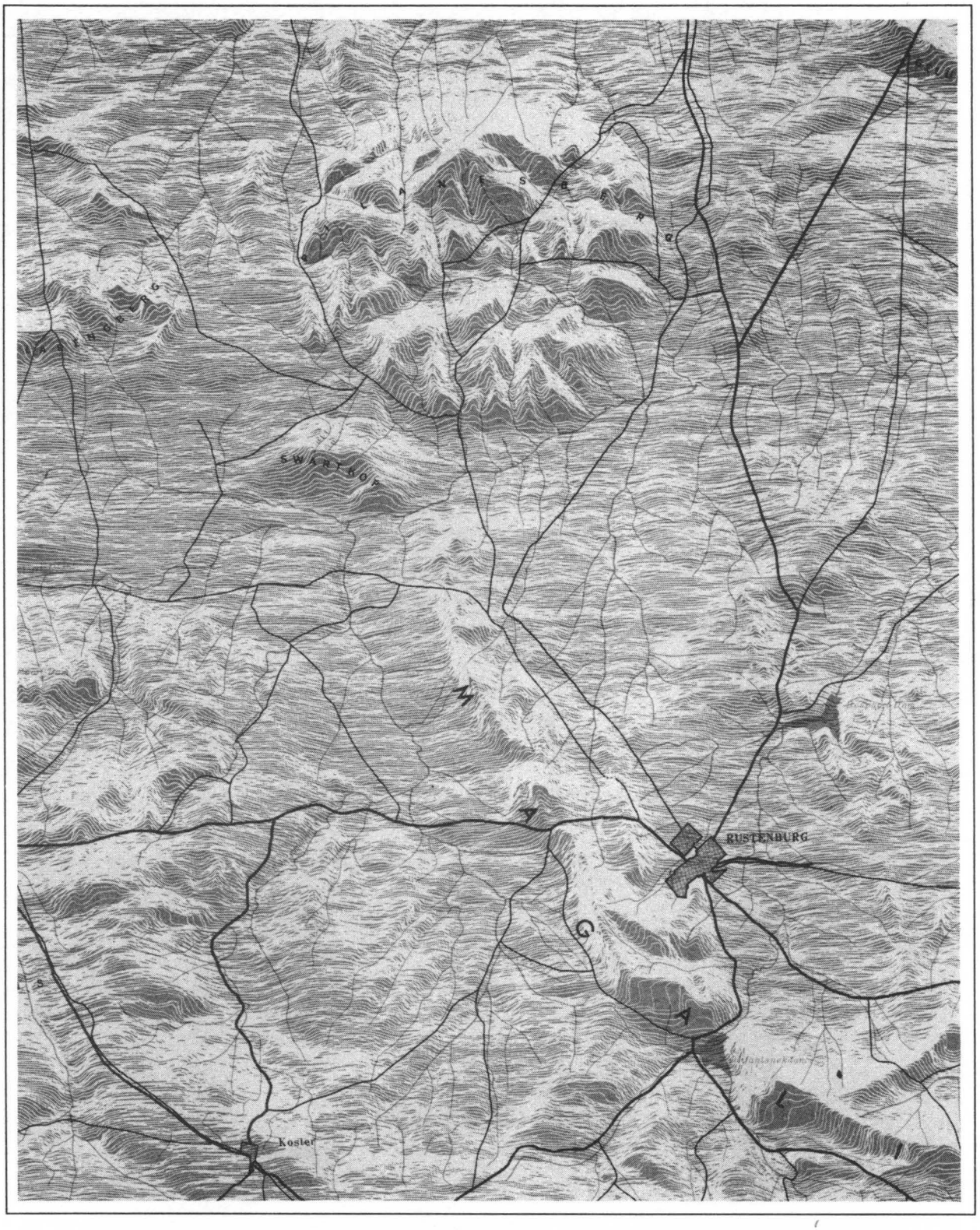
Hachuring was devised by J G Lehmann, an Austrian army officer, who in 1799 advocated that lines of varying widths follow the direction of the greatest slope. This provided an illusion of shading and was employed for nearly a century.

33 *Generalkarte der Sweitz*. Engraved by J Goll. 1929.
Geography Dept., Rhodes University.



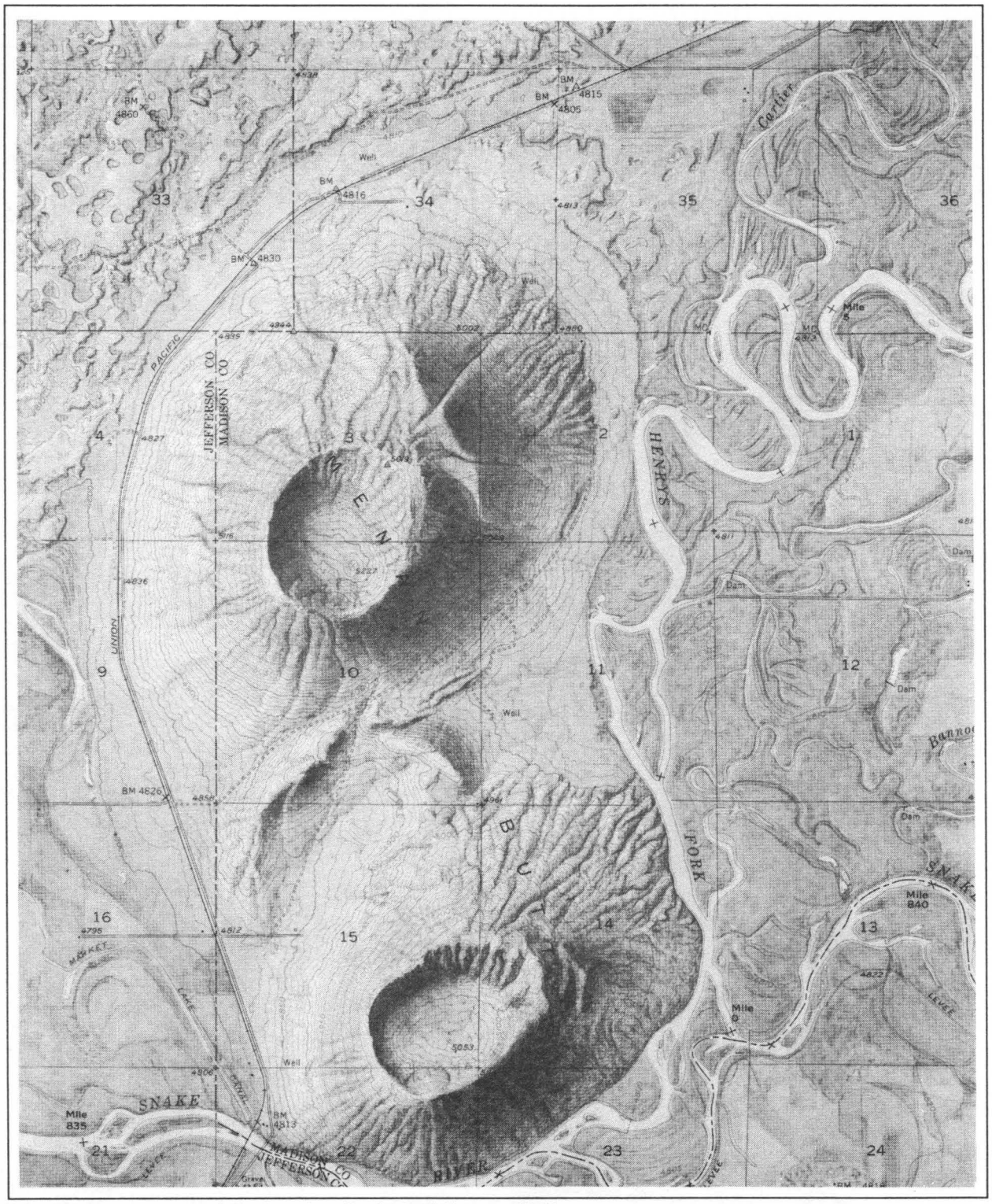
34 *Los Angeles, County California - Mount Baden-Powell.* 1940.
Geography Dept., Rhodes University.

Contours are slices of land where the vertical heights are the same all the way round.
Height is also shown by *tinting layers to show different heights.*



35 *Rustenberg: Relief and Drainage*.. Ca. 1950's.
Geography Dept., Rhodes University.

The Tanako Kitiro is a method devised by the Japanese which shows height by means of **horizontal lines**.



36 *U S Department of the Interior Geological Survey.* 1951
Geography Department, Rhodes University.

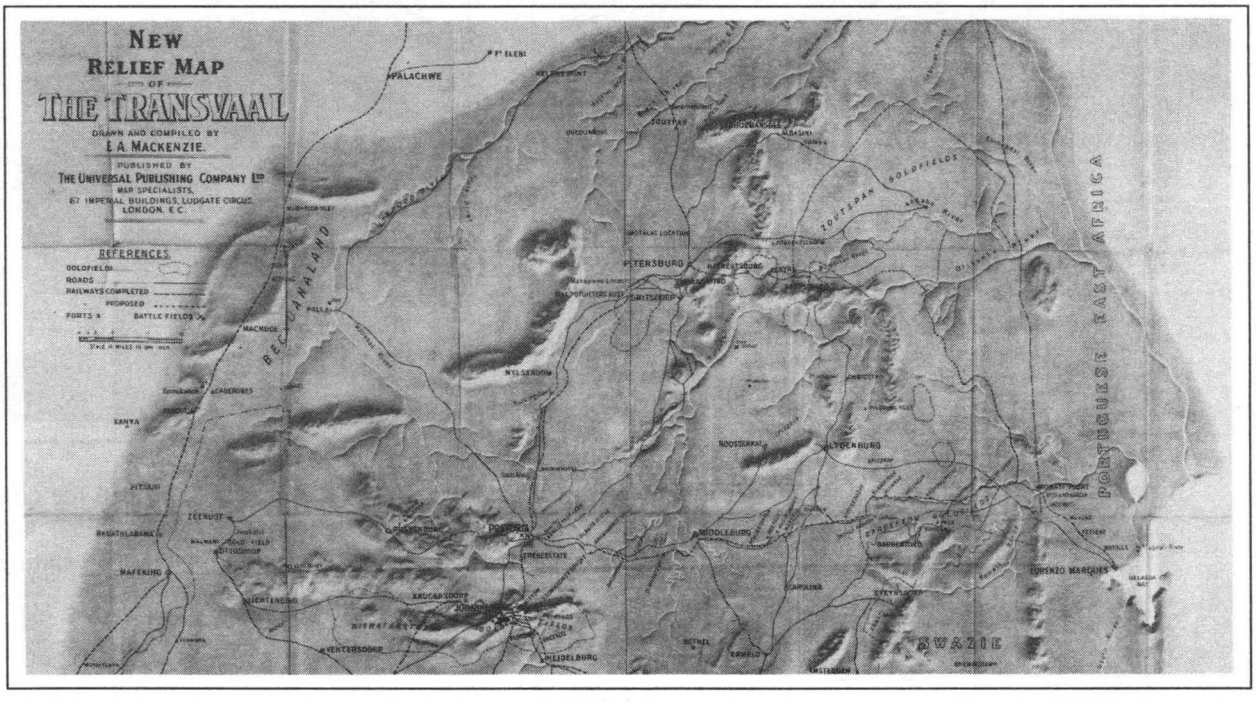
This map shows a *combination* of shading and hachuring (line drawing).

Lighting from the North-West

Cartographers habitually "light" mountains or hills from the north-west, with the shadow areas appearing in their south-east sectors. This results in a **raised** effect.

37 *Tabula Nova Particularis*. Woodcut by Martin Walseemüller. 1513.
Copy: Geography Dept., Rhodes University.

The converse occurs when the hill or mountain is lighted from the south-west. Hills appear as holes or declivities.



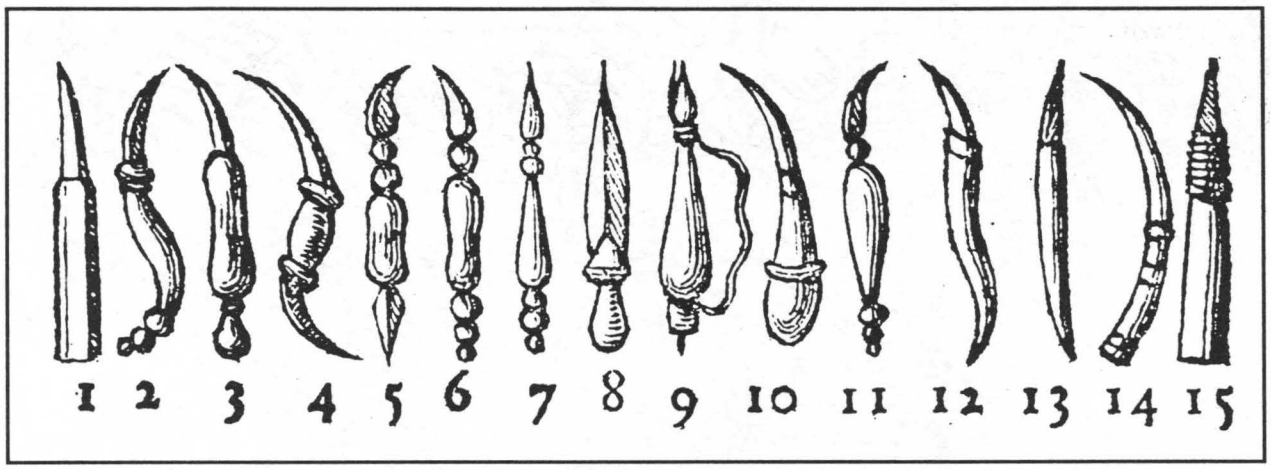
38 *New Relief Map of the Transvaal* by E H Mackenzie. 1940s.
Albany Museum.

See the "New Map of the Transvaal" - or better still, try turning the book around!

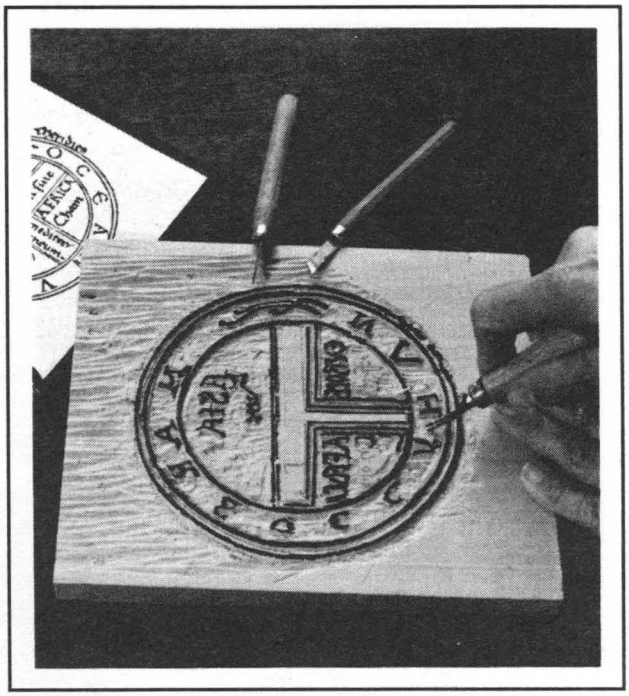
PRINTING

Woodblock Printing

The first known printed map in the Western World came from a German press in 1472. It was a simple woodcut print of a diagrammatic T-in-O style map of the world, a form used since Roman times.



39 Medieval block printing tools.



40 & 41 The woodcut involved the cutting away of the unwanted woodblock background, leaving in relief a reverse, or negative, image for printing.

Metals - Copper and Zinc

In copperplate work, map-makers were given a large surface on which to draw. Copper and zinc were soft enough to be engraved, and yet sufficiently hard not to blur under printing pressure. Polished copperplates were thinly coated with wax which hardened sufficiently to receive an image.The manuscript was laid down face-down on the plate and varnished so that the drawing would show through. It was then traced or transferred as a reverse image onto wax. The image was then cut through the wax into the surface of the plate.

Lithography

In the late 16th century, the rising cost of copper led to experiments using the action of acid on polished soft stone bases for engraving.

The lithographic process involved using acid on the stone and later zinc sheet bases, resulting in the introduction of the first chemically-produced printing method.

42 *Geological Map of the British Isles.* by J J H Teali. 1912.
Geography Dept., Rhodes University.

Manuscript images, drawn on specially prepared paper in a slightly greasy lithographic ink, were either transferred or directly drawn with pen-and-ink on to the stone or metal surface.

The plate was then washed with a weak solution of nitric acid which accentuated the inked image by etching and increasing the porosity on the un-inked background. Although the image was barely raised, it was sufficient to accept ink from the printing roller while the moistened porous areas of the plate rejected the ink. The lithographic process permitted the practicality of colour separation in map printing.

MODERN DEVELOPMENTS

Photography

The most revolutionary developments in cartography in the modern world came with the advent of process photography in the late 19th and early 20th centuries. The photographic process, together with the invention of the chemically produced chromium-gum printing plate in 1904, gave rise to a further dimension in map printing technology. The facility of **photo-lithography**, as it became known in the 1940s, provided a production sequence of original drawing to printing plate through a photographic negative. The need for the craftsman or artist was thereby gradually being reduced.

Heliozincographed maps

Heliozincography is the application of an intense artificial light source in the process of plate making.

Zincography differs somewhat from the *lithographic process* of printing: for the plate-making process, a light-sensitive coating of albumen with chromium salt was applied to the zinc, which was exposed under a glass negative of the line drawing. After exposure, the plate was inked and afterwards washed to remove the non-hardened albumen emulsion. The areas remain soft where the coating is shielded by the black background. These then leave the hardened emulsion line work standing "above" the plate background.

Then follows the engraving by hand of the drawing by means of a light needle, scratched into the zinc. Before inking, the plate was rubbed with oil; the oil does not stick to the repellent surface. Only the scratched parts accept the ink and no water is required as in the lithographic process. Being a *dry* process, it guaranteed an excellent range of tones. The fineness of the lines surpassed those lithographed on stone.

Plastics

Photo-lithography heralded the deterioration of cartographic drawing as dimensionally unstable, transparent acetate-based draughting films provided a difficult surface to draw on as the films did not easily accept ink.

The introduction of dimensionally stable polyester-based plastic Mellanex sheets in the 1940s and 1950s was to characterise a further major revolution in cartography. Plastics were to prove an answer to the need for ever-growing demands for speedily produced and accurate maps.

By the 1960's, however, cartography had risen phoenix-like from the mediocrity of the earlier half of the 20th century to new methods designed specifically for cartographic production. The development of scribing methods again brought back the quality of the engraved product:

Coated with a soft opaque layer to which the map image was chemically transferred, the film enabled map production to revert to a form of the engraving process. This technique is called **scribing**. Thus, instead of drawing or engraving an image onto a surface (wood, stone or metal plates), features are **cut** into strong Mellanex sheets. Several sheets bearing various additions may be superimposed on top of each other to form the complete image. The technique encouraged a whole new set of developments, particularly in pre-printed pressure sensitive stick-on symbols and lettering.

Printing a two-colour map

1) The original monochrome drawing is separated into features which are going to appear black in the final map; and those that are going to appear in red in the final map. A 'Fair' drawing is made of each which then becomes the 'good' copy.

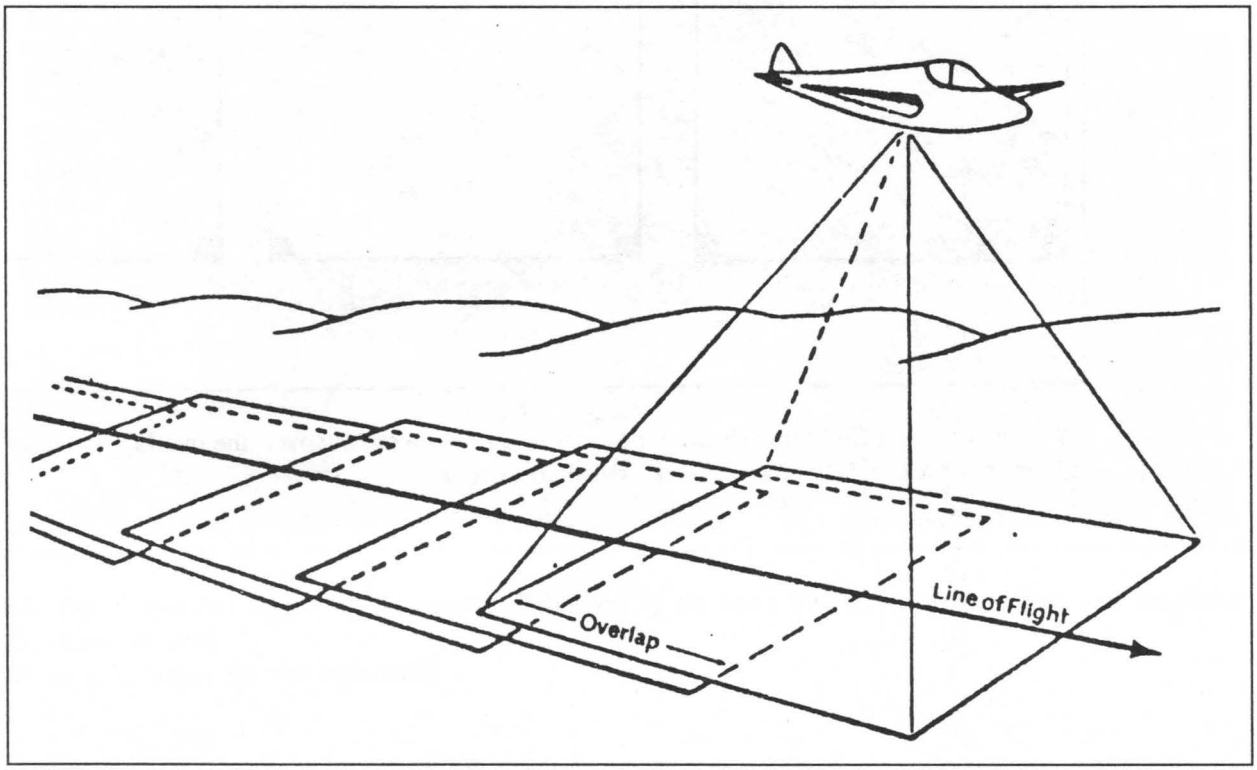
2) A photographic negative is made for each drawing.

3) The negative is now exposed onto a metal plate; the image then again becomes the right way round, a positive.

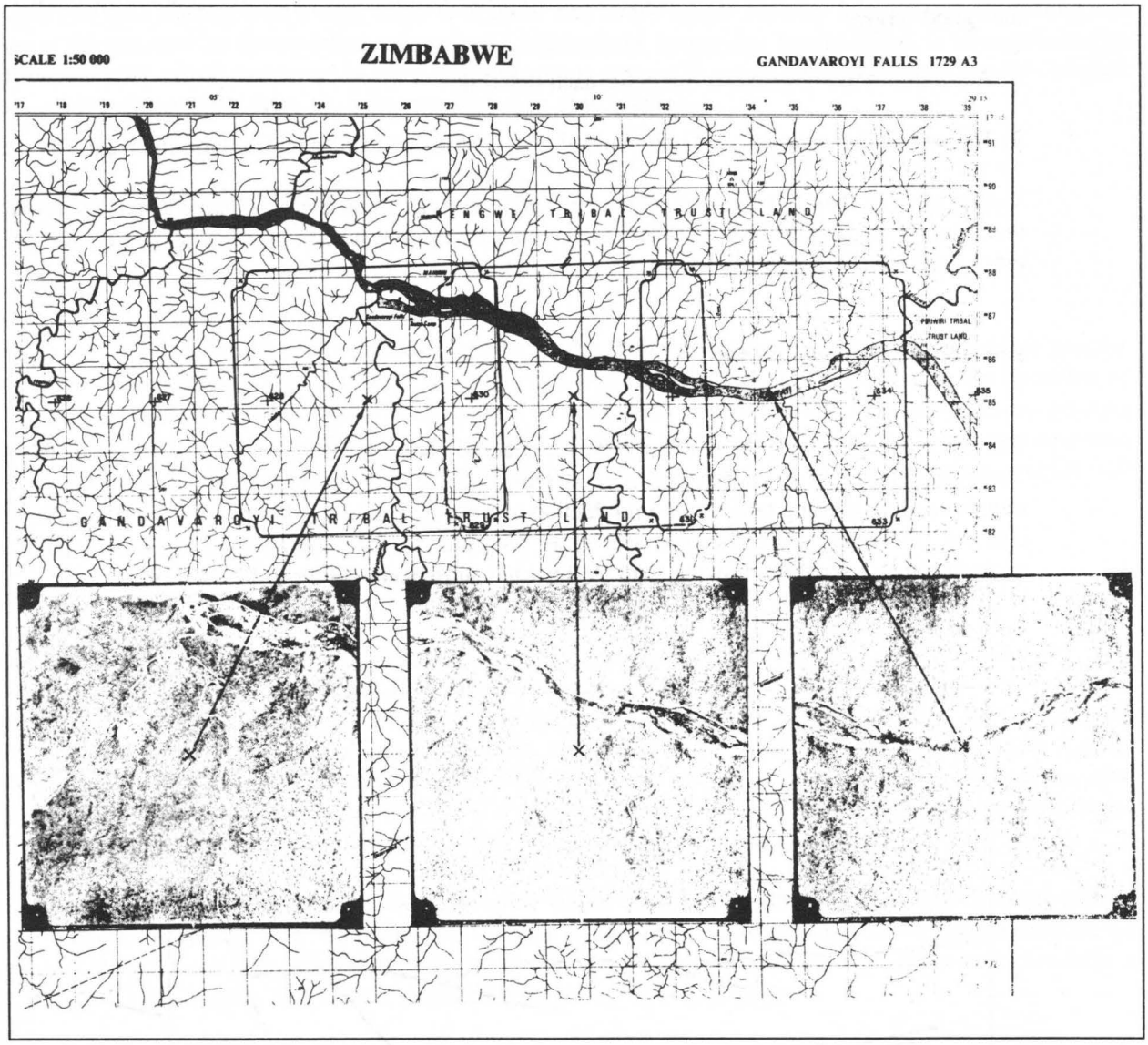
4) The plate is then put into the printing machine and the same piece of paper is passed through the printing machine for each consecutive colour; the colours being "registered" by specific key marks which are usually placed outside the frame of the map.

Printing a multi-coloured map

The process begins with the overlapping of 3-D aerial photographs which give an image of the Earth's surface. These are placed in a machine called a stereo-plotter. By using the 3-D image, the ground features can be transferred to a plotting table for the production of a *provisional map*. The provisional monochrome map is field-checked for errors and omissions. The same procedure is then followed as for a two-colour map, with the exception that a separate drawing is made for each subsequent colour to be used on the map.



43 Diagrammatic illustration of the pattern followed in air photography in order to produce a stereoscopic image.



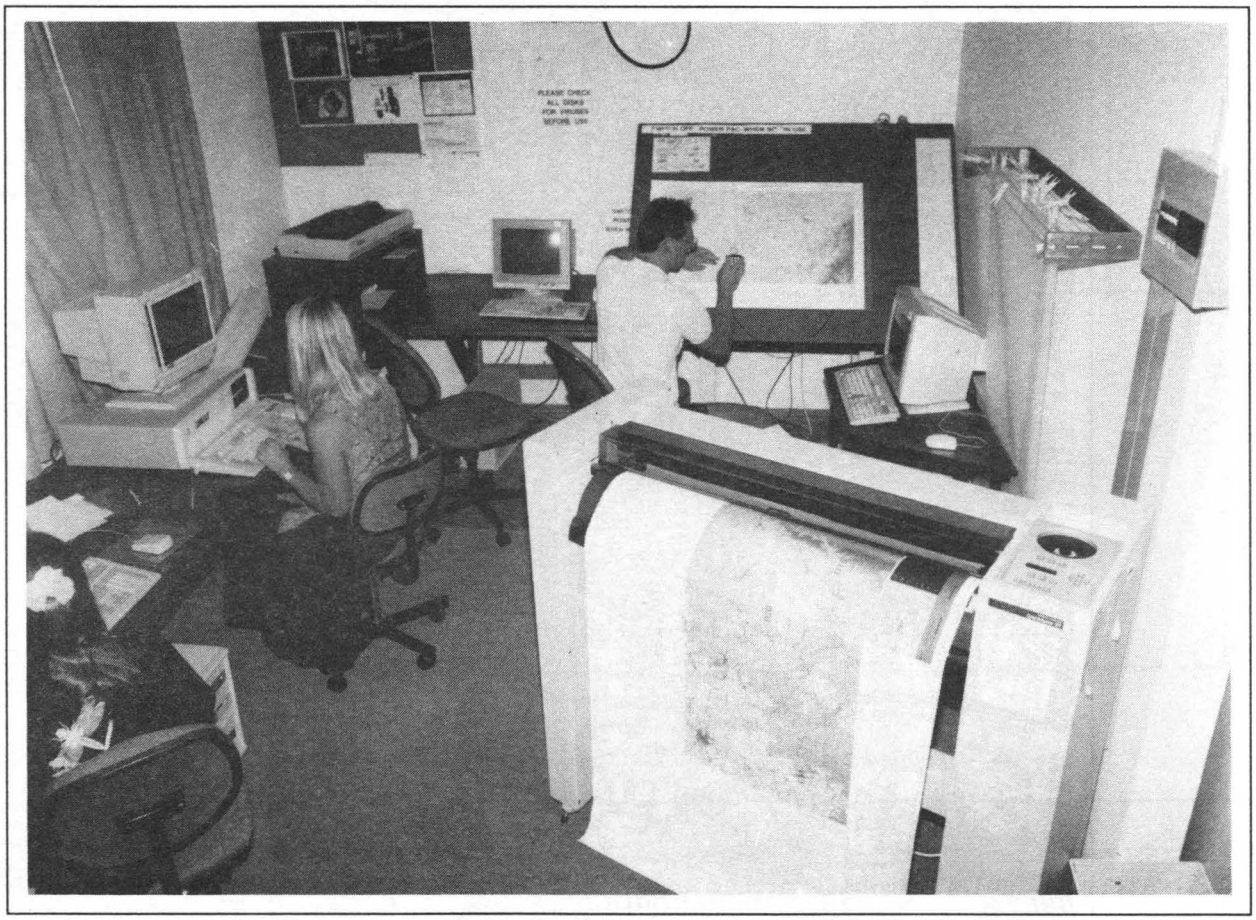
44 A section of a flight line showing portions of air photography cover, the overlapping images which form the basis for a *provisional map*. (Acknowledgment: Carver 1981).

45 *Die Kreisfreien Städte im Ruhrgebiet.* Published by the Land Surveyors of Nordrhein and Westfalen, Germany, in 1985.
Geography Dept., Rhodes University.

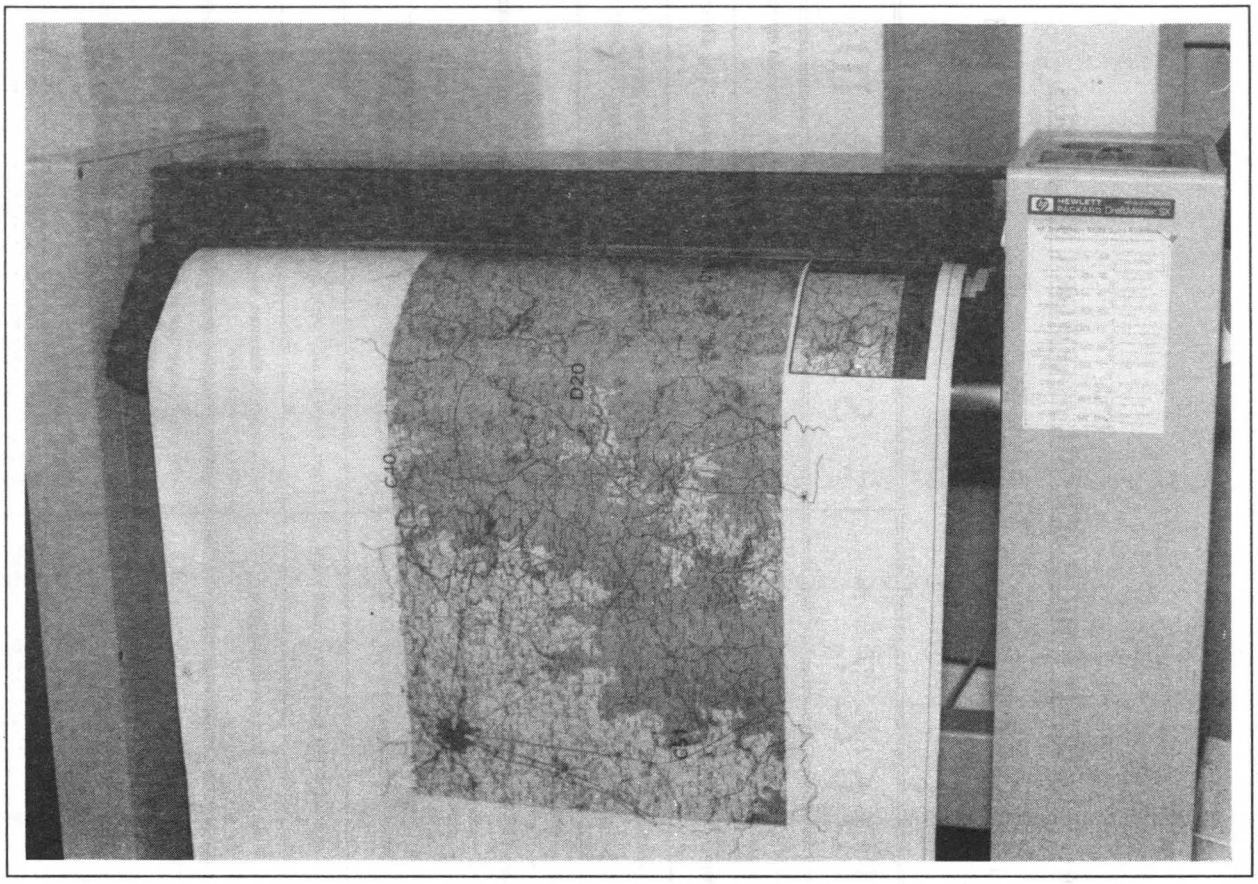
An excellent example of modern map-making and printing where modern developments are shown around original medieval villages; the map clearly delineates both political and geographical boundaries; highly coloured river and transport networks are distinctly different from subtler-toned surrounding habitations and geomorphic aspects such as contours are also clearly shown.

Computers

Cartography has developed a long way from pre-historic clay tablets to modern *GIS* (Geographical Information Systems). Data such as altitude, surface temperature, population, rainfall or vegetation is fed into the computer. This information is then processed in a map drawn (in various colours or in black-and-white) by the computer. The *GIS* operator can also alter the field of interest by zooming in on ever-diminishing areas, or by enlarging sections of the same areas. *GIS* maps can also be programmed to exclude or include other variables or even project future possibilities based on these variables.



46 GIS operators at work.
Courtesy Geography Dept., Rhodes University.



47 An example of a map produced entirely by GIS.
Geography Dept., Rhodes University.

The sky's the limit? - satellite photography

The development of aerial photography and photogrammetry as data sources forced cartographers to keep up with ever-increasing demand for new data. However, satellite photography has opened up possibilities for data-collecting hitherto unimaginable.

In May 1993, the TV programme *Beyond 2000* reported an Australian artist as having succeeded in "cutting-and-pasting" many years of collecting cloudless satellite images of the Earth's surface onto an ordinary schoolroom-type globe. This is perhaps the very *first* real photographic portrait of the Earth!

HOW RELIABLE ARE MAPS?

It must be remembered that Cartographers have not always worked as independent artists, craftsmen or technicians. Their work is often subject to the bias of particular patrons or organizations whose best interests they must seek to protect.

War-time maps of Europe, for instance, or even some Russian maps produced in the 1960s, have shown towns deliberately drawn in incorrect locations to prevent strategic measurements being taken from them by enemy forces. Developments such as photogrammetry and computers, however, will obviate both human error and deliberate deception as cartography moves ever toward to a more truthful reflection of the heights, breadths and depths of the Earth's surface.

AN OVERVIEW OF SELECTED SKILLS AND ACTIVITIES APPROPRIATE TO A HIGH SCHOOL MAPWORK SYLLABUS

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		STD 6 & 7	STD 8, 9, & 10
TYPES OF MAPS	**GLOBES**	The round world; Great circles; Longitude and Latitude; Time zones; Seasons; Day and night; Lunar phases; Eclipses; Tides	As an aid to understanding atmosphere circulation and ocean currents; to demonstrate other phenomena, eg. El Niño
	ATLAS	Physical and political maps; Comparing different maps; Using the index; World biomes	Regional maps; Thematic maps; Environmental maps; Using different types of atlases
	1:50 000 TOPOGRAPHICAL MAPS	Orienting a map; Use of symbols; applying a key; The concept of scale	Detailed work on topographical maps; Cross-sections, gradient, magnetic bearing calculations, intervisibility, contours; Using maps in conjunction with aerial photographs
	OTHER MAPS	Street maps; Bus timetables and maps; Maps in holiday brochures and tourist guides; Weather and climate maps	Time and distance maps; Time and cost maps; Large scale maps; Synoptic charts; Municipal maps; Geological and historical maps
ASPECTS OF MAPS	**DIRECTION**	Gauging direction by the geographical coordinates on world maps using different projections, eg. Mercator, Mollweide; 16 points of the compass	Bearing calculations; Orienteering exercises; Giving directions between places on maps; True and magnetic bearing
	COORDINATES	Latitude and longitude to degrees and minutes; Four and six figure grid referencing	Six figure grid referencing; The effective use of an atlas
	PROJECTIONS	Key properties of the main projections; Flat maps from a round world	Peters, Mercator and others; Projections as propaganda
	SCALE	Word, line, representative fraction; Calculations at scaling up and down; simple map making	Calculating map distances, heights and gradients; Cross-sections vertical exaggeration
AIDS TO MAPPING	**IMAGES**	Small scale, annotated orthophotomaps; Oblique and vertical aerial photographs	Using aerial photographs in conjunction with maps; Satellite images, eg. Metrosat, Landsat; Slides and videos; The print media
	DIAGRAMS	Line graphs, bar graphs and pie charts superimposed on maps; Sketch maps; Model building from a diagram; Cartograms, eg. school classrooms drawing proportional to class size	River drainage patterns; Population pyramids; Soil profiles; Triangular diagrams; Geological sections; Regression lines; Scattergrams; Theoretical models
	FIELDWORK	Drawing maps in the field, eg. mapping a local area from a high point	Using detailed measurements based on field work to draw maps

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A concise, well-illustrated introductory resource for understanding the history and process of map-making. Written in an easy-to-follow style, the booklet is a 'must' for academics, teachers, school children and lay persons alike.