

8-PAGE SPECIAL: WHAT IT IS LIKE IN SPACE 1/6

# LOOK AND LEARN

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No. 100, 14th DECEMBER 1963

EVERY MONDAY—PRICE ONE SHILLING

## The QUEEN WHO WENT ON A CRUSADE

SEE PAGE 26





# LOOK AND LEARN

No. 98. 30th November, 1963  
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# BETWEEN OURSELVES

This old island of ours is going through an exciting period of exploration—not on the surface, but below the ground. Why is this? Because a new search is going on for the world's buried treasures, oil and minerals. During the last century more of these have been removed from under the ground than in the whole of the world's history.

Britain comes into the picture in the search for more oil and more tin. Is there a great deposit of oil under the North Sea? We are not sure, but drillings are being made and hopes are high.

As for tin, this is a strange twist of fortune, for in Cornwall the tin mines have mostly been regarded as derelicts from the past. Julius Caesar found Cornish tin invaluable, for the metal was scarce in Rome and in later times there were as many as 200 tin mines in the county. Today it only provides one per cent of the world's tin. But the demand is growing throughout the world and supplies abroad are shrinking. So our Western county may again find itself very much on the economic map.

If ever the same thing happened with Welsh gold, then indeed Britain would really become a Treasure Island.

The Editor

## Quick QUIZ

### WORDS

1. We talk about a pride of lions. What is the group term for partridges?
2. What is a misogynist?
3. Which of the following words are mis-spelled: seperate; catalyst; syntax; apostrophe?

### COUNTIES

1. What is the county town of the Scottish county of Banffshire?
2. In which county is Blenheim Palace?
3. In which county is Stratford-upon-Avon?

### GEOGRAPHY

1. Where would you expect to find the Tuareg people?
2. Which European country owns the island of Tahiti?
3. What is the capital of Mexico?

### NATURAL HISTORY

1. To which monkey family does the mandrill belong?
2. The duck-billed platypus, kangaroo, bat and elephant all belong to the same family in the animal tree. Which family is it?
3. What tree's leaf is the national emblem of Canada?

### PEOPLE

1. Next year is the 400th anniversary of the birth of a great British writer. Who was he?
2. Who is the deputy leader of the Labour Party?
3. Who was Prime Minister of Britain before Mr. Macmillan?

### ANSWERS ON PAGE 25

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## TREASURE

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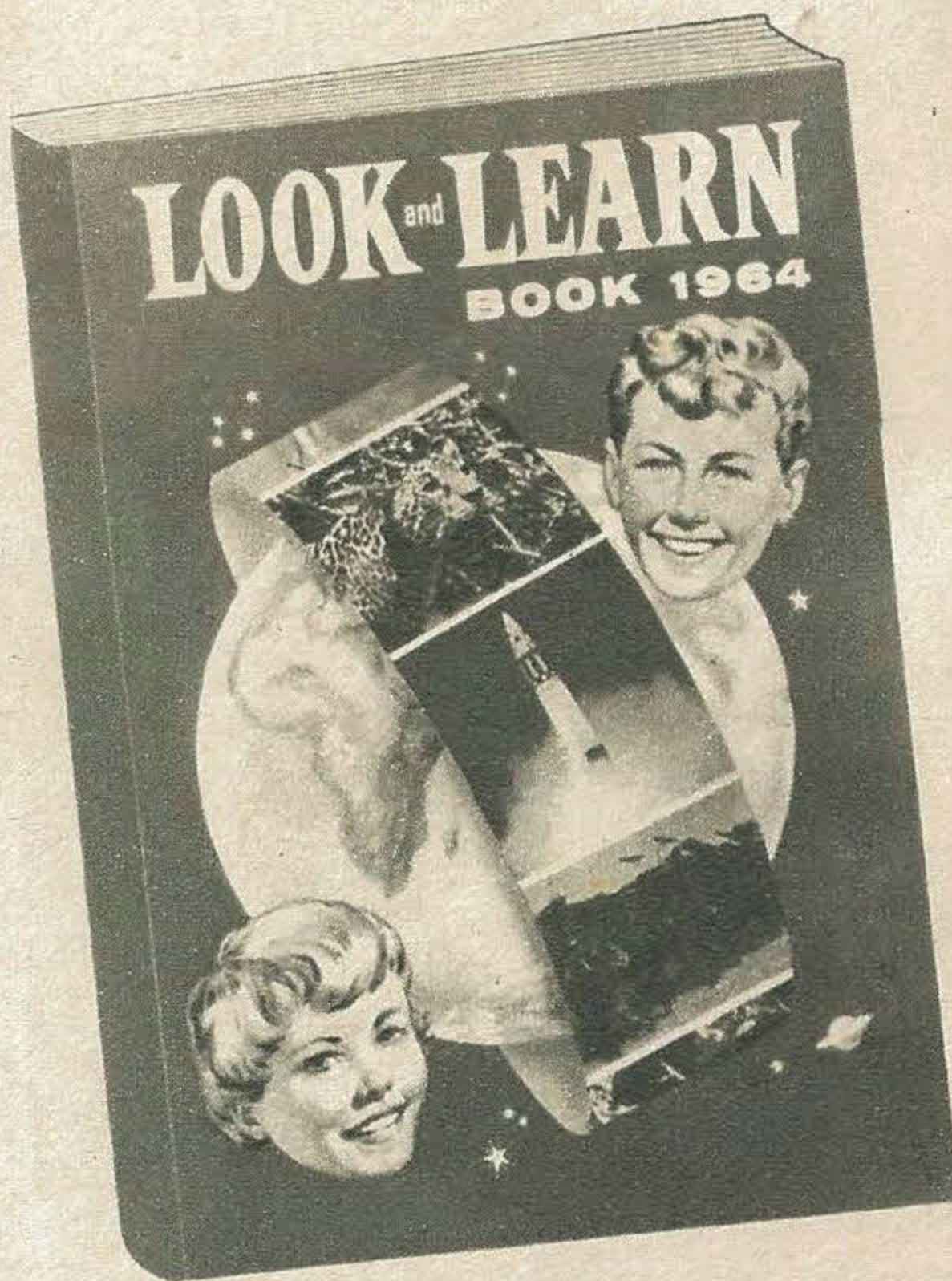
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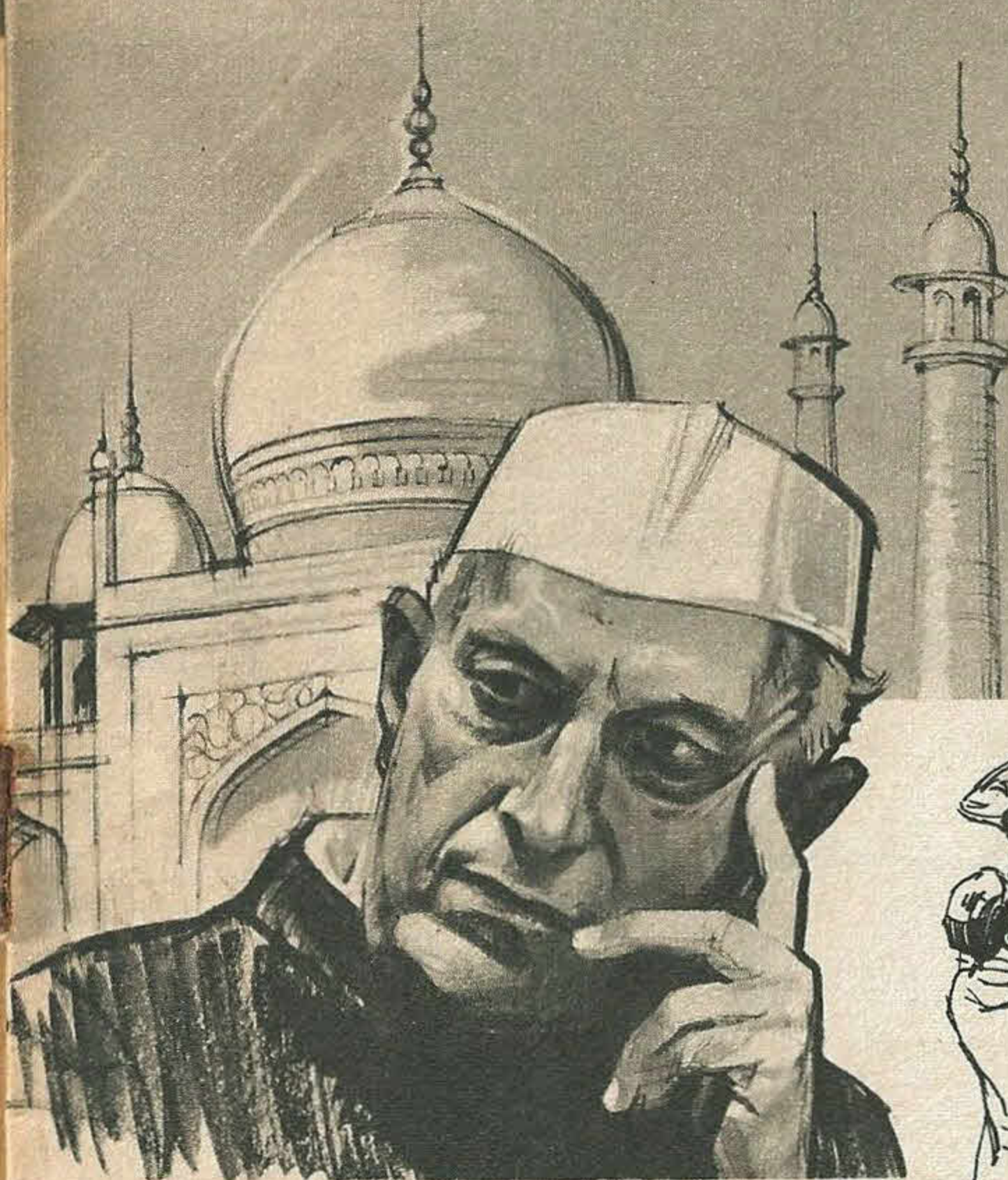
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## THE LOOK AND LEARN BOOK

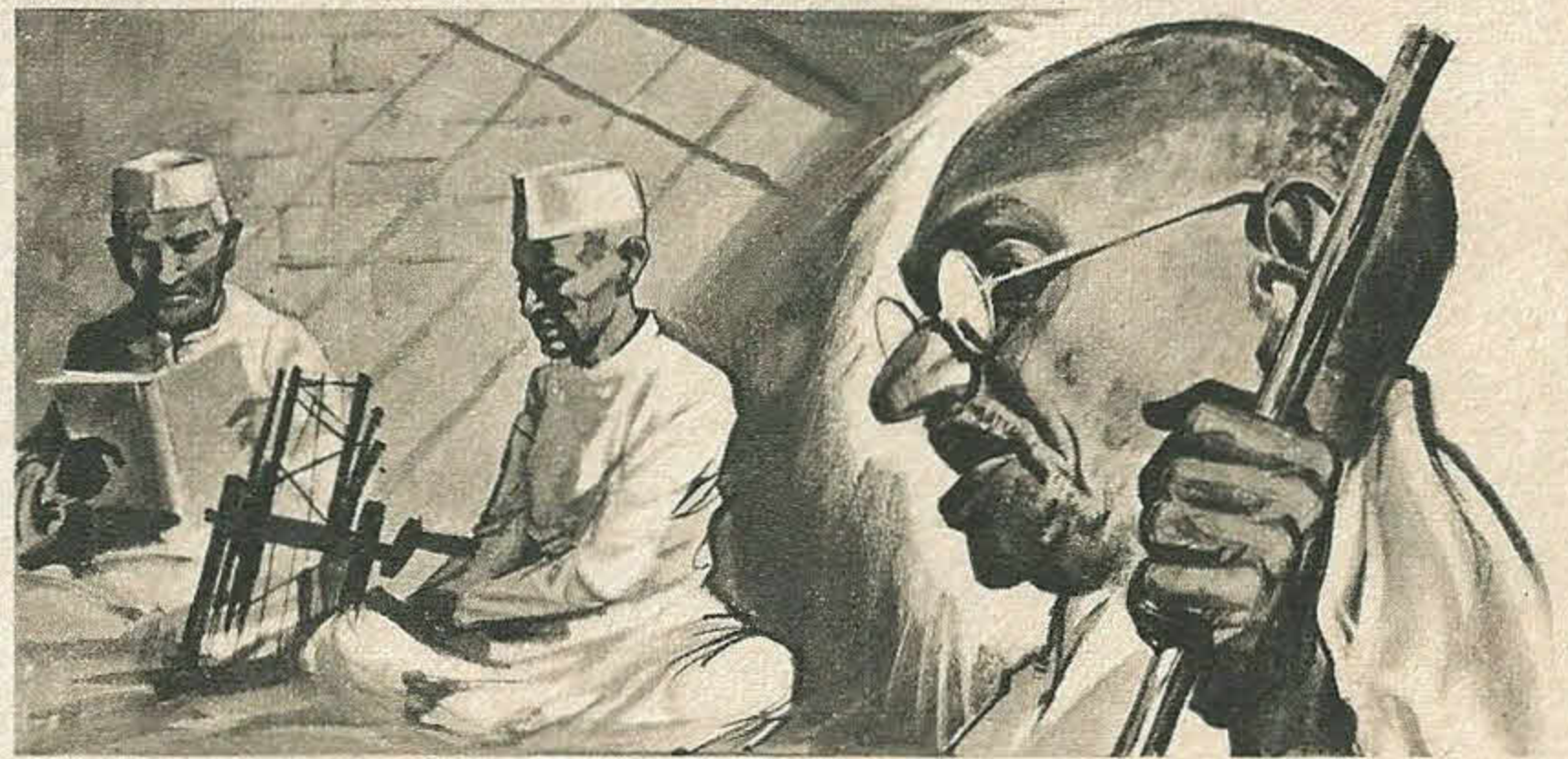
ON SALE AT NEWSAGENTS AND BOOKSHOPS—PRICE 12'6



# HE LEADS INDIA'S MILLIONS

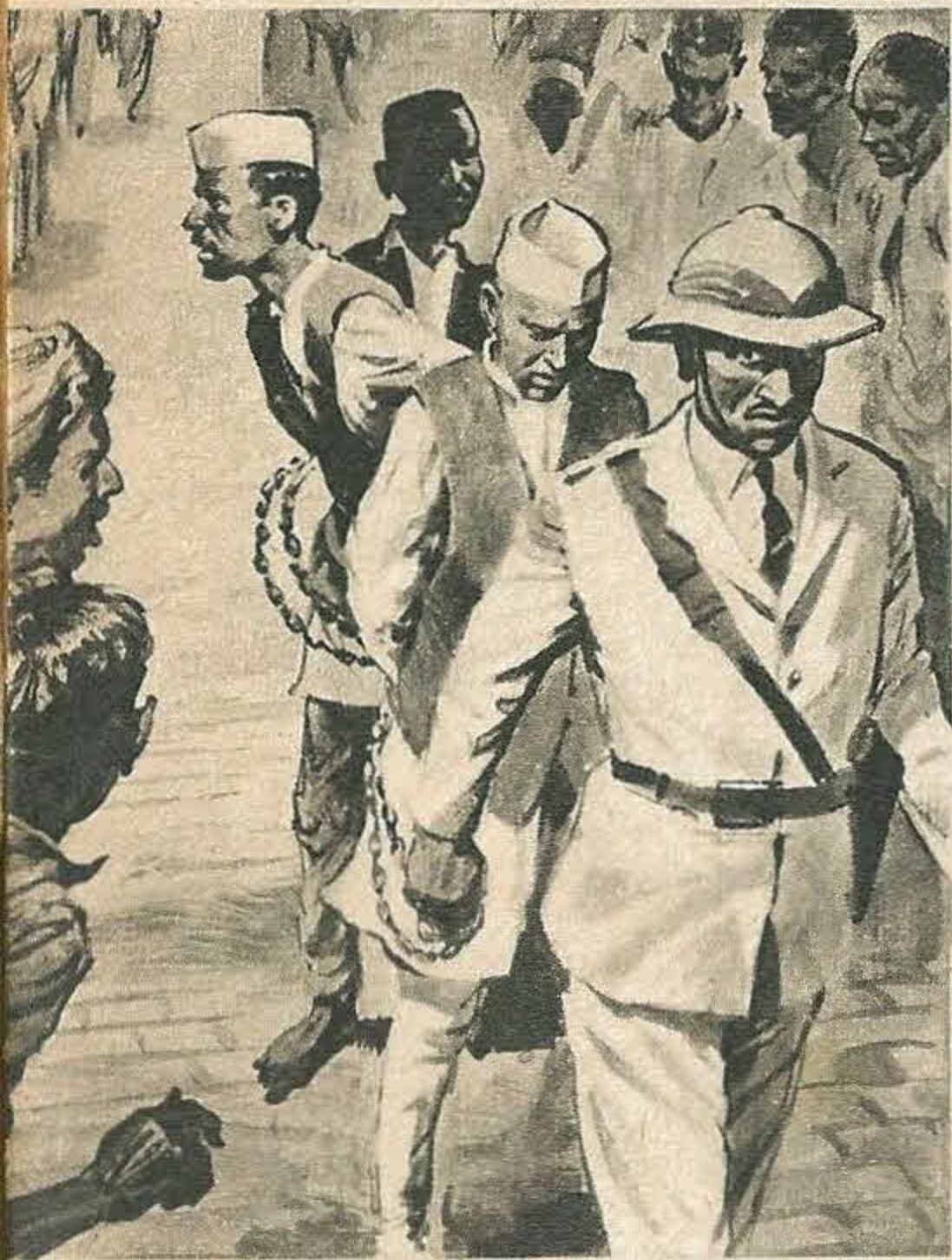


**B**RTAIN ruled the great country of India for almost two hundred years. The first administrators were men of the East India Trading Company, the great organization which developed India's land and resources. Later the British Government itself took on the task, and in 1877 Queen Victoria was proclaimed Empress of India. But during the whole of this period of British rule, many Indians plotted and planned for independence. When it finally came, a great leader was needed—and he appeared in the unlikely form of an elegant British-educated lawyer, Jawaharlal Nehru.



In 1912, after seven years in England, Nehru returned home to his family to become a lawyer—but another task soon took all his time.

Nehru had become a fanatical believer in Indian independence. He and thousands of Indians like him soon found a leader in Mahatma Gandhi, who stirred up the nation to passive resistance against the British. In 1921 Nehru was jailed, and spent much of his time at a spinning wheel.

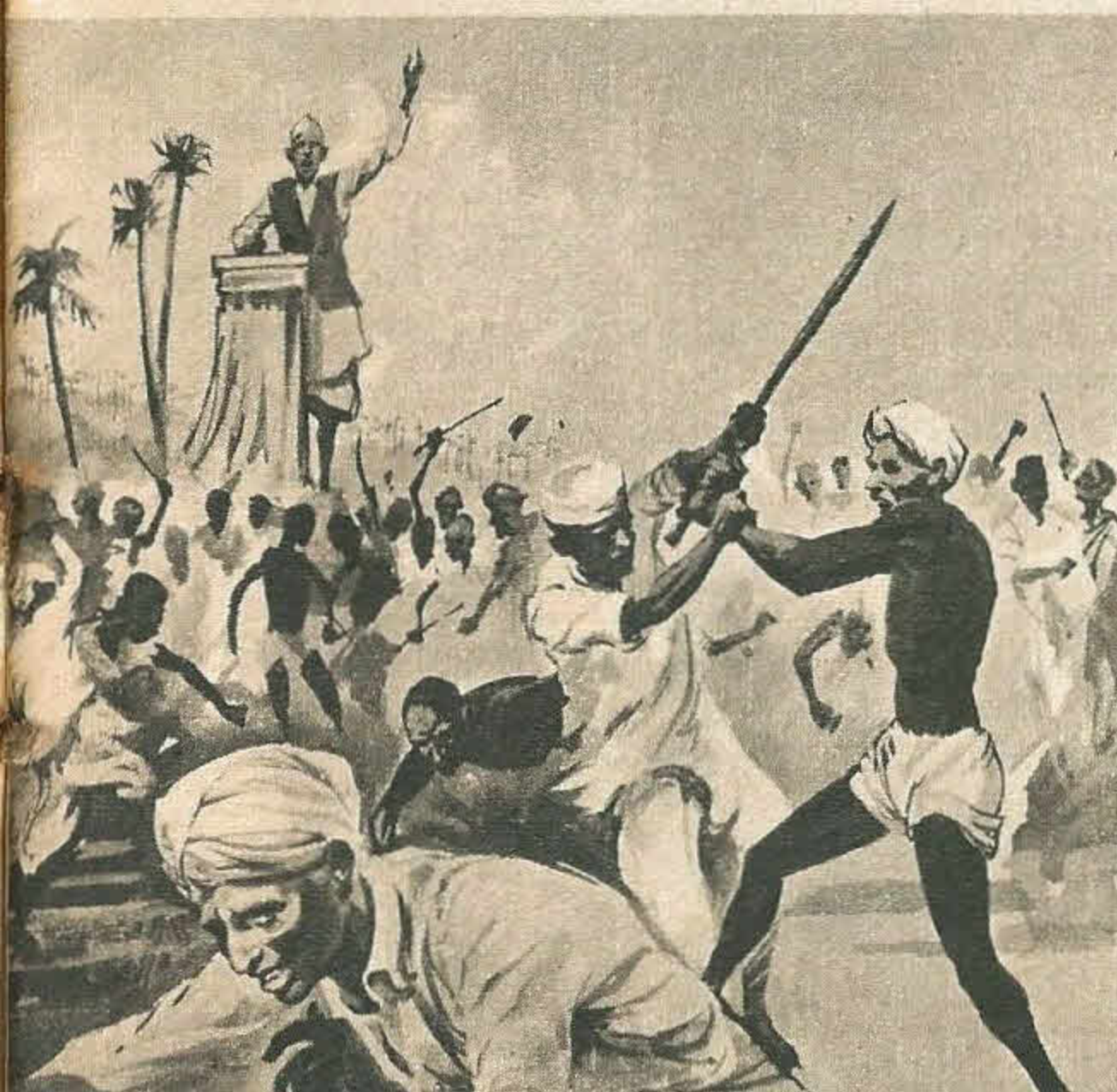


But even though Gandhi himself was arrested in 1922 the movement went on. Nehru continued to speak—and was once led on a chain to prison with his colleagues.

In 1929 the leaders were again arrested. Nehru disagreed with Gandhi's desire to compromise with the British.

Indians fought bravely on the side of the Allies in the Second World War. When it was over the British took the first step of granting independence by appointing Indians to the Viceroy's Council.

Nehru soon received his reward: when India became a dominion in 1947, he was the country's first Prime Minister and Foreign Minister. Today, sixteen years later, Nehru still holds both these posts.



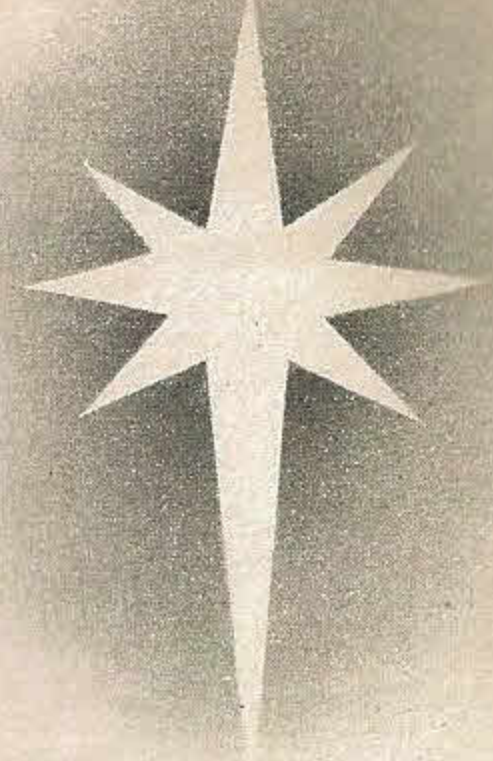
But freedom did not bring peace. Anti-government demonstrators threw bombs at his car while he drove through Calcutta to speak in public. And while he spoke, one part of the crowd fought the other.

When India became a republic within the Commonwealth in 1950 Nehru was a major statesman. As a guest of Chinese Premier Chou En-lai, he explained that India wished for friendship with all countries.

Friendship with all countries . . . Nehru demonstrated this wish when he visited the Soviet Union in 1955. Here, too, crowds cheered the man who had fought for India's freedom for over forty years. Today Nehru still fights—to combat poverty and to make his nation great.



Beginning **THE CHRISTMAS STORY**  
 specially told for LOOK and LEARN by  
 The Reverend JAMES M. ROE



MADONNA AND CHILD  
 BY MICHELANGELO

# THE SHEPHERD'S TALE

*When I awoke the fire had gone down and the sky was filled with bright light.*  
*Then a voice said, "Do not be afraid. I bring you good news . . ."*

IT was the strangest night I have ever spent. There are still things about it that I don't quite understand. But though it's every bit of thirty years ago, and I was not much more than a boy, I still remember it as if it were yesterday.

There were three of us out with the sheep that night. We seldom leave them alone, and never in winter when there are wolves about. What a winter it was that year! As cold as I can recall in all my time as a shepherd.

The whole flock had been grazing on the hillside and we had brought them down and penned them into a fold at the head of a little valley. I had only joined Reuben and Amos, the other two, late in the afternoon. They had been out since dawn, and I brought food for them from the village.

Once the sheep were safely penned we made a fire. There was a keen frost that made every star in the sky twinkle as they only do on a bitter night. Except for one star. I remember that one especially; it was new, and it shone right over our village with a steady glow. I kept on looking at it; it was like some sort of a sign in the sky.

Reuben and Amos were tired out, so when we had finished supper they put me on guard for a bit. Amos lay down by the fire, while Reuben stretched himself right across the doorway of the sheep-fold, so that any sheep that tried to escape would wake him up.

Soon they were both asleep.

I must have dozed a bit too, and it was only when the fire went down and I felt cold that I

woke up again. Suddenly the sky above me seemed to be light everywhere. The fire was nearly out, but there was this great glow all around, and above it all, that star.

Reuben and Amos must have woken up at the same moment, for when I looked around they were on their knees, shielding their eyes from the growing light with their hands.

They were good men those two. Men of God, you might say. They used to tell me that one day God would visit His people, just as the prophets had said He would. I remember thinking that they seemed not so surprised or so frightened as I was. In fact, I was thoroughly scared!

## The Messenger

UNTIL I heard the voice, that is. There was something about it that reassured me. It was a strong, clear voice, and the first words it spoke were, "Don't be afraid."

At first we could not see the speaker, though his voice was near at hand. Then I made out his form, a white-robed figure standing by a shaft of bright light. We listened, on our knees, as though we were in the Temple itself.

"I bring you good news," he said. "News of a Saviour, who is born today in the City of David."

We all knew where he meant, because the City of David is Bethlehem, where we all come from.

"And this will be the sign for you," he went on. "You will find the child lying in a manger."

In a manger! We stared at each other in confusion. What mother would ever want to put a baby there, with the animals poking their heads in every few minutes?

Then there was the singing. Such singing as

I have never heard before or since, no, not at the festivals in Jerusalem itself. It seemed to come from all over the night-sky. "Glory to God in the highest"; it echoed across the valley. "Peace on earth, good will towards men." Those were the words. And then the light and the white-robed figure and the voices faded away, and everything was still again.

"We had better go," said Reuben shakily, and Amos answered excitedly, "Yes, we'll go—this is the night promised to our fathers; the Saviour of our people has come!"

Together we blocked up the entrance to the sheepfold with briars. It was all we could do to protect the sheep. Then we set off for the village about two miles away. We had to climb out of the valley up to the ridge on which Bethlehem stands, and by the time we were there we were out of breath.

Bethlehem was crowded with visitors for the census which had been ordered by the Emperor Caesar Augustus and nearly everybody we met was a stranger. Nobody could tell us anything about a new-born child. We tried our friends and neighbours, and all the likely places.

## Stone Shelter

IT was the innkeeper who took us to the Child in the end. We had asked for him before, but were told he was busy.

"Yes," he said when we found him. "There has been a child born here tonight. A baby boy. In the stable below; the inn is packed, it was the only shelter I could offer them. Come and see for yourselves."

We followed him to the rough stone shelter which served as a stable, and there we found the Child and His mother, just as we had been told we should. He was lying, all wrapped up, on a bed of straw in the manger.

We know now who He was, but to us that night it was all a great mystery. We just knelt there and thanked God for letting us be the very first to find Him.

It seems a long time ago. But I remember it as if it were yesterday. . . .

## THEY WATCHED THEIR FLOCKS

THERE have been shepherds on the hills of Palestine for at least 4,000 years. Shepherds are often mentioned in the Bible, which tells us how they lived. Their flocks usually consisted of not more than a hundred sheep, since they had to move around constantly in search of grass and running water.

At night the sheep were penned in stone enclosures, and guarded from thieves and wolves. Every shepherd carried a crooked staff with which to rescue sheep when they were in difficulties, and a club for protection.

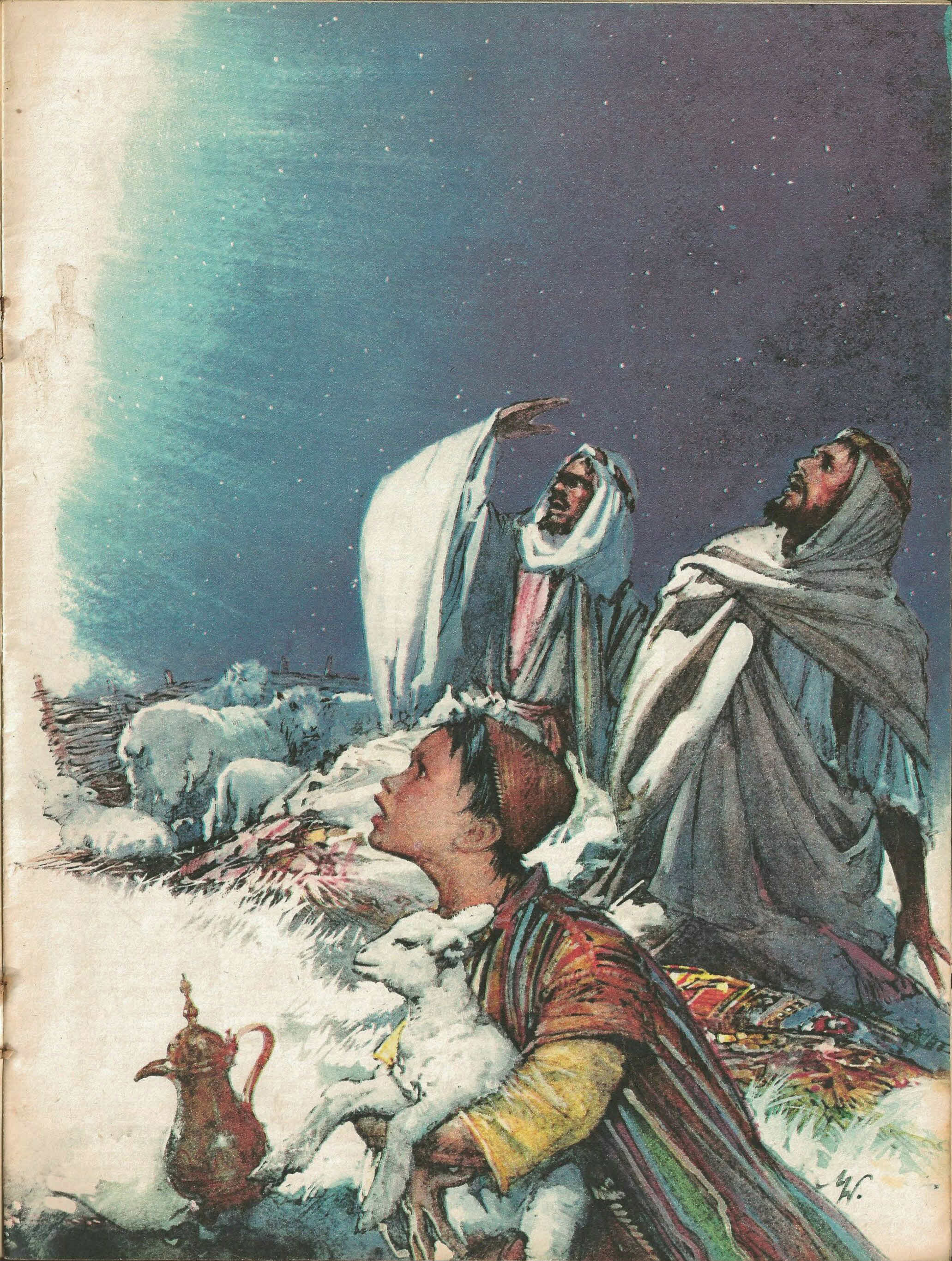
Many, like David, the shepherd boy, also had leather slings for hurling stones at marauders.

A good shepherd knew each sheep in his flock, however alike they seemed. Sheep were kept for their wool, which was used by everyone for clothing. The best of the flock were sent for sacrifice at the temple in Jerusalem.

An Eastern shepherd does not drive his flock, but leads it, and shepherds can be met today whose way of life is practically the same as that followed in Biblical times.

**NEXT WEEK:  
 THE INKEEPER'S  
 STORY**

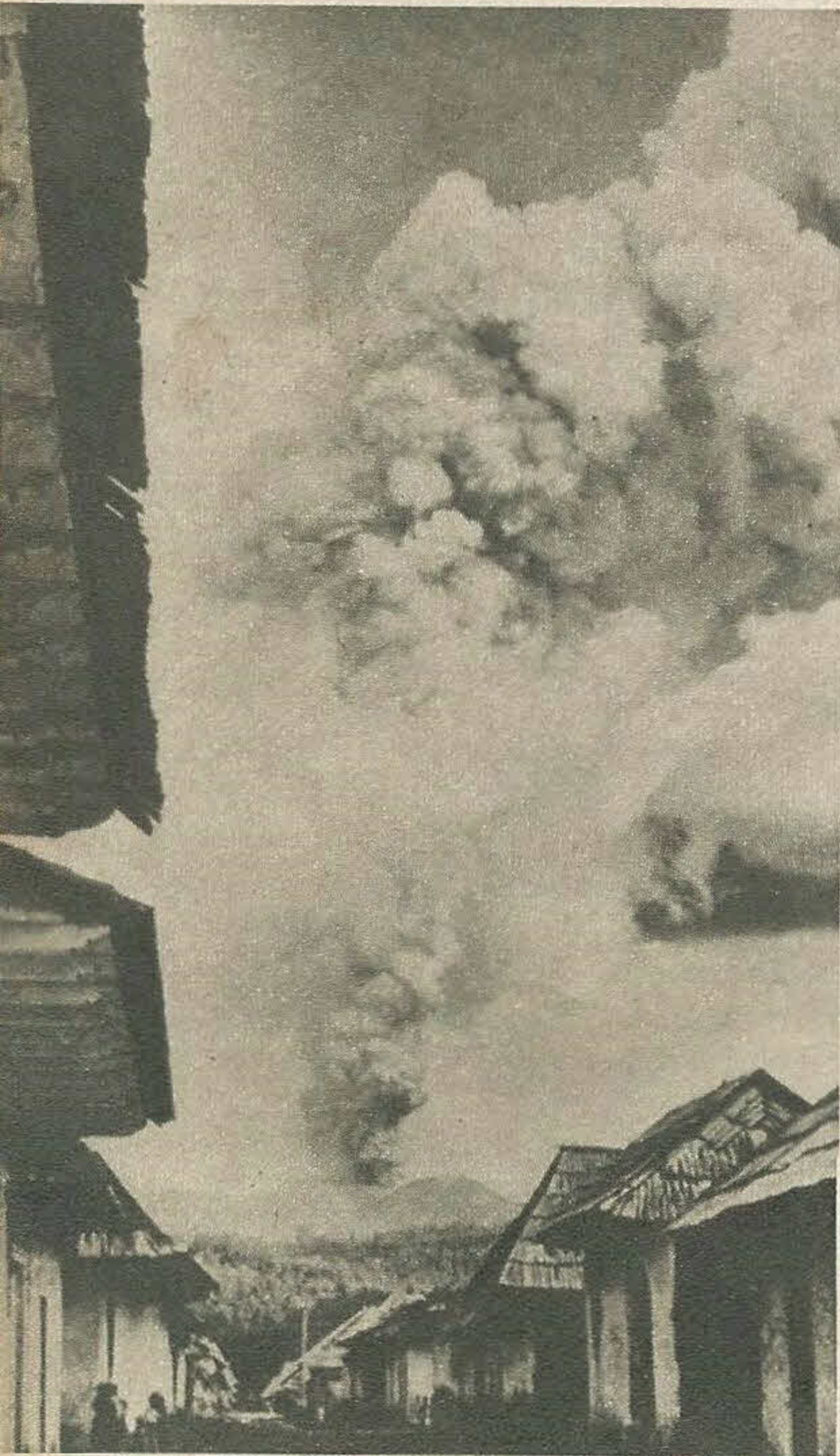




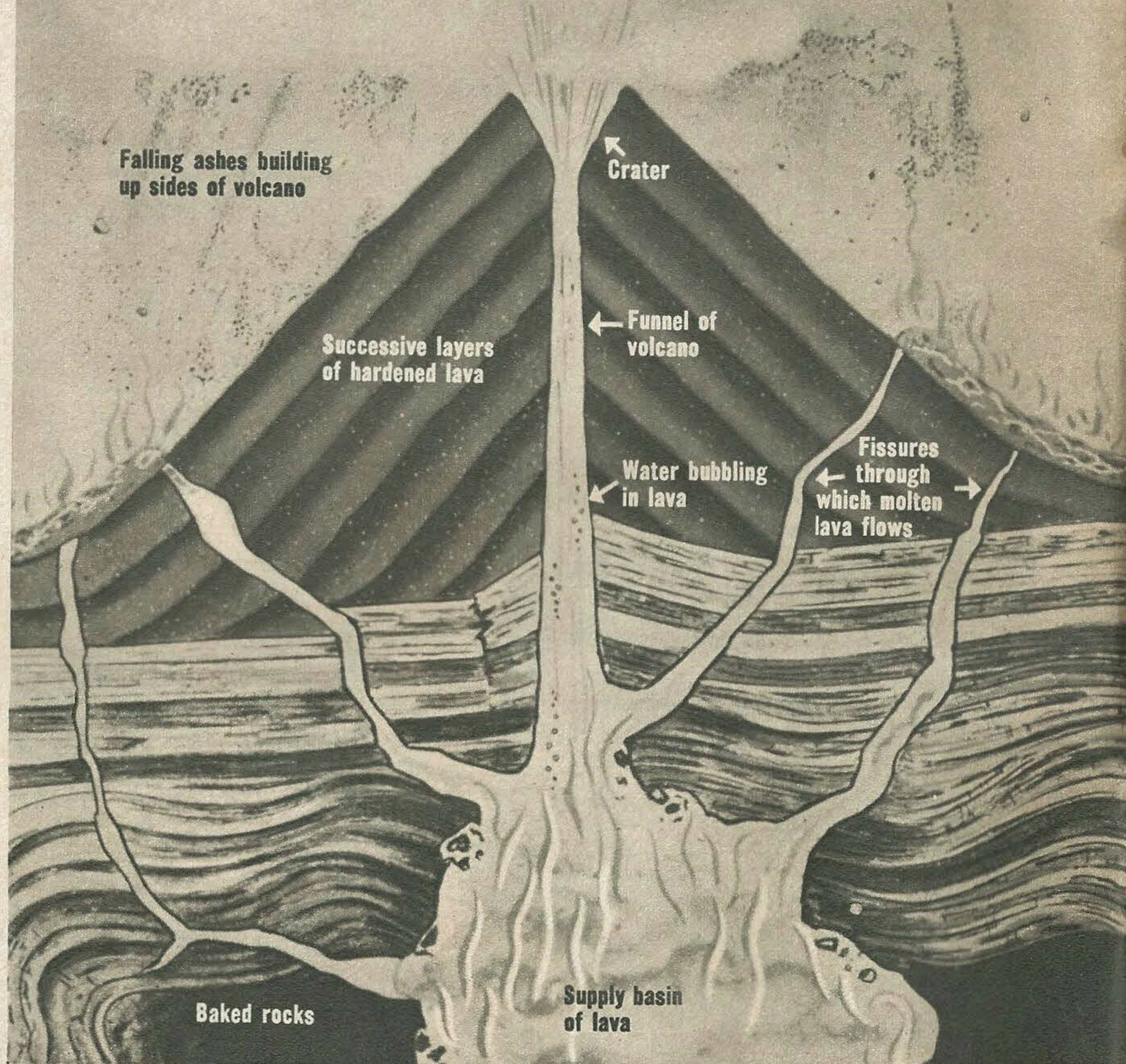


When volcanoes 'blow their top' they are . . .

# THE WORLD'S SAFETY VALVES



An erupting volcano threatens a Mexican village with burning lava and rocks. Already several villages in the area have been evacuated. Right: The diagram shows a cross-section of an active volcano. Many volcanoes spurt lava through side fissures as well as through the central funnel. The fissures act as extra safety-valves.



SCATTERED throughout the world are about four hundred mountains that from time to time burst into flame and spurt out an avalanche of burning rock and liquid mud. Often their fiery torrents have overwhelmed and buried whole cities and laid waste the countryside for miles around.

From very early times these mountains of fire have been called volcanoes.

The name was originally given to Mount Etna in Sicily, and to the mountain Stromboli in the Lepari Islands off the south coast of Sicily, because they were thought to be the places where Vulcan, the Roman god of fire, had his fire and forge.

There are three kinds of volcanoes—active, dormant and extinct.

Active volcanoes are those which erupt frequently. Examples are Mauna Loa in Hawaii, Etna in Italy, and Cotopaxi in the Andes of South America. Cotopaxi is the tallest active volcano in the world.

"Dormant" comes from the Latin word *dormire*, meaning to sleep, and a dormant volcano is one which erupts only very occasionally. An example is Vesuvius in Naples.

Extinct volcanoes are those which have become cold and from which no eruption has been recorded during the whole history of man. There are

hundreds of these in the world. Many islands in the Pacific and other oceans are the crests or tops of extinct volcanoes. In Britain we have Mount Snowdon as an example.

Active and dormant volcanoes are rather like the safety valves which allow steam to escape from boilers when pressure becomes too high.

The volcano allows high-pressure material to escape from below the earth's surface.

Countless millions of millions of years ago the whole earth was a ball of fire. The outside has now cooled down into a hard crust, but the rocks below the crust are still red hot and molten.

## Struggle for Room

EVERYTHING that is hot expands—it swells and struggles to fill more space. But usually the hard outer crust of the earth is strong enough to prevent this expansion from doing any damage.

Sometimes, however, there are enormous bursts of expansion which develop into explosions.

These explosions are thought to be started by sea water trickling through the earth's crust and reaching a bed of molten rock. The red-hot rock turns the water into steam which expands and sends up hot masses of rock, gas and steam.

Struggling for more room, the molten rock and hot ash (called "lava") finally escapes through

a crack in the earth's surface, and bursts into the air. Cascading to the ground, it piles up around the crack to form a conical-shaped mountain with a hollow top called a "crater." As the lava cools, it becomes hard and solid, and makes a volcanic mountain with a hollow centre called a "funnel" through which more ash and rock continue to be thrown out.

Normally, the amount of material coming up the funnel is not very great and when it flows over the top of the crater it hardens before it can reach the bottom of the mountain, so that the mountain "grows."

Sometimes, however, so much lava is forced up the funnel that the burning mass flows down the mountain-side and into the country beyond, destroying everything in its path.

At other times a volcano may belch lava for some days and then stop. The lava cools and forms a plug in the crater.

Days, or even years, later, pressure again forces lava up the volcano funnel. The rising lava is stopped for a time by the plugged crater, but this only increases the pressure until finally the plug is blown off the crater, and the lava bursts out.

Although there are about four hundred active and dormant volcanoes in the world, it is only occasionally that any of them become active enough to cause damage.



\*\*\*\*\*

# TRAGIC MEN OF THE MOUNTAINS

**O**F all the ancient peoples of the world perhaps the Indians of the South American Andes are the most tragic. They have been overrun and enslaved many times in their long history. The Incas and the Spaniards were their masters in successive centuries, yet these mountain Indians, who are the true people of the Andes, have managed to preserve their ancient culture which remains unchanged to this day.

They live in tiny, isolated populations, cut off from their nearest neighbours by almost impassable mountains. Many centuries of life at an altitude of 13,000 feet have accustomed these people to a hard life. They are able to mine gold, silver, copper and tin high up in the Andes, where most ordinary people find it hard to breathe.

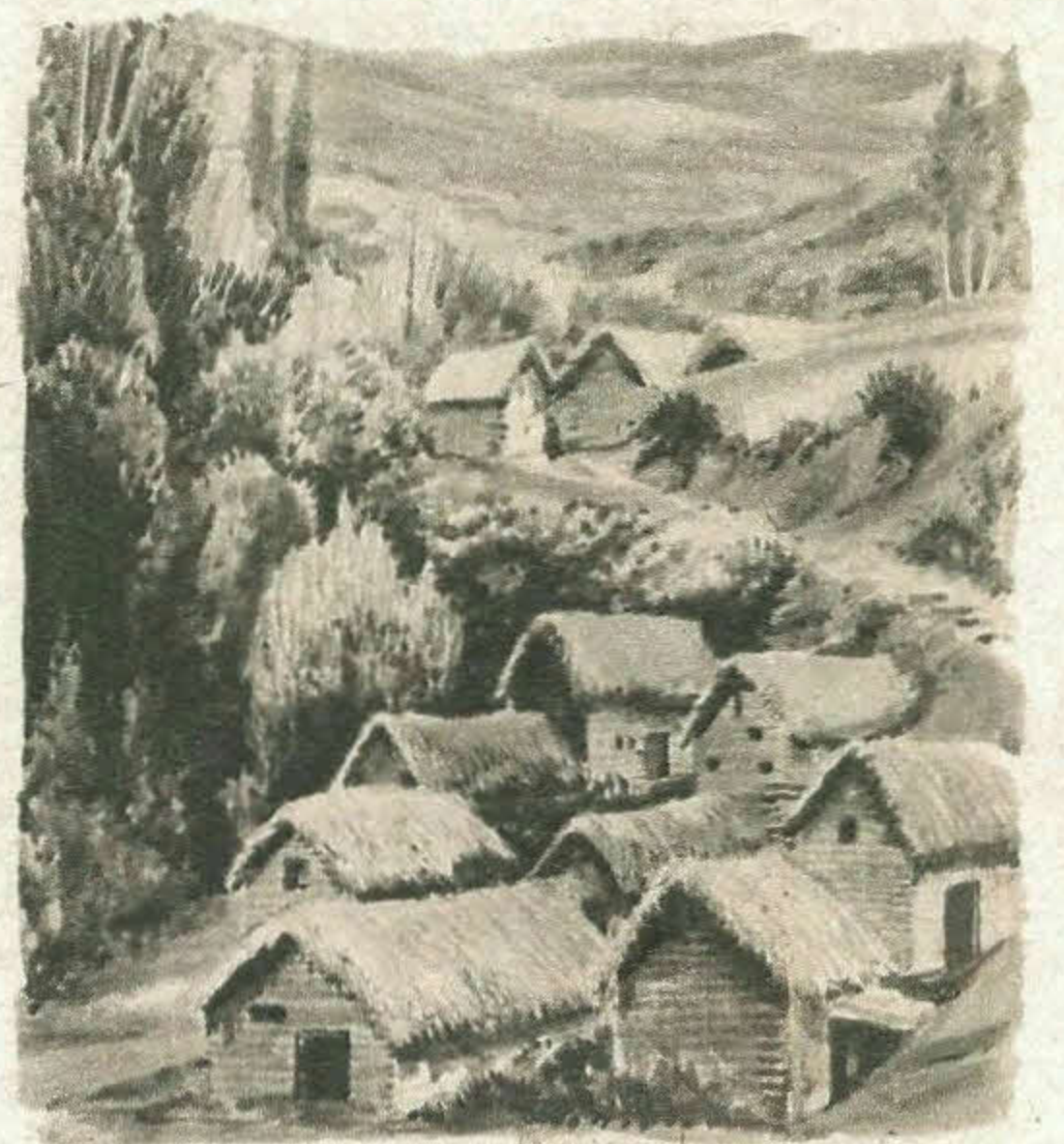
Unlike many mountain communities the Andes Indians are lucky in having both climate and land which is suitable for agriculture.



▲ A festival is a main social rite in the Andes, being a living embodiment of the legends of the people. This is the dance of the Carnival Devil, who represents sin.



The most important person in an Andean village is the Alcade, or leader of the community. He is the man who directs the farming in his village, and the duties of the Alcade have changed little since Inca times.

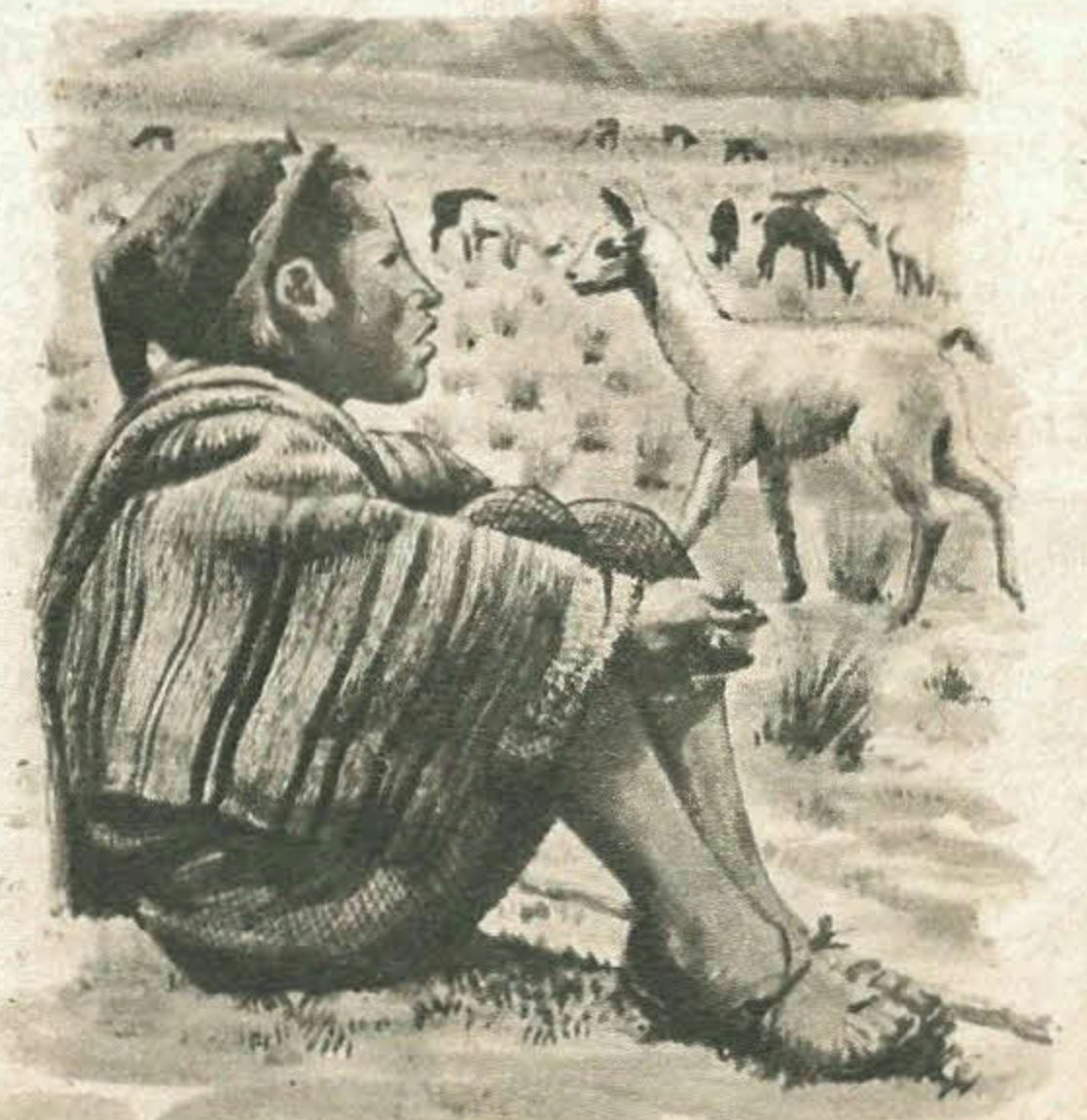


▶ This is a typical peasant community, or *ayul*. The Indians build their houses of unbaked brick and thatch, without chimneys or windows. Their simple diet consists of maize or potatoes, and meat is a rare luxury.



At harvest-time the Indians work in gangs of twenty under mounted overseers. A great estate may include 500 families, who live in their small villages and work their section of land. It is a tradition that Indian women always wear their best clothes and jewellery while harvesting.

▶ From their earliest years Indian children are dressed like their parents. Their main job—an important one—is to watch the llama flock, regardless of wind or rain, for the hardy llama is the chief means of transportation in the mountains.





**WHAT IS:**

**A SHADOW**



A Highlander and his horse cast sharp shadows beside Loch Leck.

LIGHT rays travel in straight lines. When the sun is behind any object, the light rays from it are interrupted, so that in front of the object there is a dark patch where no light rays are falling. This dark patch is the shadow.

If the object between the sun and the ground in front of it is of glass or other transparent material, no shadow will be cast, because light rays can pass through transparent materials.

The length of a shadow on the ground

depends upon the angle of the sun to the earth.

A shadow is shortest at noon because the light rays from the sun are falling at a steep angle as the sun is then overhead, and the rays are interrupted for a shorter time.

As the sun sinks lower and lower towards the horizon when the day draws on, the light rays from the sun fall at a more sloping angle. In this way they are interrupted more and the shadow gets longer.

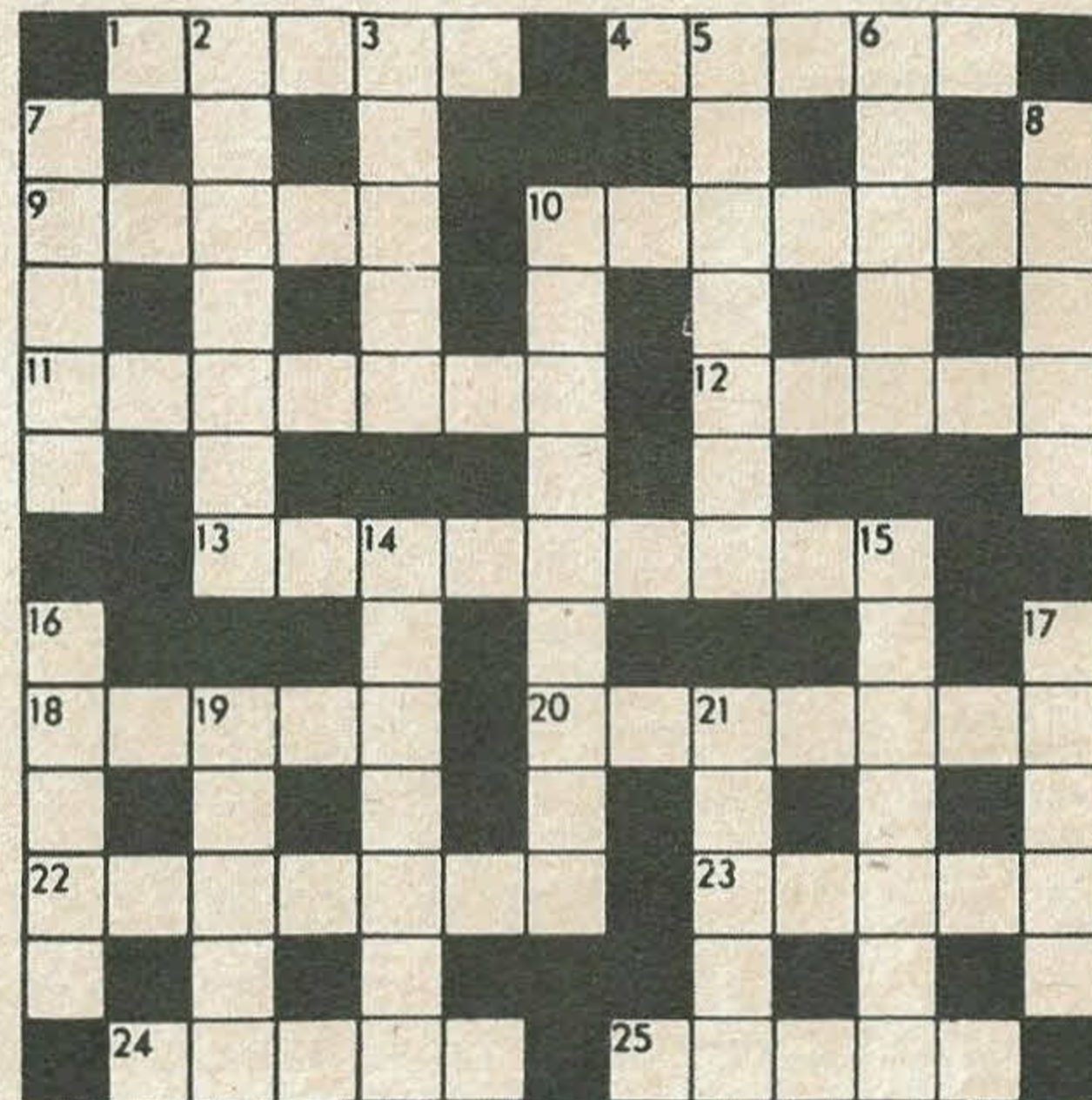
**CROSSWORD**

**CLUES ACROSS**

1. It may be nutmeg, ginger or cinnamon. (5)
4. The iron block used by a blacksmith for hammering red-hot horse-shoes. (5)
9. To pass on a message or picture, using a satellite, perhaps. (5)
10. When we go shopping, money is placed on this. (7)
11. Cromwell defeated Prince Rupert at the battle of — Moor in 1644. (7)
12. Belonging to the countryside. (5)
13. Prime Minister until October, 1963. (9)
18. To do better than anyone else. (5)
20. These Arctic dwellers originated in Greenland. (7)
22. Now is the time to start thinking of that Christmas — for father. (7)
23. Another name for wireless transmission. (5)
24. The most common English surname. (5)
25. A quick meal. (5)

**CLUES DOWN**

2. One of a band that Chaucer describes in *The Canterbury Tales*. (7)
3. There is one underneath St. Paul's Cathedral. (5)
5. What a football referee must be. (7)
6. Another word for "bury." (5)
7. What are tom-toms? (5)
8. To cook meat on a gridiron. (5)
10. A great land-mass, such as Asia. (9)



Solution on page 25

Clue to 4 Across

Clue to 13 Across

Clue to 7 Down



**WHAT MACBETH?**

ONE of Shakespeare's most famous plays is *Macbeth*. It is an action-packed thriller with several murders, ghosts, witches, battles and even a forest which marches up Dunsinane Hill. It is an ideal play for school dramatic societies where the staging of the various events taxes the ingenuity of producers to the utmost.

It is attractive, too, to adult performers, for its long speeches present splendid opportunities for dramatic acting and act as good practice pieces for the greater speeches that abound in other Shakespeare plays.

But just how accurate is it?

Accuracy is something which some people who have enjoyed *Macbeth* have seldom concerned themselves with. For its magnificent dramatic entertainment value has obscured the fact that the central figure, Macbeth, King of Scotland, was an authentic historical person.

Our knowledge about this great king of Scotland, who reigned for 17 years (1040-57) in comparative peace and prosperity, is scarce, and much of the evidence for and against him is derived from later historians who read the earlier writings but formed their own opinions, often prejudiced against him from the start.

**Rightful Heir**

THREE main sources of information may, however, be regarded as relatively reliable. They are the Anglo-Saxon Chronicle, the chronicle of a monk named Florence of Worcester (contemporary), and Prior Andrew Wyntoun's chronicle (fourteenth century).

The first reference to Macbeth in the *Anglo-Saxon Chronicle* is in 1031, when Canute of England visited Scotland to receive the homage of Malcolm II and two lesser northern kings, one of whom was Macbeth. He belonged to the royal family of Scotland and began his career as king of a small dominion called Alban.

Macbeth was first cousin to Duncan I, who ruled Scotland from 1034 to 1040. The law of succession in Scotland at that time was a peculiar one. Sons did not automatically succeed to their fathers' thrones, and for some time the succession passed to and fro between cousins.

Consequently, whilst Duncan had two sons, Malcolm and Donald, custom dictated that Duncan's heir would in the first instance be Macbeth. This simple fact, then, disposes of Shakespeare's story that Macbeth murdered Duncan and dispossessed his sons to usurp the throne, because the throne would have become his in any case. The legend is further disproved by the fact that Duncan was killed in battle at Bothgouanan, near Elgin, in 1040, in an attempt to teach a rebellious noble a sharp lesson. There is an entry in the register of St. Andrew's which reads: *Doncath interfectus est in Bothgouanan* (Duncan was killed at Bothgouanan).

**Off to Rome**

ONCE it is seen that the first crime attributed to Macbeth is untrue, the succeeding crimes and faults immediately come under suspicion. Ignoring at this point the murders of Banquo and of Macduff's wife and children (assuming, that is, that they existed beyond the imagination of Shakespeare), it may be deduced from the play that Macbeth was a rather dreadful tyrant. This justifies the culminating event of the play, the defeat and death of Macbeth in battle at Dunsinane Hill.

**WHAT REALLY HAPPENED? HE NEVER MURDERED ANYONE!**

*Shakespeare was cruelly unkind to this great king. For during Macbeth's untroubled 17-year reign, Scotland prospered at home and abroad as never before.*

But when we look more closely at the evidence we begin to see a very different story.

Florence of Worcester may not have been born during Macbeth's reign, but it cannot have been much later, to judge from the date of his death (A.D. 1118). He reports that Macbeth was sufficiently free from national worries in Scotland to make a pilgrimage to Rome in 1050, where he distributed silver to the poor. A journey of this kind took many months in those days, a period of time hardly convenient for absence if his country was racked by tyrannous rule.

Wyntoun states that Macbeth pursued a vigorous campaign against highway robbers with considerable success. He adds:

*And seventeen winters full he reigned as king he was then in Scotland. All his time was great plenty, abounding both in land and sea. He was in justice right lawful, and still his laws all awful.*

So, even if allowance is made for exaggeration by the chronicler, there still emerges a healthy reputation for Macbeth. Moreover, subsequent



Macbeth, Shakespeare's version: On the stage Lady Macbeth snatches the daggers from her husband's hands after he has murdered the sleeping King Duncan in their castle.

historians who were obviously hostile to Macbeth admit that Scotland prospered under his rule, and some have described the wealth of the country.

There are also examples of his generosity to the Church. He granted the lands of Kirkness to the Culdees of Lochleven, and later gave them more land in Bolgynie.

The test of a strong rule, tempered with benevolence and justice, lies in the fact that no serious outbreaks of rebellion occur and that the people support the ruler when the country is invaded. Macbeth's reign was put to this test in 1054 when Siward, Earl of Northumbria and one of Edward the Confessor's chief nobles, marched against Scotland with a huge army.

**Courageous**

THE reasons for this invasion are not clear. It may have been because Macbeth declined to pay homage to the English king, unlike his fore-runners Malcolm II and Duncan. There was no reason for him to have done so, since Scotland was not a kingdom subject to England, and its internal affairs were considerably more stable than they had been under Macbeth's predecessors. Alternatively, it has been suggested that Macbeth was harbouring political exiles from the English court.

The invasion was launched by land and sea and a great battle was fought at Dunsinane Hill, near Perth, on July 27. Macbeth was technically defeated, but not without having inflicted crippling losses on the English, who retired from the field.

Contrary to Shakespeare's version, Macbeth was not killed. He continued to reign for three more years.

In 1057, Malcolm, son of Duncan and under the influence of the English court, attempted to assert a claim to the throne of Scotland. At Lumphanan, in Aberdeenshire, he met Macbeth in battle. The great king was slain, and the kingdom then fell to the victor. We cannot doubt that Macbeth was courageous to the end.

**A Good Word**

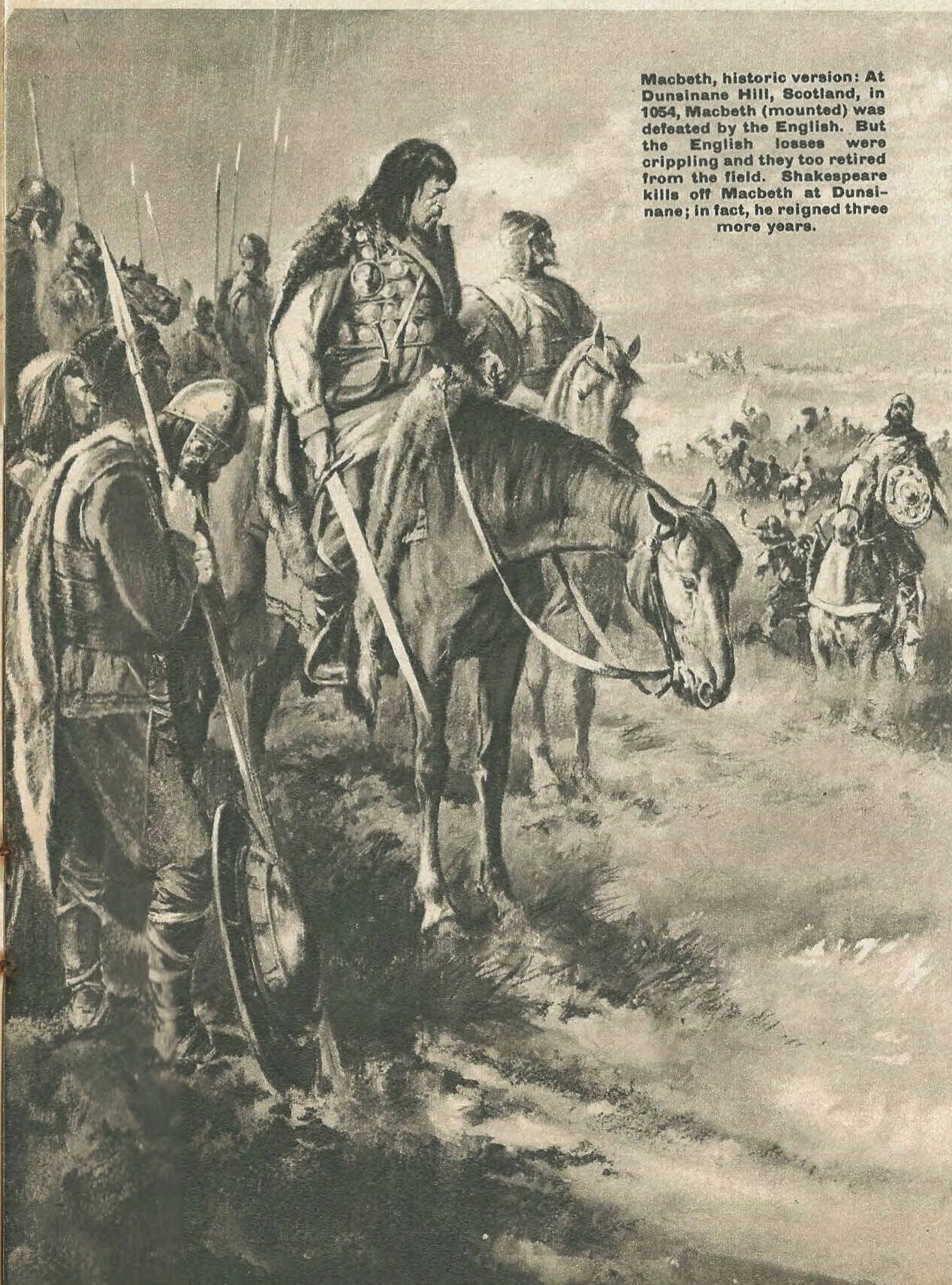
MALCOLM took over a prosperous and orderly kingdom, and began to rule a people that had regained their national pride.

In the 1530s William Stuart collected the different Scottish chronicles and published them in an omnibus volume. He was biased against Macbeth, but could not avoid reproducing this verse from one of the earliest writings:

*Both spear and shield to all churchmen was he, and merchants all that sailed the sea; To husbandmen that laboured upon the ground, A better king in no time might be found.*

In view of the fact that Stewart's volume was available to Shakespeare, it is curious that his portrait of Macbeth took no account of the facts in his favour.

It is even more difficult to understand how subsequent historians also ignored the earliest and most reliable reports, and merely followed the Shakespeare line.



Macbeth, historic version: At Dunsinane Hill, Scotland, in 1054, Macbeth (mounted) was defeated by the English. But the English losses were crippling and they too retired from the field. Shakespeare kills off Macbeth at Dunsinane; in fact, he reigned three more years.





From a Pallas Gallery print size 22 in. x 18 in. Art Institute, Chicago. © S.P.A.D.E.M. Paris 1963.

# The Lady at the Piano

by PIERRE AUGUSTE RENOIR

**P**IERRE AUGUSTE RENOIR (1841-1919) helped to create the French Impressionist technique of painting, a style of art in which light and atmosphere are emphasized, leaving only the vaguest suggestion of form. As an apprentice, Renoir painted porcelain, blinds and fans before entering the studio of a painter named Gleyre in Paris.

He developed a love of rich colour and solid form and a preference for figures rather than landscapes. In later life, when Renoir suffered badly from arthritis, he had his brushes tied to his hands so that, in bold strokes, he could paint beautiful women in bright colours. In his lifetime he produced about 6,000 paintings and 155 lithographs.

**A Picture  
to  
Remember**



# LOOK AND LEARN



## FOCUS on WHAT IT IS LIKE IN SPACE

**F**OR thousands of years men have been looking at the sky and trying to solve the great riddle of what we now call the solar system. And even modern astronomers have not found the answers to all the questions that puzzled our ancestors.

Today we have telescopes that can probe countless millions of miles into space, cameras that photograph stars we cannot see, delicate thermometers able to take the temperature of distant stars, and radio receivers that pick up "signals" from stars so far away that their light died out long before these signals had finished their journey to the earth at a speed of 186,000 miles a second.

Even robot space ships have been sent to some of the planets to collect information about

**CONTINUED ON NEXT PAGE**

**I**N America and Russia spacemen are preparing for a journey to the moon. What kind of a place will they find?

The moon is 2,160 miles in diameter and, as the earth's satellite, revolves round our world at an average distance of 239,000 miles. Most of its surface consists of great dusty plains from which rise mountains and old crater walls. There is no air or water, so there can be no life, and if there were volcanoes the fires have long since died out.

The moon is a dead world, but it affects our living earth by causing the tides.

Where did the moon come from? No one knows for certain, but some astronomers think that it was torn out of the earth, and that the hole it left behind is now the Pacific Ocean.





# FOCUS on WHAT IT IS LIKE IN SPACE

CONTINUED FROM PREVIOUS PAGE

them and radio it back to scientists on earth.

But we still do not know where our world and the other planets came from. In fact, we are not quite sure what the planets would really be like if we could actually land on them.

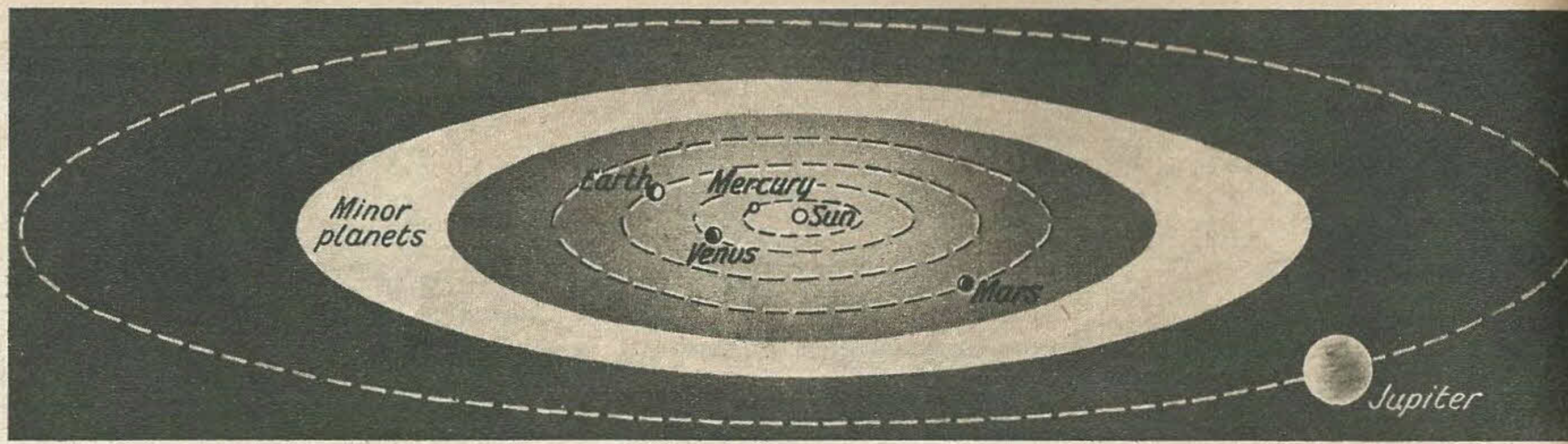
It is true that a great mass of information has been collected by astronomers which gives us some idea of what the planets are made of, what they weigh, and whether or not there may be life on them.

But there is still a great deal more to learn and many problems that must remain unsolved until some intrepid space traveller from earth has actually landed on one of the planets.

What, then, is this mysterious solar system about which we know so much—and yet so little?

Solar comes from a Latin adjective *solaris*, meaning "of the sun." And the solar system consists of the sun and the nine planets, of which our earth is one, that travel around it.

Also included in the solar system is the moon, which is not a planet but is called a satellite



because it travels round the earth. Many of the other planets also have moons or satellites.

Scattered throughout the vast spaces between some of the planets are comparatively tiny bodies which are too small to be called planets or moons and which do not travel in paths like those of planets and moons.

These are called asteroids or planetoids. There are about 1,500 of them and they range in size from a few miles in diameter to the largest, called Ceres, which is 485 miles in diameter.

The sun itself is simply one of the thousands of millions of stars in the universe. It is quite a tiny star as stars go, and not a particularly bright one. But it looks big and bright to us in relation to other stars because it is the one closest to the earth, while all the others are so much farther away.

## Pigmy Sun

**B**y our standards of size and distances on the earth, the sun is very big and very far away. The sun is 864,000 miles in diameter, against the earth's diameter of 7,926 miles, and 93,000,000 miles separate our world from the sun.

But the sun is just a pigmy on our doorstep when we remember that a star such as Betelgeuse has a diameter nearly 300 times that of the sun. It is because it is so far from us, 1,950 million million miles away, that Betel-

geuse appears to an observer on earth only as a pin-point of yellowish-red light.

There are even larger stars than Betelgeuse, some of them 2,500 times bigger than the sun. But they are all so far away that even through the most powerful of telescopes they appear to be just tiny spots of light.

The farthest of the planets, Pluto, is 3,670 million miles away. In relation to the endless distances in outer space, this is not more than a step.

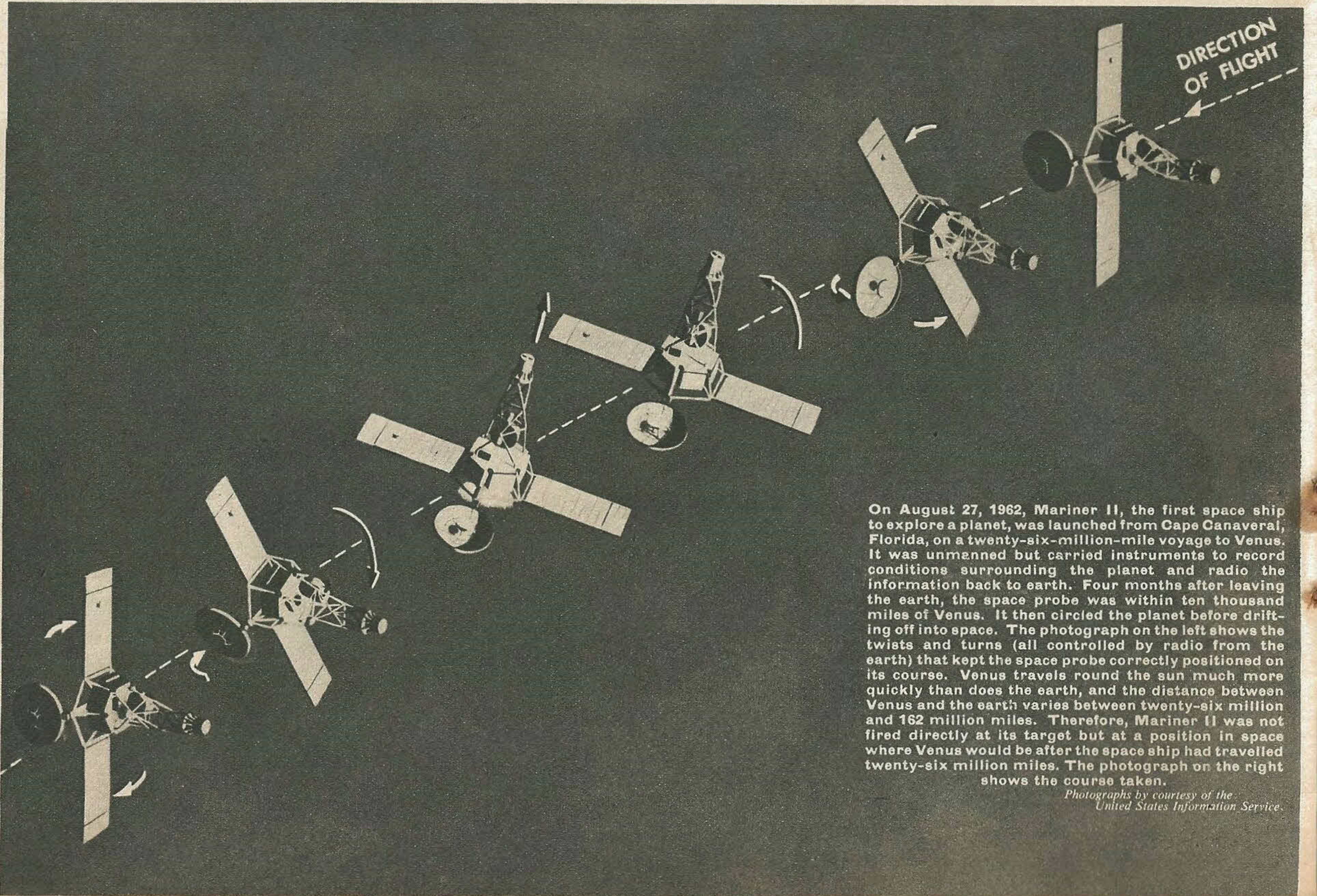
So you see that the sun and the whole solar system are only a speck in the universe.

When men first began to study the night sky, they discovered that there were a few "stars" that behaved quite differently from the other stars. Instead of being fixed like the Pole Star, those of the Plough, and the hundreds of others that twinkled in the sky, these strange stars moved about.

Five of these moving "stars," Mercury, Venus, Mars, Jupiter and Saturn, were known to the ancient Greeks. Because of their unusual movements they called them planets. The word "planet" comes from the Greek *planetes*, meaning a wanderer.

Strictly speaking, however, "planets" or "wanderers" is not a very good name for the planets. Although they do move and are not fixed like the stars, their movements are anything but wandering: they follow fixed paths or orbits round the sun.

Since the days of the ancient Greeks, three



On August 27, 1962, Mariner II, the first space ship to explore a planet, was launched from Cape Canaveral, Florida, on a twenty-six-million-mile voyage to Venus. It was unmanned but carried instruments to record conditions surrounding the planet and radio the information back to earth. Four months after leaving the earth, the space probe was within ten thousand miles of Venus. It then circled the planet before drifting off into space. The photograph on the left shows the twists and turns (all controlled by radio from the earth) that kept the space probe correctly positioned on its course. Venus travels round the sun much more quickly than does the earth, and the distance between Venus and the earth varies between twenty-six million and 162 million miles. Therefore, Mariner II was not fired directly at its target but at a position in space where Venus would be after the space ship had travelled twenty-six million miles. The photograph on the right shows the course taken.

Photographs by courtesy of the United States Information Service.



Mercury, Venus, the Earth and Mars are called the minor planets because they are those nearest to the sun and, with the exception of Pluto, are the smallest. This drawing shows the orbits or paths of the minor planets and their relative distances from the sun. After Mars comes Jupiter, the first of the major planets.

Astronomers collect much of their information about outer space from an instrument called a radio telescope. This consists of a very sensitive type of radio receiver using a huge aerial like that on the right. Certain stars are made up of particles of matter which are constantly moving, and this movement releases radiation in much the same way that a broadcasting station on the earth transmits programmes. These "star broadcasts" are picked up by the radio telescope.

Photograph by courtesy Mullard, Ltd.

more planets, Uranus, Neptune and Pluto, have been discovered. All the nine planets which, of course, include earth, move round the sun from west to east.

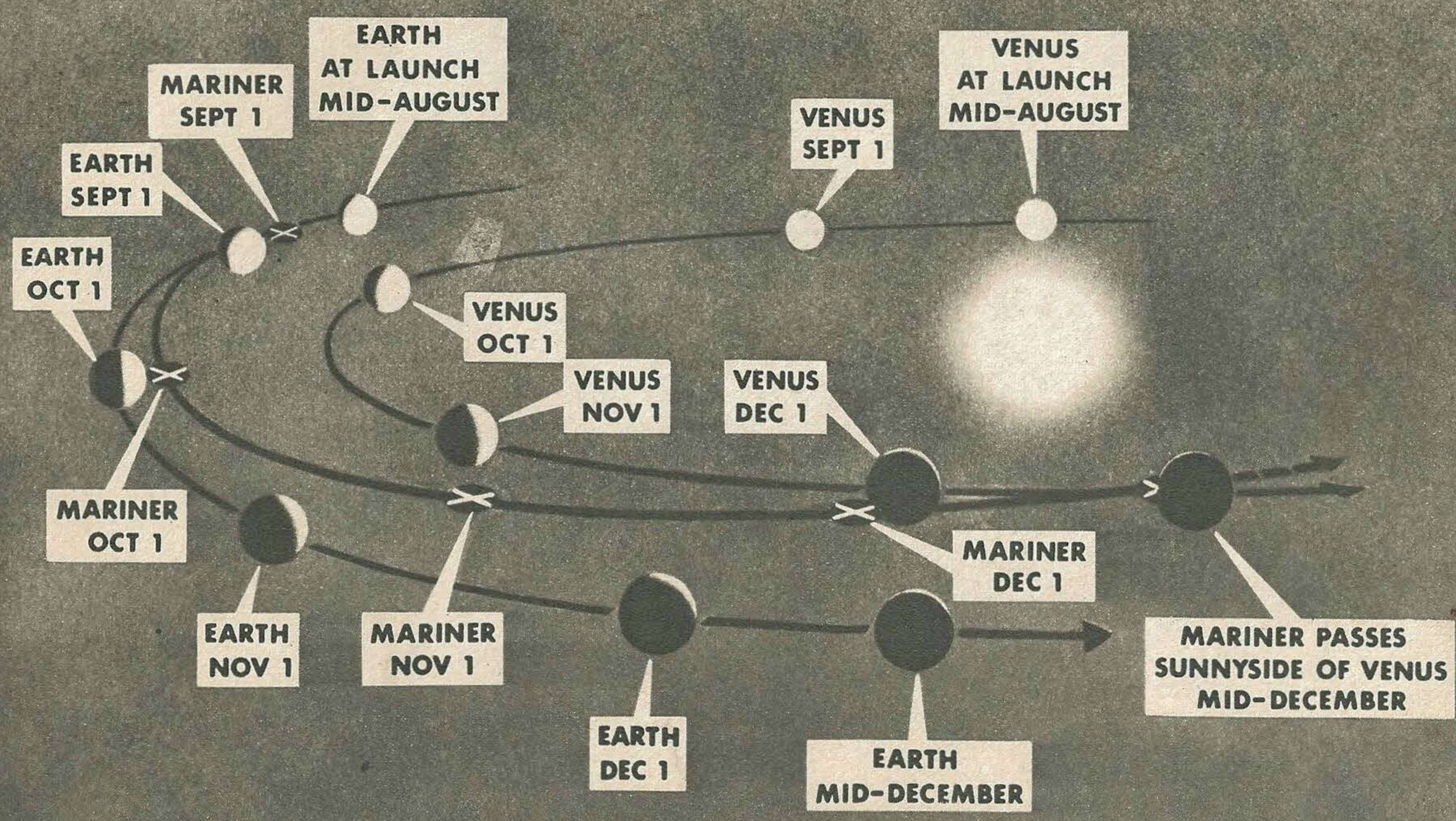
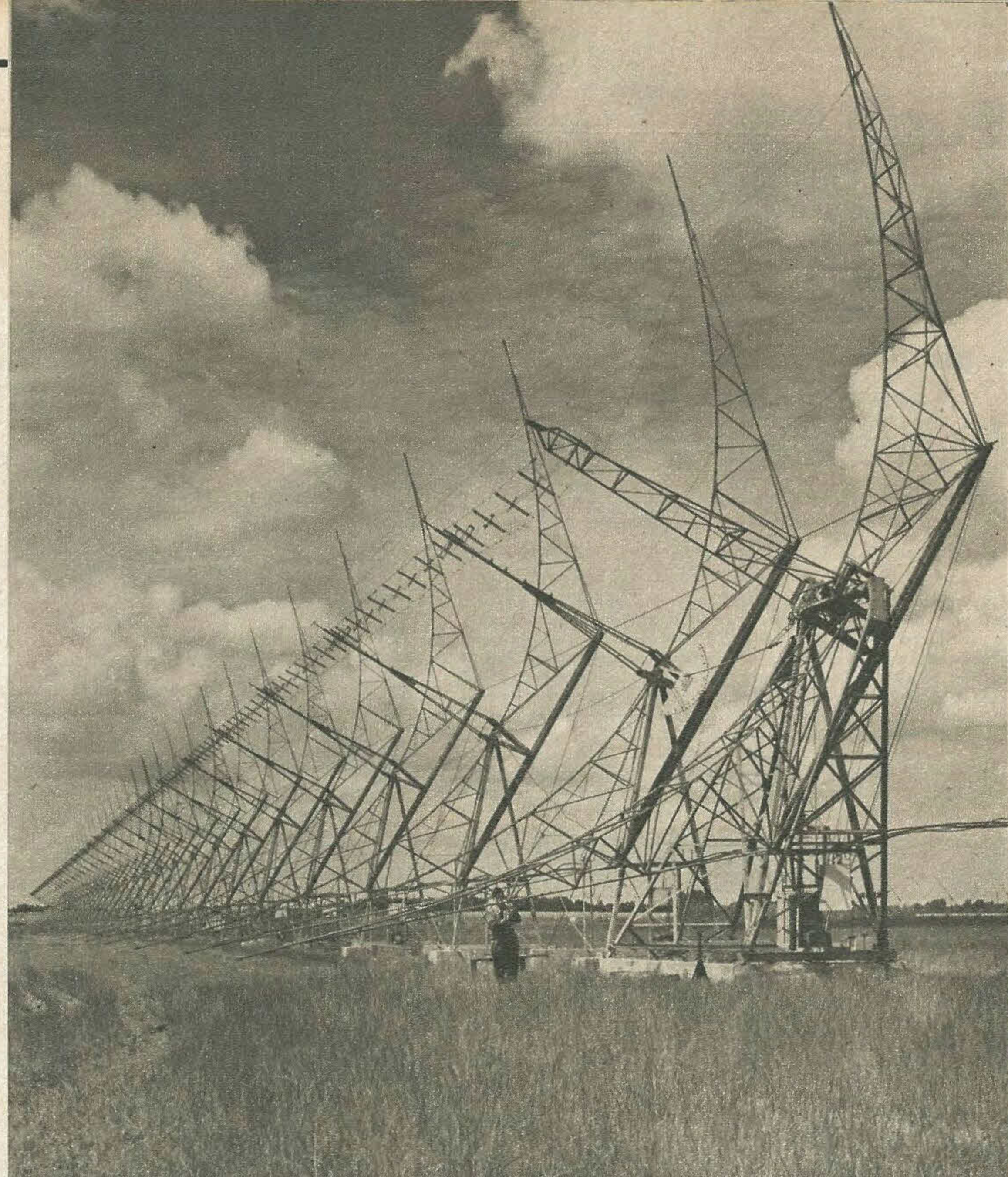
Mercury and Venus are called "inferior" planets because their paths take them between the earth and the sun. The outer planets, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto, are called "superior" planets because their paths carry them beyond that of the earth.

Inferior planets move around the sun much faster than does the earth, while the superior planets move much more slowly. Another interesting thing is that the planets which are nearest to and farthest from the sun are the smallest, while the two middle ones, Jupiter and Saturn, are by far the biggest.

One very important difference between the planets and stars is the light shining from them and which enables them to be seen. Stars make their own light, just as the sun does, because they consist of masses of glowing gases.

On the other hand, the planets have no light of their own. They only reflect the light from the sun, in the same way that the moon shines because it reflects the sun's light.

The planets vary in size from the smallest, Mercury, which is 3,000 miles in diameter, to Jupiter, the giant of the Solar System, which is 88,700 miles in diameter. This is about eleven times the diameter of the earth. Jupiter is such a monster that all the other eight planets could be contained inside it.



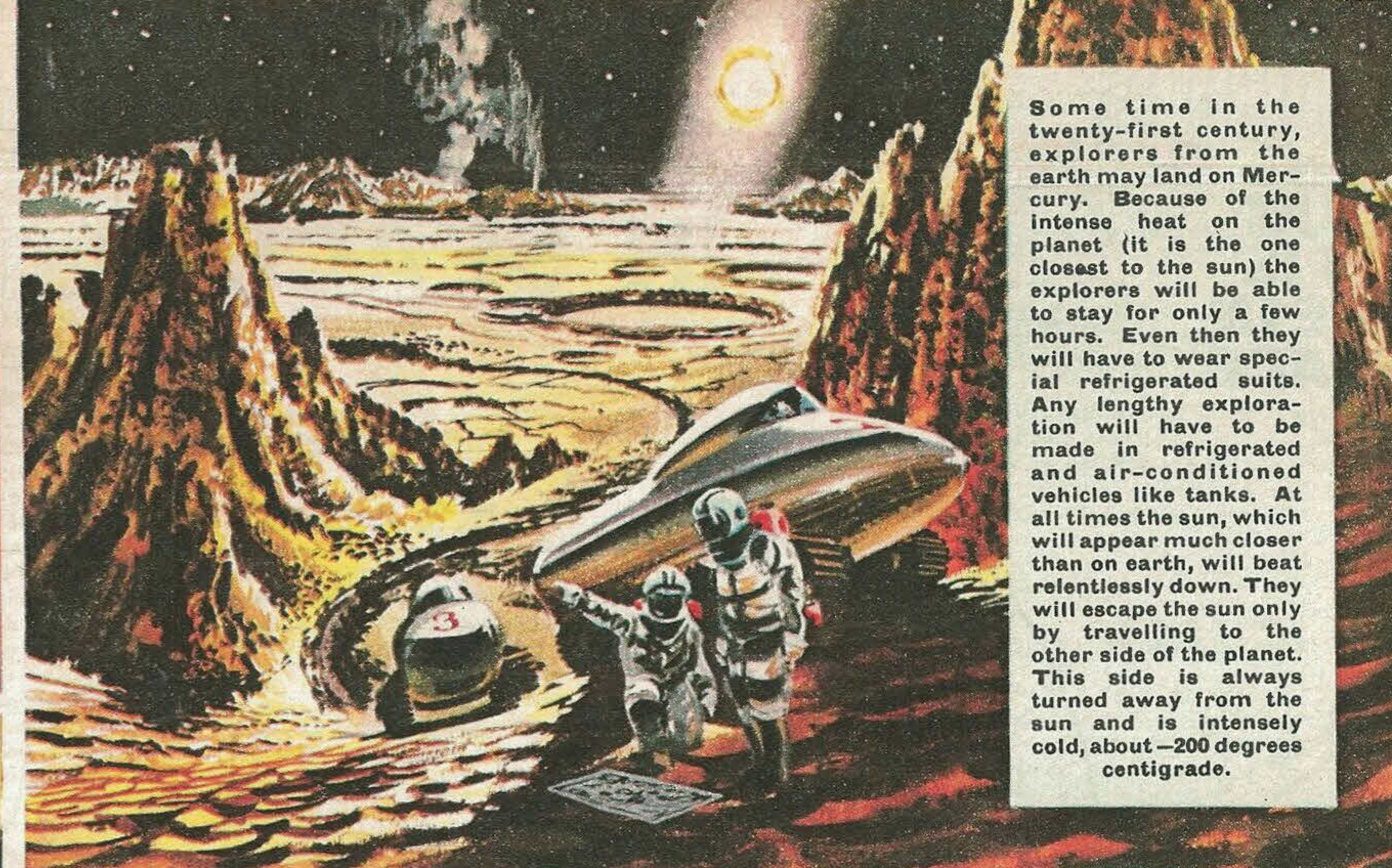


# LOOK AND LEARN

## Focus on *THE SOLAR SYSTEM* JOURNEY INTO SPACE

Will man ever reach the planets? If he does, these are the kind of sights that the first explorers may see

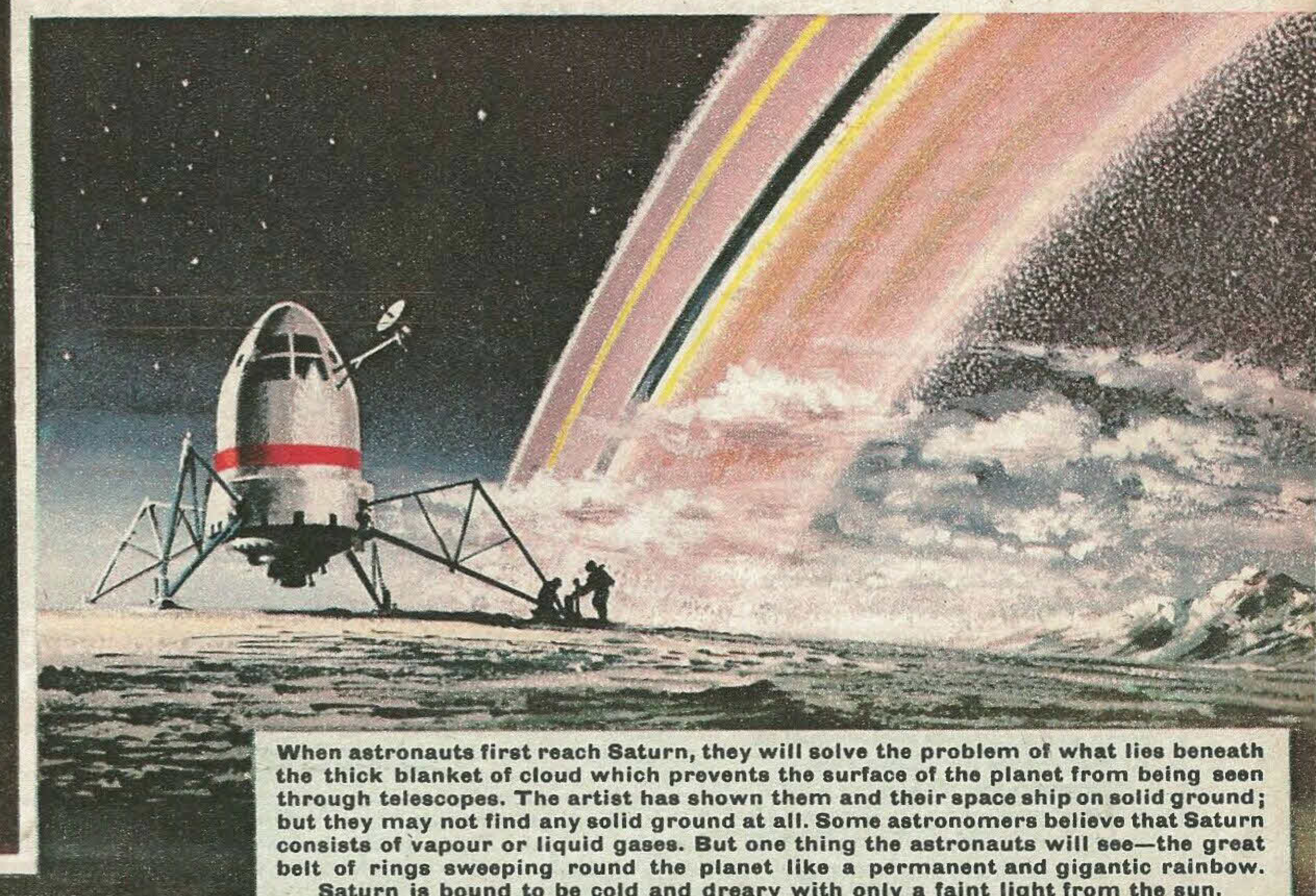
Although the moon is a satellite, not a planet, it will be the astronauts' springboard to planetary travel. Safely landed after a journey of 240,000 miles through space, astronauts have left their capsules to explore the lifeless surface of the moon. Their space ship stands beside a moon crater. The eerie light is sunlight reflected from the earth just rising behind the lunar mountains. Because the moon is so close to us we know a great deal about its surface and other conditions. But when men venture farther into space they will really explore the unknown. On the opposite page we have an artist's impressions of what astronauts may find.



Some time in the twenty-first century, explorers from the earth may land on Mercury. Because of the intense heat on the planet (it is the one closest to the sun) the explorers will be able to stay for only a few hours. Even then they will have to wear special refrigerated suits. Any lengthy exploration will have to be made in refrigerated and air-conditioned vehicles like tanks. At all times the sun, which will appear much closer than on earth, will beat relentlessly down. They will escape the sun only by travelling to the other side of the planet. This side is always turned away from the sun and is intensely cold, about -200 degrees centigrade.



This is what a space craft might look like flying through the great clouds of gas that surround Jupiter—484 million miles away from the earth. The clouds are constantly swirling and seething so that astronauts would be flying blind. A number of manned or unmanned "probes" will have to be made before any men can venture on to the planet itself. Very little is known about its surface.



When astronauts first reach Saturn, they will solve the problem of what lies beneath the thick blanket of cloud which prevents the surface of the planet from being seen through telescopes. The artist has shown them and their space ship on solid ground; but they may not find any solid ground at all. Some astronomers believe that Saturn consists of vapour or liquid gases. But one thing the astronauts will see—the great belt of rings sweeping round the planet like a permanent and gigantic rainbow. Saturn is bound to be cold and dreary with only a faint light from the sun.



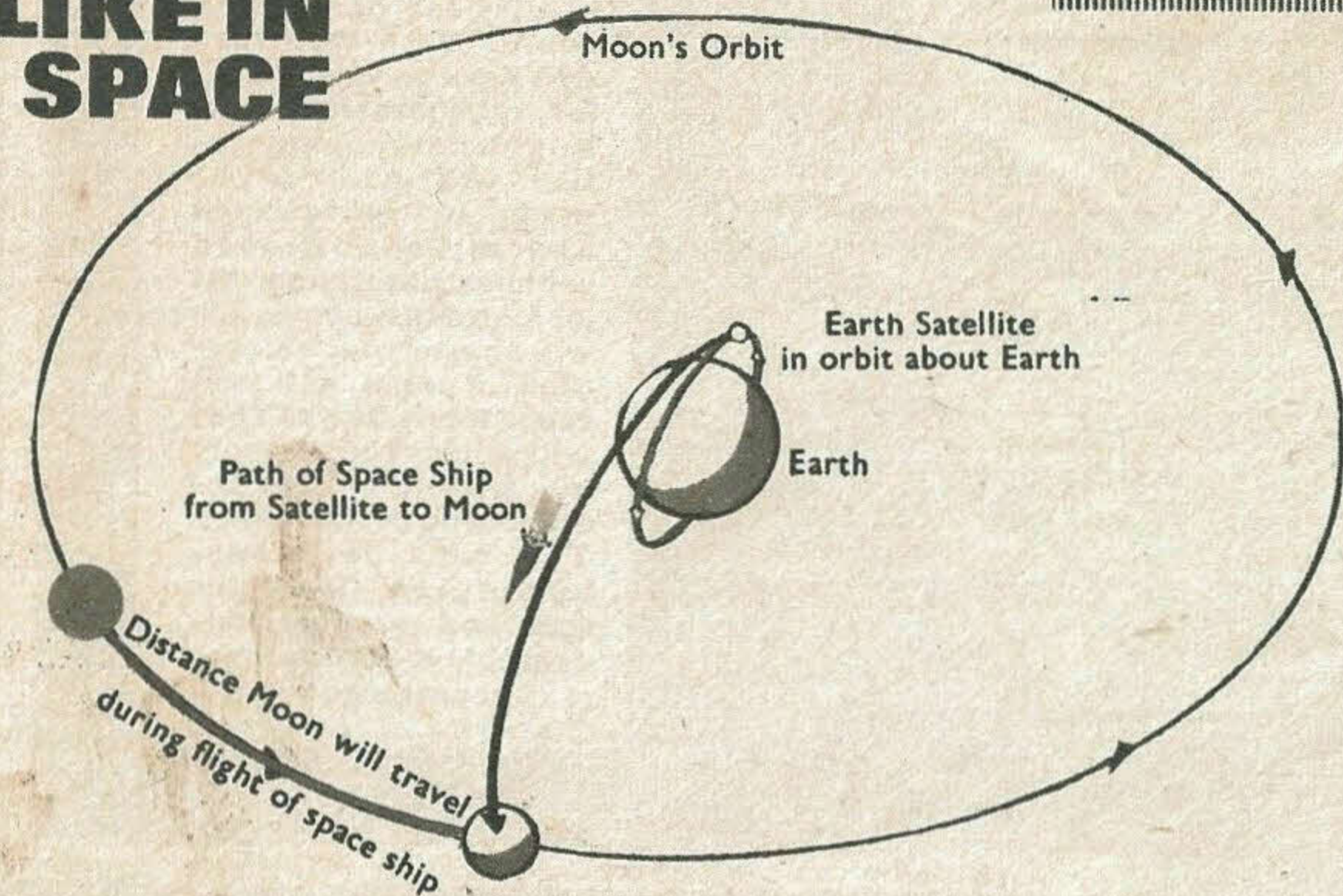
Mars will probably be the first planet to be visited by man. When nearest to the earth in its orbit it is only 35 million miles away and it is the only planet whose surface can be studied from the earth through telescopes. We already know that it is very much like the Earth and may have some primitive form of plant life. It may also have a thin atmosphere, so that explorers can wear a simple type of breathing mask. They may also find some water, but it will not be in the so-called "canals."



# FOCUS

on  
WHAT  
IT IS  
LIKE IN  
SPACE

## A MERRY-GO-ROUND IN SPACE



Seen from the earth, the moon seems quite a large target; but it is nearly 240,000 miles away—and moving. So the navigator of a space ship bound for the moon would not travel in a straight line. If he did he would miss his destination by several hundreds of miles. Thus the space ship would have to follow a curved course to reach that point in space where the moon would be several hours after the space ship left the earth.

**W**HY do the planets continue their endless journeys round the sun? Why do they not travel in a straight line to be lost in the vastness of space?

The answer to these questions is gravity and centrifugal force.

Every object in the sky exerts on other objects, or other objects exert on it, a pulling force called gravity.

The strength of an object's gravity, or power of pulling anything towards it, depends upon the size of the object and, much more important, its density. Density is the amount and kind of material from which an object is made.

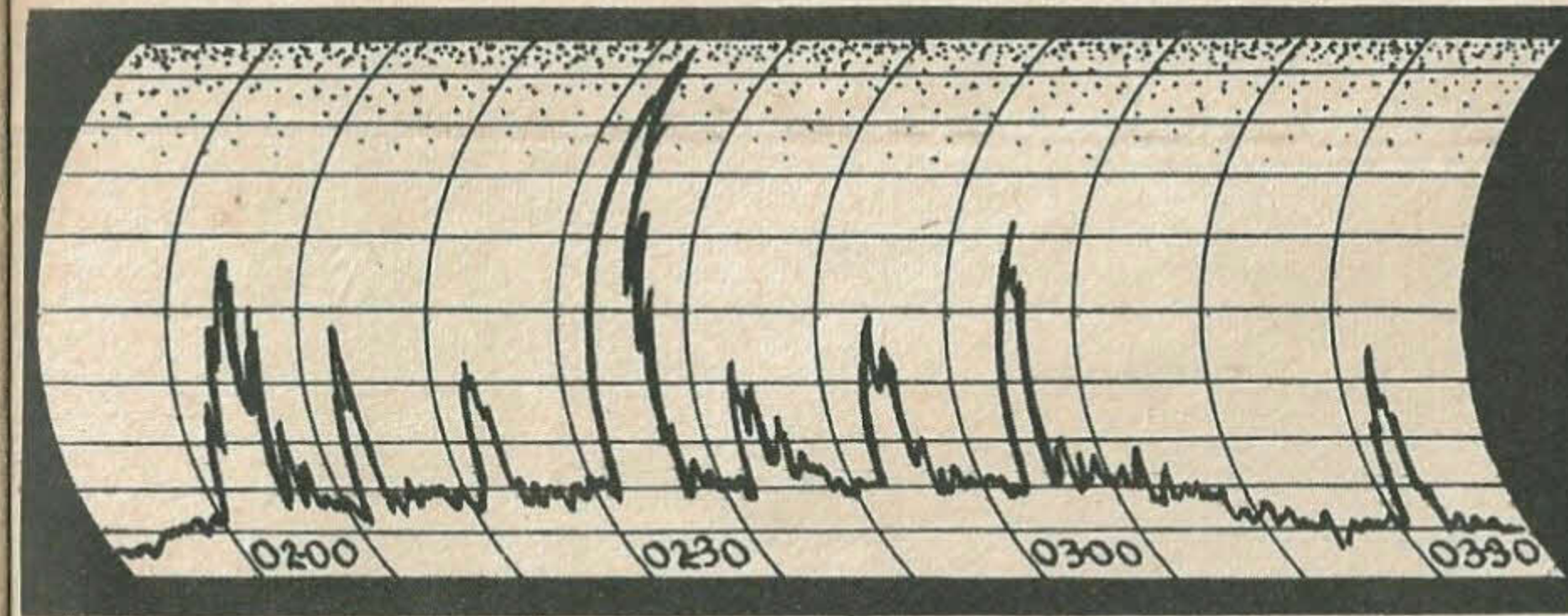
We get an example of gravity every time we throw a stone.

The stone always falls back to earth. That is because the earth is much bigger, heavier and denser than the stone.

All the members of the solar system, from the sun to the smallest of the planets, have gravity.

The sun has the strongest pull on gravity of any object in the solar system because of its vast size.

Although the sun is made up of gases, which are much lighter than the rock which makes up the earth and is therefore less dense, there



The photograph on page 3 showed you the aerial of one of the radio telescopes used by astronomers to probe the secrets of space. The radio information received is converted into electrical impulses which move a pen across squared paper. Here is a picture of the signals broadcast by a star thousands of miles away. The figures at the bottom are the times when the signals were received.

is such a vast amount of gas making up the sun that it is actually many times heavier than the earth. The sun is 864,000 miles in diameter, and its mass, or amount of material in it, is 750,000 times greater than that of the earth.

The sun, therefore, exerts a tremendous gravity pull on the planets. It is so big that if all the nine planets with their moons and satellites were brought together they would fit quite comfortably into a small bit of the sun.

You may now wonder why, if the sun has this tremendous pulling power of gravity, it does not drag our earth and the other planets towards it so that they crash on to its blazing surface.

That is exactly what would happen if the planets were standing still and not travelling in nearly circular paths round the sun. And they travel along these paths at a tremendous speed. This speed partly overcomes the effect of the sun's enormous gravity or force that otherwise would pull the planets into it.

You can quite easily prove for yourself how speed overcomes gravity.

Lie on your back on the ground and swing around you a stone attached to a length of string. As long as you continue to swing the stone on its string, the stone continues travelling round and round you in a complete circle.

But if you let go of the string, the stone at

once shoots off for a short distance and then falls to the ground. It has been pulled there by the gravity of the earth.

In this example, your body was the force of gravity of the sun, the stone was a planet, and the piece of string was the pulling power of gravity.

While the stone was swinging round on its piece of string, it was developing what scientists call centrifugal force. Centrifugal force is just another way of saying travelling in a circle at high speed.

But when you let go of the string, centrifugal force was ended and gravity took over. Exactly the same thing would happen to the planets if they stopped moving. The invisible strings controlling their movement round the sun would be snapped and they would fall on to the sun, just as the stone fell to the ground when you let go of the string.

### Planet Momentum

**T**HE reason why the planets keep moving round the sun without stopping is much too complicated to explain here, and would take up far too much space. It is enough to know that they started whirling round the sun when they were first formed and have continued doing so because of a force called momentum.

The momentum that keeps the planets spinning is the same thing as the momentum that keeps a top spinning.

Here is an example that may help to explain what momentum is.

Get an ordinary peg top and on its side mark a dot with a pencil. This dot represents one of the planets while the exact centre of the top represents the sun.

Now start the top spinning. As the top turns round and round so the dot turns round and round. Then gradually the top slows down and with it the speed at which the dot turns.

The dot started moving round because when you pulled away the string you had wound round it you gave the top momentum. But as there is no such thing as perpetual motion, that is motion that never stops, the momentum gradually died down.

Exactly the same thing is happening to the momentum that keeps the planets moving round the sun. Their momentum, and therefore their speed, is gradually becoming less and eventually they will stop spinning round the sun.

But the speeds of the planets and their distances from the sun are so vast that in comparison with any spinning object we can imagine on the earth, the loss of momentum is unbelievably slow.

Another thing that will puzzle you is why the planets do not follow each other in a procession round the sun in the same way that a troupe of performing elephants walk trunk-to-tail round a circus ring.

### Size and Density

**T**HE reason for the planets revolving or orbiting at different distances from the sun is because they are not all of the same size and density.

The heavier or denser a planet is, the greater the effect of the sun's gravity upon it, therefore the closer it will be to the sun. Mercury, Venus, and the Earth are of much denser or heavier material than the very distant planets, so that they are closer to the sun.

Then because they are more under the influence of the sun's gravity, they must travel faster to develop enough centrifugal force to overcome the sun's gravity.

Mercury, which is the closest of all the planets to the sun, travels round its parent once every 88 days, but Pluto, which is the farthest planet from the sun and the one on which the sun's gravity has the least effect, takes 248 years to make one journey round the sun.

As you will see from the drawing on page 2, the planets do not move round the sun in perfect circles. Instead, the path of a planet is elliptical, that is, oval or egg-shaped.

This is because the planets themselves have gravity, and their gravity affects each other. There is a certain amount of pull by one planet on another so that at certain points on its journey one planet's gravity will pull more strongly on another planet.

As a result, the planet that is being pulled is attracted for a time from what otherwise would be a circular path or orbit.

## THE SUN AND ITS FAMILY OF NINE PLANETS

### OUR VERY OWN STAR

**H**EART and centre of the solar system is the sun.

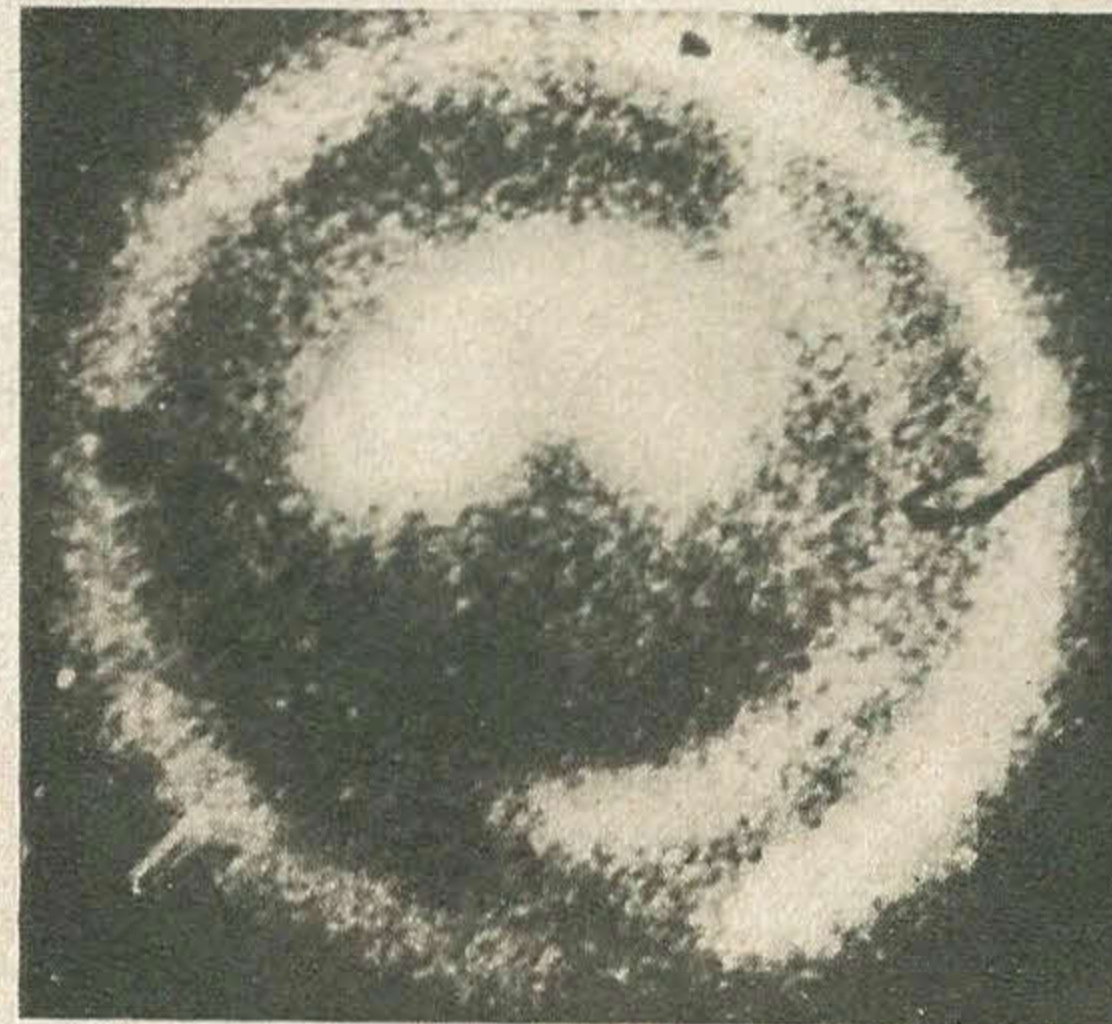
If the sun disappeared, the solar system would break up and the planets fly off into space, because it is the gravity or pulling power of the sun that keeps the planets travelling round it in orbit.

Because the sun is on our doorstep, only between 91 and 94 million miles away, we know more about it than we do about any other star. We know that its diameter is 865,600 miles—nearly 109 times that of the earth.

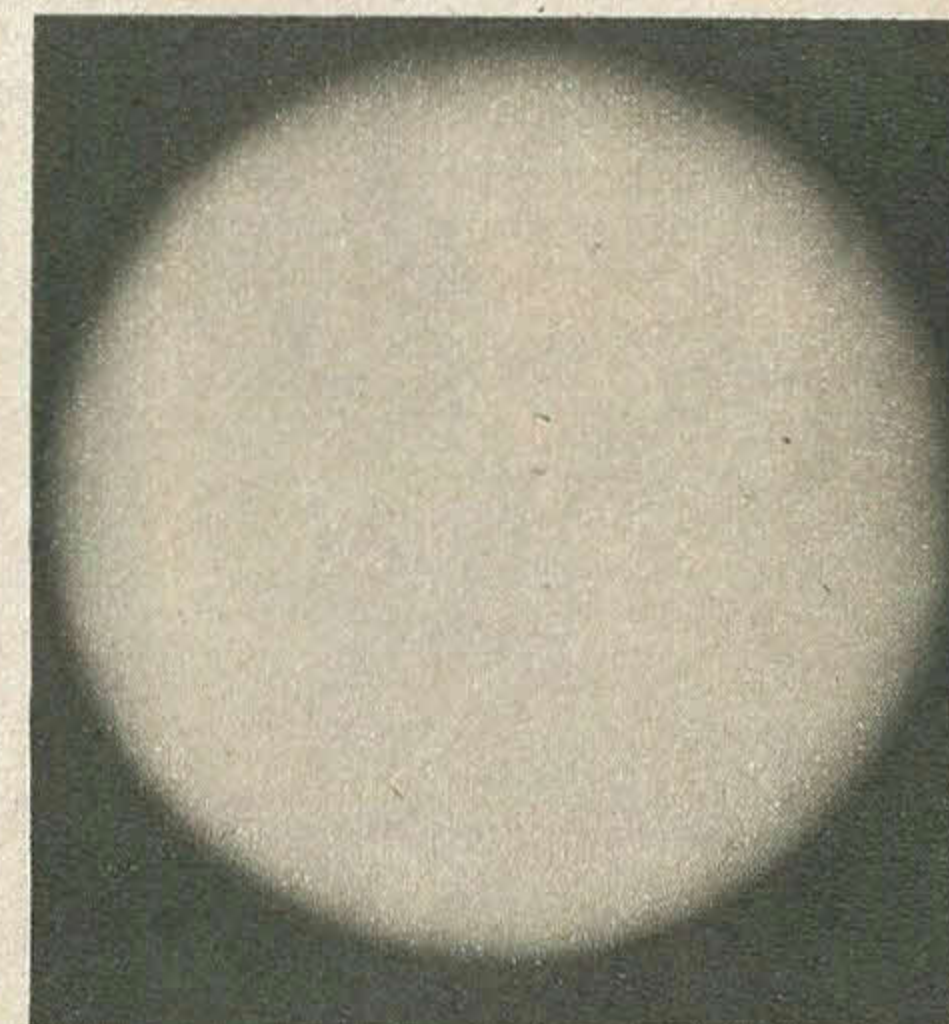
We also know that the sun is a large mass of glowing gases, one of the chief being hydrogen. The temperature of this vast furnace is 4,000 degrees centigrade at the surface and 18 million degrees centigrade at its centre.

There is so much of the gas that its own weight presses it together at the centre of the sun with a force equal to six million tons per square inch.

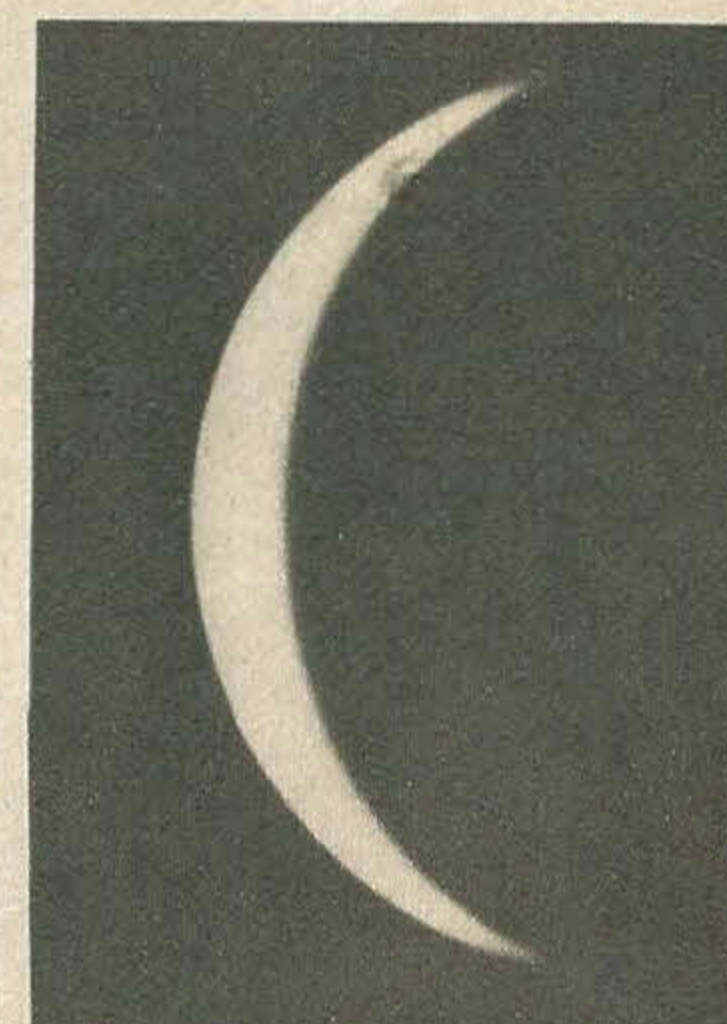
This means that the sun has what is called a great mass, or amount of material—333,420 times greater than the mass of the earth.



When seen from the earth, the sun appears as a round red or yellow disc with smooth edges. Actually, the sun is divided into three circular parts or sections, but these are only seen clearly when the sun is photographed beyond the earth's atmosphere. First comes the bright central disc called the photosphere. This is surrounded by the chromosphere, round which is the corona—greater streamers of gas sweeping hundreds of thousands of miles into space. This picture of the sun was taken by a camera in a rocket 130 miles above the earth.



Only 3,100 miles in diameter, less than half that of the earth, Mercury is the smallest of the planets and the nearest to the sun: 36 million miles at its greatest distance. It is quite close to the earth: 57 million miles at its nearest. It has a rocky surface like that of the moon, no atmosphere, and the side facing the sun has a temperature four times greater than that of boiling water. The planet's closeness to the sun makes careful observation of its surface very difficult.



Although Venus is the planet that comes closest to the earth, 26 million miles away at its closest, it is the one we know least about. It is surrounded by great masses of cloud through which telescopes cannot penetrate. What we can see of Venus has a diameter of about 7,575 miles. Its surface may be like that of the earth, and there may be some air and water.

## AND THEIR SATELLITES



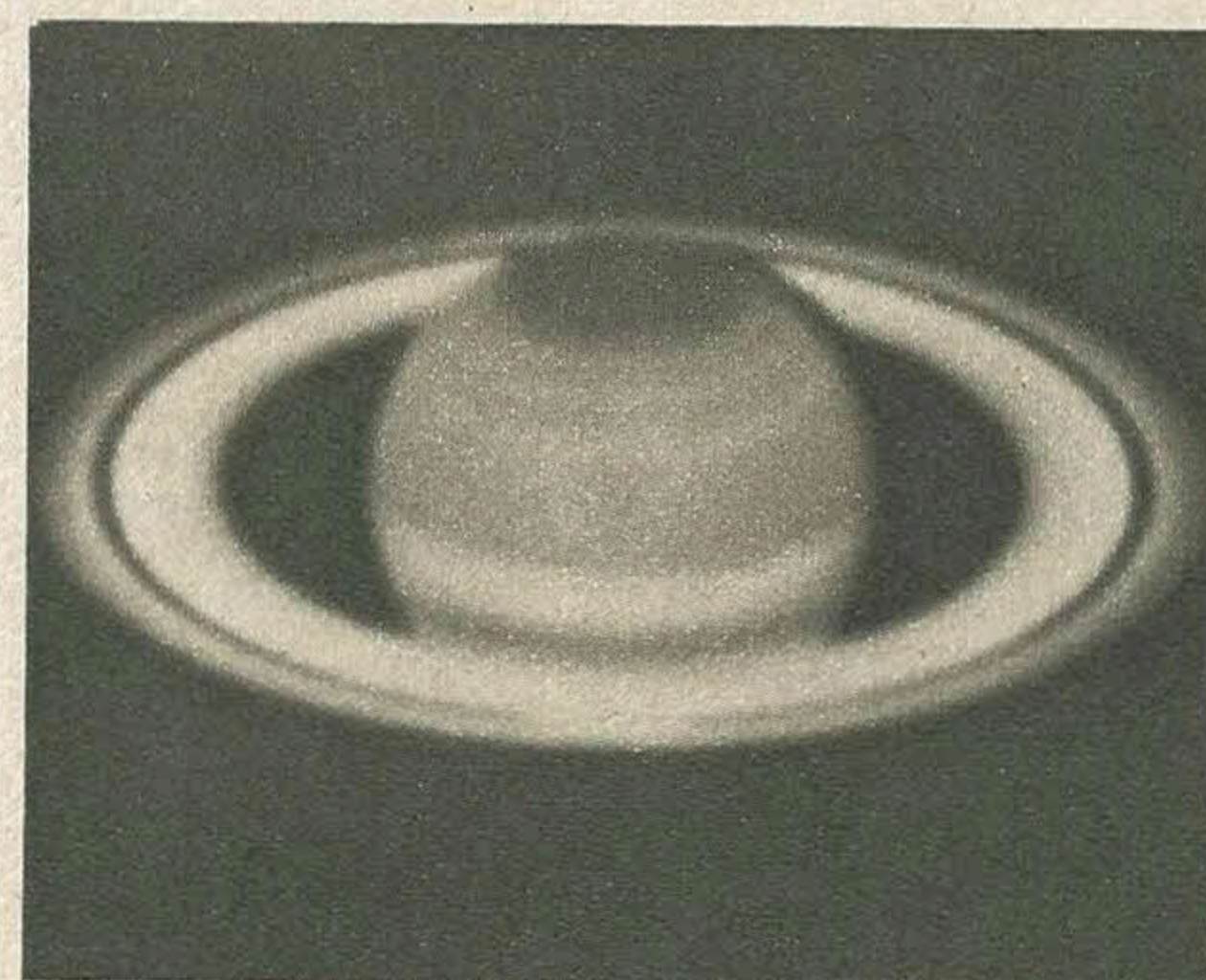
This photograph of the earth was taken from a rocket at a height of about 200 miles and shows that the earth is shaped just like any other of the planets. Third in order of distance from the sun, the earth is one of the smaller planets. But it is most important in the solar system because it is the only one on which life as we know it can exist. It supports our life because of its average distance from the sun, 92 million miles. It is not near enough to the sun to be too hot, like Mercury, and it is not far enough away to be too cold, like Pluto. Above all, it has an atmosphere. Not only does this atmosphere enable us to breathe, but it acts as a "firescreen" to protect us from too much sun.



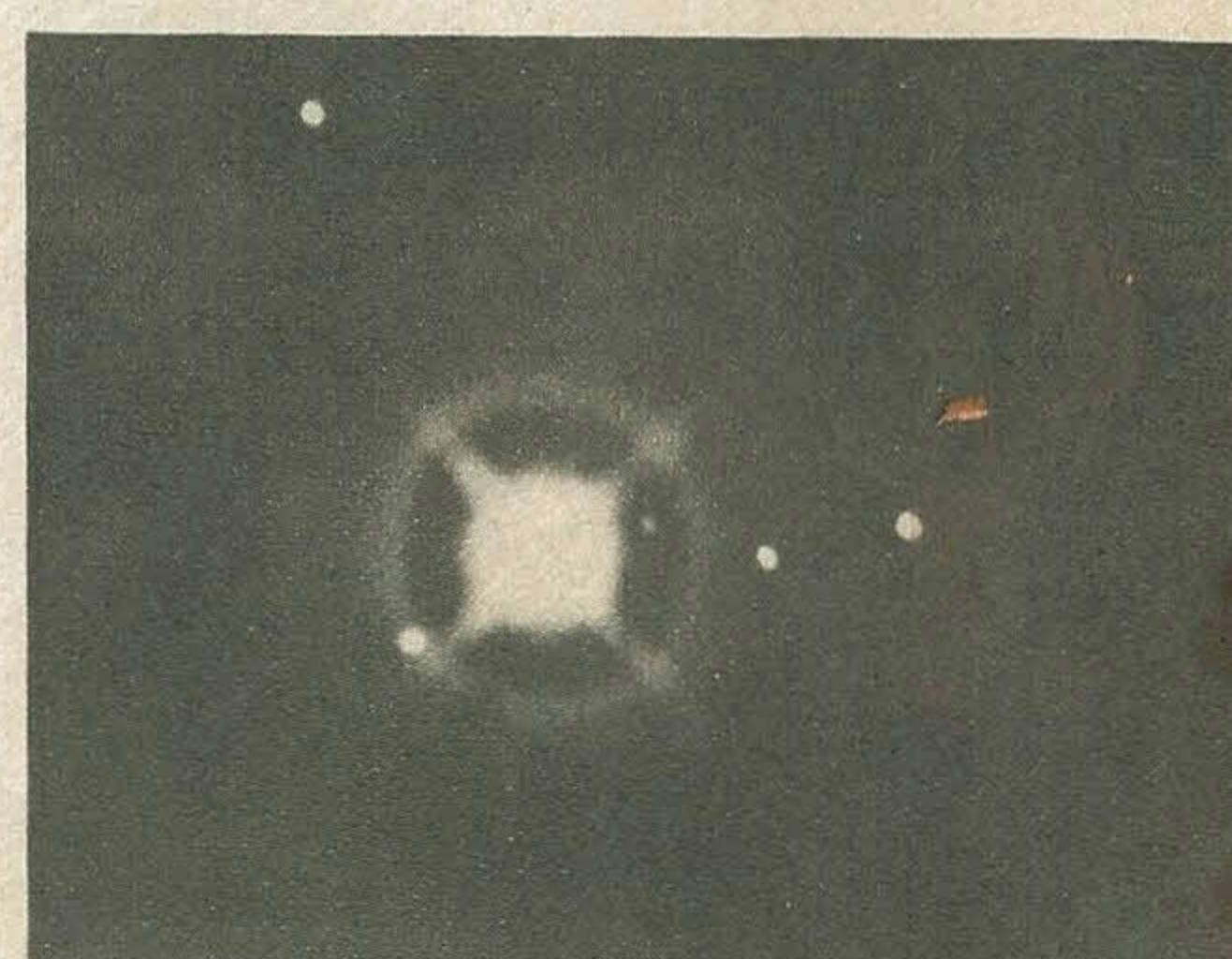
At its closest to the earth Mars is 35 million miles away. It is 4,215 miles in diameter and its surface is very like that of the earth. It is thought to have some water and a small breathable atmosphere. There may even be some form of plant life. But there is no race of super men on the planet able to build giant canals. The so-called canals are natural ravines or valleys. Mars has two moons, the largest ten miles in diameter.



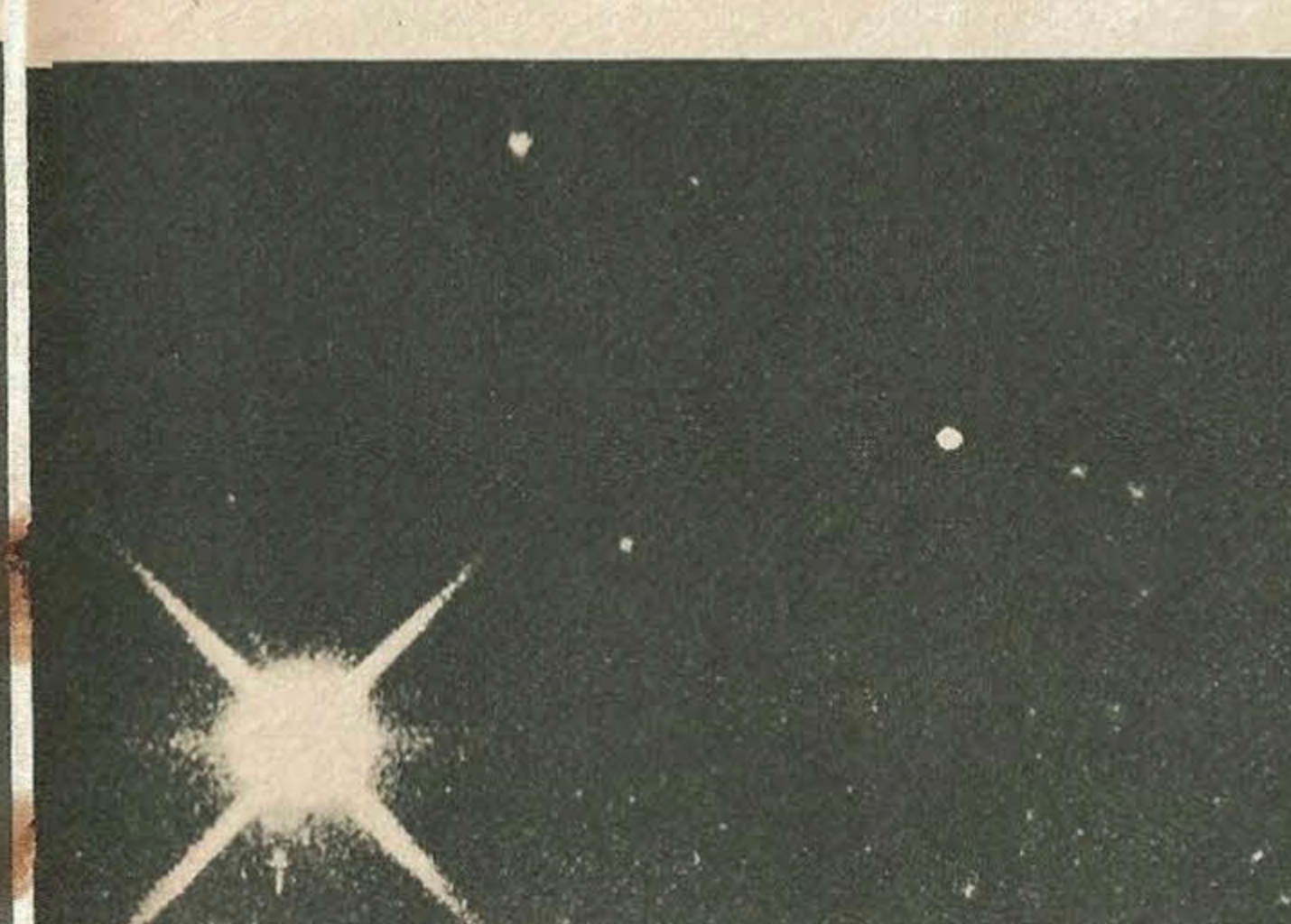
Fifth in order of distance from the sun, Jupiter is the giant of the planets. It is 88,700 miles in diameter and at its nearest to us is 390 million miles away. It probably consists of a mass of gases surrounding a comparatively small solid core. Its cloud blanket is encircled by a series of coloured rings. There is also on the cloud surface a red spot, 30,000 miles long and 8,000 miles wide. Jupiter has twelve moons: the largest is bigger than our moon. Most of them are of rock, but one may be ice.



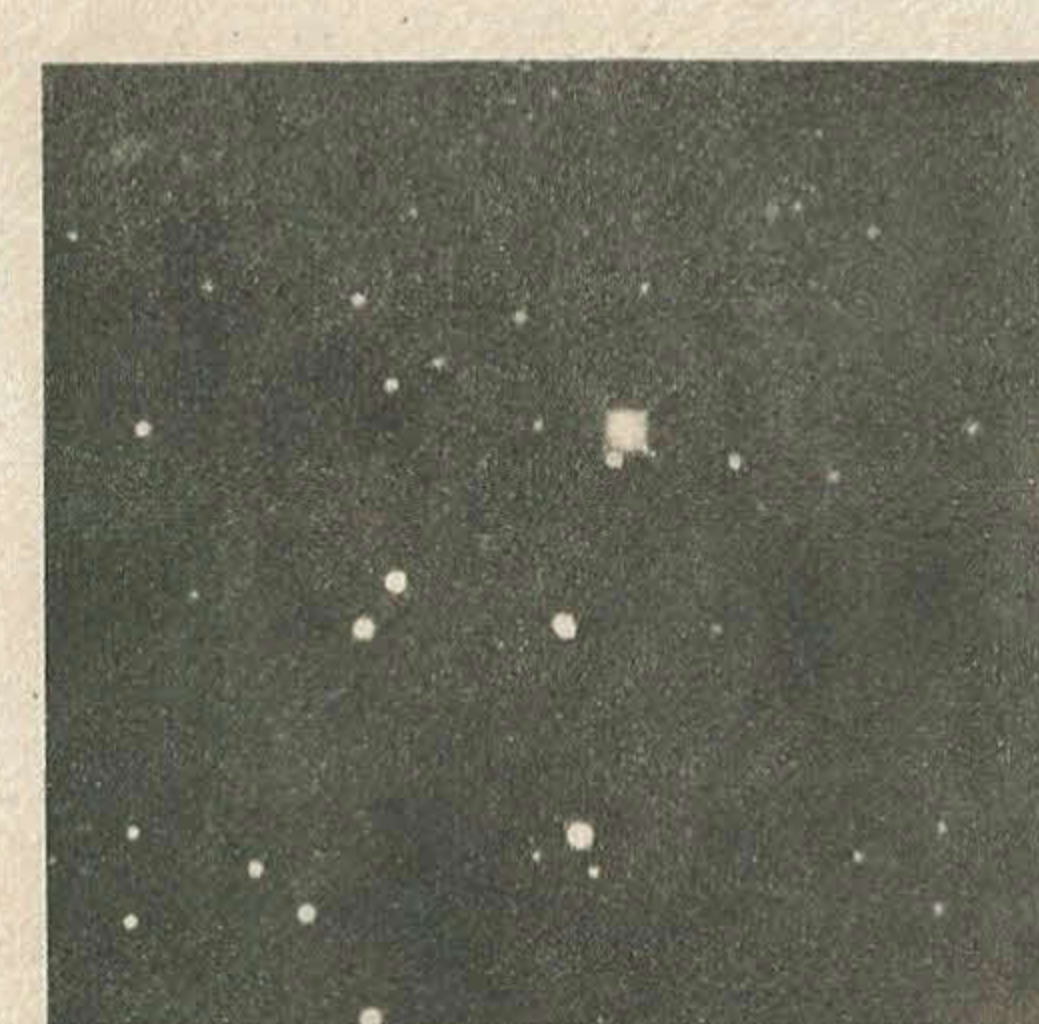
Saturn is the most magnificent planet in the solar system. But as its nearest distance from us is 1,028 million miles its glory can be seen only through a powerful telescope. Saturn is 67,000 miles in diameter and its average distance from the sun is 887 million miles. The planet is surrounded by three rings. The outer one is 171,000 miles in diameter and 10,000 miles from edge to edge. The inner one is 122,000 miles in diameter and 11,500 miles from edge to edge. The rings are thought to consist of millions of tiny meteorites or particles of ice. Saturn has twelve moons, the largest 2,700 miles in diameter.



Uranus is at an average distance of 1,784 million miles from the sun and 1,680 million miles from the earth. It was discovered by the English astronomer Herschel in 1781 and named by him Georgium after King George III. It got its present name in 1861. Uranus is 30,000 miles in diameter, but little else is known about it except that it is surrounded by great clouds of gas and that its surface must be very cold. Uranus has five moons, the last being discovered in 1948. The biggest moon, Titania, is 600 miles in diameter and circles the planet at a distance of 273,000 miles.



Eighth planet in order of distance from the sun, Neptune is almost the twin of Uranus, being only 2,000 miles more in diameter. Its average distance from the sun is 2,796 million miles. As it takes 164 years to travel once round its orbit, its "summer" and "winter" each last forty years. Because of its distance from the earth, about 2,709 million miles, very little is known about Neptune except that it is surrounded by a thick mass of cloud through which the sun never penetrates. The surface temperature is 200 degrees centigrade below zero. Neptune has two moons. The second one, about the size of ours, was not discovered until 1949. It is about 300,000 miles away from its planet.



At an average distance of 3,613 million miles from the sun, Pluto is the most distant planet. It was not discovered until 1930. Because of its distance from the earth, 3,575 million miles at its nearest, very little is known about Pluto, except that it must be very dark and cold. It is unlikely that it has any moons. Pluto takes 248 years to make its journey round the sun and receives little heat from it.



# FOCUS on WHAT IT IS LIKE IN SPACE

## BIRTH of the PLANETS

No one knows where they came from. Were they pulled out of the Sun or did the Sun explode?

EVER since men have known that there was such a thing as the solar system they have wondered where the earth, the moon and the planets came from. All manner of fables and legends were told about the beginning of the solar system.

Today, scientists have tried to solve the problem, but although their proposed solutions are based on scientific facts and not on fables, astronomers are not certain that any particular explanation of the origin of the solar system is the correct one.

Scientists are certain of one thing, however. It is known that the same kinds of material or elements are to be found in the sun and planets.

This has suggested that at one time in the most distant past the sun and the planets, together with their satellites or moons, were all a single body. There are also a number of likenesses in the behaviour of the planets:

They all move in the same direction round the sun.

They move in very nearly the same plane. That is, if you could travel into space and look along the outer edge of the solar system, the sun and its planets would be all level with each other like peas arranged on a flat plate.

The solar system forms a little family by itself, as all its bodies are clustered comparatively close together in what is really a tiny corner in the vastness of space.

### Family Likeness

THEREFORE it is not surprising that astronomers are inclined to believe that all the planets were formed more or less at the same time and in the same way.

If the various planets and their moons were formed at different times and in different ways, we would not expect them to behave so much alike and to follow the orderly pattern they do.

But although scientists have decided that the planets and moons of the solar system had the same origin, they have not yet agreed what that origin was.

One theory which many astronomers accept is that the solar system was the result of a gigantic accident in space.

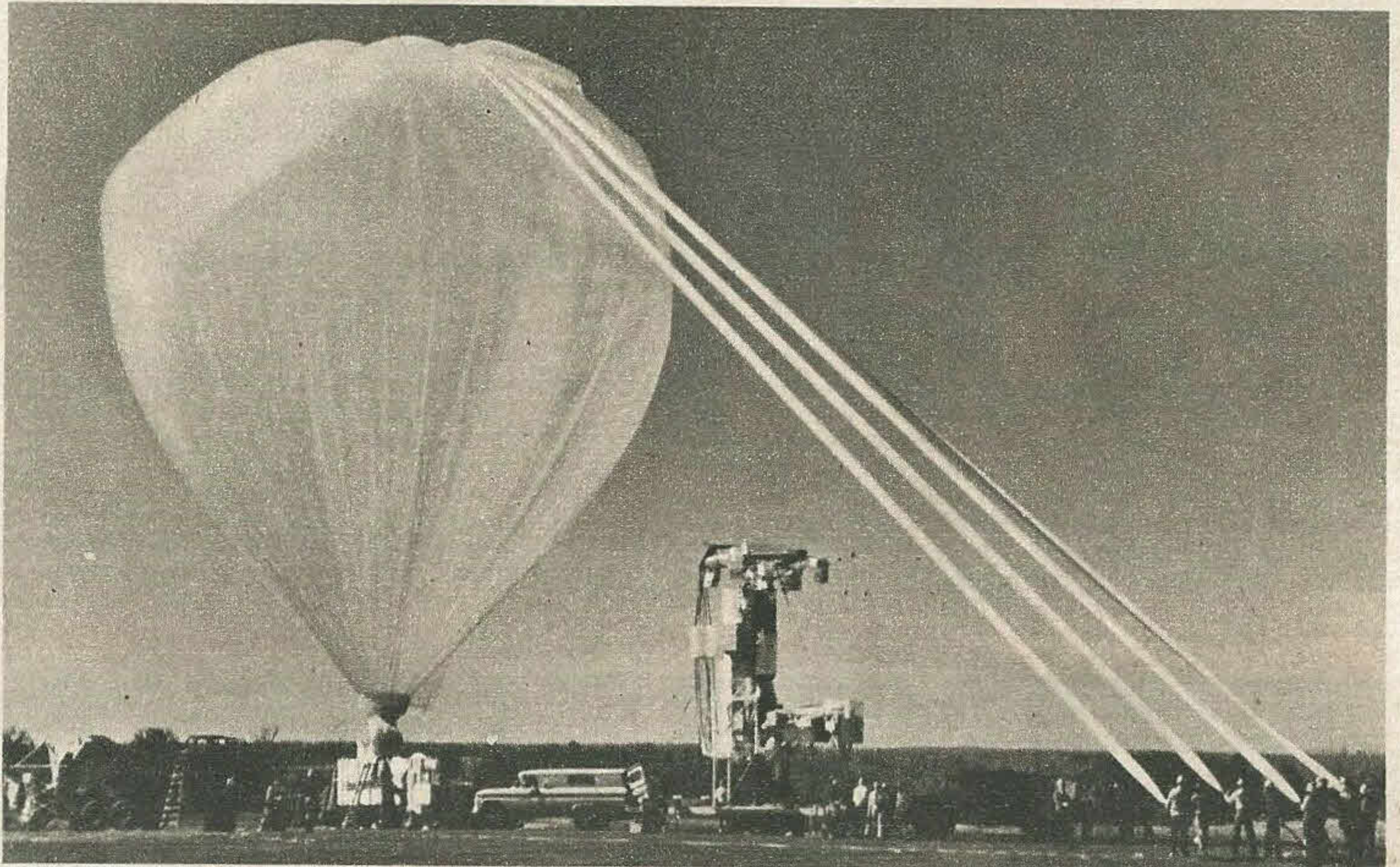
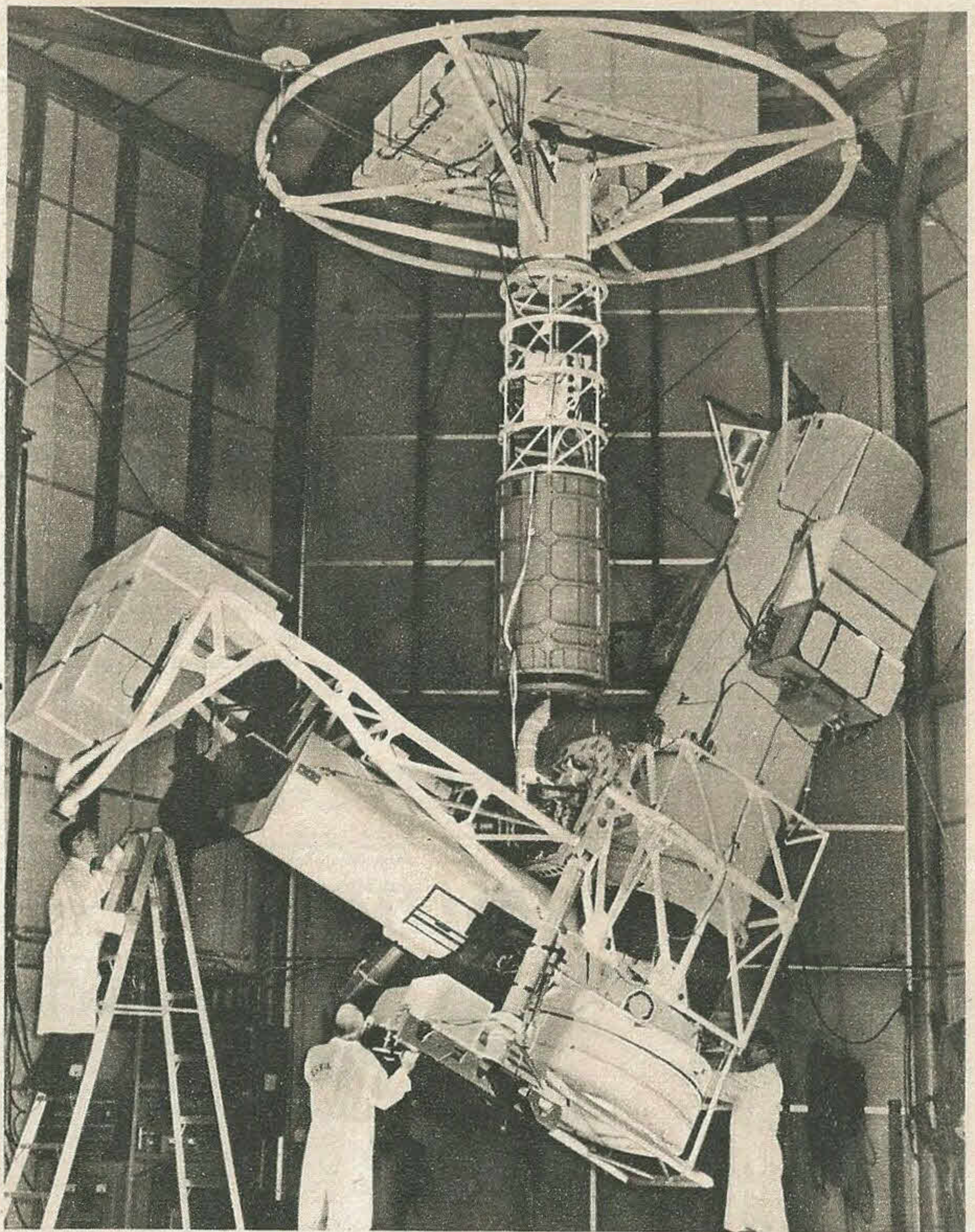
Countless millions of years ago the sun was even then a vast mass of burning gas, but very much bigger than it is today.

Then another and much bigger star approached the sun. Because its gravity was much stronger than that of the sun, the big star acted on the sun rather like a magnet and dragged from it a vast mass of gas.

As it swept away in its course the gravitational pull of the big star decreased and was unable to attract completely the mass of gas torn from the sun. So it left behind it this mass of gas, which, shaped rather like a cigar, was thin at the tips and broad in the middle.

Because of the sun's gravity, the cigar-shaped mass of gas could not move away from the sun

Last March a three-ton telescope was lifted by balloon 80,000 feet above the earth, where the atmosphere is thinner, to observe the planet Mars. Right: the telescope, called Stratoscope II, under test. Below: being attached to its balloon. The telescope returned to earth by parachute with photographs of Mars taken by automatic camera.



altogether. It had to travel round it, but at a distance of many millions of miles.

Millions more years passed, and the cigar-shaped mass of gas began to break up. The pieces then became the planets. The centre of the cigar became the biggest planet and as its thickness decreased towards the ends the fragments became the smaller planets.

This, of course, is only a very brief account of one theory as to how the solar system began. There are many more details, but they are all

far too complicated to be understood except by experts in astronomy.

According to another theory, the sun, then many times bigger than it is today, exploded. This is not at all impossible, because exploding stars, called by astronomers novae, or new stars, are not uncommon.

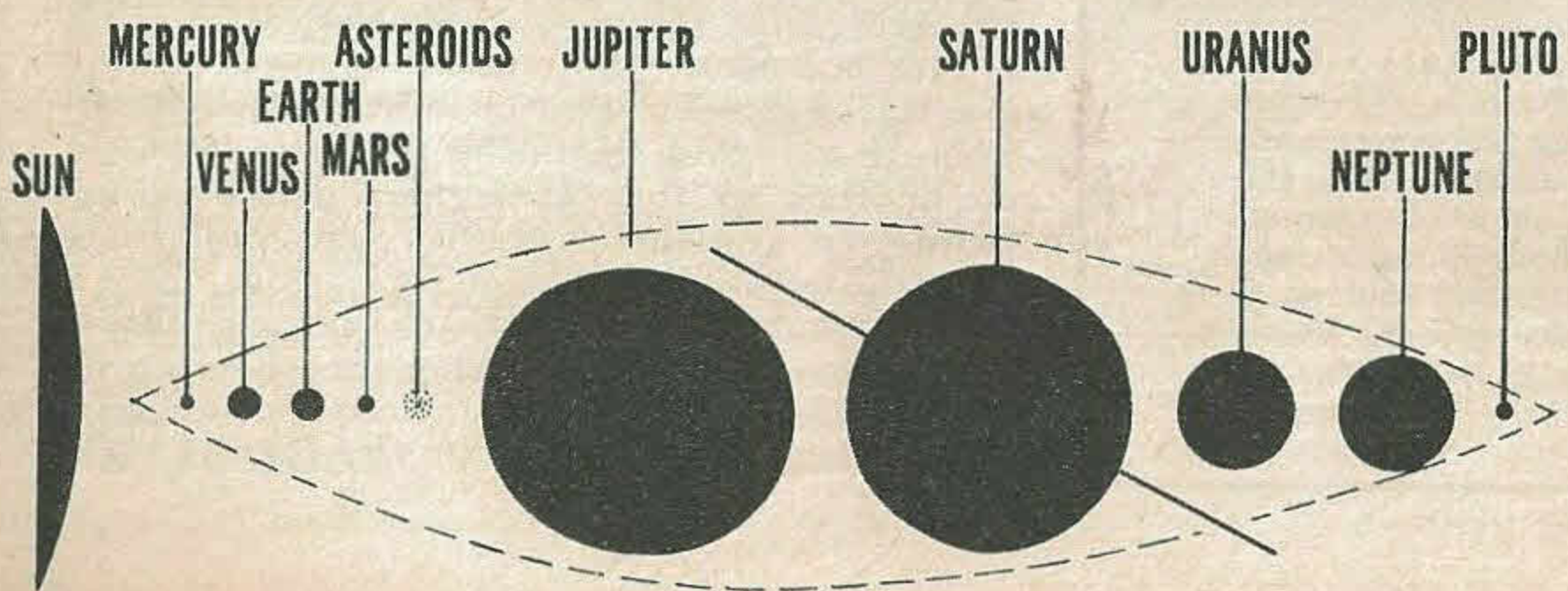
When the huge sun exploded, vast fragments of gas were thrown out in all directions and in time became the planets. The vast mass of gas fragments is believed to have been over 4,000 times the present diameter of the sun.

In the centre of the explosion was the biggest fragment of all, and which we now call the sun.

The force of the explosion caused the other fragments to start circling round the sun and in time they developed into the planets.

There are several other theories to account for the origin of the solar system. But none of them has yet been proved to the satisfaction of all astronomers.

The origin of the solar system still remains one of the great mysteries science has to solve.



How the planets may have originated from a gigantic cigar-shaped mass of gases pulled from the sun by the gravity of a passing star. The mass then broke up, the big pieces in the centre becoming big planets and the little pieces at the ends became the smaller planets.

Courtesy Perkin-Elmer Corporation



# HOW FRUIT GETS INTO CANS

**T**HE process of preserving fresh food was begun in 1809 by Nicolas Appert, a French chef, and although modern canning methods are highly mechanized the principle is still the same.

The processed food is packed in thin steel cans lined with a coating of tin. Fruit cans are specially varnished to prevent acid in the fruit corroding the metal. The cans are automatically fitted with lids at the rate of 10 to 250 a minute—according to the size of machine and tins.

Canned food is sterilized in a retort (steam pressure cooker) for about 30 minutes in a temperature of up to 270 degrees Fahrenheit to kill all harmful bacteria. Afterwards the cans are thoroughly cooled in cold water or air. They are then colour-coded to identify their contents, labelled, and finally packed ready for export.

Our Colour Cameraman took these pictures inside one of the world's largest canneries, Koo International of South Africa, where 40 million cans are supplied to the world market every year.



Above: Basketfuls of delicious pineapples, freshly picked from the huge pineries, or plantations, are taken by lorry to the factory for processing and canning.



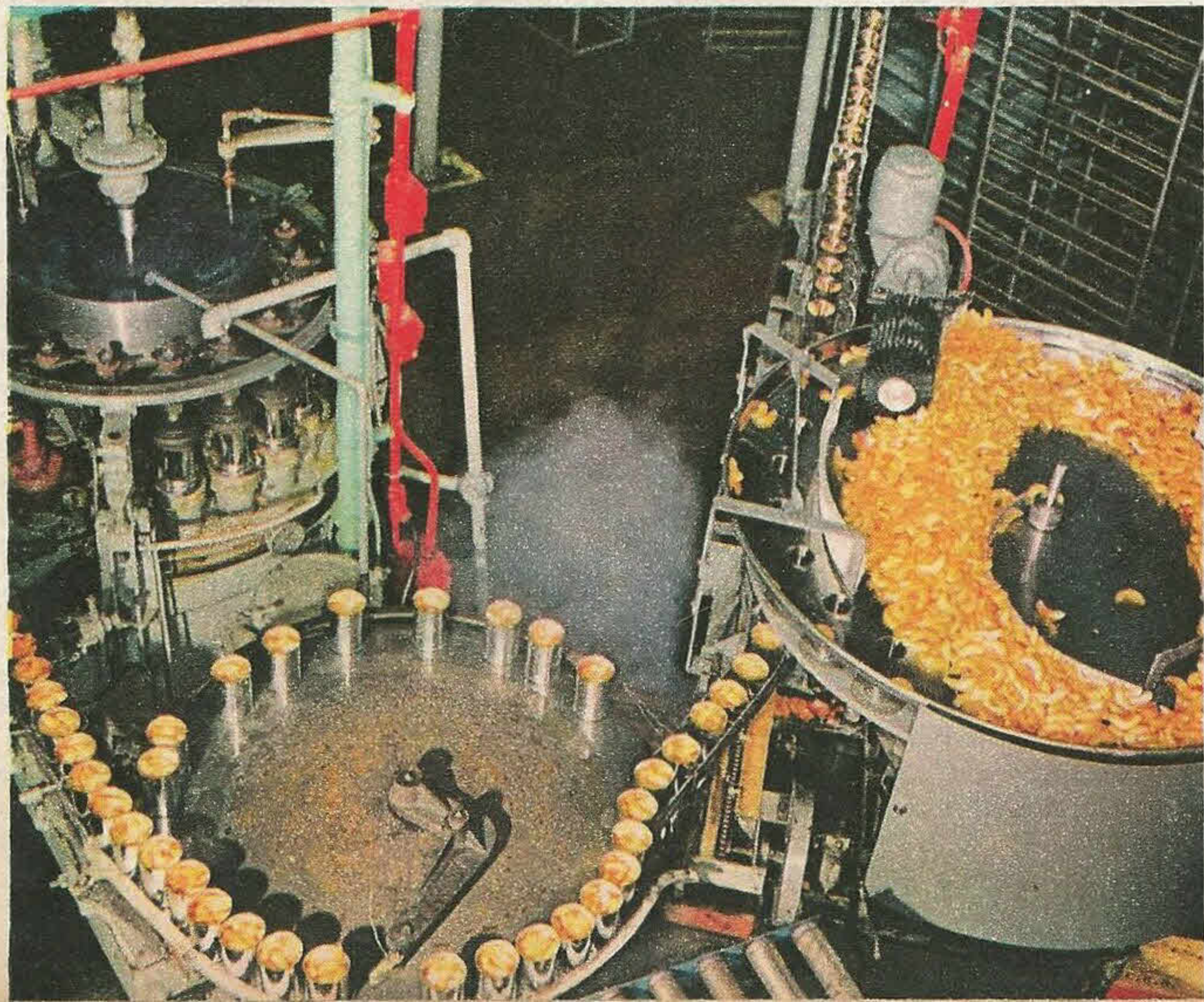
At the factory the pineapples are tipped on to a conveyor belt, graded by machine and emptied, via a moving carriage, into a bin. When the bin is full and the pineapples are required for processing, the bin opens and drops the fruit on to another conveyor belt.

After the pineapples have been mechanically peeled and cored, they are trimmed by women. This process must be done by hand to ensure that any peel left by the machine or any blemishes in the fruit are removed. The pineapples are then sliced and diced.



Prepared fruit arrives at the can-filling machine. Here you see peaches which have been stoned, skinned and sliced. The rubber brush (top right) sweeps the fruit slices through holes into the cans underneath. Syrup is then added.

Frequent tests are made during production to make sure that the final products are of top-quality standard. Koo chemists carefully examine tins of peaches. Each tin is weighed and checked against a standard weight to see that it contains the correct amount.



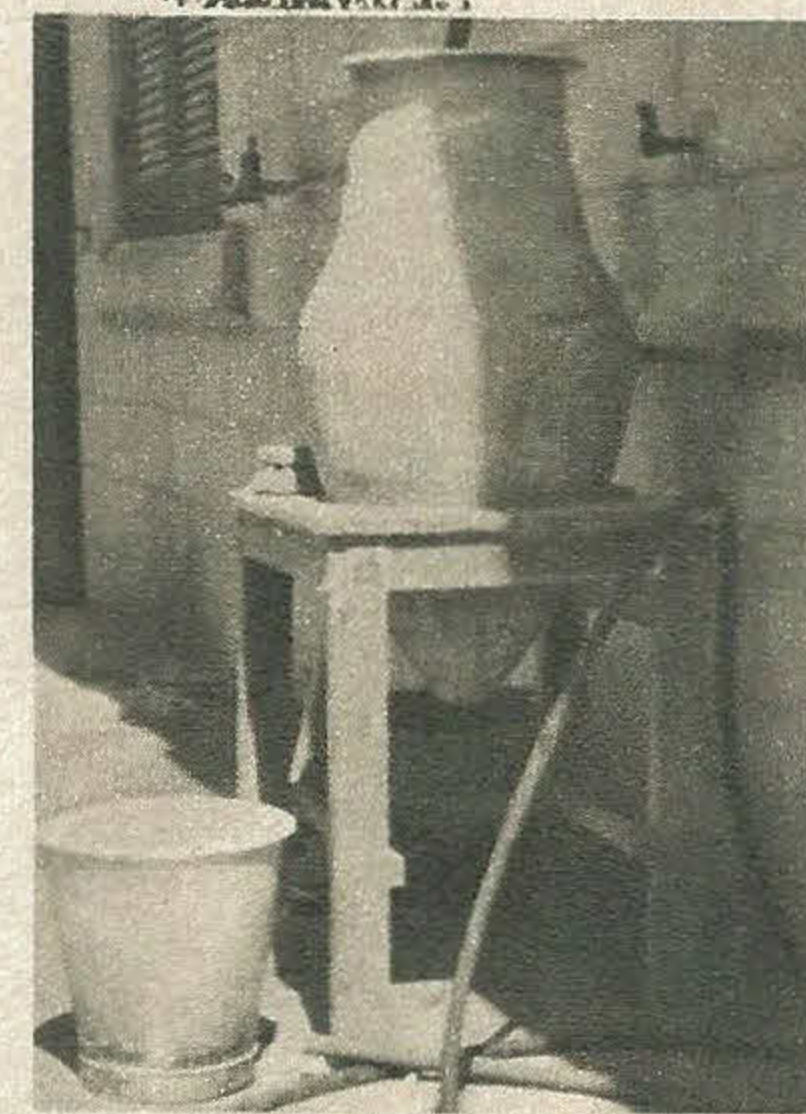


... the Southern Region of British Railways is the busiest, most complicated railway in the world. Every year 400 million passenger journeys are made on it—more than the yearly total on all the major railways of the United States and Canada combined. We often hear about business people who "catch the 8.15 to Town," but on this railway there are no less than forty trains which appear in the timetable as "the 8.15." People travel to London every day from 400 stations. Our picture shows the scene inside a modern signal-box.



British Railways, Southern Region.

## Did You Know That...?



... hot sun can make water cool. The vessel shown here is a chatti, made of very porous pottery. The water inside seeps through to the outer surface where the hot sun causes it to evaporate and this reduces the temperature of the water inside—just as perspiration makes your body cool down. The chatti is in use in hot Mediterranean countries.

... some plants grow in mid-air without soil. Spanish Moss, seen here, is a typical example. It hangs in festoons from fences, wires and branches of trees, absorbing moisture from the air through hairs on the shoots. It belongs to the Bromeliaceae family of which there are hundreds of species, including pineapple.



Because the portrait of the Queen is missing from this pair of National Productivity Year Stamps, they are now worth £775—instead of the original price of 1s. 3d.! They were bought at a post office in Middlesex by an American serviceman.

# HOW HANNIBAL HUMBLLED ROME

Few cases of sheer tactical skill overcoming greater numbers are more evident than in Hannibal's invasion of Italy. At Cannae he brought disaster to the great Roman empire—yet he was outnumbered two to one

**T**O the simple, hard-faced tribesmen who roamed the Swiss Alps and lived in cold dark caves in the mountain passes it must have been a fantastic sight. Coming through the mountain defile was a long, twisting column of men, their heads bent against the driving snow, slithering and staggering over the ice.

The year was 218 B.C. Hannibal, greatest of all the generals of Carthage, was crossing the Alps in his bid to invade Rome.

The watching tribesmen gaped in wonder as the straggling column of men and strange beasts halted before a great rock that barred their path. They stared harder as Hannibal's men gathered round the rock, shored it up with felled timber, set fire to it, poured vinegar over it, and then attacked it with pickaxes!

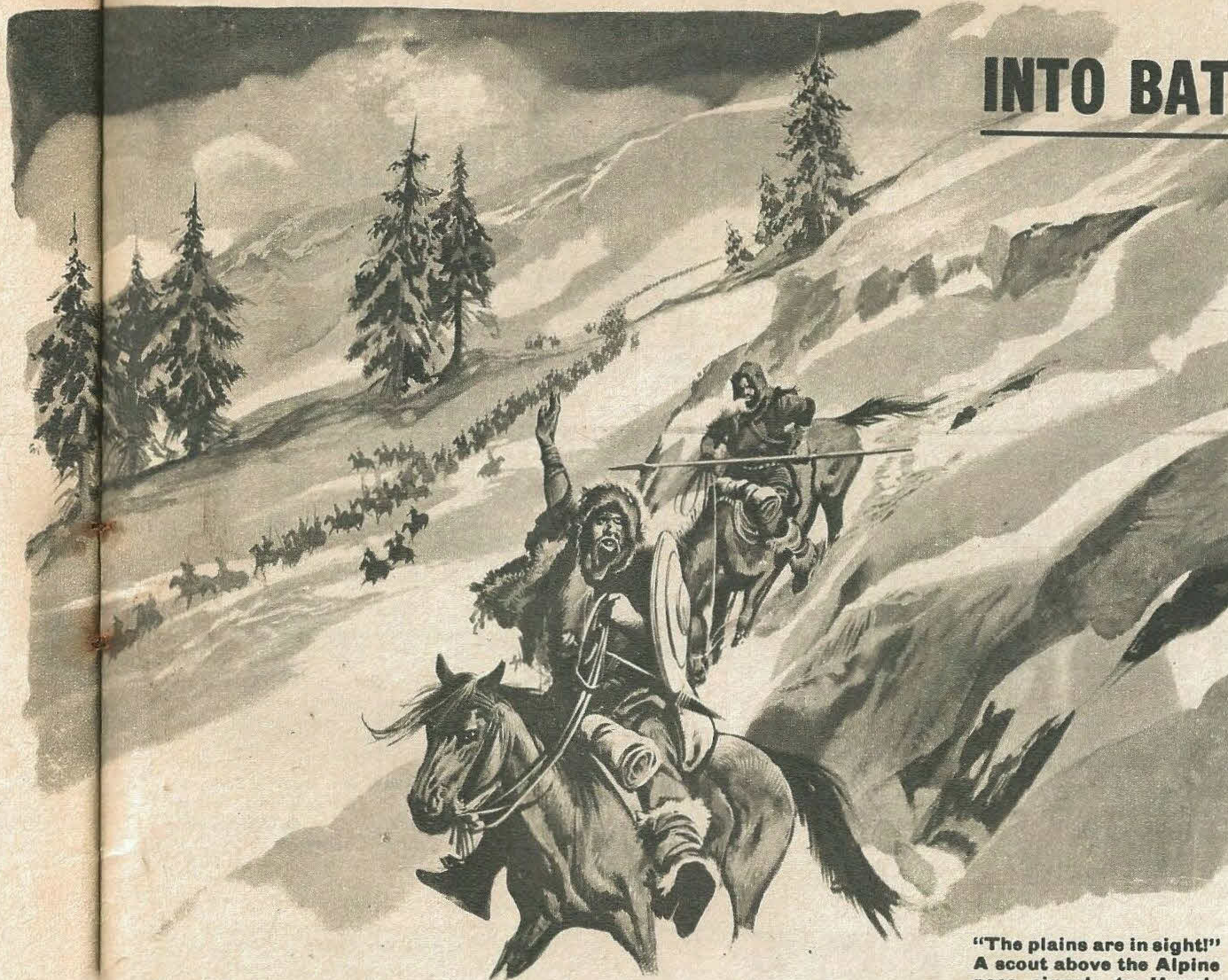
The watchers were seeing the Carthaginian army's well-tried and proved method of breaking up a troublesome boulder. No doubt, too, they were glad of the warmth of those flames, even from their vantage point a respectable distance away. It was bitterly cold.

For seventeen days Hannibal and his army of 40,000 men with their elephants, brought along to terrify the Roman enemy, had been crossing the mountains. Never in their lives had there been seventeen days like it. Ice-cold storms of snow and sleet had frozen them, starvation had tortured them, bitter nights huddled on ice had exhausted them and disease had weakened them. None of these troubles, though, had induced them to turn back.

All the way from the sunshine of Spain they had marched, these Africans, Gauls and Spaniards who made up the Carthaginian army, taking the overland route because Rome's mastery of the sea would have quickly destroyed a naval invasion. They had come because for years the Romans had been jealous of their city's trading powers, and had sworn to annihilate Carthage from the known world.

And here they were, lashed by all the severity of the Alpine weather but with all their trust in the greatest military tactician the world had so far produced—Hannibal, already a legend at the age of twenty-nine.

A shout of triumph from the advance scouts passed quickly down the column. The green plain of Northern Italy, around the River Po, had



"The plains are in sight!" A scout above the Alpine pass signals to Hannibal's army.

been sighted! The tortuous mountain crossing was coming to an end.

The Romans in the north could scarcely believe their eyes when they saw the invaders. Surely, they wondered, these men could not have come from anywhere on Earth. No invader could possibly have crossed the mountain barrier on their northern frontier—especially in winter. That was why they always left the north virtually unguarded.

### Two-part Army

**T**HE news was conveyed southwards to Rome. The people of that city were in despair when they heard it: they well knew that there was no Roman army in the north capable of holding the unexpected invaders.

Hannibal soon proved their worst fears. His men drew an army of Roman legions into battle and, aided by his superb, highly-trained cavalry—the best in the world—massacred most of them. Then the worst of winter arrived and halted his march south.

When spring came again Hannibal, mounted on the only surviving elephant of the nineteen he had brought with him from Spain, pressed on relentlessly, driving his army at a furious pace. Meanwhile, the Romans were coming up northwards to meet him. Across the 100 mile wide

stretch of Italy they now divided their army into two parts—each part about as large as Hannibal's army. One section was to defend the eastern side of the country, the other the western.

Hannibal's great dash southwards soon caught up with these two armies. With typical brilliance he daringly marched right between the two of them: making his army the inner portion of a great "sandwich." When he was level with both Roman armies he was on a great plain between a lake and a range of hills, and on these hills he quartered his army. The plain could be approached now only along a narrow pass, through which one of the Roman armies had to come to get him.

The Romans were in great spirits. They were sure they had trapped the Carthaginians, and were confident that all they had to do now was to squeeze Hannibal's army from both sides. Through the pass they came, looking for Hannibal. Then quite suddenly, a thick fog came down, engulfing the plain. Hannibal's men emerged almost leisurely from the hills and fell upon the enemy. In that fog the Romans did not have a chance; they were cut down and slaughtered by an army they never even saw. In their terror many of them stumbled blindly upon the lake and ran agonizingly into it, where they presented easy targets for Hannibal's cavalry.

It was a strange battle: a battle of screams and cries and sudden death—but a battle that no one saw.

When the news of Hannibal's victory reached Rome there was alarm and panic. No less a person than Quintus Fabius, the Dictator himself, decided to lead an army out on to the plains after Hannibal. Fabius, however, thought that the best way to tackle Hannibal was first to wear him out. So, on sighting the invading army, he kept at a distance from them and followed them wherever they moved, so that they were never given a chance to relax.

If Hannibal did not relax, neither did the people of Rome. They scornfully nicknamed Fabius the "Delayer," and when a whole summer of this kind of negative campaigning had gone by they demanded that their Senate should stir up some action. Accordingly the Senate elected a co-Dictator to handle the campaign with Fabius, a man named Marcus Minucius. The two

## INTO BATTLE—STORIES OF THE WORLD'S GREAT CONFLICTS

Dictators were completely different men, and soon they were quarrelling bitterly.

But the arrival of Marcus Minucius did get the Roman army moving, and Hannibal was involved in some skirmishes with them. Still there was no real battle, though, and the co-Dictators were replaced as army commanders by two more men, Gaius Varro and Lucius Paulus.

This time Varro was the man of action, and so eager was he to fight that he permitted Hannibal to get himself into a position of considerable advantage over the Romans—a position where Hannibal could make maximum use of his far superior cavalry on open ground against an army that was twice as strong as his own. The place was the wide plain of Cannae, in Apulia, and the date was August 2, in the year 216 B.C.

### Half-moon

**S**PEEDILY the Romans drew up their formations facing Hannibal. Their 70,000 infantrymen were really only peasants who received no pay and had to return to the fields after each summer campaign. Even their generals were merely the élite from among the Roman citizens, for this was still 100 years before Marius, the man who first gave Rome a permanent army, with each legion divided into ten cohorts of 600 men and the legendary silver eagle for its standard.

Hannibal's formation was half-moon shaped. In the centre were his toughest fighters, the Gauls—no race inspired more terror in the Romans than the Gauls—and the Spaniards from his army base a long way back in Spain. On each side of this centre, but dropped back to make the "half-moon", were his African mercenaries, and on each flank, still farther back, his famous cavalry.

On came the Roman infantry now, smashing charge after charge at that jutted-out centre. Gradually the Gauls and Spaniards in the Carthaginian line fell back under the onslaught. But this was a tactical retreat, for the more ground they gave the more the Romans came in at them, with the result that in a short while there was a deep "V" in the Carthaginian front—and inside that "V" were a lot of Roman soldiers.

It was just as Hannibal had planned it. As soon as there were sufficient Romans inside the "V" he closed his infantry around them. With swords and pikes flashing, the Carthaginians tightened their circle around the Romans, killing thousands and thousands of them in that terrible squeeze. On the flanks their cavalry, more than a match for the Roman horse, stormed through the Roman flanks, turned, and came back in the opposite direction to the support of their encircling infantry.

### Fatal Delay

**T**HE bloodshed was fearful. Seven out of every eight Romans who fought at Cannae, including the consul Lucius Paulus, were slaughtered on that terrible day. Cannae, indeed, was one of the greatest disasters that ever befell Rome. When the few fortunate Romans who had lived through the battle had fled, Hannibal, the master tactician, surveyed the bloodied field in triumph.

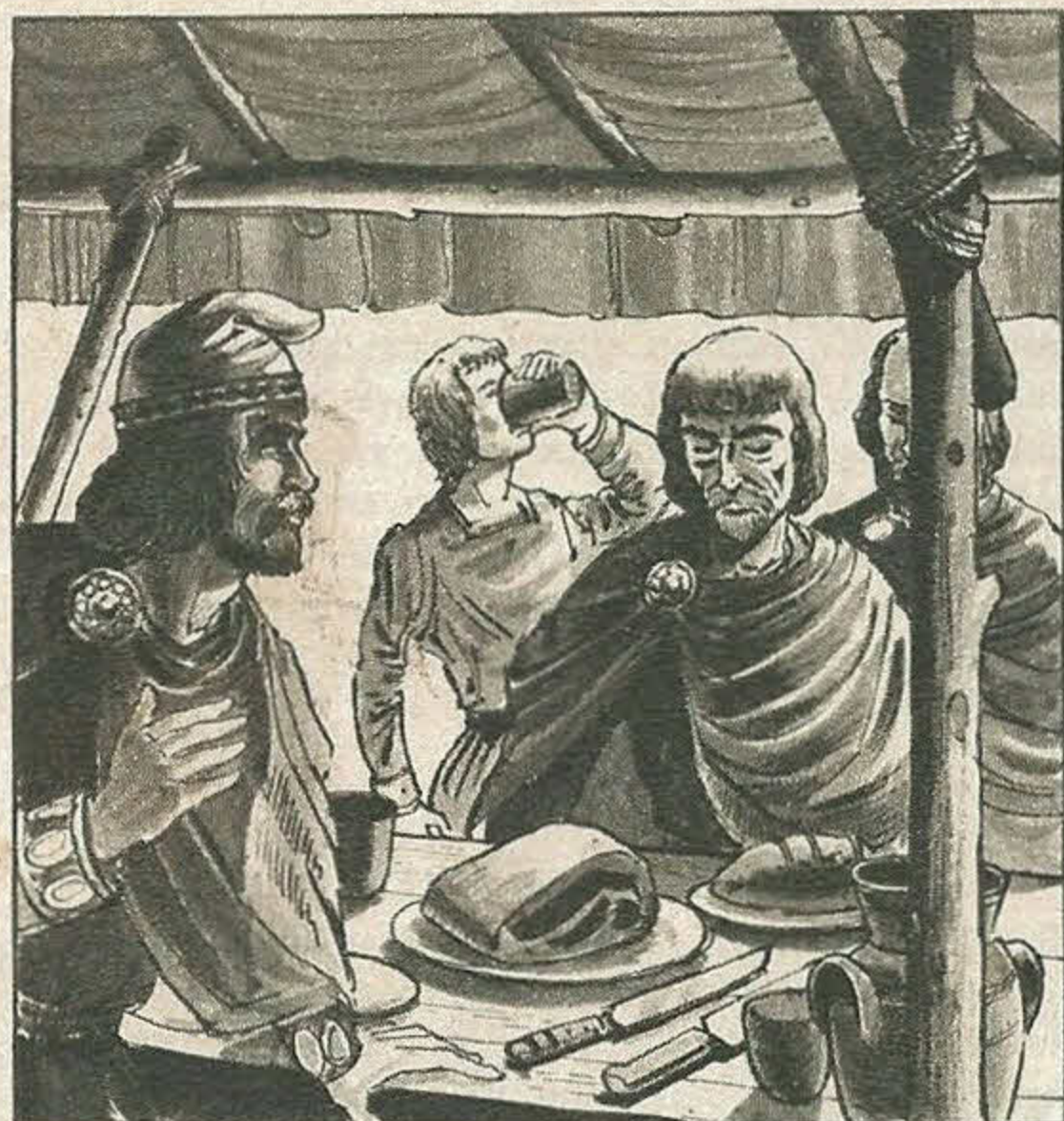
A few days later he was on the march again. Now he could take Rome—or could he? Hannibal decided that he was not strong enough, and halted at Capua to await reinforcements. But a Carthaginian army which marched under Hannibal's brother to his aid was beaten by the Romans. And when a new Roman general, Cornelius Scipio, was threatening Carthage, Hannibal had to return to defend his own homeland.

Years later, in 202 B.C., Scipio defeated a Carthaginian army at the Battle of Zama, and Hannibal had to flee into exile. For many years more the Romans hunted him down ruthlessly until, rather than be captured by them, he took poison and died.

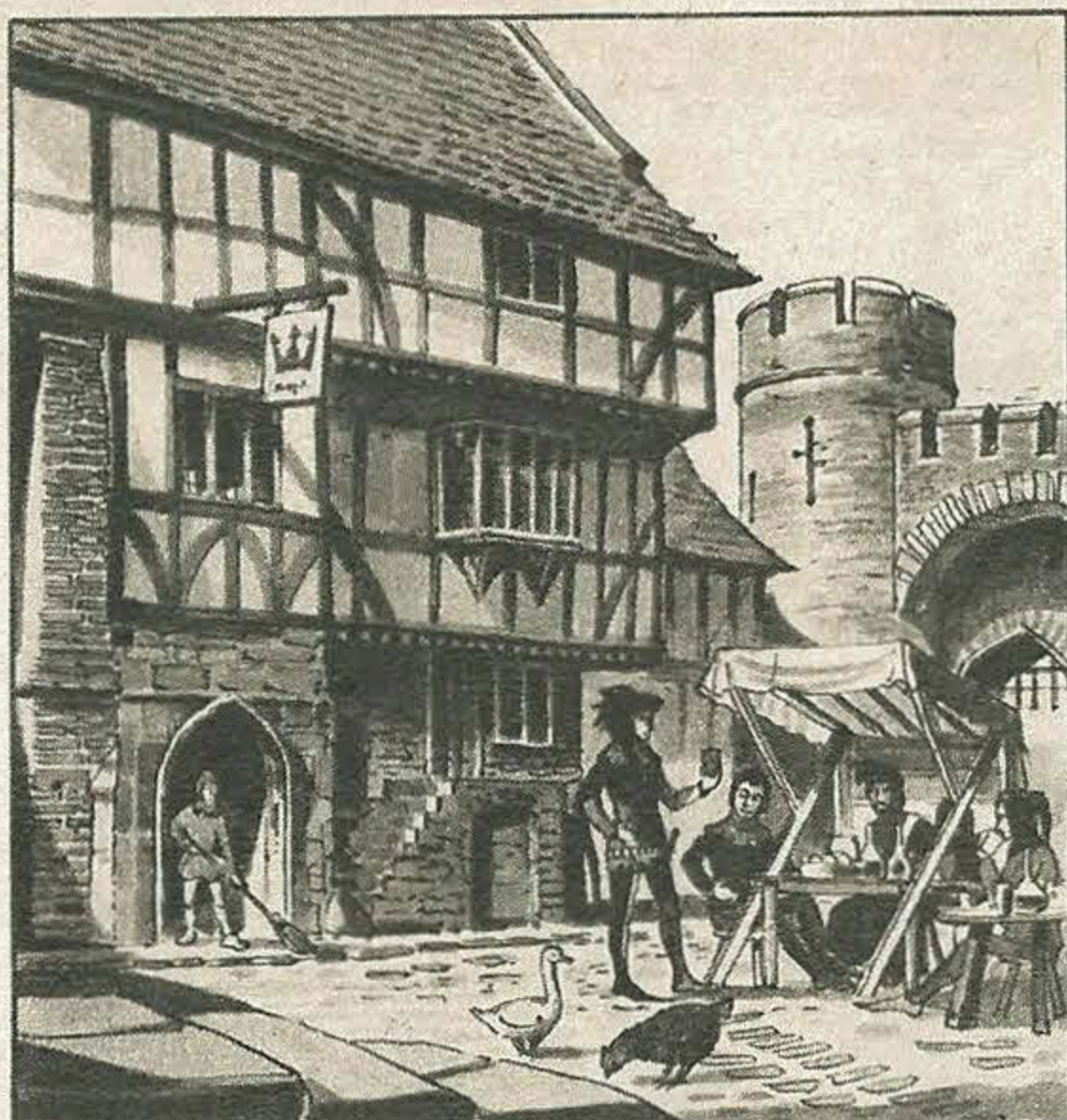




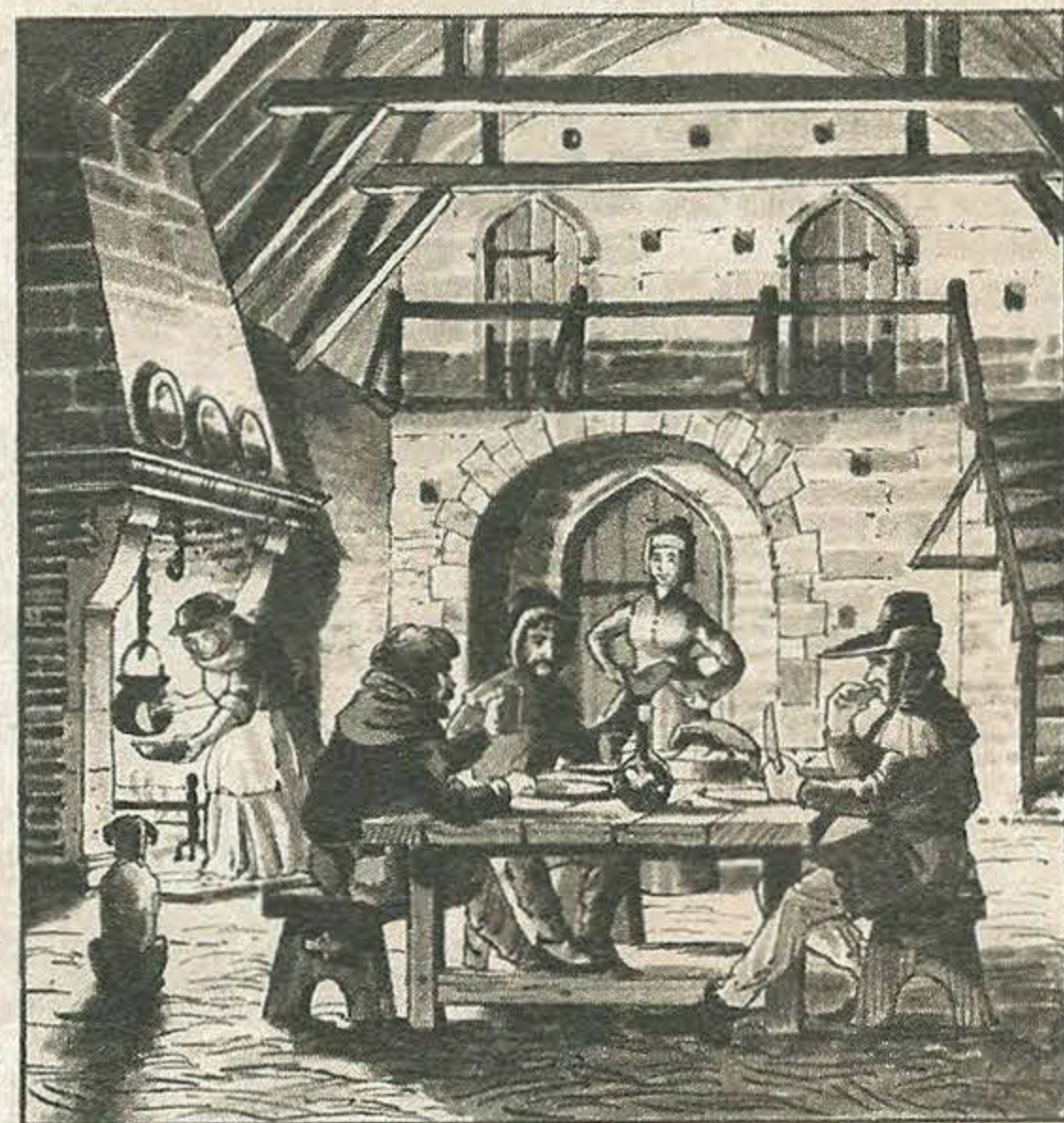
# FOOD FOR THE TRAVELLER



In the Anglo-Saxon era in Britain people were great eaters. To eat four meals a day was considered quite normal, though in Norman times, two were regarded as sufficient. The picture above shows an eating and drinking booth at an Anglo-Saxon fair, where beef could be bought, as well as ale and cider.



During this period journeys were long and tedious, and many people stayed overnight at roadside inns, where food was provided, as well as crude sleeping arrangements. Also illustrated is a Gate-House Stall, where drink and light meals could be bought by travellers stopping temporarily.



This is the interior of a typical inn during the early medieval period. The old woman is serving broth made of assorted vegetables, while the eaters sit at a communal table. After their meal, travellers usually spent the night on the rush-covered floor in front of the fire before continuing their journey next day.



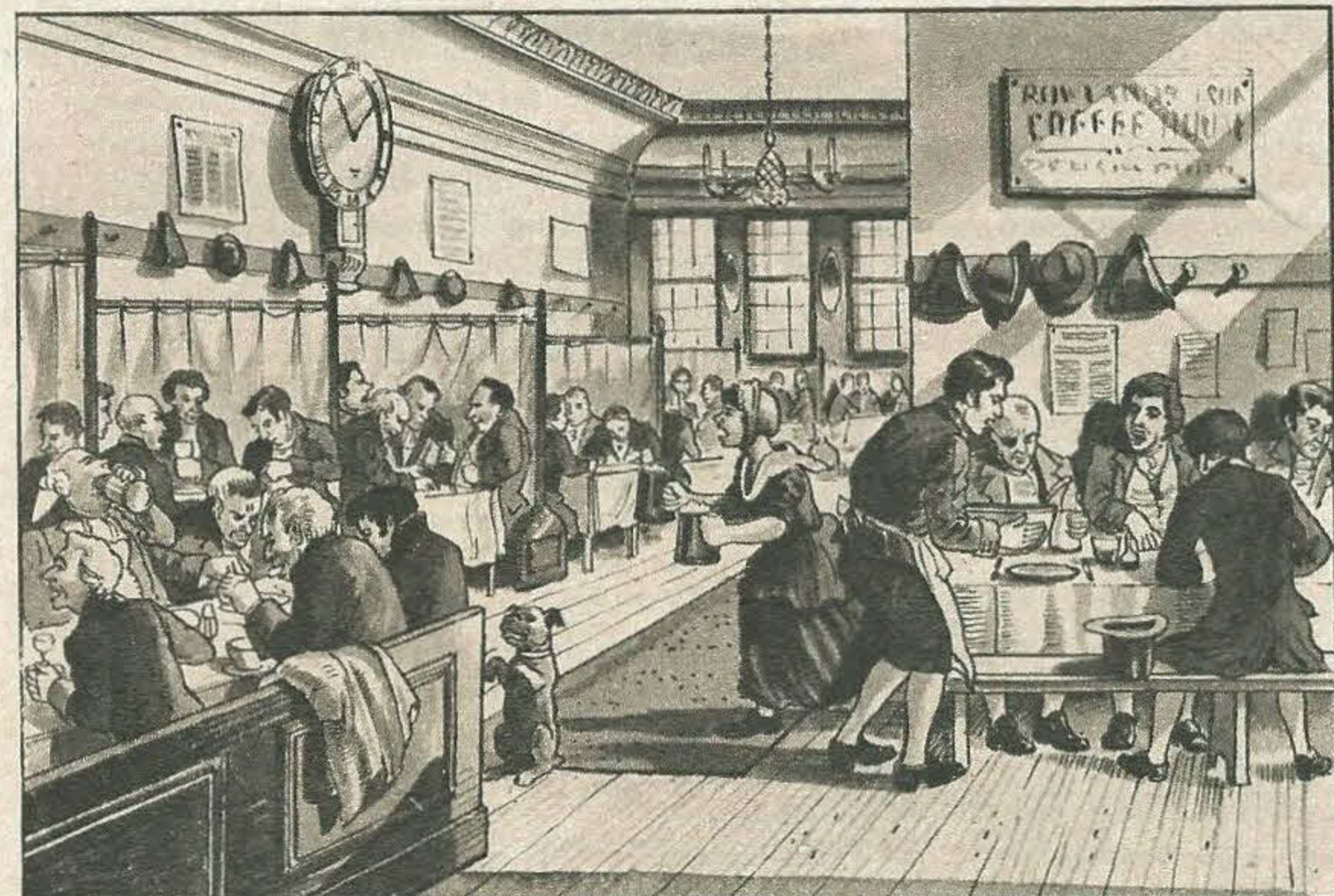
In medieval times, when pilgrimages were made to holy shrines, all big abbeys catered for their guests by having lodging-houses in which the pilgrims could eat and sleep. For over three centuries the abbeys were noted for their hospitality, which was offered free to all travellers.



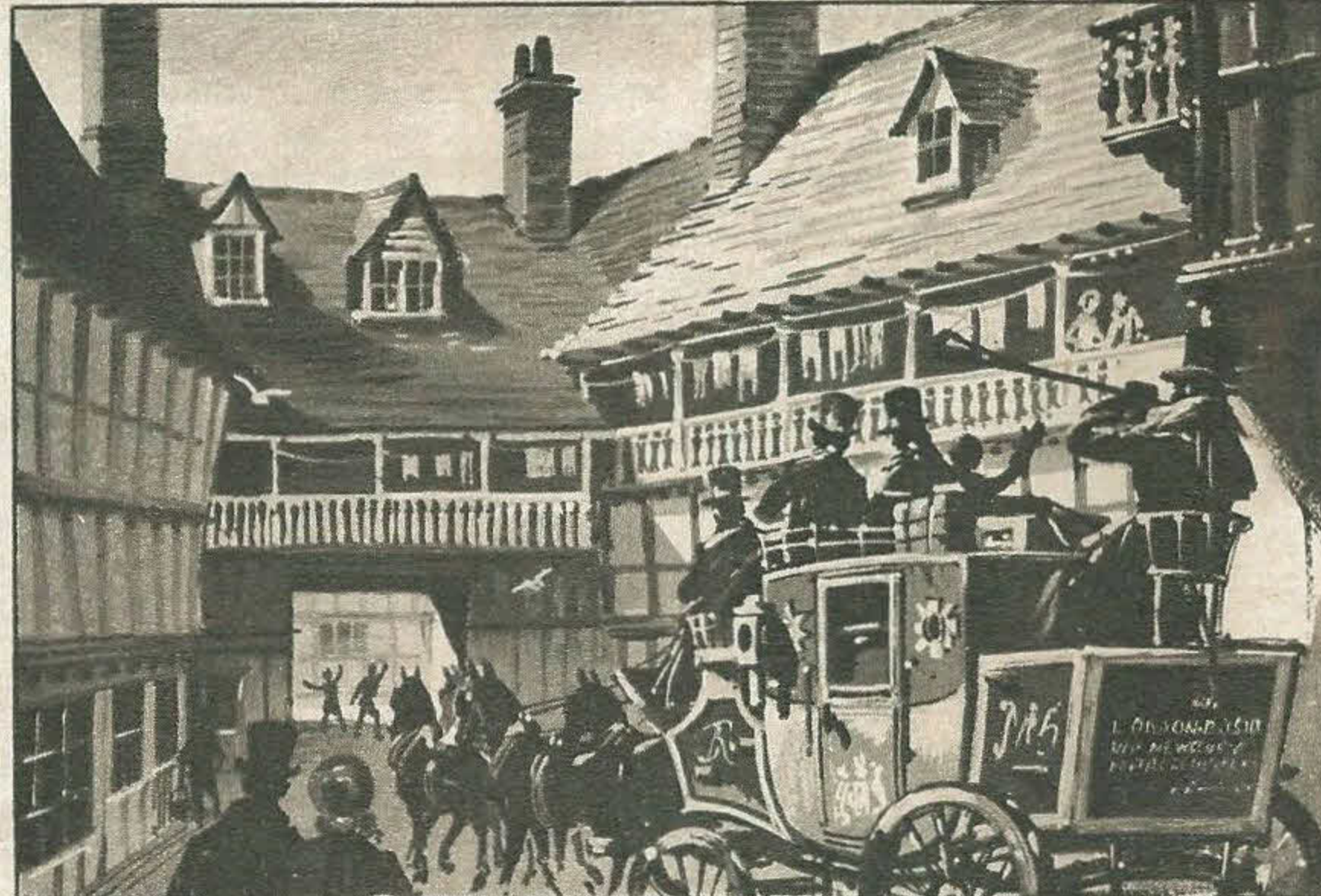
During the reign of the first Tudor kings, the food situation in England was desperate, for many thousands of acres of farmland had been laid waste in the Wars of the Roses. When Queen Elizabeth I came to the throne, however, "eating out" became both commonplace and enjoyable.



Taken from a contemporary print, this picture shows a coffee-house of about 1700. At this time they were very popular and became not only eating houses, but also political debating forums and places of business. Lloyd's, the great marine insurance company, began in a coffee-house.



By 1810 the coffee-house had advanced to the stage of a large restaurant. Food served here consisted of oysters, herrings, hot pheasant, suckling pig, cheese, bread and butter, while there was a choice of ale, cider or wine to drink. Eating out was now not only a business activity, but also an important social function.



The regular running of efficient coach services had its effect on roadside inns, for meals were now prepared in accordance with the coach timetables. Tired and hungry travellers were fed and rested while the coach-horses were being changed. Those staying overnight could breakfast on beef and ham, and drink pots of beer.





*Some day airliners travelling at hundreds of miles an hour may pull in at...*

# FLYING FILLING STATIONS

**B**EFORE designers start drawing the plans for a new airliner they must decide two very important questions—what will be the aircraft's *payload* and what will be its *range*?

"Payload" is the number of passengers or the amount of cargo that an airliner can fly to its destination. "Range" is the distance it can fly without having to land for re-fuelling.

If the amount of fuel pumped into the airliner's tanks at the start of a flight is increased, the range will be increased, but less payload can be carried. This means fewer passengers or less cargo, so the airliner will earn less on fares for that flight.

But this is only part of the problem of balancing payload with range.

An aircraft cannot carry as heavy a load when it takes off from a runway as it can when it is in the air.

The problem of increasing an aircraft's range without reducing its payload has been solved by the flying filling station.

Just as the motor car can call at a petrol pump to fill its tank, so aircraft can now refill their tanks on a journey. Only they do it in the air and while flying at speeds of hundreds of miles an hour.

The flying filling station is an aircraft fitted with huge tanks of fuel.

Trailing from the aircraft is a hose. One end is attached to the fuel tanks and the other end has fixed to it a hollow cone called a "drogue" and shaped rather like the funnel used for pouring liquid into a narrow-necked bottle.

The aircraft to be refuelled has projecting from a position on its nose, wing, or fuselage, a device called a probe—a hollow tube fitted with a nozzle.

The pilot of the aircraft to be re-fuelled flies behind and slightly below the aerial tanker. He then manoeuvres his aircraft until he can push the probe into the drogue trailing from the tanker.

## Automatic Lock

**I**MEDIATELY the probe enters the drogue, they are automatically locked together. A valve then opens automatically and a pump on the flying tanker starts up to deliver fuel at the rate of 750 gallons a minute.

When the tanks are filled, the pilot of the aircraft receiving fuel immediately slackens speed slightly. This exerts a pull on the hose connecting the two aircraft so that the probe and the drogue are automatically released.

The flying filling station was invented by Sir Alan Cobham, a famous record-making pilot of the 1920's and 1930's. He first used the system in a very primitive form on his attempt to fly non-stop from Britain to India in 1934.

The Royal Air Force began using flying filling stations after the Second World War for refuelling jet fighters and so extending their range. Later the United States Air Force adopted the system for bringing fighters across the Atlantic non-stop.

Last summer an aircraft of the U.S.A.F. flew non-stop from Japan to England refuelling in flight five times on the way.

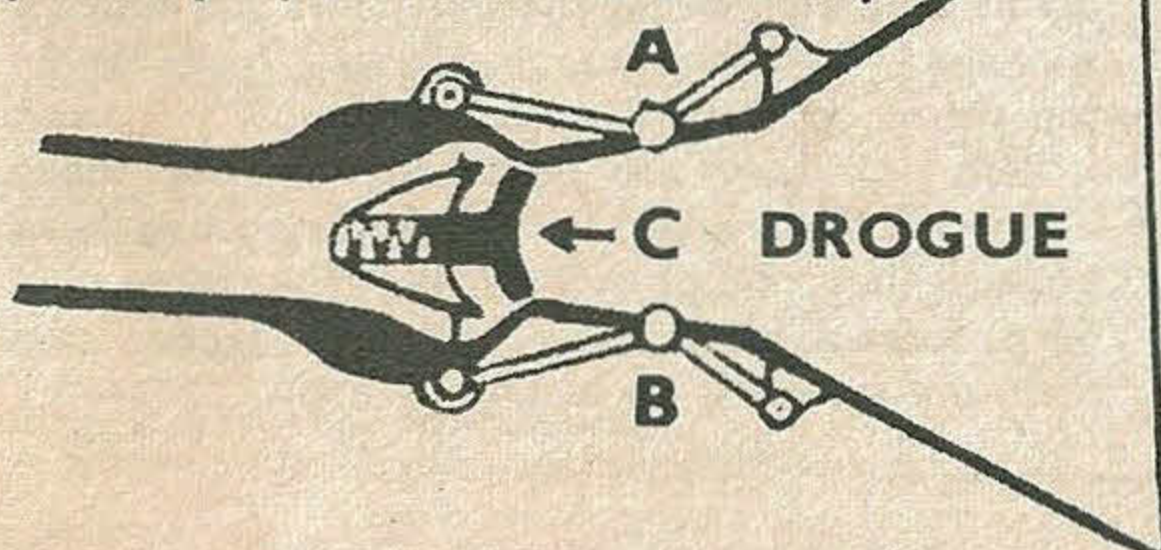
Flight refuelling is now an everyday technique in military aviation and its success has suggested to civil airlines a solution to the problem of increasing range without sacrificing payload.

In America, several experimental non-stop flights have been made from the east to the west coast by using flying filling stations on the way.

The Air Ministry is planning to set up a chain of flying filling stations across the Indian and Pacific Oceans.

It is also proposed to use helicopters as tankers. These would not need runways for take-off. The tankers could then be based on islands too small for the building of ordinary airfields.

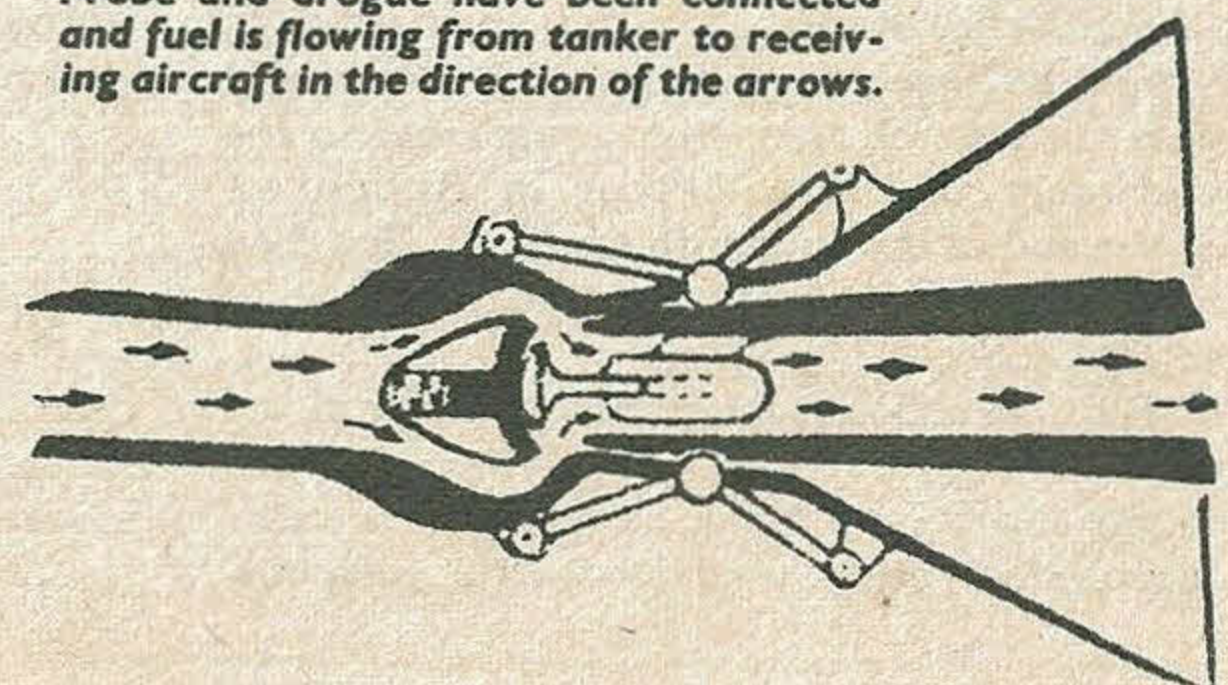
When the probe enters the drogue it pushes against contacts A and B which light a lamp to show the tanker pilot that connection has been made. The valve C on the probe then opens and fuel flows between the two aircraft.



Valve on end of probe. When it makes contact with drogue it opens like an umbrella to prevent it from slipping out.



Probe and drogue have been connected and fuel is flowing from tanker to receiving aircraft in the direction of the arrows.







WONDERS  
of  
NATURE

# WHEN A BOAR GOES TO WAR...

*... nothing can stop him. Even a tiger can fall victim to this savage creature*

**H**UNTING the wild boar was once a favourite sport in Britain, and the horse-men who chased these snorting creatures through the undergrowth were given a run for their money with a sure prize at the end.

Although the boars could run very quickly, they could not keep up their speed for long, and the ease with which they were caught led to the disappearance of the wild boar in Britain towards the end of the sixteenth century. But they are still to be found on the Continent, especially in the Black Forest.

The European Boar (above) is a member of the pig tribe, having forty-four teeth with prominent tusks, the lower ones being as sharp as a razor and capable of being used as fearful weapons.

His cousin is the Indian Wild Boar, who is recognizable by a mane of long, black bristles running from the nape of the neck along the back.

These large pigs, however, are all much alike, with their pointed muzzles and coats of reddish brown, chocolate or black hairs that usually form a crest on the top of the head and neck.

### Feeding on Fish

**N**ATURE has been kind by giving them thin coats in the tropics and woolly under-fur in the cooler climates, for these animals roam large areas of the world from western Europe and North Africa to Bengal, Burma and China.

They live in moist or marshy places where they

can turn up the ground with their snouts in search of food (coarse grass is their favourite) during the mornings and evenings. They also feed on the carcasses of animals, and in Assam (India) wild boars have been known to dig out fish that bury themselves in the mud during the dry season.

As a rule, the females and the young boars go about in herds, while the old boars are solitary roamers. Two families, numbering from six to ten young, are reared each year.

Although they are bold, boars rarely make unprovoked attacks, but once they have been aroused they cannot be stopped. They have even been known to attack and kill tigers—and certainly a tiger is no mean opponent.



THE STORY SO FAR

Bunter's adventures as a runaway from Greyfriars School are short and sweet. Finding life aboard the Sally Ann, where he had signed on as cook, rather too tough, he returns to Greyfriars at dead of night, shuts himself in the school pantry and says he will not leave until he is promised lenient treatment. This is refused, so Bunter stays locked in until the following night when, finding it rather cold in the pantry, he sneaks out to get his bedding from the dormitory. On the way back to his "fortress" Bunter hears someone approaching in the darkness. He decides he is being followed, and waits in an alcove, ready to pounce.

THE ELEVENTH CHAPTER  
A Wanted Man

THE unknown marauder rounded the corner and as he passed the alcove, Billy Bunter brought down the blanket suddenly on his head, completely enveloping him.

There was a muffled gurgle and a crash and Billy Bunter's victim collapsed with a clatter on the floor.

"Yerrugh! Groogh!"  
Next minute the fat heavy bulk of Billy Bunter descended on the fallen one, rendering him quite powerless to get up.

"Got you!" chuckled the Owl of the Remove softly, as he fastened the blanket tight round the victim's neck. "Thought you'd catch me napping, didn't you? He, he, he! I caught you napping instead and—Oh! crumbs! It isn't one of the Greyfriars beasts after all!"

Bunter stared in amazement on seeing his victim's legs protruding from underneath the blanket. The moonlight, streaming in at the window, showed a pair of corduroy trousers and rubber-soled boots!

"Yerrugh! Gerroff! I'm being choked!" came in gurgling tones from under the blanket.

It was a man's voice!  
Then, to Bunter's further surprise, he saw a large sack lying on the floor nearby. The sack mouth was open and inside he could just see the football shield which the first eleven had won last season, and some of the valuable school plate.

"Mum—my hat!" gasped the junior, "I—I've caught a burglar!"

The great truth dawned on him suddenly, and Billy Bunter was amazed.

"Wow-wow-wow!" gurgled the luckless burglar, "Takeitoff! I'm choking! I'll come quietly! Lemme head loose!"

Billy Bunter sat there gasping, undecided whether to run or stay there. If he had known that it was a burglar coming down the corridor, he would have run for his life! But quite unintentionally, he had captured the man and his swag single-handed!

"Great Scott! What's the matter here?"

It was Wingate's voice. The captain of the Sixth, roused from his sleep by the sound of the burglar's fall and the scuffle that followed, had left his bedroom to find out the meaning of the disturbance. He stopped and gasped when he saw the strange man, enveloped in a blanket, sprawled on the floor and Billy Bunter sitting on top of him, with a sack nearby!

"Bunter!" exclaimed the Greyfriars captain. "What the dickens—"

"I've captured a desperate burglar, Wingate," said Billy Bunter, blinking. "Terrific rascal he is, too! Alone I did it! Here is the swag! I—"

"Bunter! Now I've got the little rotter."

Loder came bounding along the passage in his dressing gown. He did not stop to ask any questions. He made a grab at William George Bunter and hauled him up by the scruff of his neck.

"Yarooogh! Yah! Wow! Stoppit! Help!" wailed Billy as Loder shook him.

"Look out!" shouted Wingate suddenly. "The burglar's escaping!"

The burglar, taking advantage of the removal of Billy Bunter's weight, had flung back the blanket and jumped up. He was wearing a mask!

Wingate sprang forward and closed with him. There was a short, fierce struggle, but help was at hand. Some other Sixth formers came along, and the burglar was soon overpowered. He was trussed up in the blanket so that there was no escape.

Wingate picked up the sack and examined

# BUNTER THE HERO!

by FRANK RICHARDS

the contents. He gave a long low whistle. "Whew! He must have cleaned out the Head's room of everything, besides our cup and other trophies!" he said. "Thank goodness we've got it back, or the rotter would have got away with a haul worth at least a thousand quid!"

Loder was still holding Billy Bunter by his fat ear and the fat junior's yells rang out through the night. Doors banged everywhere, and juniors came up to see what was happening.

Harry Wharton & Co. and a whole host of Removites crowded into the corridor.

"My giddy aunt!" gasped Bob Cherry. "What on earth's been happening?"

Wingate explained quietly.

"Bunter's caught a burglar!" said Bob Cherry faintly.

"Unaided and alone!" murmured Frank Nugent.

"Impossible!" said Peter Todd.

"I tell you I caught the burglar!" howled Billy Bunter wrathfully, struggling free from Loder. "I raided those bedclothes from the dormitory and as I came down here I heard the burglar approaching. I thought I was being followed by one of you chaps and went for him—no, what I mean is—"

"Ha, ha, ha!"

"I knew he was a burglar as soon as I saw him, of course!" said Billy Bunter. "I stood in his path and challenged him. He flew at me with murder in his eyes—"

"Oh, Jiminy!"

"And a terrific fight ensued," Bunter spoke dramatically. "We fought like demons. He was a strong brute, but I gradually gained the mastery. My thoughts were not for my own safety, but for the school and its valuables!"

"Oh, draw it mild!" exclaimed Johnny Bull.

The Greyfriars boys chuckled as Bunter continued to give a dramatic account of what he, in his fertile imagination, really believed to have been a terrible struggle with a burglar. In the midst of Bunter's tale, Mr. Quelch strode along the passage.

"Bless my soul!" he ejaculated. "This—this is almost unbelievable! You have saved the school valuables! I had no idea that you were such a brave and resourceful youth! Loder, there is no necessity for you to tweak Bunter's ear in that vicious manner. Bunter, you must now surrender to the authority you have been setting at defiance for so long!"

The Owl of the Remove blinked nervously at Mr. Quelch.

"I—I say, sir, I'm not going to be punished, am I?" he stammered. "I've been through enough! I demand justice!"

"You will receive justice, have no fear of that, Bunter," said Mr. Quelch quietly. "I am having nothing more to do with the matter, but will place it entirely in Dr. Locke's hands in the morning. I have no doubt that he will take into account the service that you have rendered Greyfriars tonight when he passes judgment on you for your misdeeds. Bunter, you will go to your bed in the dormitory. I will telephone the police to come and apprehend this rascal!"

The boys dispersed to their dormitories. Billy Bunter gathered up his bedclothes and rolled away with Harry Wharton & Co. to the Remove dormitory.

"Bunter's caught a burglar!" gasped Bob Cherry. "Well, chaps, that takes the cake! Wonders will never cease! What silly chump said that the age of miracles was past?"

"Oh, really, Cherry, you beast—"

"It was a fluke!" said Peter Todd looking severely at the fat Removite. "Own up, Bunter, that you nabbed the burglar by mistake!"



Wingate stopped and gasped when he saw a figure enveloped in a blanket sprawled on the floor, and Bunter holding it down. "What's the matter here?" the prefect asked.

"I—I won't!" roared Billy Bunter wrathfully. "I knew he was a burglar, I tell you! I didn't think it was Loder, or one of you rotters! The thought never entered my head!"

"Ha, ha, ha!" roared the Removites.

"Well, it's lucky for you, Bunter, that things have turned out like this," said Harry Wharton. "You couldn't have held out in the pantry much longer. And you would have been scalped by the Head! He'll probably let you off a lot for capturing the giddy burglar. But you're bound to get a licking."

"Yow! Do you really think so, Wharton?"

"I do!" said the Remove captain solemnly. "In fact, we've a good mind to bump you ourselves for the trouble you've caused us lately."

"Beasts!"

Billy Bunter rolled hastily into bed and the Removites chuckled.

Soon, quiet settled on the Remove dormitory, and once more the night stillness in that apartment was disturbed by the untuneful snore of William George Bunter.

Dr. Locke arrived back at Greyfriars early next morning and he listened to Mr. Quelch's account of Billy Bunter's escapade in amazement.

A further surprise awaited the school when news came from Courtfield that the man Bunter had caught was a notorious burglar who had been raiding houses in the neighbourhood for a long time, and whom Bunter had impersonated on that memorable occasion when he had robbed his brother Sammy of Loder's tuck.

The Head summoned Billy Bunter to him, and the Owl of the Remove was alone with him for nearly an hour.

"Bunter, I have considered all the misdemeanours of which you have been guilty during my absence, and I do not hesitate to say that in the ordinary way you would have been punished most severely!" said Dr. Locke in a grim voice. "Any other boy would have been expelled for what you have done, but as I have frequently in the past had reason to think, you, Bunter, are a more foolish youth than a rascal. In consideration of the service you have rendered the school I shall take a lenient view of the situation. I cannot, however, let you off without giving you some reminder that what you have done constitutes a flagrant breach of school rules, and that you must not attempt any such thing again. Hold out your hand!"

The Head gave him three strokes of the cane and then delivered a lecture on his misdeeds.

Billy Bunter's fat hands were tucked under his armpits and he was uttering the most heart-rending noises imaginable when at last he crawled from the Head's study.

The juniors grinned at Bunter's suffering and told him it served him right!

When Peter Todd looked in at No. 7 study some time afterwards Billy Bunter was sitting in the armchair with a bag of tarts on his lap, munching his way solidly through the lot.

The tarts belonged to Peter Todd. Bunter was himself again!

THE END

BEGINNING NEXT WEEK:  
BUNTER  
THE LION TAMER

ANSWERS TO QUICK QUIZ (from page 2)

Words

(1) Covey of partridges. (2) A woman-hater. (3) Separate should be spelled separate; syntax should be spelled syntax.

Counties

(1) Banff. (2) Oxfordshire. (3) Warwickshire.

Geography

(1) Sahara. (2) France. (3) Mexico City.

Natural History

(1) Baboons. (2) They are all mammals. (3) Maple.

People

(1) William Shakespeare. (2) George Brown. (3) Sir Anthony Eden (now Lord Avon).

SOLUTION TO CROSSWORD (from page 8)

ACROSS: 1. Spice; 4. Anvil; 9. Relay; 10. Counter; 11. Marston; 12. Rural; 13. Macmillan; 18. Excel; 20. Eskimos; 22. Present; 23. Radio; 24. Smith; 25. Snack.  
DOWN: 2. Pilgrim; 3. Crypt; 5. Neutral; 6. Inter; 7. Drums; 8. Grill; 10. Continent; 14. Collect; 15. Nomadic; 16. Tempo; 17. Aston; 19. Cream; 21. Koran.



Queens of England—Berengaria

# ENGLISH QUEEN WHO NEVER SAW ENGLAND



Richard the Lionheart loved the beautiful Princess Berengaria at first sight. He courted her in Spain, married her in Cyprus, left her in France—and never once brought her back to England

**Y**OUNG Richard, third son of King Henry II of England, was at a grand tournament at Pamplona, in Navarre, in Spain, when he set eyes on the girl he thought was the most beautiful he had ever seen in his life.

Her name was Berengaria, daughter of Sancho the Wise, King of all Navarre, and she lived with her parents in Pamplona.

"Was there ever a woman so fair as your sister?" whispered the spellbound Richard Plantagenet to his companion, Sancho the Strong, brother of Berengaria, and Richard's friend.

Richard could not have known then that one

day he would succeed his father on the English throne and become immortalized as Richard the Lionheart, and that Berengaria would become his Queen—a Queen of England who never once set foot on English soil.

When Richard finally succeeded his father on the English throne, he sent his mother, Queen Eleanor, to the court of Sancho the Wise to claim for him the hand of Berengaria. Sancho was delighted with the match; first, though, Richard had to prove that he was free to marry the

princess of Navarre by renouncing his fiancée Alice, sister of Philip, King of France.

The problem was settled by all the parties concerned at a meeting in Italy. While Philip of France chafed at the slight to his sister, Richard rejected Alice and announced his engagement to Berengaria. It was Lent, and that season forbade marriage, so Richard happily set sail for Palestine on one of his famous wars against the infidel, while Berengaria and Richard's sister Joanna followed in another boat.

On the way a great storm blew up. Richard ordered a lantern to be put on his boat to rally the fleet in the darkness.

At length Berengaria's ship, cut off from the rest of the fleet by the storm, took shelter in Limasol harbour in Cyprus. There the Spanish princess became the object of the attention of a crafty local lord named Isaac—so much so that the captain of the ship hastily ordered the anchor aboard and set sail again.

When the gale subsided Richard, by now in Crete, looked around and found Berengaria's ship missing. At once he put to sea and found his fiancée, now half dead with fatigue and terror, still on her ship in another part of Cyprus.

"Who has caused this?" he shouted in a great Plantagenet temper.

Anxiously the ship's crew told him about Isaac. With a yell of rage Richard seized his battleaxe, rallied his men and, leaping over the ship's side, led the English into Isaac's capital of Limasol, which he plundered mercilessly.

## Accidents of War

**H**AVING thus driven Isaac into the hills, Richard could now make preparations for his wedding to Berengaria.

And what a wedding! The month was May, the year 1191. Berengaria wore a transparent veil open on each side like a Spanish mantilla. On her head was a regal diadem studded with gems. And by her side was the happy Richard, with his yellow curls and bright complexion—a figure like Mars himself.

When the wedding feast was over Richard again set sail in beautiful summer weather for Palestine, with Berengaria.

All that we now know for certain is that the accidents of war divided the King from Queen Berengaria's company. Richard saw Berengaria depart in a ship from Acre on September 29, 1192, for it was his intention to return home by an overland route across Europe. But on the way he was captured by his enemy Leopold of Austria, and kept a prisoner for many months.

Not until Christmas of the year 1196 were the royal couple again reunited, in Richard's French possessions, and after that Berengaria accompanied her husband on all his campaigns and was with him when he died from a crossbow wound.

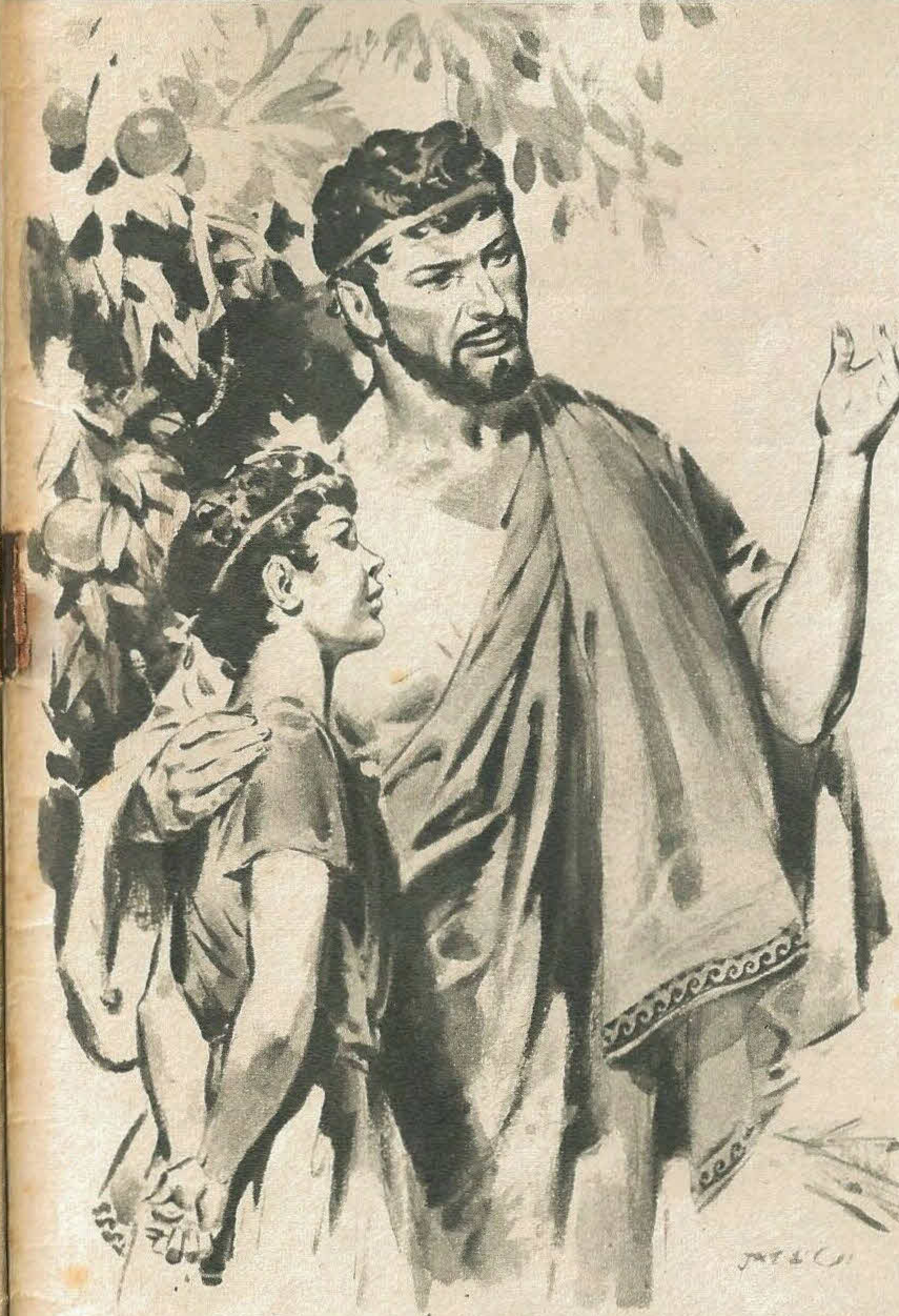
Poor Berengaria! No sooner was Richard dead than his sister, her great friend Joanna, died too. For the remainder of her life she occupied her time building an abbey, helped with funds provided by her brother-in-law John, now King of England. And in her abbey she died at a great age—the Queen of England who never went to England.



Richard Lionheart was at a tournament in Spain when he first saw his future queen—the beautiful Berengaria of Navarre, sister of his greatest friend.

The World's Thinkers—Aristotle

# THE ONLY ENCYCLOPAEDIA THAT EVER LIVED



*To properly observe the world, said Aristotle, a man must know everything that anyone else has known. Aristotle set out to do this—but even his great knowledge did not stop him making some giant howlers.*

Aristotle with his pupil Alexander, who was destined to become one of the world's greatest leaders.

**A** QUARTER of a million pounds—that is what Aristotle is said to have received as a present from his star pupil, Alexander the Great.

The great philosopher was already a wealthy man. At the age of seventeen his father, physician to the King of Macedonia, had died, leaving him a large fortune.

A year later, Aristotle went to Athens to attend Plato's famous Academy. He was a colonial boy, with accent, dress and manners very different from the polished society of Greece's greatest city state. He soon picked up more cultivated customs. Short and slender, he copied the foppish clothes of the wealthiest students, and affected a lisp.

But he quickly showed promise of becoming the "best educated man who ever trod this earth," and "the master of those who know."

At Athens Aristotle became a devoted follower and friend of Plato. He learned, and he himself taught.

When Plato died, philosophy became almost a branch of mathematics at the Academy. Aristotle rebelled, and he departed for Asia Minor where he formed a group of thinkers whose views were nearer to his own.

In 342 B.C. the forty-two-year-old Aristotle became tutor to fourteen-year-old Prince Alexander, grandson of the king whom his father had served.

At Pella in Macedonia, and among the orange and lemon groves of Stagira, where Aristotle was born, he laid the foundations of the character of a boy who was to become the supreme war-lord of his day, an astute politician and a brilliant ruler—Alexander the Great.

At Stagira, which had been destroyed by war, Aristotle gave his pupil a unique practical lesson in statecraft. Together, they reassembled the scattered population, organized the complete rebuilding of the town, drew up its laws and formed its local government, and laid out an academy, gymnasium and park.

Never has so great a pupil had so great a lesson from so great a teacher.

When Alexander's father died, Aristotle returned to Athens. And Alexander, now king, began the conquests that took the silver shields of Macedon from Syria to Egypt, from Candahar to the Indus, and from the Indus to the Persian Gulf.

How much Alexander reckoned his success was due to Aristotle's training can be gauged from the magnitude of his gift. The amount has been exaggerated by ancient historians, but even allowing for this, it seems certain to have been at least equivalent of £250,000 of our money.

Back in Athens, Aristotle bought a group of buildings and opened a school which he called the Lyceum. He soon gathered many students, and in the mornings he lectured to them on logic, physics and metaphysics, and in the afternoons on rhetoric (the art of persuasion) or politics. Most of the lectures and discussions took place while teacher and pupils were walking in the gardens.

Aristotle also found time to collect the world's first great library of manuscripts and maps. For one set of these he paid several thousand pounds, which he was able to afford even before Alexander's generosity.

He applied logic—the study of methods of valid proof—to subjects ranging from zoology to poetry, from history to astronomy. According to Aristotle, God revealed truth in the gradual

build-up of human understanding, and in the natural processes man could observe in the world outside himself. The object of philosophy was to achieve harmony between these two sources of inspiration and information.

To do this, a man must know, at least in his own subject, everything that anyone else had known. Aristotle set out to achieve this in every subject—except mathematics and music. His vast range included even such items as estate management and "the science of wealth." He read, memorized, investigated, contemplated and only then considered himself ready to set down his own theories. For example, before venturing upon a theory of the State, he studied and wrote the detailed constitutional histories of more than 250 existing states.

## Ideal State

**I**N his theory he concluded that the State (in Greek terms this does not mean "nation," but a self-governing city with enough surrounding farmland to feed its people) was the highest social institution, and ensured the greatest good and happiness for mankind.

In Aristotle's ideal State, every citizen was to have two houses, one in the actual city and one on the outskirts. Most of their time would be spent in discussions, poetry readings and music in the city squares. No industry would be allowed, so that no great discrepancies in wealth would arise. And, as in the actual Greek city States, all the work would, of course, be done by slaves.

It is this last vital fact that twists so much Greek political thought into a form that has little relevance to us today.

Admiration of the Greeks should not blind us either to their stupidity when it comes to practical scientific matters. Writings attributed to Aristotle tell us that "Man alone presents this phenomenon of heart beating." (*Had he never held a bird?*) Also: "Humans are the only animals with flesh on their legs." (*Had he never felt a goat's leg?*) Again: "The reason that children sleep so much is that their food is carried upwards."

Aristotle's so-called scientific work is littered with scores of such howlers. "Not one germinal discovery in science is due to him or his disciples," is how one modern-day scientist sums up Aristotle's contribution.

Yet there is little doubt that in philosophy his influence has been greater than that of any other thinkers, except the founders of the great religions.

In his own time, however, Aristotle was not recognized by authority. Hidden jealousies and suspicions flared up after the death of his protector, Alexander. He was accused of blasphemy, and sentenced to death. But he had already fled to Chalcis, to his mother's old family home. And there, in 322 B.C. at the age of sixty-two, he died of a stomach disease.

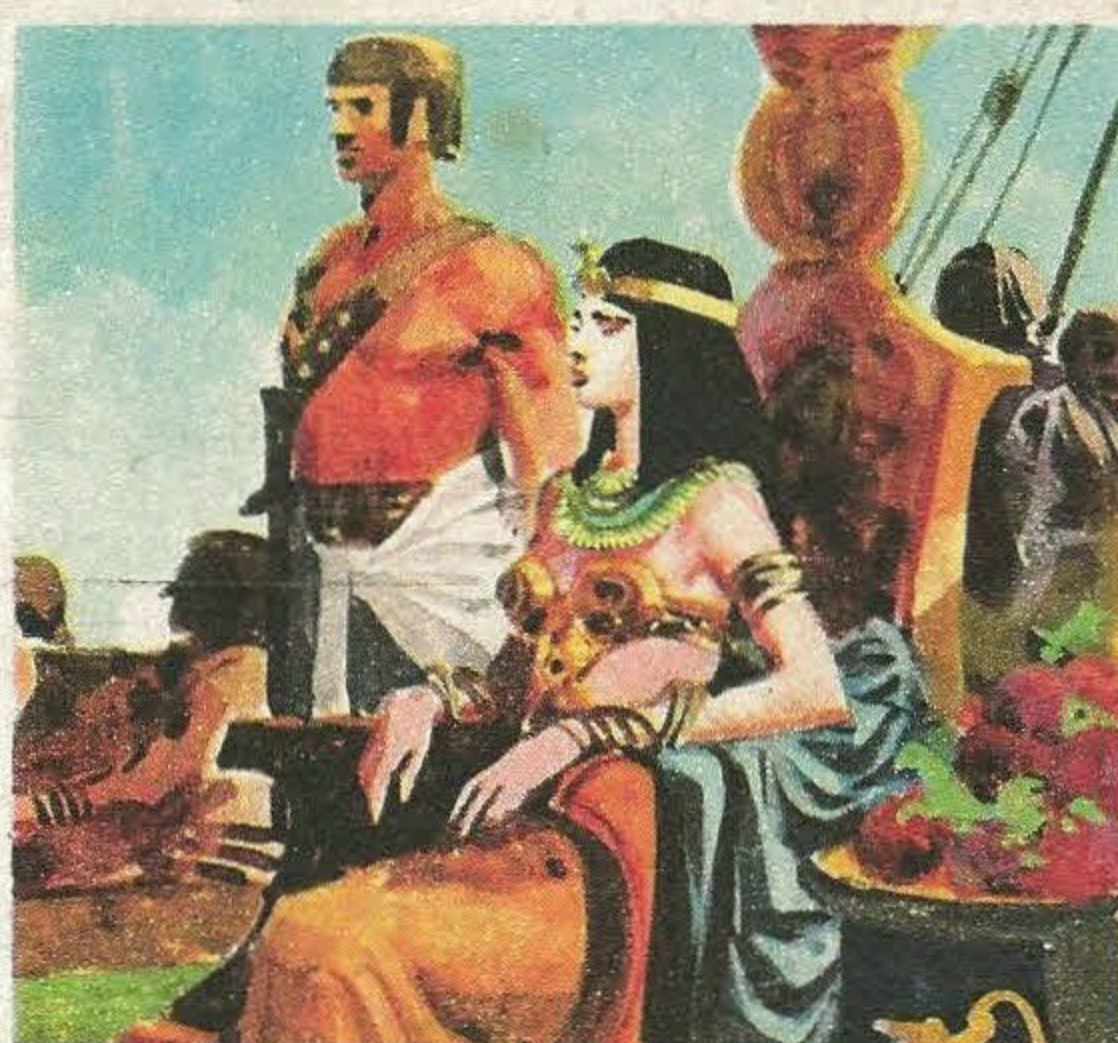
Many of his writings were buried in a cellar, and it was not for another two hundred years that they were published and scholars all over Europe began to pay homage to the only encyclopaedia that ever lived.



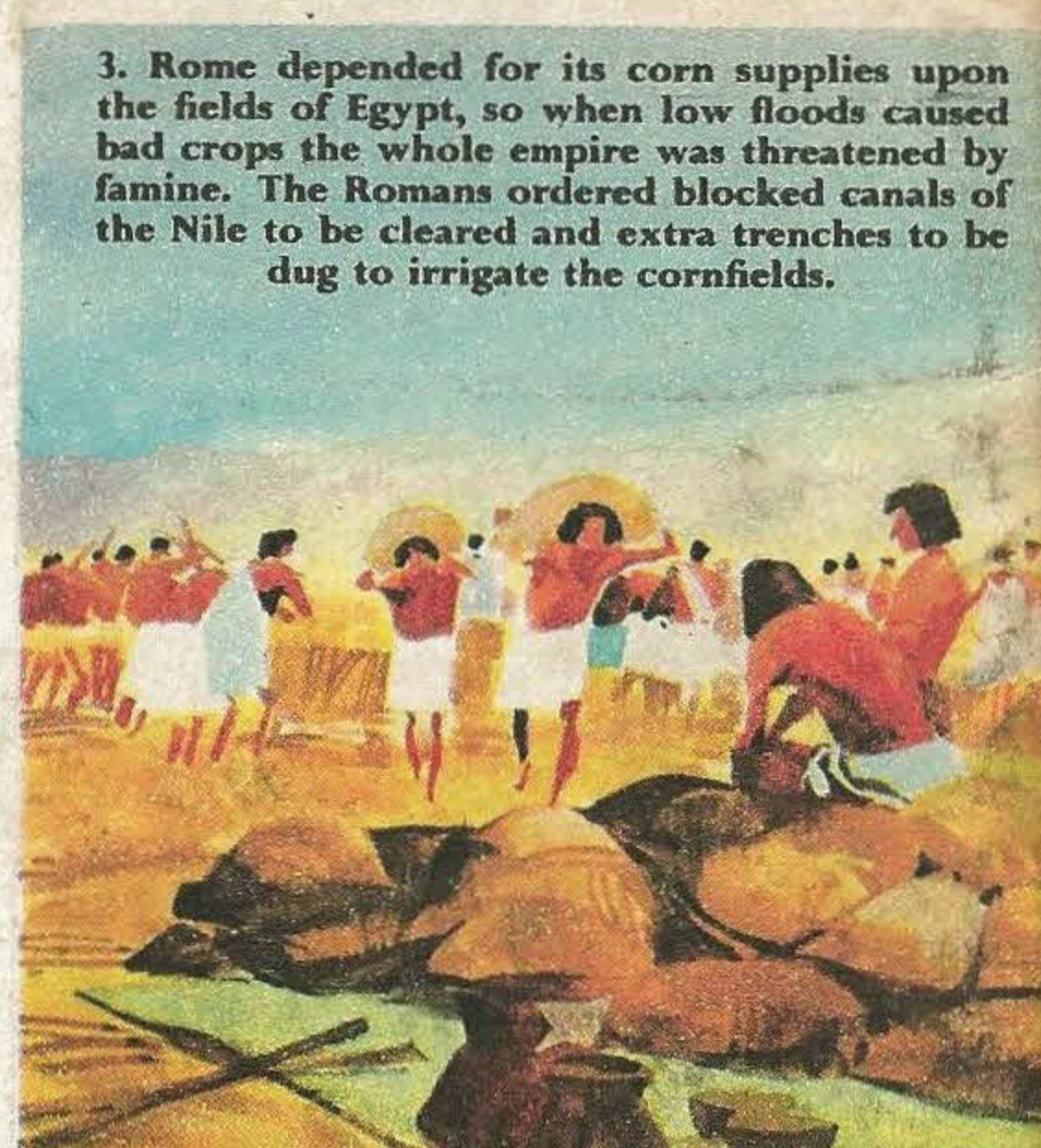
# MOUNTAINS OF THE MOON



1. Under Greek rule in the fourth century B.C., Egypt was divided up among Alexander's generals. Grants of farm land along the Nile banks were given to Greek soldiers, who settled in the villages. Eventually the 7 million people of the Nile valley became mixed Greek and Egyptian stock as the result of marriages between the two races.



2. Queen Cleopatra called in the Romans to help her in a quarrel with her elder brother over the throne. The Romans became powerful enough to capture Egypt in 30 B.C. and turn it into a Roman province.



3. Rome depended for its corn supplies upon the fields of Egypt, so when low floods caused bad crops the whole empire was threatened by famine. The Romans ordered blocked canals of the Nile to be cleared and extra trenches to be dug to irrigate the cornfields.

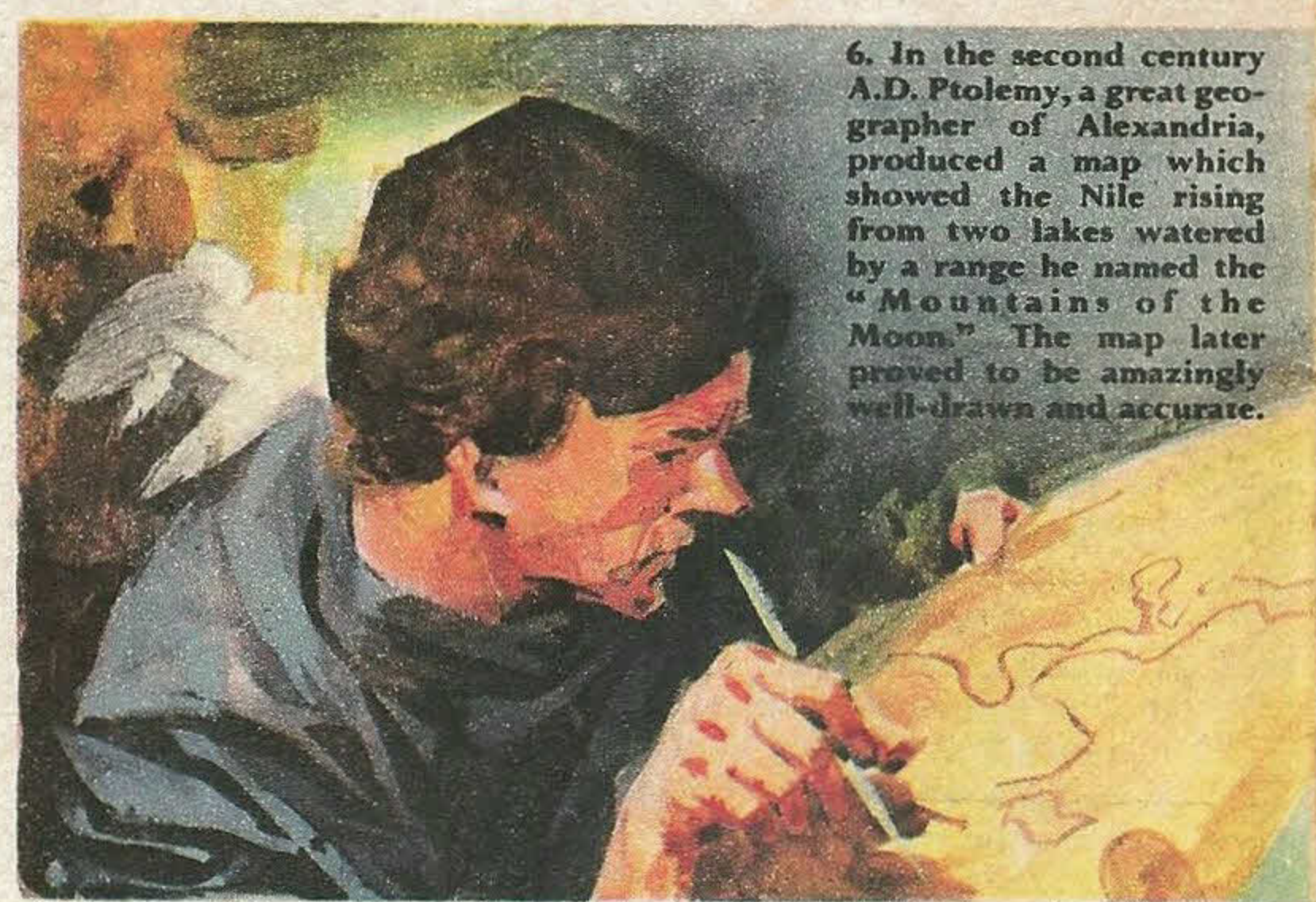


4. The source of the Nile was still a mystery, but in A.D. 50 a Greek merchant, Diogenes, made an inland journey and reported finding two great lakes fed by mountain snows, which he claimed were the Nile sources.

5. The Emperor Nero sent two centurions up the river to explore Nubia, but their way was blocked by a floating swamp of vegetation, called sudd by the Arabs.



7. Arabs invaded the Nile valley in A.D. 639. After a famous siege at Umm Dunain on the river, they crossed into the Faiyum area and took over the fertile lands there. In A.D. 640 they defeated the Romans at Heliopolis.



6. In the second century A.D. Ptolemy, a great geographer of Alexandria, produced a map which showed the Nile rising from two lakes watered by a range he named the "Mountains of the Moon." The map later proved to be amazingly well-drawn and accurate.



8. The Arabs controlled Egypt for many centuries, founding the city of Cairo as their capital in A.D. 969, not far from Memphis, where the early Egyptian kings had ruled.

**NEXT WEEK:  
THE STRUGGLE  
FOR EGYPT**