A window open on the world

The UNESCO Courier

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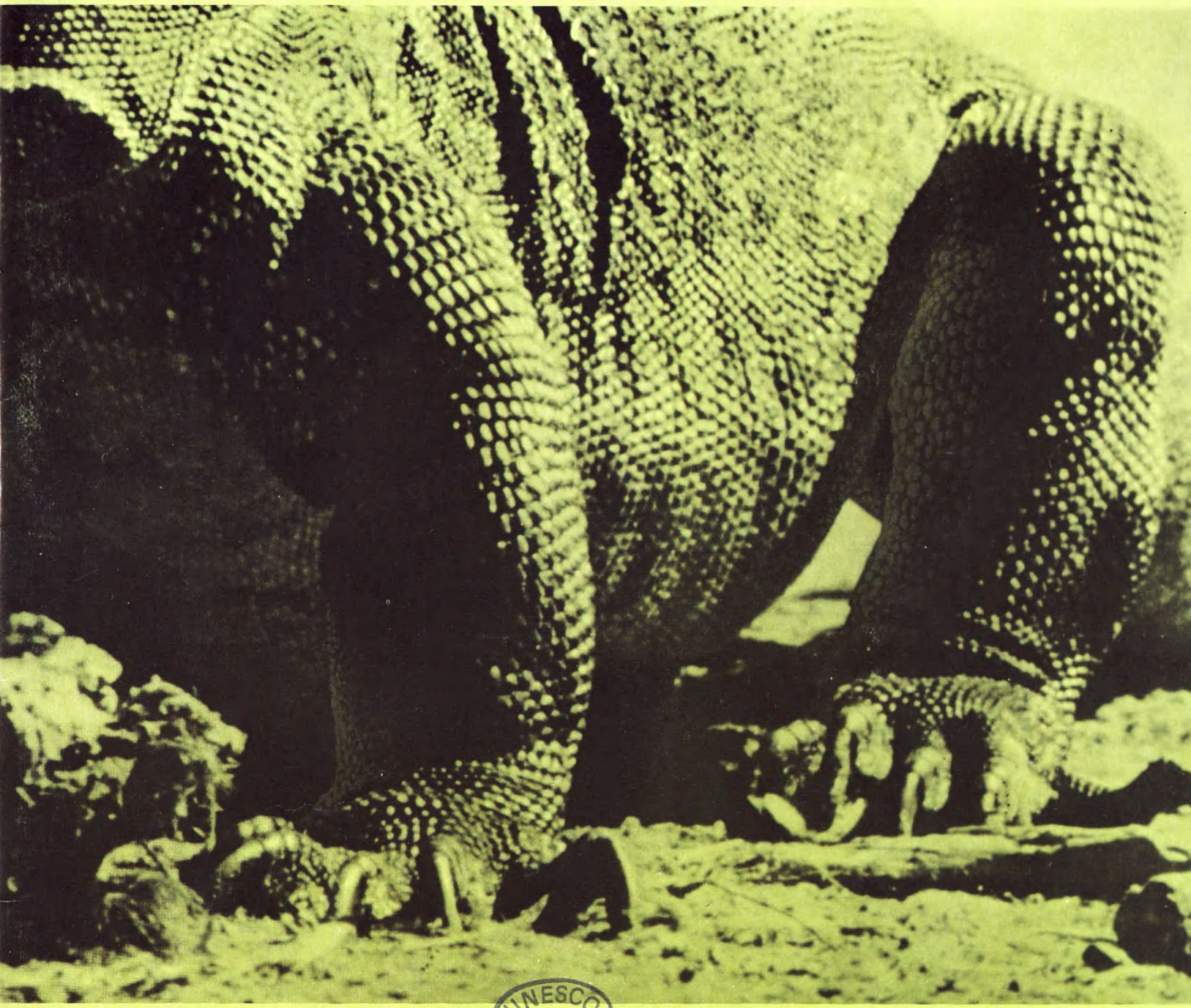

WAR OR PEACE ?

Which will it be: the way of the dinosaur or a united world to build the future ?

From "Bogomil Sculpture" by Otto Bihalji-Merin and Aljz Benac. Photos by Toso Dabac © "Jugoslavija", Belgrade, 1962.

The hand of the Bogomils

TREASURES OF WORLD ART 19

Enormous upraised hands, symbols of supplication, figure on many of the tens of thousands of tombstones carved by the Bogomils in Bosnia and Herzgovina (Yugoslavia). The Bogomil graveyards—vast stone communities of the dead—are the memorials of a medieval religious cult which found refuge in the Balkans. The authors of this extraordinary and still largely unknown art decorated tombs, sarcophagi and coffins with subjects ranging from geometrical designs to scenes from daily life, which have the originality, forcefulness and spontaneity of genuine folk art.

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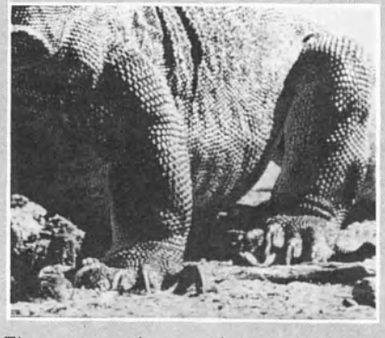

This extraordinary photograph was taken by the French film producer, Georges Bourdelon during an expedition to the Sunda Isles (Indonesia) in 1957 to locate the creature, and is shown in Georges Bourdelon's film, "The Lizard of Komodo".

Photo © Georges Bourdelon, Paris

Cover photo

This is a rare photograph of that elusive monster the "Dragon of Komodo", a giant lizard, 10 to 20 feet long, still found in parts of Indonesia. One of the world's last surviving prehistoric animals, its massive body and giant tail and claws are reminiscent of the dinosaurs that once roamed the Earth. This living fossil could well symbolize war—that other anachronistic fossil of today.

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WAR OR PEACE?

Arab refugees in the Middle East.

Photo © Sanda - Holmes-Lebel

THIS issue of the "Unesco Courier" goes to press at a time when peace in our world is poised over a precipice. Wars and conflicts, though "limited" in nature, have spread a broad swathe of death and destruction across many lands. And no sooner has one area of conflict ceased firing than the flames seem to attack another. At the same time the spectre of the nuclear and "conventional" arms race continues with mounting ominousness.

Just under three years ago, the "Unesco Courier" reported, in an issue devoted to the problems of disarmament (Nov. 1964) that the world's expenditure on arms had reached the astronomical figure of $ 120,000,000,000 a year. Today we are spending incredibly higher sums, and the arms race mania is engulfing many more countries.

Despite this—or rather because of all this—the voices that are being raised to put an end to the headlong race towards Armageddon are growing louder and louder. Resort to violence, as a means of settling differences, is being denounced more vehemently than ever before. And for millions upon millions of people everywhere in the world, war today is seen for what it really is—man's greatest folly, a monstrous anachronism in an age where the survival of humanity itself is at stake.

Last November, the Plenary Session of the General Conference of Unesco adopted a resolution which called on all its Member States to reject war once and for all as an instrument of national policy and to condemn all forms of direct and indirect aggression and interference in the domestic affairs of States; to renounce recourse to violence in settling their differences; respect the right of all nations to self-determination and independence; and to take all action to contribute to an agreement on general and complete disarmament under international control.

The resolution also called on Unesco, as a world organization, "to disseminate the truth that war is no longer a possible solution to man's problems," and adopted as Unesco's mandate the U.N. Secretary-General's request that "Unesco bring home, at all times, to all peoples and governments in all parts of the world, what war means today." It recalled U Thant's message to Unesco in which he declared that "in the past 20 years, the very progress of science and technology has brought new, terrible and ever-present dangers to mankind as a whole, the dangers inherent in the new weapons of mass destruction."

It is to this purpose that the present issue of the "Unesco Courier" is devoted: on the one hand, to review the situation created by the present arms race with its escalation of nuclear weapons; on the other, to underline the urgency of reaching agreement on practical methods for the de-escalation of arms and weapons, that is, disarmament, and the no less urgent task of assuring the peaceful growth and progress of all countries, developed and developing alike.

Which is it going to be? The way of the dinosaur and the end of our species; or a united world building a common future? It is up to the peoples and governments of all nations to face the reality that all men have a common destiny today, and that that destiny must be to build a world community in peace by a combined effort.

Vietnam.

Photo © Holmes-Lebel

First results of an international poll undertaken with the aid of Unesco

INQUIRY INTO A DISARMED WORLD

HOW do people today visualize the future of the world? A vast international inquiry based on public opinion polls has been in progress for the past three years in an effort to obtain an answer. The poll is being carried out by the European Co-ordination Centre for Social Research and Documentation, in Vienna Austria, an independent unit of the International Social Science Council, with the financial aid of Unesco.

The inquiry is divided into two stages. The first, on the theme Image of a Disarmed World was carried out in three countries, France, Norway and Poland, under the direction of Professor Jean Stoetzel, of the University of Paris, and is now completed. The second stage is at present getting under way and will comprise an even more far-reaching programme of inquiry on the theme The World in Year 2,000.

The public opinions polls for the second stage will cover at least 13 countries (Czechoslovakia, Denmark, Finland, Federal Republic of Germany, Italy, Netherlands, Norway, Poland, U.K., U.S.S.R., Sweden and Yugoslavia), under the over-all direction of Professor Johan Galtung of the International Institute of Peace Research in Oslo, Norway. The inquiry will make it a special point to poll the opinions of young people, particularly with regard to their views about a world in the process of partial or total disarmament. The full inquiry, along with an analysis of the findings, is not expected to be completed before several years.

On the following pages, the "Unesco Courier" is pleased to present some of the first results of the inquiry on the Image of a Disarmed World. Some 5,000 persons, comprising a representative sampling of the populations of France, Norway and Poland, were interviewed at their homes during the winter

CONTINUED ON PAGE 7

In the answers to the questionnaire, figures indicate the percentage of the total persons polled except where otherwise stated.

1

How would you like to see the world organized after total disarmament?

	France	Norway	Poland
As at present	17	17	14
With a world government and no national frontiers	19	7	29
Maintain national sovereignty as now, but strengthen the role of international organizations such as the U.N.	25	48(a)	29
Form regional groups of countries with common interests	25	23(b)	12
No answer	14	5	16

Norwegian version:

(a) "About as now, but with a stronger United Nations."

(b) "With regional unions of nations that belong together".

2

Imagine for a moment that total disarmament has taken place in the whole world. Do you think that would mean any changes in the lives of people like yourself?

	France	Norway	Poland
Yes	53	61	74
No	38	25	24
No answer	9	14	2

3

In all countries of the world people discuss how the Government should spend public money. What do you think of your Government's effort in the following fields; do you think it should do more; that it is doing enough; or that it should do less?

	France	Norway	Poland
● *Military defence*			
More	9	6	12
Enough	37	26	23
Less	40	64	32
Don't know	14	4	33
● *Industry, development*			
More	46	55	24
Enough	36	30	43
Less	2	10	13
Don't know.....	16	5	20
● *Assistance to developing countries in Africa, Asia and Latin-America*			
More	15	18	5
Enough	29	42	15
Less	44	36	29
Don't know.....	12	4	51
● *Education*			
More	64	56	43
Enough	28	38	42
Less	1	4	5
Don't know.....	7	2	10

	France	Norway	Poland
● *Social welfare and health*			
More	61	55	62
Enough	24	39	20
Less	1	4	4
Don't know.....	7	2	14
● *Housing*			
More	77	80	73
Enough	20	16	18
Less	—	1	2
Don't know.....	3	3	7
● *Agriculture, development*			
More	45	30	64
Enough	19	45	19
Less	1	20	4
Don't know	35	5	13
● *Communication, roads*			
More	80	84	61
Enough	16	13	22
Less	—	1	1
Don't know.....	4	2	16

of 1964-1965. The French poll was carried out by the French Institute of Public Opinion under the supervision of Madame Hélène Riffault; the Norwegian survey, by the International Institute of Peace Research in Oslo, under Johan Galtung; and the Polish inquiry by the Polish Institute of Public Opinion, under Professor A. Sicinski.

Persons polled were all 18 years or older, of both sexes, and were asked to reply to a series of some 30 questions on aspects of disarmament and world affairs. The initial inquiry sought to determine, first, how well informed people are on international affairs generally, and to what extent they are interested in such problems. Another series of questions sought their views on the prospects of disarmament, and how they thought resources thus released could best be used.

A detailed analysis of the replies should help to throw light on the attitudes and values that influence public opinion on such questions as disarmament, and may be extremely helpful in revealing factors most likely to contribute to the attainment of world peace.

Already, however, one point is quite clear. The polls carried out thus far in countries with widely differing social and economic systems, foreign policies and cultural and historical backgrounds, might have been expected to reveal widely differing points of view. The contrary has been found to be true with a striking identity of views on most of the questions asked. Although this first stage of the inquiry was limited to three countries, its results suggest that it may well be a preview of general opinion regarding attitudes towards the world of tomorrow in which armaments are drastically reduced or completely discarded.

5 In your opinion what is the greatest danger man is facing today ?

(Open question)

	France	Norway	Poland
Nuclear weapons, nuclear warfare	63	59	51
World war, war ('nuclear' not mentioned)	27	13	43
Hunger, poverty, overpopulation	18	5	10
German militarism	—	—	12
China (a)	17	4	—
Disease, cancer	14	—	5
Conflicts between nations, between races	8	2	8
Communism	6	3	—
Wages too low, high cost of living, unemployment	4	—	—
Armaments, armament race (b)	—	1	6
Other answers	9	8	9
No answer	3	5	7
Total (c)	169	100	151

(a) Norwegian version: China and its atom bomb.

(b) Not included in French questionnaire.

(c) The answers in the Norwegian survey add up to 100 %, the French and the Polish results show multiple answers.

4 Taking for granted that money should be given to the underdeveloped countries of Africa, Asia and Latin America, should that money go directly from the rich countries to the poor, or should it be deposited with an international organization which would then decide how it should be used, or should aid be given in both ways?

	France	Norway	Poland
To an international organization	46	48	40
Directly	23	33	17
Both	14	13	9
Don't know	17	6	34

6 What do you think would be the result of a third world war for your country?

(Fixed alternatives)

	France	Norway	Poland
Total destruction	30	39	51
Irreparable losses	29	20	30
Heavy losses, but not irreparable (a)	29	35	6
Don't know	10	6	12

(a) Polish version: "Heavy losses but with perspectives for reconstruction." Norwegian version (two items are put together): "Heavy losses but not irreparable", "Not so heavy losses".

CONTINUED ON NEXT PAGE

7 In terms of war, peace and disarmament, what do you think the world situation will be like in 5 years and in 20 years, will there be:

	France	Norway	Poland
● *The same situation as now*			
In 5 years	31	49	29
In 20 years	9	16	4
● *More armament*			
In 5 years	25	16	23
In 20 years	11	10	4
● *Partial disarmament*			
In 5 years	22	20	15
In 20 years	18	23	13
● *World war*			
In 5 years	4	3	6
In 20 years	9	10	17
● *Total disarmament*			
In 5 years	4	1	3
In 20 years	18	11	15
● *Don't know*			
In 5 years	14	11	24
In 20 years	35	30	47

8 Would you approve of the integration of a part of the armed forces of your country into a permanent international force under United Nations command?

	France	Norway	Poland
Yes	33	45	24
Perhaps.....	34	29	24
No	—	15	—
Don't know	33	11	52

9 Which of the following is the most important factor in assuring world peace? (order of choice)

	France	Norway	Poland
The good sense of leading statesmen.	1	1	1
That the big powers do not want war..	2	3	3
Public opinion against war	3	5	2
The balance of power between the blocs	4	6	4
Treaties, conferences and meetings between nations ..	5	4	7
The United Nations	6	2	5
The power of the Western bloc.....	7	7	7
The power of the Eastern bloc.....	7	10	6

Figures for France and Poland give the order of choice of the most important factor. Those for Norway indicate "very important" factors. Norway's questionnaire offered a choice of four classifications: "very important", "somewhat important", "of no importance", "negative importance".

10 Do you think that in the years ahead your standard of living will increase, decrease or stay the same?

	France	Norway	Poland
Increase	39	36	38
Stay the same	35	46	36
Decrease.....	14	11	13
No answer	12	7	13

11 Do you speak any foreign languages?

	France	Norway	Poland
Yes.....	26	—	37
No	74	—	63
No answer	0	—	0

Question not included in the Norwegian questionnaire.

12 For each example in this list of possible news items, say whether it interests you a great deal, a little or not at all

	France	Norway	Poland
● *A new disarmament proposal in Geneva*			
A great deal ...	41	50	43
A little	27	—	35
Not at all	26	—	22
?	6	—	—
● *The independence of a new nation in Africa*			
A great deal ...	16	9	24
A little	30	—	40
Not at all	46	—	35
?	8	—	1
● *A new development in another country*			
A great deal ...	11	11	13
A little	32	—	37
Not at all	52	—	49
?	5	—	1
● *A political event in your own country*			
A great deal ...	20	15	28
A little	28	—	46
Not at all	38	—	25
?	14	—	1
● *The result of a national football match*			
A great deal ...	22	3	15
A little	24	—	19
Not at all	49	—	65
?	5	—	1
● *An increase in the cost of living*			
A great deal ...	79	11	64
A little	12	—	20
Not at all	8	—	14
?	1	—	2

(1) The Norwegian question asked: "Which two items would you like to know more about?" Norwegian figures are based on the foremost choice in terms of interest aroused.

(2) ? = "No answer" or "Don't know."

13 Have you travelled abroad during the last ten years?

	France	Norway	Poland
Yes.....	40	73	12
No	60	27	87
No answer	0	0	1

The Norwegian questionnaire asked: "Have you ever travelled abroad."

14 In which of these cities is the headquarters of the United Nations located?

	France	Norway	Poland
Geneva	34	8	15
New York	36	73	64
Washington	10	10	6
Vienna.....	0	0	0
Other.....	1	0	0
No answer	19	9	15

15 In the summer of 1963, a treaty was signed in Moscow between the Soviet Union, Britain and the United States. What was the treaty about?

	France	Norway	Poland
A ban on certain nuclear tests	52	59	54
A joint programme for space research.	6	14	9
A settlement of the Cuban problem...	6	11	3
No answer	36	16	34

SCIENCE AND DISARMAMENT

by Philip Noel-Baker

Nobel Peace Prize, 1959

Photo Unesco - Dominique Roger

PHILIP NOEL-BAKER, *one of the world's leading authorities on questions of disarmament, was awarded the Nobel Peace Prize in 1959. He has devoted many years to research on problems of peace and disarmament and has written numerous works on these subjects, including "Disarmament" (1926); "The Private Manufacture of Armaments" (1936); "The Arms race: A Programme for World Disarmament" (1958) and many other studies. In 1932 he attended the League of Nations Conference in Geneva, the first of the major world conferences on disarmament, in which 64 countries took part. Philip Noel-Baker has been a member of two British Governments (1942-1945 and 1945-1951) and is a member of the present British Parliament. In November 1966 on the occasion of Unesco's 20th anniversary celebrations, he took part in the round table meeting which appraised Unesco's contribution to peace (see page 64). Philip Noel-Baker has always been closely associated with sport. He was a member of the British Olympic track team in 1912, 1920 and 1924; team captain in 1920 and 1924 and silver medalist in 1920. He is now president of the International Council of Sport and Physical Education.*

"The time is not far distant when man will get hold of Atomic Energy—a source of power which will enable him to build his life as he likes . . . Will man be able to make use of this power and direct it for good, and not for self-destruction? Is he old enough to know how to utilize the power which Science must inevitably give him?"

Academician V. I. Vernadsky of the U.S.S.R., February 1922

"Science has been glamorized for so long that many people firmly believe it can do no wrong."

Prince Philip, Duke of Edinburgh, 1963

WITH the beginning of the modern arms race about a hundred years ago, science and engineering became the major factors in preparation for war. Until then, manpower—numbers, training and discipline—had been of decisive importance in determining a nation's military strength. During and after the Franco-Prussian war, the importance of armament—weapons, equipment, armour, transport, signals—rapidly increased. Expenditure on ordnance and warships grew greater every year.

Before the First World War began, the General Staffs had grasped the fact that superior armament might be decisive. During the First World War, new weapons were introduced, to the production of which scientists had made their contribution—aircraft, poison gas, flame-throwers, tanks, and many more. Before the Second World War far-seeing members of the British and German General Staffs had invited eminent scientists to join their Defence Departments as permanent advisers.

But it was only after the Second World War had actually begun that the military leaders of the belligerents fully grasped the proposition which Professor Isidor Rabi long afterwards expressed as follows: "The combining of military techniques and science makes it easy to apply scientific principles to kill people—who are not strong structures." (1).

From 1939 onwards, scientists came in mounting numbers into every war department; military research was rapidly expanded; scientific methods were applied by leading scientists to the actual conduct of operations by land, sea and air. After the war was over, this process did not stop. On the contrary, it has continued with accelerating momentum until today.

This has revolutionized the armaments that governments maintain, and the training of their national forces. In consequence, it has changed the problems of disarmament and has made it essential that the scientists should play a leading part in disarmament negotiations.

In the League of Nations Conference of 1932, the major problems to be solved were the techniques by which manpower could be equitably reduced and limited; the abolition of military aircraft; naval disarmament, by the abolition of "capital" ships and submarines, and the limitation of other vessels; budgetary reduction and control.

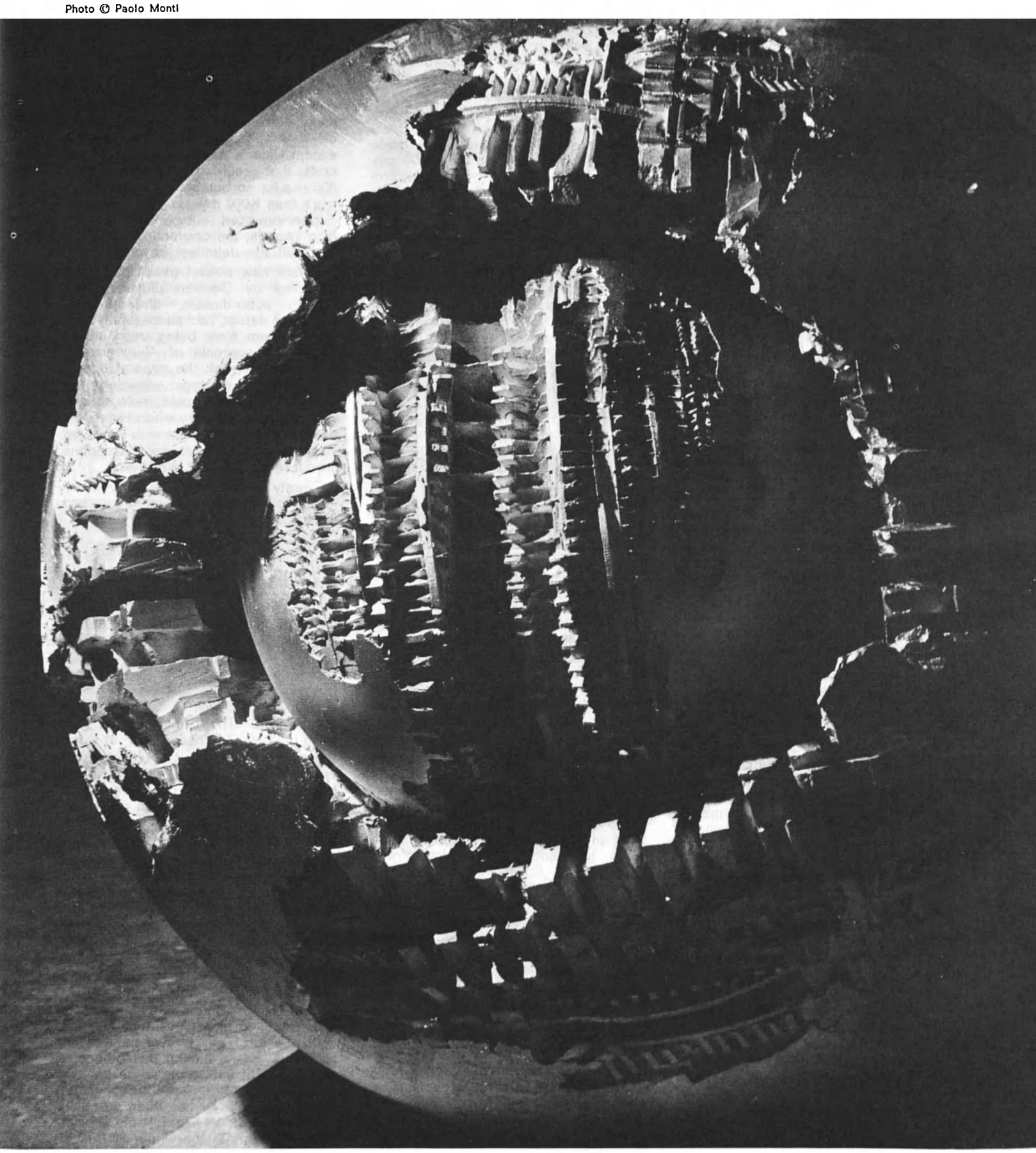
The negotiations in the League Pre-

(1) *New York Times*, January 1, 1958. Professor Rabi was chairman of President Eisenhower's Scientific Advisory Committee and has been consultant of the Military Research and Development Board since 1946; he was awarded the Nobel Prize for Physics in 1944.

CONTINUED ON PAGE 12

Mutilated, deserted, its great cities in ruins—will this be the face of our planet after a Third World War? This bronze sculpture, "Globe", is the work of the young Italian artist, Arnaldo Pomodoro. In many of his sculptures the artist portrays the crucial problem of man today: universal harmony or complete annihilation.

Photo © Paolo Monti



paratory Commission and in the conference itself were more thorough, more serious, and technically much more successful than any that have taken place since 1945. They were conducted by leading statesmen who had military and civil service advisers to help them. Every technical problem of a general disarmament treaty was satisfactorily solved; only the political decision to sign the treaty was required. Much of the work done (for example, on the four problems mentioned above) still remains valid today. Yet it is doubtful if a single scientist was present in the League commission and conference from first to last.

Things are different now. Scientists have made the modern weapons; they must play a major part in solving the new technical problems which these weapons involve, and in drafting the detailed clauses of the disarmament treaty; they must help to form the public opinion by which a treaty can be carried through.

The following table of expenditure by two important countries shows how "the combining of military techniques and science" has expanded since 1939 (1).

Expenditure on military research and development, all defence departments

Period	*United Kingdom*	*United States of America*
	(£ million)	($ million)
1938-1939	5.7	Nil
1939-1940	7.9	26.4
1947-1948	40.0	529.2
1951-1952	80.0	821.0
1953-1954	100.0	1 569.2
1956-1957	204.0	1 407.9
1960-1961	228.0	8 400.0
1964-1965	250.0	13 400.0

(1) In considering the meaning of these figures, allowance must be made for the factor of inflation. At 1953 prices, the United Kingdom figure would be £210 million, i.e., in real terms it had more than doubled in ten years. (£ = 2.8 dollars at the current exchange rate.)

There are no figures publicly available which show United States and United Kingdom expenditure during the war years. But Dr. Vannevar Bush has described the creation of the Military Research Organisation of which he was the head in the United States; he had 35,000 scientists under his direction. In addition there was the very large international team, under Dr. Robert Oppenheimer, working on the Manhattan District Project for the production of the first atomic bomb.

These are large figures; but the numbers, both in the United States and the United Kingdom, have greatly increased since then. In his Economic Message to Congress in January 1963, President Kennedy said: "The defence, space and atomic energy activities of the country absorb about two-thirds of the trained people available for exploring our scientific and technical frontiers."

A small part of "atomic energy activities of the country" is devoted to civil ends; thus it is perhaps true to say that 60 per cent of the United States scientific and technical experts are engaged in military work. The proportion in the United Kingdom is less; 20 per cent of the experts, and 40 per cent of the national expenditure on research. But President Kennedy's words were true of both countries when he said: "We have paid a price by sharply limiting the scarce scientific and engineering resources available to the civilian sectors of the economy."

The scale of the enterprises made possible by a budget of $ 13,400 million is immense. In the platform adopted by the Democratic Party for the presidential election in August 1964, President Johnson pledged himself to "maintain the world's largest military research and development effort, *which has initiated more than 200 new programmes since 1961*, to ensure American leadership in weapons systems and equipment".

New weapons developed since 1945

There is no information about the Soviet Government's expenditure on military research: but its startling achievements in multi-megaton nuclear weapons, ICBMs (intercontinental ballistic missiles), sputniks and space flight show that it must be very high. It is known that the Soviet General Staff have devoted much attention to tactical nuclear weapons and to other types of new weapons.

There is no doubt that other governments are doing the same. It was recently revealed that French expenditure on military research had been greatly increased. It is unlikely that German and Italian expenditure is much less. Mainland China, India, Israel, Pakistan, the U.A.R. and many other countries certainly have military research establishments, though probably as yet on a much smaller scale.

If increased power of offensive attack is the purpose of military research, then the governments have certainly got their money's worth. All the weapons of offence used against Hitler—aircraft, tanks, artillery, submarines—have been enormously "improved". New weapons of every description have been added. Three categories of weapons of mass destruction —nuclear, chemical and biological— have been developed.

Although it seemed in 1955 that the "ultimate" weapons had been devised, everything produced in that year is long since out of date; there is now a total revolution in military equipment every five years. Professor Rabi has warned us that the "progress" made in the next twenty years will be no less rapid or dramatic than that of the last twenty.

Conventional weapons

It is already difficult to remember that in May 1945, when Hitler's Germany surrendered, there were no nuclear weapons; no ballistic missiles except Hitler's rudimentary V2; no aircraft that could travel faster than 400 m.p.h.; no bomber with a range of more than 1,000 miles. There were no nuclear-powered submarines or surface vessels; the conventional torpedo was still the deadliest naval weapon.

Potent new poison gases had been prepared by German chemists, but Hitler's subordinates, already conscious of defeat, had successfully prevented them from being used. Both sides had arsenals of "biologicals", but dared not risk the general opprobrium and the strategic hazards which their employment would have meant. Broadly, up to the day when Hitler fell, the war had been fought with improved versions of the conventional weapons produced by the First World War.

Twenty years later, those conventional weapons have been further and enormously improved.

Two of the latest types of United States military aircraft are the B-58 and the B-70. The B-58 can carry a 50-megaton load of bombs, i.e., the equivalent of 50 million tons of TNT. It has travelled from New England to Paris in just over three hours. The B-70 is designed to travel at three times the speed of sound; if it is constructed in numbers for the United States Air Force, it will cost $ 100 million per aircraft. The British TSR-2, if it were built, would "hedge-hop" at twice the speed of sound; it could be guided by instruments to its target and back; the pilot need only interfere if something went wrong. All these aircraft, refueled in the air, would have a range of many thousands of miles.

The modern submarine is propelled by nuclear power. It can cruise for thousands of miles, and for periods of weeks, without coming to the surface. It can navigate under the Arctic ice-cap, and can break the ice and fire its missiles. Or it can fire its missiles from many feet below the surface of the open sea.

The United States Government is now installing what President Johnson called "the new over-the-horizon radars giving us almost instantaneous knowledge of ballistic missiles launched for attack". Aerial reconnaissance photography has been so much improved that a handful of aircraft could photograph the whole of Russia

in a few hours; from a height of 60,000 feet, they could reveal the smallest objects (a golf ball) on the ground.

Similar improvements have been made in tanks, artillery, naval surface vessels, especially aircraft carriers and amphibious landing vessels, and even in rifles, machine guns, and all the other conventional weapons of the Second World War.

But most attention, and most expenditure, has been concentrated on the weapons of mass destruction.

Nuclear weapons

The basic facts about nuclear weapons are well known: the Hiroshima bomb was more than 1,000 times as powerful as the conventional "blockbusters" used by the RAF against Berlin; the 20-megaton (1) weapons now carried by United States bombers—and no doubt by Soviet bombers too—are more than one thousand times as powerful as the Hiroshima bomb.

Thus the "yield" of the unit of air attack deliverable by a single bomber has been multiplied a million times. One 20-megaton weapon is equivalent to nearly fourteen times the explosive power of all the bombs dropped by all the Allies on Germany in six years of war. We forget that almost all the cities of Germany lay in ruins in 1945.

One 20-megaton bomb more devastating than 1,000 Hiroshima bombs

The 20-megaton bombs exist in large numbers. They can be delivered by United States B-52 bombers, by the obsolescent B-47, the B-58, by the Soviet Bear and Bison, and the British V bombers, and by some types of Soviet intercontinental ballistic missiles.

But many authorities believe that a 20-megaton bomb is larger than any military or civilian target would require. The British Home Office Manuals of Civil Defence calculate the results of a 10-megaton bomb on London; if it were "dropped centrally", there would be "irreparable damage over most of the London County Council area" (i.e. a circle of total destruction roughly eight miles across) "with minor damage over the whole of the metropolitan area" (a circle perhaps thirty-two miles across). In most other British cities, however, a good deal of potential damage would consist of open country."

In other words, there is only one target in the United Kingdom large enough to need a 10-megaton bomb for its total destruction. In fact a 1-megaton bomb would probably put all but the largest cities out of action. The new United States submarine missile, Poseidon, which is replacing the Polaris A3, has a yield of 1.5 megatons (i.e. 75 times Hiroshima.) Its greater yield is due to the newly discovered, and more potent, nuclear explosive, plutonium-241. In 1961, the U.S.S.R. exploded a 57-megaton bomb, and boasted not without reason that it could have been 100 megatons.

It has been calculated that the United States has a stockpile of nuclear weapons with a total yield of 50,000 to 60,000 megatons; the Soviet Union a stockpile of 20,000 megatons or more; the British and French much less. The United States stockpile includes "tens of thousands of 'tactical' weapons".

The United States Secretary of State for Defence, Mr. McNamara, has warned us that new processes may soon make the production of nuclear weapons cheaper and easier than it is now. He has said that, in spite of "fail safe" and the "permissive link" (sometimes called the "electronic key") and other devices to guard against technical and human failure, there remains a grave danger of "accidental" or "unintended" nuclear war.

Biological weapons

In the view of some qualified authorities, the menace of biological weapons is now hardly less grave than that of the nuclear stockpiles.

Brigadier-General J. H. Rothschild was head of the United States Chemical Corps until 1957. (The Chemical Corps is in charge of both chemical and biological weapons.) In a recent book, "Tomorrow's weapons", Brigadier Rothschild says that the small quantities required make "biologicals" the Quartermaster's dream; they can be used, says Rothschild, to attack "hundreds of thousands of square miles." A cloud of the chosen agent can be released on to a favourable wind; "a deep cloud several hundred miles across will be able to travel long distances and still be effective".

All the diseases which attack man are potential agents. The most suitable are those with highest "infectivity" and "virulence". Rothschild adds: "The microbes can be made more resistant to antibiotics, thereby rendering treatment of the diseases more difficult."

Another authority, Major-General Brock Chisholm of Canada (2), commented in 1957 on this development of biological weapons, which was then beginning: "Research is at present going forward with a view to making the bacteria of more general diseases, e.g., cholera, typhus, etc., much more virulent, so that the vaccination, etc., now carried out might not serve as a protection to anyone who was infected. This line of investigation is very dangerous to the future of mankind."

Modern microbe hunters of death

There can no longer be any doubt that biologicals are potential weapons of mass destruction. The American Chemical Society estimates that a single large bomber, distributing only 450 pounds of the selected agent, could spread the disease over 34,000 square miles; between 25 and 75 per cent of the population would become casualties, although not all would die.

Expenditure on biological warfare research has greatly increased in recent years.

There is another serious objection to the present rapid development of biological weapons. Once research has solved the technical problems of producing and stocking these weapons, and of delivering them against an enemy, their large-scale production is very cheap—the amount of an agent needed to attack a very large area is very small. Thus an enormous power of destruction might become available to many nations at an almost negligible cost. This danger will certainly confront the world within a measurable future, if the arms race goes on.

Chemical weapons

An American reporter, Mr. James Polk, has vividly described a nerve gas plant at Newport, Indiana.

"The killer chemical which emerges from the plant's ovens and chilling chamber is nerve gas. A stealthy assassin, it is odourless, tasteless and virtually invisible. A drop, breathed or soaked into the skin, can be fatal.

"At the end of this unique assembly line, laced with 40 miles of pipes, the nerve gas is poured into rockets, land mines and artillery shells—destination secret... The plant has now been in operation twenty-four hours a day for three years" (3).

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(1) "Megaton" = 1 million tons of TNT.

(2) Major-General Chisholm, Commander Canadian Royal Army Medical Corps, Second World War, in personal charge of experiments with biological weapons. After the war, he was first Director-General of the World Health Organization.

(3) *War/Peace Report*, New York, July 1964.

The nerve gas "paralyses and kills by attacking the body's cholinesterase, a key substance in transmitting nerve signals for muscles to expand. When this fluid is crippled, muscles continue to constrict, and the body strangles its own vital organs".

A United States Army handbook says that this gas can cause "death within four minutes", and that it is so potent that, delivered only on a small scale, its effect can approach that of nuclear weapons. "The gas is very cheap; the Newport plant costs only $3.5 million per year to run."

Brigadier Rothschild, in the book referred to above, confirms all Mr. Polk's assertions. The gases first discovered by Hitler's chemists, which they called Tabun and Sarin, Rothschild labels "GB". He says that GB is thirty times as lethal as phosgene the most deadly of all the gases of the First World War. It can therefore be used in expensive rockets. In high concentrations, readily attainable in the field, it cannot be detected until the lethal dosage has been inhaled.

Brigadier Rothschild also describes a class of less volatile anti-cholinesterase agents which he labels "V-agents". He says: "These are very effective through the skin, because practically none evaporates. A tiny droplet, if not removed immediately, will be absorbed and cause death. Such a droplet on the skin might well go unnoticed, since the process of absorption is painless."

V-agents used in aerosols cause long-term hazards—drops which remain on the ground, on trees, on buildings, do not evaporate.

The American Chemical Society on Civil Defence has calculated that one big bomber carrying a load of nerve gas could distribute the gas over "an immediate effective area" of 100 square miles; the gas would cause casualties to 30 per cent of the population in the area; not all the casualties would necessarily be fatal. A group of five bombers could cover a large city. The United States, it says, has no effective present defence . . . . . .

The brief assortment of facts recited above may give a general impression of what the scientists have achieved in weapon development in the last twenty years. It gives no idea of what a war fought with these weapons would be like.

No governments, and few scientists, have even attempted this task. Yet is it not essential that the peoples should understand what would happen, if the armaments for which they pay were ever used? It is certainly essential that the reader of this article should have some picture in his mind, if he is to grasp its point.

Two brief quotations may, therefore, be reproduced—quotations which describe the probable effects of nuclear bombs. The first is a description, based on material in the British Home Office Manuals of Civil Defence, of what would happen if a 10-megaton bomb were burst over a central point in London. It was given to a conference of the World Federation of Mental Health in Paris in 1961:

"One 10-megaton bomb, burst 6,000 feet above Trafalgar Square, would wipe out London: its centre blasted to dust and rubble; a pillar of flame a mile high, twenty miles across; winds of hurricane force; gas mains, tanks, petrol stations all exploding; the air sucked from every shelter, replaced by carbon monoxide; every escape route blocked with crashed vehicles and fallen buildings; every person in the open within forty miles blinded, their retinas burnt to nothing by the thermo-nuclear flash, 1,000 times brighter than the sun; the drivers of trains and cars and lorries, the pilots of aircraft, sightless, helpless, hurtling to their doom."

The second is an account by two eminent American scientists, Dr. Harrison Brown and Dr. James Real, of what a similar bomb would do, if it were exploded above Los Angeles (in *Community of Fear*, 1960). They asked their compatriots to imagine that "the bomb hits during the working hours of a week-day".

"The blast effects would exterminate virtually all but the most deeply sheltered living things within a radius of five miles. Blast casualties would be severe up to ten miles. But the phenomenon that would complete the devastation of life in the entire area would be fire. The area would be one great sea of fire which would burn until there was nothing more to consume.

No survivors in a 50-mile wide sea of fire

"A good proportion of the metropolitan area's 3.5 million car and trucks would be lifted and thrown like grotesque Molotov cocktails, to spew flaming gasoline, oil, and automotive shrapnel onto and into everything in their paths. In an instant most underground gasoline and oil tanks would rupture and explode within the blast area, and a large proportion of the remainder within the firestorm radius would follow, each in its own particular manner—pumps and pipes sheared, and finally higher and higher ambient temperatures, which would soon expand, rupture and explode the remainder."

The authors then describe how the remaining area of Los Angeles, "row upon row of cheap, flammable, commercial structures" would be burnt, and what would happen to the "bush-covered hills and scrub forest" on the city's borders. They say that "anyone unacquainted with the remarkable explosive nature of the oil-carrying grease-wood, sumac and scrub pine is surprised and frightened by the volatility of the material, even when it is wet. The novel aspect of a thermo-nuclear conflagration, however, is that most of these highly flammable materials would break into intense flame simultaneously—a phenomenon never before achieved either by man or by natural causes".

Dr. Harrison Brown and Dr. James Real then say that, in their belief, in Los Angeles "at least a twenty-five mile radius (i.e., a circle fifty miles across) . . . would be, within minutes, engulfed in a suffocating firestorm that would persist for a long time". No one, they think, would survive unless inside very deep shelters, with built-in oxygen supply and cooling system. Even so, the chance of reaching safety would be "slim", after the firestorm.

"A major problem would be trying to get through ankle-high to knee-high ash containing numerous hidden pitfalls; clambering for dozens of miles over huge smoking piles of radioactive rubble, burned out timber, wire and steel. If the survivor made it to the edge of the devastated area, he in all probability would have accumulated by that time a fatal dose of radiation which would shortly claim what was left of his life."

Radioactive fall-out

The two quotations above deal with the effects of a single bomb delivered on a single city. But in a general war, in which the whole, or a large proportion of the nuclear stocks were used, radioactive fall-out would be by far the most potent cause of casualties. Dr. Ralph E. Lapp, who has the unique distinction of having been Nuclear Research Adviser to all three of the United States Defence Services, has calculated that if a 20-megaton bomb were burst in the air, so vast a quantity of radioactive bomb debris would fall back to earth that it would give a lethal dose of radiation to everyone in the open over an area perhaps as great as 5,000 square miles (1).

If the United States and Soviet Governments decided "to destroy each other's society" (this is the phrase in current use to explain "deterrence") each of them, as said above, could launch an attack amounting to 20,000 megatons or even more. A lethal mantle of fallout covering 5 million square miles would be genocide on a comprehensive scale; the wind would take an ample part to other nations perhaps neutral in the war.

This section on the achievements of the scientists engaged in military research may appropriately be ended by

(1) *Bulletin of the Atomic Scientists*, April 1963.

CONTINUED ON PAGE 16

This striking work by the famous sculptor Zadkine commemorates the ordeal of Rotterdam, the big Netherlands' port which burned for 40 days and nights after a devastating bombardment in May 1940. Many other striking works of art erected in the reborn city testify to its afflictions during the war which caused the deaths of 20,000 persons.

Photo Unesco - Dominique Roger

a quotation from one of the most eminent of them. Writing in October 1964, Dr. Jerome Wiesner used the following words : "Both sides of the arms race are thus confronted by the dilemma of steadily increasing military power, and steadily decreasing military security . . . The clearly predictable course of the arms race is a steady open spiral downwards into oblivion." (1).

There are some scientists—and others—who still believe that disarmament is a mirage. Dr. Edward Teller, frankly leaving science for politics, argued this at length in an article in 1957 (2). He foresaw the arms race going on indefinitely for decades, with Western experts saving freedom by keeping ahead in armament technique. This is a conception of international relations which armament experts have always held—Dr. Teller was only giving it a modern look.

To bolster up this view that national security depends on constantly increasing armaments, attempts have been made to show that the arms race has brought indirect, but great, advantages in the promotion of scientific knowledge, in the stimulation of industrial advance, and, in consequence, in general social well-being. These claims may be briefly reviewed, to see whether, in fact they constitute a valid off-set against the heavy cost and the grave dangers which the arms race involves.

Advancing scientific knowledge ?

The discovery of atomic energy is usually quoted as, in itself, conclusive proof that military research has paid a handsome dividend in greater scientific knowledge.

No one would dispute that the release of atomic energy—"a source of power which will enable man to build his life as he likes"—was accelerated, perhaps by many years, because Einstein and others perceived in 1939 that it might produce the decisive weapon of the Second World War.

But it might be argued that it would have been better for mankind if this great discovery had been delayed until the United Nations had built up a solid system for settling international disputes and until the governments had carried out a general agreement to disarm. No doubt the making of the first atomic bomb, with the vast resources it involved, ushered in a cumulative advance of modern physics; but it is not yet certain that it has permanently advanced the cause of human progress; that depends on decisions still to come.

In any case, it has been suggested by Mr. Gerard Piel, an author who commands respect, that, since military research has now produced the "ultimate" weapons, its contribution to true science is at an end.

Mr. Piel makes a distinction between science and technology. "Science", he says, is concerned with the discovery of the unknown... The work of Science is to increase our understanding of the universe around us, and of the world that is within each of us." Technology is "the exploitation of the already known". It must be clearly distinguished from "the discovery of the unknown", which is science.

Mr. Piel goes on: "Contemporary weaponeering is essentially a process of miniaturization, of packing more devastation into a smaller and more portable warhead . . . This is not Science. It is Technology of a high order, and it is exploiting whole regions of knowledge only recently won from the unknown . . . But the fact remains that the immense research and development activity sponsored by the Pentagon will contribue nothing to human understanding, and can yield little else but an increase in the efficiency, flexibility and enormity of our destructive power."

Military research a spur to industrial progress?

Mr. Piel concludes that a fully militarized world, while constantly advancing in technology, would be "a world without much science" (3).

Some experts would, perhaps, dispute this view. But few would deny that, if the manpower and resources given to military research had been given to civil research instead, the resulting contribution to our "understanding of the world around us and of the world within us" would have been much greater than it is (4).

It is often said that military research has been the dynamo of progress in civil industry, and has thus contributed greatly to the material prosperity of mankind. Indeed, this assertion has been used as a major argument to justify the vast expenditure on military research.

Again, no one would dispute that the sophisticated technological advance of the armament industry has given results that are of benefit to civil industry as well.

But the point is often over-stated. It was claimed not long ago that among the "better known" discoveries by which military research has helped civil industry were the following: "nuclear power; the modern aircraft; high temperature alloys; and the modern automobile transmission". A subsidiary list of "less known" contributions included fire retardant paints, helicopters, anti-icing equipment, new plastics, and automatic electronic computers.

It is ridiculous to assert that all these inventions would not have been made if there had been no military research. The Wright brothers had constructed an aeroplane, the first heavier-than-air machine, Bleriot had flown the Channel, there had been a decade of important progress, before any War Department showed the slightest interest in aviation.

This progress would have unquestionably gone on if there had been no world wars and no military research. Indeed, it can be reasonably argued that, without war and preparation for war, more and earlier attention might have been given to the development of civil aircraft, and to the creation of a world system of passenger and postal transport.

And if credit for progress in aviation is to be given to military research, there is something to be set on the other side of the balance sheet. Hundreds of thousands of airmen killed in battle, millions of civilians blasted or burnt to death by air bombardment, the destruction of great cities and of irreplaceable artistic and architectural treasures—these were the price paid for the more rapid progress in aviation, together with the vast economic cost of maintaining the national air forces in time of peace.

In any case, the benefits which industry has derived from military research constitute only a tiny proportion of the latter's output and they are an accidental, not an intentional, result. Its overwhelmingly preponderant effect is to increase the complexity, the cost, and the destructive power of armaments; to increase the capacity for surprise attack; and thus to multiply the dangers of the arms race and the risk that unprovoked aggression might succeed.

Indeed, to say that military research is socially desirable because of the benefits it brings to civil industry is not only an economic absurdity; it is the exact contrary of the truth. Professor Seymour Melman and his colleagues have shown that the vast concentration of eminent scientists and technologists on armament work in the United States has starved American industry of the experts it needs, and has caused it to fall behind the standards of modern equipment and industry of other countries (5).

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(1) *The Scientific American*, October 1964. Dr. Wiesner was Chief Scientific Adviser to President Kennedy.

(2) *New York Times*, 8 June 1957.

(3) Mr. Piel is Publisher of the *Scientific American*. He was awarded the Unesco *Kalinga Prize for the Popularization of Science* in 1963.

(4) Dr Peter Hodgson of Oxford University writes: "I would guess that I per cent of the resources spent on weapons research could probably produce a far greater scientific advance than the weapons programme itself."

(5) *A Strategy for American Defense*, Columbia University Press, 1963. See also Professor Seymour Melman, *Our Depleted Society*, Holt, Rinehart & Winston, 1965.

The Prime Minister of Britain made the same point in December 1964: "Defence is taking too big a share of our real resources in terms of foreign exchange, scarce types of manpower and load on the most advanced industries... Defence uses one-fifth of all qualified scientists and technologists who are engaged on research and development, and defence now accounts for about 40 % of all research and development expenditure."

Social benefits ?

Other contributions to human advance which have been attributed to military research include the following: yellow-fever eradication; chlorination of water; blood-plasm substitutes; advanced weather prediction techniques

It is enough to ask two questions.

If the resources in money and expert knowledge devoted to biological weapons had been given instead to international research for the eradication of disease, might not far greater medical results have been obtained?

If the resources in money, equipment and scientific genius given to nuclear weapons had been used instead for research into what causes the weather, and for computers to turn the increased knowledge into reliable forecasts, might not a much advanced meteorology have made a large addition to mankind's annual income of food and other usable wealth?

The conclusion of this section of the argument is plain. There are some scientific, industrial, and social benefits from military research but they constitute a minimal off-set against the waste and dangers of the arms race. If the scientists and technicians engaged on this work could be diverted from "improving" armaments to peaceful industrial, agricultural and medical research, and if they were given the same equipment and resources that they have today, their achievements might quite quickly revolutionize man's individual and social life.

Science and Conscience

The scientists have made the modern weapons; for a hundred years, scientists have contributed to every development in armament technique.

With what motives have they done so? Do they carry any special responsibility not shared by their fellow citizens?

Some of the men who have made important new contributions to armament technique did so, no doubt, In the hope of making money. Some who made money—Alfred Nobel, for example—believed that their inventions would help to abolish war. Nobel wrote to his friend, the Baroness von Suttner: "My factories may well put an end to war sooner than your congresses. The day when two army corps can annihilate one another in one second, all civilized nations, it is to be hoped, will recoil from war and discharge their troops » (1).

Haber suggested the use of poison gas to the German General Staff in 1915. He was the winner of a Nobel Prize for Chemistry, he knew that poison gas would violate the accepted law of war; but he had spent the winter of 1914-15 as a private in the trenches and he foresaw the long years of strategic stalemate and of senseless slaughter which would come, unless some new weapon could break the stalemate and bring hostilities to an end.

Einstein, Szilard, Peierls and Rotblat all detested war; they knew the immense perils which nuclear weapons would involve; but they thought the greatest danger was that Hitler should get nuclear weapons first. That was what made them persuade President Roosevelt to authorize the Manhattan District Project; that was what inspired their colleagues in the Project team to the stupendous efforts which they made. This could, no doubt, be regarded as only a special case of the general compulsion of the arms race; but it was a case in which men preeminently endowed with social conscience acted from the highest motives, in the interest of humanity as a whole.

The same could certainly be said of Sir Robert Watson-Watt, who brought the priceless gift of radar to the Royal Air Force to help it meet the threat of Goering's bombers. And it could certainly also be said of many lesser scientists, who have volunteered their contribution to the military defence of causes in which they ardently believed.

But, no doubt, for the great majority of the men who have worked in military research in various countries, no such special motive was required. Their governments invited them to enter this branch of its service, precisely as it invited (or compelled) other men to join the fighting forces. They accepted the invitation, or obeyed the order, with the same sense of patriotic duty which all good citizens should feel.

Do the scientists engaged in military research carry a special responsibility for the present dangerous arms race—a responsibility which their fellow-citizens do not share?

The following propositions will probably command fairly general assent:

(1) Quoted In August Schou, *The Nobel Peace Prize.*

1. No citizen of a democratic country can escape a share of responsibility for what his government does in matters of national defence. If he pays his taxes, he is financing the work on weapons which the scientists complete.

2. It is open to a scientist to refuse to work in military research—one example being that of Professor Otto Hahn, who first split the uranium atom in 1939, when he led eighteen foremost German physicists in 1957 in declaring that they would "never take part in any way in the production, testing, or use of atomic weapons". This is equivalent to the stand of the conscientious objector, who declares that he will play no part in war. It is worthy of all respect. But to most scientists it will not seem an acceptable way out of the dilemma with which the arms race now confronts them.

The responsibility of the scientists

3. If a scientist accepts employment in his government's military research, and if he feels, as he normally will, that his nation's security depends on his work in keeping the national forces adequately equipped with modern weapons, then it is his duty to make the utmost efforts to improve those weapons, and to keep his national forces up to the highest standards of fighting power achieved by other nations.

4. In carrying out his share in military research, the scientist is normally under orders from generals and ministers. If there is guilt in making the modern means of war, it lies primarily on the shoulders of the ministers who make the political decisions that these means of war shall be produced, and on the parliaments who pay. If the scientists were simply under orders, like other civil servants, this would be the main answer to the questions now being discussed.

5. But in reality the scientists engaged in military research are not simply under orders; they are not simply civil servants with no direct responsibility for what is

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done. On the contrary, they know so much more about modern weapons, and about the possibility of further "improving" them, than the generals or the politicians can possibly know, that they inevitably play a large part in the process of decision-making.

Of all the new departures in United States nuclear weapons policy since 1945, all but one were initially conceived and put forward by scientists: the Oppenheimer-Baruch plan for nuclear disarmament; the "fusion" or hydrogen bomb; the development of so-called "tactical" or "battlefield" nuclear weapons; the ballistic missile for the delivery of nuclear warheads; and the ban on nuclear tests. The only exception was the doctrine of massive retaliation, which was the brain-child of John Foster Dulles.

In so far as scientists are effective participants in decision-making about weapons, they share the kind of responsibility borne by generals and ministers; and in view of their greater knowledge, their true share of responsibility for what is done may be greater than the share of their military or political chiefs.

6. This special knowledge and influence of the scientists lays on them a special duty which they cannot escape. This is the duty to explain to their General Staffs, to their ministers, and to all their fellow citizens the real destructive power of the new weapons which they have devised, introduced and perfected. This means, in plain language, that they should do whatever is needed to warn their own nations and the world of the grave dangers of the present arms race.

7. But this special duty does not end with explaining the nature of the modern armaments, and the danger of their accidental or unintended use. It must also include an obligation to help devise the technical clauses of a disarmament treaty by which the arms race can be ended and to join in the educational effort needed to create the public opinion by which the policy of disarmament can be made to triumph. This is a duty which lies inescapably on those scientists who are engaged, or who have been engaged, in military research.

8. As pointed out in paragraph 4 above, the scientists share responsibility for the making of the modern weapons with the generals and the ministers under whose orders they serve. It follows that the duty described in paragraphs 6 and 7 lies also on the generals and ministers, and that the programme of action described in later sections of this article should be undertaken by them all.

In principle, it is impossible to dispute this proposition. But today it is necessary to recognize the facts of international life. Twenty years after the second "war to end war", the generals as a class have shown small belief that war and armaments can be abolished; they regard it, rather, as their duty to explain the difficulties and dangers of disarmament; so far, very few of them have made constructive proposals for ending the arms race.

The ministers have been willing, year after year, to accept resolutions in the General Assembly of the United Nations declaring that disarmament is the most important objective of their foreign policy. But they have failed to give their delegates the instructions which would enable them to negotiate a disarmament treaty.

Against the complicity of silence

There is no point in arguing which nations have been most to blame. The fact is that the ministers will only feel able to take grave decisions which disarmament requires when there is an overwhelming body of public opinion throughout the world on which they can rely to give them support.

9. Only the scientists can create this body of opinion. They can speak with an authority which the ordinary citizen, the non-scientist, cannot challenge, and to which he is compelled to listen. Since they cannot hope for much help from the generals or the ministers, they must act by themselves, in a supreme endeavour to avert the mortal dangers which confront mankind.

How far do the propositions set forth in the previous section apply to scientists who are not engaged, and who have never been engaged, in military research?

At first sight, it might seem that the responsibility and duty of these scientists is less than that of scientists who *are* so engaged. Their responsibility for the arms race is less; their knowledge of the weapons and their influence on government decisions are less.

But three further propositions will not be disputed.

- Many scientists outside government service have contributed to the general body of knowledge on which military research has drawn in its work on weapons. A vast army of physicists built up the knowledge of nuclear energy from which the making of fission and fusion weapons resulted. Many of them made contributions of new knowledge without which the weapons could not have been made, even when they had no idea that they were helping to create a new and more dangerous kind of arms race.
- In so far as they understand the weapons, and the dangers to which the weapons give rise, better than non-scientists, they have a duty to help in the task described above.
- By reason of their greater knowledge, they will have more influence on public opinion than non-scientists. For example, physicists, whether engaged in military research or not, can explain the dangers of the nuclear arms race better than non-scientists; and they will carry greater weight with the average citizen. The same is true of medical practitioners and biological weapons; and of chemists and poison gases and incendiary weapons.

In short, no one with a specialized scientific training can escape a moral obligation to share in this essential work of education. And those who are not in government employ have full freedom to speak their minds; government scientists may be bound to silence by the terms on which they are engaged.

The scientists have a large share of responsibility for another development of sinister significance: the use—or misuse—of language to obscure the realities of the present arms race and of nuclear war.

Sir Solly Zuckerman, for long the Chief Scientific Adviser to the British Ministry of Defence, and, since 1966, Chief Scientific Adviser to the British Government, has given a strong warning about the danger which this involves. Writing in 1962 in the United States journal *Foreign Affairs*, he spoke of "the way the military have altered the concrete nature of certain military problems by turning them into abstractions. One dangerous example of this tendency is the term "interdiction targets". Another is the idea that nuclear weapons are just a new and more powerful form of artillery,

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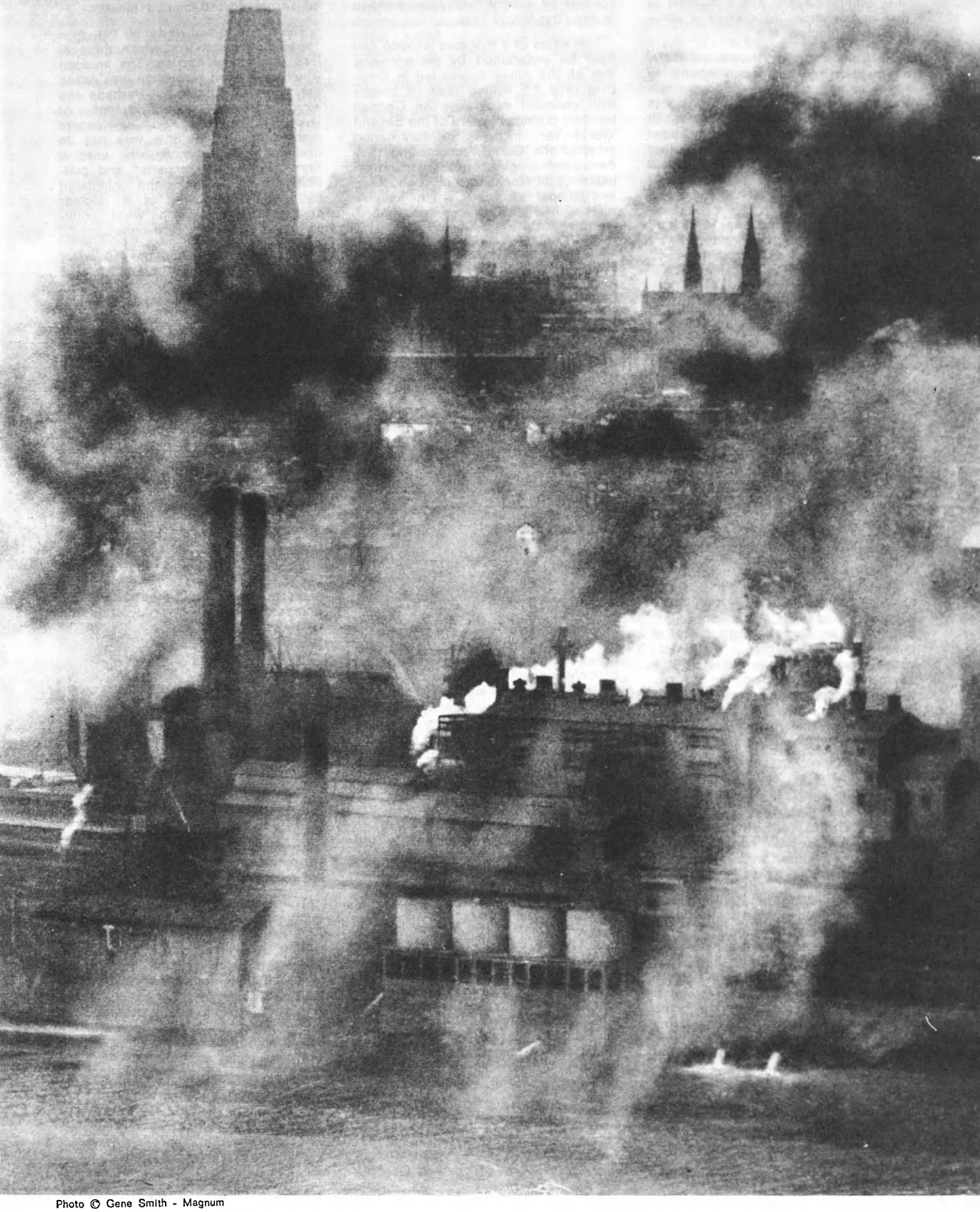
A single 10-megaton bomb can wipe out a major city and cause damage over a surrounding area of nearly 800 square miles.



and that one exchanges nuclear-fire like counter-battery fire. A third is that one is able "to restore a situation" with nuclear fire".

Sir Solly went on to explain that the destruction by nuclear weapons of "interdiction targets"—bridges railway junctions, mobilization depots and so on—would inevitably mean the destruction of towns and a large-scale attack on civilian targets; that the "exchange of nuclear-fire" would not simply mean the obliteration of the enemy's guns or launching sites, but the devastation of a large area of territory; that an adverse battlefield situation could not be "restored" by nuclear weapons as it might be by artillery bombardment—the nuclear weapons would only add to the military chaos, and would, by fall-out, be a grave danger to troops using them (1).

Kilotons and Megatons

These were illustrations of the general propositions which Sir Solly stated thus: "We must avoid the conceptual framework derived from the military terminology of pre-nuclear warfare. One may fairly ask what meaning there is to the idea of using nuclear weapons 'to defend our territories and peoples'. One can deter with nuclear weapons. Can one defend?" (2).

Sir Solly was discussing the misuse in the nuclear age of previously accepted, and valid, strategic terms. But there is also a large body of newly-invented jargon; a whole vocabulary of phrases, unintelligible to anyone but the expert, for describing the nuclear weapons, the various kinds of attack for which they might be used, and the "responses" (counter-attacks) which might most advantageously be made.

One part of this jargon is mathematical and, no doubt, necessary, both for the scientists and the General Staffs. To express the explosive power of a nuclear weapon, it is described as either in the "kiloton" or the "megaton" class.

A kiloton is the equivalent of 1,000 tons of TNT; a megaton is the equivalent of 1 million tons of TNT. The bomb that destroyed Hiroshima was approximately 20 kilotons; the first H bomb exploded at Bikini in March 1954 was 15 megatons; in September 1961, the U.S.S.R. exploded a bomb of about 60 megatons. If this bomb had had an outer sheath of uranium-238 instead of lead its power might have exceeded 100 megatons.

These terms "kiloton" and "megaton" obscure from the ordinary citizen the great destructive potential of the weapons. A half-kiloton weapon sounds like something very small; in fact it has the explosive power of 600 to 700 twelve-inch shells with a charge of TNT. One twelve-inch shell was considered a very formidable weapon in the First World War.

The effect of a megaton weapon can best be understood by remembering that all the Allies succeeded in dropping only 1.2 million tons of bombs with chemical explosives on German territory during six years of the Second World War. In doing so, they ruined most of the German cities, and they destroyed a great part of German industry, oil stocks and oil production, and almost all the German railway system. The smallest megaton weapon has the same explosive power.

There is another insidious danger in these mathematical terms, especially when they are used in "the conceptual framework derived from the military terminology of pre-war nuclear warfare". A United States scientist, Dr. Donald Brennan, has expressed it thus: "Even among professionals, I have observed an occasional tendency to think of kilotons as tons." (3)

The new military jargon— a dangerous word game

"Professionals"—i.e., soldiers sailors and airmen trained with conventional weapons and experienced in conventional military operations—come to think of the new weapons as similar to those which they employed in the two World Wars. This is a singularly perilous aberration, which disguises the real nature of operations from those who plan them.

But, in spite of these dangers, the use of these mathematical terms is not only useful, but also necessary, as noted above, both for scientists and General Staffs. They cannot write out "the equivalent of thousands (millions) of tons of TNT" thousands of times, to explain their meaning.

The problem is to ensure that all who use the terms, including military "professionals", journalists, commentators and the general public, really grasp the significance of the terms; that they really come to understand that kiloton weapons are at least a thousand times as powerful as the shells and bombs used in the Second World War, and may be up to 50,000 times as powerful; while even the smallest of megaton weapons is at least a *million* times as powerful as the twelve-inch shell, and the largest so far made, 60 million times.

There are other parts of this new "strategic" jargon for which there is less intellectual excuse. The weapon which destroyed Hiroshima was called the "nominal" bomb. Perhaps the word "nominal" was convenient. At least it evoked no unpleasant memories; perhaps this was not its greatest merit to those who used it first. For when "experts" and politicians want to make the uninitiated appreciate the power of a nuclear device, they abandon the word "nominal", and speak of "Hiroshima".

Seeking to persuade the House of Commons of the great strength of the proposed British "independent" nuclear deterrent, Sir Alec Douglas-Home said that the eighty Polaris missiles in the five United Kingdom nuclear-powered submarines "will have a strikeload of 2,500 or 3,000 Hiroshima bombs".

"Hiroshima" evokes, "nominal" disguises, the reality of what the bombs would mean. The same is true when a 2-megaton warhead, which, as already mentioned, is nearly double the explosive power of all the bombs dropped on Germany in six years of war, is called a "low-yield thermo-nuclear device".

Some of the new jargon passed into journalistic, and indeed, into general, use. The commonest and the most misleading of the euphemistic phrases which are employed is the word "tactical" applied to the smaller types of nuclear weapons.

Euphemistic phrases

No one thought that the Hiroshima bomb was tactical in 1945. It had caused casualties many times as great as the total strength of the British Army of the Rhine. It was a substitute for, and had averted, an Allied campaign against Japan, to which several million troops had been assigned, and which was expected to last for 18 months. It caused the enemy's immediate and unconditional surrender.

The United States Lilienthal Committee, which drew up the first draft of the Baruch-Oppenheimer Plan, writing in their report in March 1946 while the impact of the first bombs was still quite fresh, spoke of: "The really revolutionary character of these (atomic) weapons, *particularly as weapons of strategic bombardment aimed at the destruction of cities and the eradication of their populations.*"

This view of A-bombs was universally accepted until the first H-bomb was exploded in 1954. Only then did General Staffs begin to say that A-bombs were "tactical". They called them "tactical" because something bigger and more devastating had been devised. Having these bigger weapons,

(1) *Foreign Affairs*, January 1962.

(2) *ibid.*

(3) *Arms Control and Disarmament.*

the Staffs, by an almost subconscious process of thought, began to make plans for war in which A-bombs were regarded as artillery. Marshal of the Royal Air Force Sir John Slessor, in *Strategy for the West*, spoke for many of the experts when he said: "We may use nuclear power in a bomb or shell tactically for conventional purposes. That is merely to employ one projectile to do what we had to use thousands to do in Korea".

This was written with the most honest intent. But in fact, no nuclear weapon, not even the half-kiloton bazooka-launched infantry bomb, the Davy Crockett, bears any relation to what artillery used to do. It is entirely different in kind. And, of course, only a very small proportion of the so-called "tactical" or "battlefield" weapons have as low a yield of explosive power as the Davy Crockett. The vast majority have a yield as large as the Hiroshima bomb; and very many are more powerful still.

In the summer of 1964, Mr. McNamara, the United States Secretary of Defence, said the *average yield* of the different weapons classed as "tactical" was 100 kilotons, i.e., five times as powerful as the Hiroshima bomb. It is evident that, by all hitherto accepted canons of military literature, such weapons are what the Lilienthal Committee called them—"weapons of *strategic* bombardment", and that they are capable of the "destruction of enemy cities and the eradication of their populations".

'Megadeath' 'megacorpse' and other abhorrent phrases

The use of the word "tactical" to describe them has done more than all the rest of the jargon put together to distort the thinking of the "experts" about the use of nuclear arms, and to lead the general public to accept what in 1945-46 almost everyone agreed was utterly unacceptable.

But there are other dangerous words. When missiles with hydrogen warheads became operational, the General Staffs based their plans on the assumption that these more powerful weapons would be used for the "destruction of enemy cities and the eradication of their populations".

But the eradication of civilian populations was an unpleasant thought. It was less distasteful to plan for the elimination of "military" targets. The phrase "counter-force strategy" was invented to describe the policy of making the first major, strategic nuclear onslaught against these military targets—Staff headquarters; manpower depots; airfields; missile sites; naval, especially submarine, bases and dockyards; munitions factories; "interdiction targets", such as major bridges, railway junctions and marshalling yard, road transport centres and the rest.

Of course, many of these military targets are situated in, or near, towns and cities; they could not be attacked with megaton weapons (and a strategic onslaught would mean that) or even with multikiloton weapons, without killing a great number of civilians as well. But it sounds more civilized, more in accordance with Grotian International Law, to speak of attacking military targets first; "counter-force strategy" has soothing overtones.

The alternative to "counter-force strategy" is "counter-value strategy". "Counter-value" means directing the first strategic nuclear attack not on the military targets but on centres of population and industry. The deliberate purpose of this attack would be to wipe out the enemy's towns and cities, exterminate his civilian population, and destroy his industrial production.

Blanketing the facts

There are human beings who advocate the adoption of a "counter-value strategy"; they believe that to announce the adoption of a "counter-force" policy must weaken the strength of the deterrent. Fortunately their numbers are few; but the invention of the phrase ('counter-value') to describe the murder of a nation will rank with historians of the future as a classic example of the militarist thinking of 1965.

So will the parallel phrase, "bonus kills". In strategic planning, it appears, it is convenient to calculate only the casualties that will be immediately caused by the flash, blast and fire effects of a given kilotonnage or megatonnage of nuclear bombs. It is on this basis that the plans for an operation are drawn up, the weapons allocated, and so on. If, in addition to these primary casualties, other people die as a result of fall-out, they are referred to as "bonus kills" (1).

There are other jargon phrases, just as abhorrent on moral and intellectual grounds: "megadeath", to mean the death of a million people; "megacorpse", to mean a million dead bodies; "overkill", to express the power to destroy the entire population of an enemy country more than once.

Whatever its technical advantages, there are dangers of various kinds inherent in the use of this euphemistic jargon. Others besides Dr. Brennan's "professionals" think they are speaking of tons when they speak of kilotons; the error is common among journalists, amateur strategists, and the general public. In 1964, it led a candidate in the United States presidential election to speak of tactical nuclear weapons as "the successors of yesterday's conventional arms" (2); he urged that officers in the field be given authority to order their use.

Let no one think that this is a small matter, or that the sinister importance of euphemism has been over-stated. The constant repetition of disingenuous phrases like those cited above has led to a kind of self-induced hypnosis among those who ought to understand the dangers of the modern arms race and particularly among the politicians; while for the general public it has simply blanketed the facts. The scientists engaged in military research must carry their full share of the blame for this result.

The first efforts by scientists to warn the world

The scientists who asked President Roosevelt to authorize the effort to make a nuclear bomb did so with heavy hearts. Those who served in the international team of the Manhattan District Project shared their doubts and fears. Dr. Arthur Compton has described how they "prayed that they might not succeed".

When in 1944 it became evident that their prayers would be in vain, and that the age of nuclear fission was dawning, the most eminent among them, Niels Bohr of Denmark, wrote a memorandum for President Roosevelt, warning him of the immense dangers to mankind that nuclear weapons would mean.

"Unless some agreement about the control of the use of the new active materials can be obtained in due time, any temporary advantage, however great, may be outweighed by a perpetual menace to human society... No kind of customary measures will suffice for this purpose (the control of atomic energy). The terrifying prospect of a future competition between nations about a weapon of such formidable character can only be avoided through a universal agreement in true confidence."

Already Niels Bohr foresaw the perils that were being unleashed; he foresaw that the necessary international agreement must be *universal* and that it must breed true confidence. His anxiety was shared by many of his colleagues. In the same year, 1944, in the so-called Frank Report,

(1) Ralph E. Lapp, *Kill and Overkill*. See also footnote page 40 on his book "The Voyage of the Lucky Dragon".

(2) Senator Goldwater, *The Times*, 18 August 1964.

CONTINUED ON PAGE 58

THE CHALLENGE OF PEACE

by Vadim Ardatovsky

EARLY in June 1967, as participants in an international meeting of journalists held in Strasbourg, we tried to forget the outside world and spent an agreeable week discussing the recent progress of technology and its growing impact on the press.

In our small way, we tried to make a contribution to that increasingly popular exercise which has been termed "Futurology" and which sometimes skims fairly close to Science Fiction. We tried to visualize the world of tomorrow and more especially what a "Golden Age" of journalism might be like tomorrow. We saw artificial satellites whirling through space, transmitting facsimile newspapers to every corner of the globe. Any family could select any of the world's newspapers at the touch of a button, and some of them were even "talking newspapers" which added a more personal touch. Stories by news reporters on the spot were sent directly to automatically operated composing machines, while front page dispatches were flashed instantaneously via laser beams.

Our tiny international group, made up of journalists from France, U.K., U.S.S.R., U.S.A., the Arab countries, Japan, Yugoslavia, Ireland, Czechoslovakia and other countries, even went so far as to work out how long it would take for such innovations to be introduced, whether in the next twenty, fifty or a hundred years.

By tacit agreement we omitted any mention of politics despite the fact that a war had broken out in the Middle East that very week and no one could then predict whether it would be possible to circumscribe the conflict that had erupted or whether it would eventually spread to other countries. Our discussions on the future progress of the communications industry were

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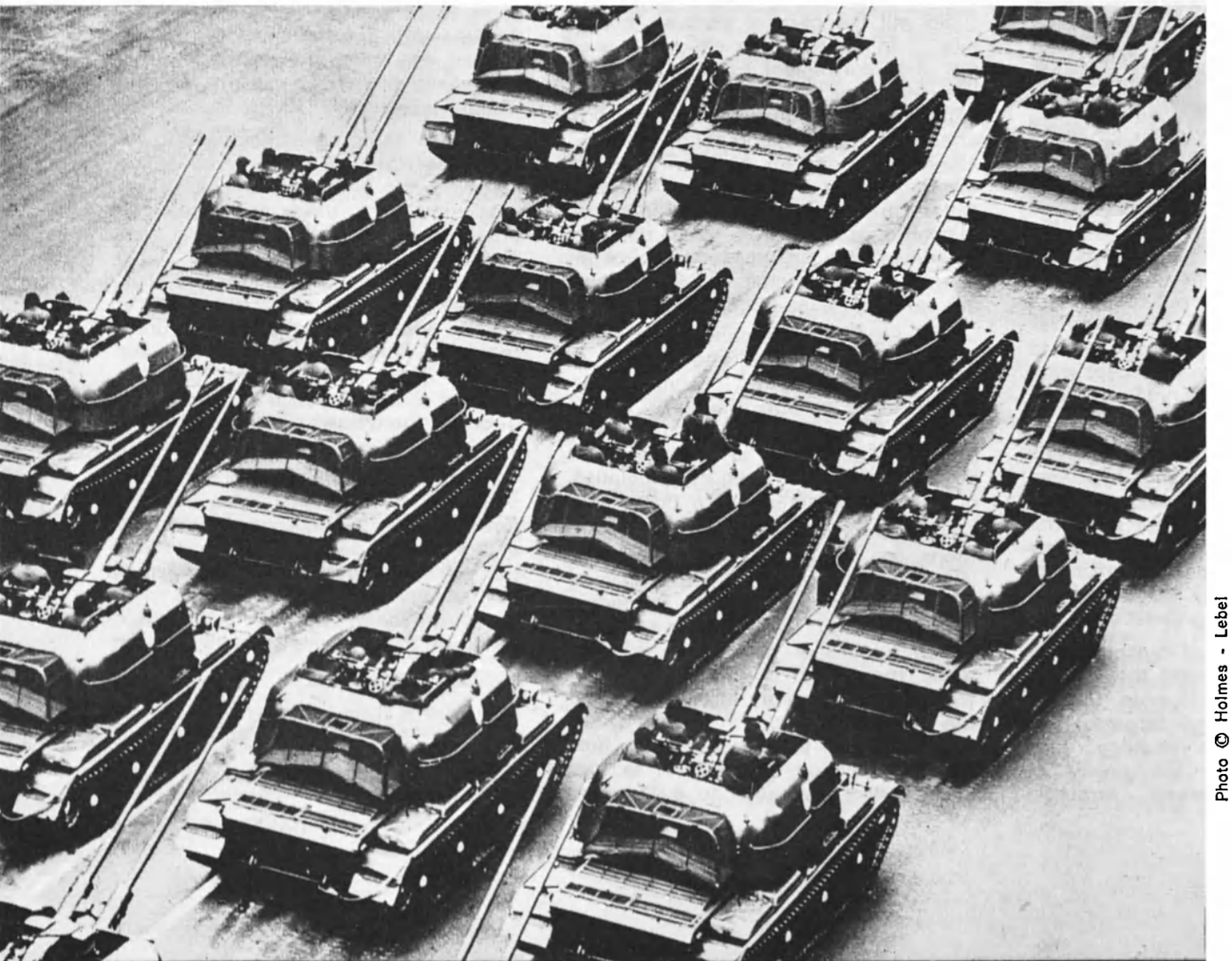

Weapons of war (left). Tools for peace (right). But a tank costs far more than a tractor and nations squander astronomical sums to maintain their arsenals of modern weapons. The cost of a new prototype bomber with full equipment, for example, equals the price of 50,000 tractors, or 75 fully equipped 100-bed hospitals or 30 science faculties each with 1,000 students (see "Unesco Courier", November 1964).

Photo © Holmes - Lebel

Photo © APN - Ivanov

based on what seemed a natural assumption that the world would develop peacefully in the foreseeable future.

Clearly no one—except a comparatively small group of professional military men—can think of drawing up vast plans for the future with the perspective of a world war in front of him. The architect breaking ground for a new skyscraper, the gardener landscaping a new park, the artist starting on a new painting, all think ahead to the future enjoyment and benefit of their work to society for years and even generations to come. To put it another way, the need for peace is as natural to man as his need for oxygen, and the most important instinct of man—the instinct to stay alive.

A Swiss scientist, Jean-Jacques Babel, has recently calculated that in the course of history man has waged 14,500 major and minor wars, and the French sociologist, Gaston Bouthoul, is the author of a study entitled 8,000 *Traités de Paix* (8,000 peace treaties). Someone has worked out that man's "Golden Age"—when peace has reigned throughout the world—has been of surprisingly short duration, hardly more than a total of 220 years!

I wonder whether we shouldn't stop and reflect on this a moment, and ask ourselves how much those 14,500 wars have impeded the advance of civilization.

People may differ widely in their opinions about Karl Marx's philosophy but no one, I believe, could argue with the following statement he made about war : "From a purely economic point of view, it is tantamount to a nation throwing a portion of its capital into the sea."

In the course of the Second World War, 60 per cent of the national revenue of the belligerent countries was drained away and lost forever. In addition, this terrible holocaust claimed the lives of 50 million persons who died in a sea, not of water, but of blood.

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The rocky road to international agreements

It would hardly seem necessary today to describe once again the horrible consequences of a new world war, a war fought with nuclear weapons. The destruction involved would go far beyond what any of us could possibly imagine. The world's press has on various occasions quoted a figure which is in no sense an exaggeration : the death of 700 to 800 million people as a result of the first nuclear attack.

CLEARLY, therefore, neither common sense nor the spirit of humanity give mankind any other choice today than the establishment of a lasting peace. Yet it is a secret to no one that we live in a world of unstable, uneasy peace. Time and again we have seen the flames of war erupt in Korea, Algeria, Suez, Vietnam and the Middle East . . . As dangerous for peace today is the present tendency of the majority of nations to stockpile armaments. Professor George Schwartzenberger, of London University, was certainly right when he said that present-day relations between nations are permeated with mutual distrust and constant fear of other nations' intentions.

It would therefore appear quite logical that nations seek to perfect the means for their own defence. But there does not seem to be any formula for doing away with the "world in arms" and the suspicions which derive from it, other than the elimination of the material basis of this fear and distrust, that is, the armaments themselves.

It is only since the end of the 19th Century and in the brief interludes between wars in our own time that world political thought has been led to consider seriously the theory of general disarmament. In the past, disarmament was applied to a country after it met defeat ; it had to surrender its arms, its fortifications were destroyed and other measures of a similar nature were taken. Bitter experience has taught us that far from preventing new wars and conquests this increased the danger of war.

That is why, during the Second World War with its untold destruction and millions of victims, people everywhere were made acutely aware of the urgency of establishing a lasting peace based on the one means of definitely guaranteeing it, namely, disarmament. Even before the war had actually ended, Moscow, London, Washington and Paris were already seeking ways to build the peace of the future.

In October 1943 a meeting of the Ministers of Foreign Affairs of the Four Allied Powers was held in Moscow. In the declaration they jointly signed it was emphasized that the problem of disarmament should be resolved in the same spirit of unity which had been displayed by the Great Powers of the Anti-Nazi coalition.

The approach to the problem of disarmament at that time was perhaps somewhat naive : the soldiers would return home after victory and would abandon their rifles and uniforms forever ; at the same time production of guns, tanks and bombers would be stopped.

The appearance of a new type of weapon and its production by one of the Powers changed the situation. Disarmament became even more vital than before, but the solution to the problem became even more difficult.

At the first session of the United Nations General Assembly in 1946, the U.S.S.R. proposed a "draft international convention to prohibit the production and employment of weapons based on the use of atomic energy for the purpose of mass destruction." This plan called for the destruction within three months of all atomic weapons and, what is often forgotten nowadays, the setting up of an international control body with very wide powers. This body would have had access to atomic installations in all countries and made sure that no state infringed the convention.

HAD this project been adopted, the atomic bombs in the possession of the United States would have been destroyed, and neither the U.S.S.R. nor Great Britain, nor France nor any other nation would have been able to produce their own Atomic and Hydrogen weapons. The problem of disarmament would have resumed its "pre-nuclear" aspect and might have been easier to resolve.

At the time, however, it was argued that the Soviet Union was seeking to destroy weapons it did not possess and thus obtain a military and strategic advantage. In view of the ideas prevailing at that time, this attitude could well be justified. But had it been possible in 1946 to foresee the situation twenty years later, this argument might well have lost its full force and appeared politically short-sighted.

Scientific and technical progress is governed by its own laws which are often independent of politics. Even in the days when Leonardo da Vinci was designing his flying machines, men vaguely foresaw the possibility of rockets and supersonic planes. Had the great atomic physicists and mathematicians whose names are now familiar to everyone (with a timelag of 10 to 20 years) never been born, there can be no doubt that other scientists would soon have discovered atomic energy along with its immense potentialities for destruction as well as for peace. The spread of nuclear energy and weapons to other countries was thus, obviously, only a question of time.

THE question of the control of nuclear weapons has certainly been the big stumbling block of all discussions on disarmament. There was once a time when heated debates occurred over the question "which came first the chicken or the egg?" In our present age we have seen endless discussions on whether control should precede disarmament or disarmament precede control. It must be obvious, however, that the only rational formula must be : "No disarmament without control, and no control without disarmament." In theory everyone is in agreement on this, both in the United States and the Soviet Union ; but in practice.....

In practice the means of war and destruction continue to be stockpiled and perfected. For this reason it is more important than ever to do everything possible to facilitate a *detente* in international relations, and to prepare the ground for eventual total disarmament by an effort to limit the present arms race.

The first successful attempts in this direction was made in 1963 when the Powers signatory to the Moscow Treaty agreed to ban nuclear weapon tests in the atmosphere, in outer space and under water. Agreement came following a whole series of discussions, all of which centered on the major issue of control.

Today, more than four years after

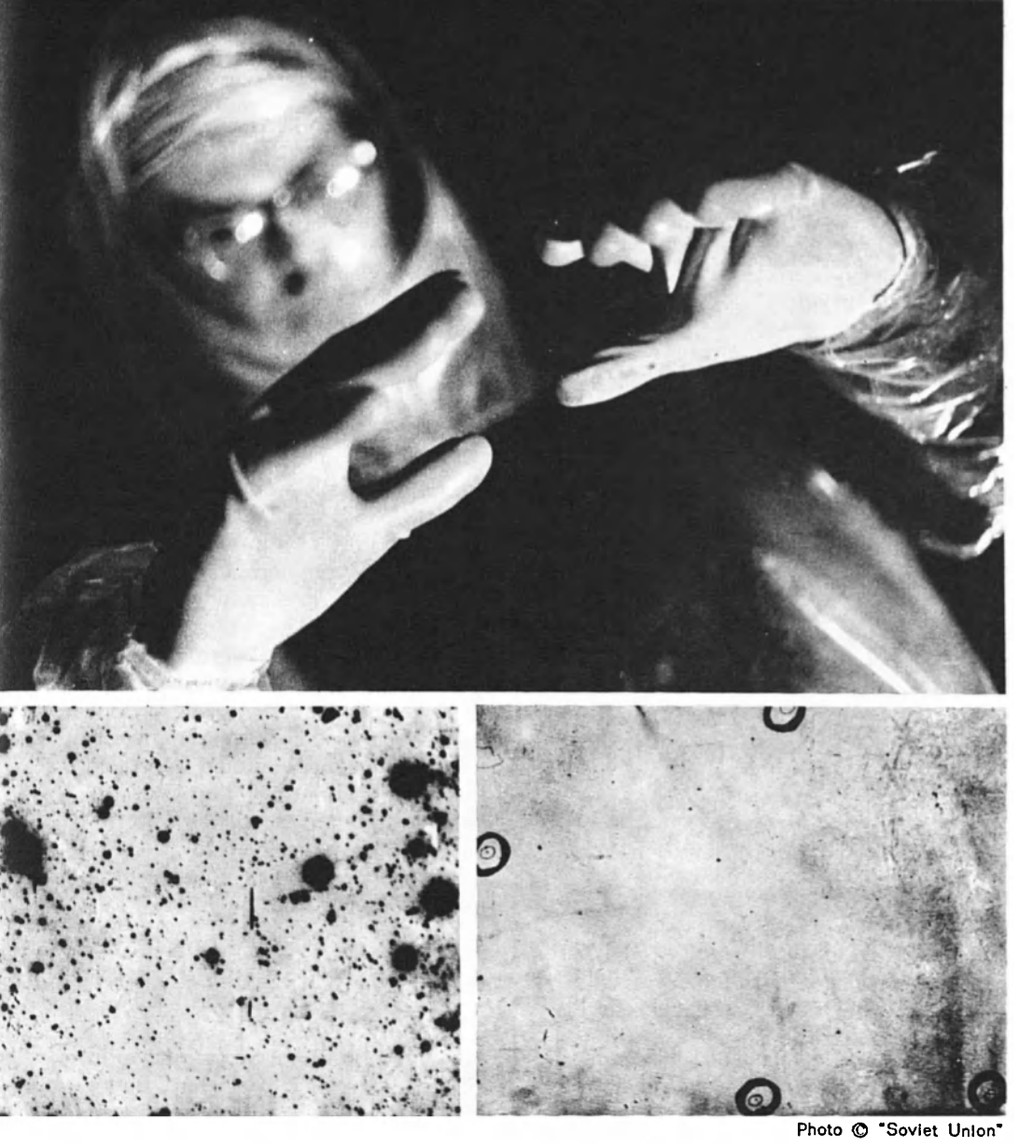

Photo © "Soviet Union"

The Nuclear Test Ban Treaty signed in Moscow on August 5, 1963 prohibited nuclear weapon tests in the atmosphere, in outer space and under water. France and Mainland China, who were not signatories, have since carried out nuclear tests in the atmosphere. Top, scientist examines a radiogram which reveals extent of radioactive pollution in the atmosphere. Tests have shown that contamination by fall-out particles decreased considerably after the signing of the Moscow Treaty. Above left, dots and spots on a radiogram made in the autumn of 1962 indicate density of radioactive particles in the air. Above right, a 1965 radiogram has only four spots (circled).

the agreement was concluded, the sceptics and Doubting Thomases have been proved wrong. National detection devices have shown their complete effectiveness in assuring reciprocal control.

On December 19, 1966 the General Assembly of the United Nations unanimously adopted a historic treaty on principles governing the activities of States in the exploration and use of outer space including the Moon and other celestial bodies. The treaty specifically bans the orbiting in space of "any objects carrying nuclear weapons or any other kinds of weapons of mass destruction." This "demilitarization of outer space" treaty was simultaneously signed in London, Moscow and Washington on January 27, 1967. I was privileged to be present at the signing of this important document in Moscow which took place in the same building where the Moscow Nuclear Test Ban Treaty was signed in 1963.

We should not forget however that as early as 1959 the Antarctic Treaty (signed by 12 countries operating in the southern continent) guaranteed that Antarctica "shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord." The treaty prohibits the establishment of military bases, military manœuvres and the testing of any type of weapons, and bans nuclear explosions or the disposal of atomic waste in the Antarctic. The demilitarization of Antarctica has assured the constant friendly co-operation of scientific bases and expeditions at work there.

I feel that these steps, limited though they may appear to some, give us cause for optimism and are an incentive for further steps in the same direction. Thus, the time may well be ripe now to convene a world conference in which every nation possessing nuclear weapons would pledge itself not to be the first to make use of such weapons. Then too, apart from Antarctica there are many parts of the world where denuclearized zones could be established. Plans have already been put forward for the denuclearization of Scandinavia, the Balkans, Africa, Central Europe as well as other areas.

There are also various proposals (including one from the U.S.S.R.) for the reduction of all military budgets by 10 to 15 per cent, or by any other agreed amount, although events in South-East Asia and the Middle East have made it extremely difficult to carry such projects out.

The prohibition of underground nuclear explosions, however, now appears closer to a solution. Two years ago, at the 18-nation Geneva disarmament talks, several non-committed countries put forward a compromise plan calling for a ban on high-powered underground explosions and a moratorium on all other underground explosions, pending the conclusion of a general agreement on the question. This proposal does not correspond fully to the Soviet position but it has been accepted by the U.S.S.R. as a palliative to give the discussion a new start.

IT was with great interest that I read an article by Walter Lippmann published in the "Unesco Courrier" of October 1965 on the search for ways to establish peace on a lasting basis. While I admire the logic and the approach taken by Mr. Lippmann in his article as well as the feelings they inspire, I feel I cannot agree with one of the points made by the distinguished American journalist.

Mr. Lippmann writes : "... War between nuclear powers can no longer be an instrument of their national policy. This will still be the case even if, as is most probable, a considerable number of states acquire nuclear weapons. For no nation can risk the use of these weapons anywhere because, having these weapons it is subject itself to fearful retaliation... Therefore, the

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The arms race, the gravest issue of our time

prospect of averting great war by mutual deterrence is a reasonably good prospect."

Unfortunately, military conflicts have their own laws, or rather, they do not obey the laws of common sense. The events of last June in the Middle East are proof that recourse to arms between states or groups of states is neither impossible nor infrequent. Can we really therefore be sure that if armed conflicts occurred between "small" nations possessing nuclear weapons that the deterrent factor would hold true and that these nations would not make use of every weapon in their arsenal ?

I am more inclined to agree with another American Journalist, John Gunther, when he says that in the event that all countries gained possession of atomic weapons even the smallest country could spark off a world conflagration.

EVEN a tiny country with a per capita revenue from 22 to 25 times smaller than that of the United States may soon be in a position, I believe, to produce atomic weapons. Today some 10 to 15 countries possess nuclear reactors destined for peaceful purposes. But technical advances and the dissemination of scientific data are such that, with the reduction in the cost of producing nuclear arms, soon there will be not just 10 to 15 countries but 50 or more *potentially* capable of undertaking the manufacture of weapons of mass destruction.

For these reasons the conclusion of an agreement on the non-proliferation of nuclear weapons seems to me particularly urgent. Most people are familiar with the arguments for and against this question. They have been voiced repeatedly at the Geneva disarmament meetings, in diplomatic circles and in the world press. The most telling argument against a non-proliferation treaty stresses that such a treaty would perpetuate the monopoly in atomic weapons of the present nuclear nations. This overlooks the point that an agreement on the non-proliferation of nuclear weapons is not an end in itself but only a first indispensable step towards the total banning of these weapons and their destruction in arsenals everywhere in the world. Furthermore, should such a non-proliferation treaty become a reality, it is proposed that the non-nuclear powers would be completely guaranteed against any possible nuclear attack by a nuclear power.

Another argument against non-proliferation holds that the banning of production of nuclear weapons (as well as the control necessary to enforce the ban) would hamper technical development in the contracting countries by preventing them from using atomic energy for peaceful purposes. It should not be difficult, however, to devise forms of control that would not prejudice a nation's industrial development. Furthermore, the pooling of knowledge and research in the peaceful use of atomic energy would increase as the possibility of its being employed in the manufacture of arms was eliminated.

It is easy to understand—though not always easy to approve—the reasons that prompt nations to keep arms in their arsenals. But the sums spent are staggering. In 1964 the world poured down the drain the astronomical sum of 120,000 million dollars for armaments. The figure is considerably higher today. If some imaginary inhabitant of another solar system was to visit our planet he would no doubt find it hard to understand why we Earthlings squander our resources and energies so uselessly.

The examples of Vietnam and the Middle East make it abundantly clear that in this day and age no problem can be resolved by resort to war. And even less so by resorting to nuclear weapons. The problem of armaments today and their destructive nature is thus the most poignant issue of our time.

IN 1967, the U.S.S.R. will spend 14,500 million roubles (13.2 per cent of its budget) on defence. (1) There are undoubtedly many ways in which this money could be usefully employed in the Soviet Union. The United States spends even huger sums on arms, including the war in Vietnam. And it too still has many social problems to solve, bottlenecks in education, public health and science, where these resources now spent on arms, could be usefully employed.

On the assumption that arms expenditure remained at the present level (which no one really wants), the Soviet Union will spend 230,000 million roubles in the course of the next 20 years. If general and complete disarmament were to become a reality, and supposing even that 20 per cent of the money saved by disarmament were diverted for the developing countries, the U.S.S.R. would still have 230,000 million roubles left over for useful purposes. The money could be spent for an infinite variety of purposes, to raise the standard of living of the Soviet people, to launch large-scale development projects in Siberia, irrigate desert lands, etc...

A look at a map of world development shows us that entire continents are in need of resources and assistance to carry through their full development. To cite only one example, the harnessing of the world's water resources could transform vast regions of our planet. In Asia, the Indus and the Mekong, the Tigris and Euphrates ; in Africa, the Nile and its tributaries, and the Congo ; in Latin America, the Parana and the Amazon.

Mankind is only now becoming aware of the great riches and possibilities at its disposal. Were these to be effectively exploited, they could eliminate hunger, sickness and many other problems due to low living standards, such as illiteracy which still affects many hundreds of millions of the inhabitants of developing countries. By the rational use of its energy and intelligence, mankind could fulfil its destiny at a much more rapid pace, and even on a universal scale now that man is moving beyond the limits of the earth's gravity.

In ancient times, people used to dream about the "Golden Age". But in the times of Plato or Thomas More, this was in fact a Utopia, a mere dream of happiness. Today, with the help of electronic machines we can calculate the extent to which progress in various spheres of human existence would be speeded up should an epoch of general peace and complete disarmament be ushered in.

(1) Editor's note: The U.S.S.R. does not include research and development costs in its defence budget. Total actual defence expenditure for 1966 has been estimated at over 35,000 million dollars. (The exchange rate of the rouble is one rouble = 90 U.S. cents.)

Photo © Henri Mardyks

Detail of a study by Auguste Rodin (1840-1917) for "The Citizens of Calais", the famous group of bronze figures on which the sculptor worked from 1884 to 1889. In 1347, during a war between England and France, six burghers of Calais volunteered to give their lives to save their besieged city. Though they were eventually spared, the event has gone down as one of history's most outstanding examples of the spirit of self sacrifice.

DEVELOPMENT— NEW NAME FOR PEACE

Encyclical Letter of His Holiness Pope Paul VI

On March 26, 1967, His Holiness Pope Paul VI issued a far-reaching Encyclical Letter on the Development of Peoples, calling on all men of goodwill to join in freeing the world of its present poverty and inequities. "The peoples in hunger are making a dramatic appeal to the peoples blessed with abundance", His Holiness said. Pope Paul stressed the urgency of the action that should be taken in a spirit of universal solidarity to assure the development of all mankind. "Development", he affirmed, "is the new name for Peace."

The Pope made an unprecedented gesture by addressing the first copies of the Encyclical, bearing his signature, to U Thant, Secretary-General of the United Nations, to Mr. René Maheu, Director-General of Unesco and to Dr. Binay Ranjan Sen, Director-General of the U.N. Food and Agriculture Organization.

We publish below salient passages from the Encyclical, and on page 35 the response of Mr. René Maheu, inspired by the message of this historic document.

Freedom from misery, the greater assurance of finding subsistence, health and fixed employment; an increased share of responsibility without oppression of any kind and in security from situations that do violence to their dignity as men; better education—in brief, to seek to do more, know more and have more in order to be more: that is what men aspire to now when a greater number of them are condemned to live in conditions that make this lawful desire illusory.

Besides, peoples who have recently gained national independence experience the need to add to this political freedom a fitting autonomous growth, social as well as economic, in order to assure their citizens of a full human enhancement and to take their rightful place with other nations. (6)

Colonization and colonialism. Though insufficient for the immensity and urgency of the task, the means inherited from the past are not lacking. It must certainly be recognized that colonizing powers have often furthered their own interests, power or glory, and that their departure has sometimes left a precarious economy, bound up for instance with the production of one kind of crop whose market prices are subject to sudden and considerable variation.

Yet while recognizing the damage done by a certain type of colonialism and its consequences, one must at the same time acknowledge the qualities and achievement of colonizers who brought their science and technical knowledge and left beneficial results of their presence in so many underprivileged regions.

The structures established by them persist, however incomplete they may be; they diminished ignorance and sickness, brought the benefits of communications and improved living conditions. (7)

Increasing imbalance. Yet once this is admitted, it remains only too true that the resultant situation is manifestly indequate for facing the hard reality of modern economics. Left to itself it works rather to widen the differences in the world's level of life, not to diminish them; rich peoples enjoy rapid growth whereas the poor develop slowly. The imbalance is on the increase: some produce a surplus of foodstuffs, others cruelly lack them and see their exports made uncertain. (8).

Undeserved hardship. At the same time social conflicts have taken on world dimensions. The acute disquiet which has taken hold of the poor classes in countries that are becoming industrialized, is now embracing those whose economy is almost exclusively agrarian: farming people, too, are becoming aware of their "undeserved hardship."

There is also the scandal of glaring inequalities not merely in the enjoyment of possessions but even more in the exercise of power. While a small restricted group enjoys a refined civilization in certain regions, the remainder of the population, poor and scattered, is "deprived of nearly all possibility of personal initiative and of responsibility, and oftentimes even its living and working conditions are unworthy of the human person". (9)

Conflict of civilizations. Furthermore, the conflict between traditional civilizations and the new elements of industrial civilization, break down structures which do not adapt themselves to new conditions. Their framework, sometimes rigid, was the indispensable prop to personal and family life; older people remain attached to it, the young escape from it, as from a useless barrier, to turn eagerly to new forms of life in society.

The conflict of the generations is made more serious by a tragic dilemma: whether to retain ancestral institutions and convictions and renounce progress, or to admit

Photo United Nations

techniques and civilizations from outside and reject along with the traditions of the past all their human richness. In effect, the moral, spiritual and religious supports of the past too often give way without securing in return any guarantee of a place in the new world. (10)

Dangerous confusion. In this confusion the temptation becomes stronger to risk being swept away towards types of messianism which give promises but create illusions. The resulting dangers are patent: violent popular reactions, agitation towards insurrection, and a drifting towards totalitarian ideologies. Such are the data of the problem. Its seriousness is evident to all. (11)

Economic growth not enough. Development cannot be limited to mere economic growth. In order to be authentic, it must be complete: integral, that is, it has to promote the good of every man and of the whole man. . . (14).

A world responsibility. But each man is a member of society. He is part of the whole of mankind. It is not just certain individuals, but all men who are called to this fullness of development. Civilizations are born, develop and die. But humanity is advancing along the path of history like the waves of a rising tide encroaching gradually on the shore. We have inherited from past generations, and we have benefitted from the work of our contemporaries: for this reason we have obligations towards all, and we cannot refuse to interest ourselves in those who will come after us to enlarge the human family. . . (17)

The ambivalence of growth. . . All growth is ambivalent. It is essential if man is to develop as a man, but in a way it imprisons man if he considers it the supreme good, and it restricts his vision. Then we see hearts harden and minds close, and men no longer gather together in friendship but out of self-interest, which soon leads to oppositions and disunity. The exclusive pursuit of possessions thus become an obstacle to individual fulfilment and to man's true greatness. Both for nations and for individual men, avarice is the most evident form of moral underdevelopment. (19)

Towards a more human condition. If further development calls for the work of more and more technicians, even more necessary is the deep thought and reflection of wise men in search of a new humanism which will enable modern man to find himself anew by embracing the higher values of love and friendship, of prayer and contemplation. This is what will permit the fullness of authentic development, a development which is for each and all the transition from less human conditions to those which are more human. (20)

Ideal to be pursued. Less human conditions: the lack of material necessities for those who are without the minimum essential for life, the moral deficiencies of those who are mutilated by selfishness. Less human conditions:

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oppressive social structures, whether due to the abuses of ownership or to abuses of power, to the exploitation of workers or to unjust transactions. Conditions that are more human: the passage from misery towards the possession of necessities, victory over social scourges, the growth of knowledge, the acquisition of culture. Additional conditions that are more human; increased esteem for the dignity of others, the turning toward the spirit of poverty, co-operation for the common good, the will and desire for peace. . . (21)

Industrialization. The introduction of industry is a necessity for economic growth and human progress; it is also a sign of development and contributes to it. By persistent work and use of his intelligence man gradually wrests nature's secrets from her and finds a better application for her riches. As his self-mastery increases, he develops a taste for research and discovery, an ability to take a calculated risk, boldness in enterprises, generosity in what he does and a sense of responsibility. (25)

Liberal capitalism. But it is unfortunate that on these new conditions of society a system has been constructed which considers profit as the key motive for economic progress, competition as the supreme law of economics, and private ownership of the means of production as an absolute right that has no limits and carries no corresponding social obligation.

This unchecked liberalism leads to dictatorship rightly denounced by Pius XI as producing "the international imperialism of money." One cannot condemn such abuses too strongly by solemnly recalling once again that the economy is at the service of man.

But if it is true that a type of capitalism has been the source of excessive suffering, injustices and fratricidal conflicts whose effects still persist, it would also be wrong to attribute to industrialization itself evils that belong to the woeful system which accompanied it. On the contrary one must recognize in all justice the irreplaceable contribution made by the organization of labour and of industry to what development has accomplished. (26)

Urgency of the task. We must make haste: too many are suffering, and the distance is growing that separates the progress of some and the stagnation, not to say the regression, of others. . . (29)

Temptation to violence. There are certainly situations whose injustice cries to heaven. When whole populations destitute of necessities live in a state of dependence barring them from all initiative and responsibility, and all opportunity to advance culturally and share in social and political life, recourse to violence, as a means to right these wrongs to human dignity, is a grave temptation. (30)

Revolution. We know, however, that a revolutionary uprising—save where there is manifest, long-standing tyranny which would do great damage to fundamental personal rights and dangerous harm to the common good of the country—produces new injustices, throws more elements out of balance and brings on new disasters. A real evil should not be fought against at the cost of greater misery. (31)

Reform. We want to be clearly understood: the present situation must be faced with courage and the injustices linked with it must be fought against and overcome. Development demands bold transformations, innovations that go deep. Urgent reforms should be undertaken without delay. It is for each one to take his share in them with generosity, particularly those whose education, position and opportunities afford them wide scope for action. . . (32)

At man's service. . . It is not sufficient to promote technology to render the world a more human place in which to live. The mistakes of their predecessors should warn those on the road to development of the dangers to be avoided in this field. To-morrow's technocracy can beget evils no less redoubtable than those due to the liberalism of yesterday.

Economics and technology have no meaning except from man whom they should serve. And man is only truly man in as far as, master of his own acts and judge of their worth, he is author of his own advancement, in keeping with the nature which was given to him by his Creator and whose possibilities and exigencies he himself freely assumes. (34)

Efforts to achieve literacy. It can even be affirmed that economic growth depends in the very first place upon social progress: thus basic education is the primary object of any plan of development. Indeed hunger for education is no less debasing than hunger for food: an illiterate is a person with an undernourished mind. To be able to read and write, to acquire a professional formation, means to recover confidence in oneself and to discover that one can progress along with the others.

As We said in Our message to the Unesco Congress held in 1965 at Teheran, for man literacy is "a fundamental factor of social integration, as well as of personal enrichment, and for society it is a privileged instrument of economic progress and of development".

We also rejoice at the good work accomplished in this field by private initiative, by the public authorities and by international organizations: these are the primary agents of development, because they render man capable of acting for himself. . . (35)

Demography. It is true that too frequently an accelerated demographic increase adds its own difficulties to the problems of development: the size of the population increases more rapidly than available resources, and things are found to have reached apparently an impasse. From that moment the temptation is great to check the demographic increase by means of radical measures.

It is certain that public authorities can intervene, within the limit of their competence, by favouring the availability of appropriate information and by adopting suitable measures, provided that these be in conformity with the moral law and that they respect the rightful freedom of married couples. Where the inalienable right to marriage and procreation is lacking, human dignity has ceased to exist.

Finally, it is for the parents to decide, with full knowledge of the matter, on the number of their children, taking into account their responsibilities towards God, themselves, the children they have already brought into the world, and the community to which they belong. In all this they must follow the demands of their own conscience enlightened by God's law authentically interpreted, and sustained by confidence in Him. (37)

Promotion of culture. In addition to professional organizations, there are also institutions which are at work. Their role is no less important for the success of development. "The future of the world stands in peril", the Vatican Council gravely affirms, "unless wiser men are forthcoming". And it adds: "many nations, poorer in economic goods,

CONTINUED ON PAGE 32

A street in Lahore (Pakistan)
Photo © Paul Almasy, Paris

"It is true that too frequently an accelerated demographic increase adds its own difficulties to the problems of development: the size of the population increases more rapidly than available resources, and things are found to have reached apparently an impasse."

are quite rich in wisdom and able to offer noteworthy advantages to others".

Rich or poor, each country possesses a civilization handed down by their ancestors: institutions called for by life in this world, and higher manifestations of the life of the spirit, manifestations of an artistic, intellectual and religious character. When the latter possess true human values, it would be a grave error to sacrifice them to the former. A people that would act in this way would thereby lose the best of its patrimony; in order to live, it would be sacrificing its reasons for living. . . (40)

Spirit of solidarity. There can be no progress towards the complete development of man without the simultaneous development of all humanity in the spirit of solidarity. As We said at Bombay: "Man must meet man, nation meet nation, as brothers and sisters, as children of God. In this mutual understanding and friendship, in this sacred communion, we must also begin to work together to build the common future of the human race." We also suggested a search for concrete and practical ways of organization and co-operation, so that all available resources be pooled and thus a true communion among all nations be achieved. (43)

Brotherhood of peoples. This duty is the concern especially of better-off nations. Their obligations stem from a brotherhood that is at once human and supernatural, and take on a threefold aspect: the duty of human solidarity—the aid that the rich nations must give to developing countries; the duty of social justice—the rectification of inequitable trade relations between powerful nations and weak nations; the duty of universal charity—the effort to bring about a world that is more human towards all men, where all will be able to give and receive , without one group making progress at the expense of the other. The question is urgent, for on it depends the future of the civilization of the world. (44)

War against hunger. . . Today no one can be ignorant any longer of the fact that in whole continents countless men and women are ravished by hunger, countless numbers of children are undernourished, so that many of them die in infancy, while the physical growth and mental development of many others are retarded and as a result whole regions are condemned to the most depressing despondency... The campaign against hunger being carried on by the Food and Agriculture Organization (FAO) and encouraged by the Holy See, has been generously supported. . . (45)

Let each examine his conscience. But... it is not just a matter of eliminating hunger, nor even of reducing poverty. The struggle against destitution, though urgent and necessary, is not enough. It is a question, rather, of building a world where every man, no matter what his race, religion or nationality, can live a fully human life, free from servitude imposed on him by other men or by natural forces over which he has not sufficient control; a world where freedom is not an empty word and where the poor man Lazarus can sit down at the same table with the rich man. This demands great generosity, much sacrifice and unceasing effort on the part of the rich man.

Let each one examine his conscience, a conscience that conveys a new message for our times. Is he prepared to support out of his own pocket works and undertakings organized in favour of the most destitute? Is he ready to pay higher taxes so that the public authorities can intensify their efforts in favour of development? Is he ready to pay a higher price for imported goods so that the producer may be more justly rewarded? Or to leave his country, if necessary and if he is young, in order to assist in this development of the young nations? (47)

Duty of human solidarity. The same duty of solidarity that rests on individuals exists also for nations: "Advanced nations have a very heavy obligation to help the developing peoples". . . Every nation must produce more and better quality goods to give to all its inhabitants a truly human standard of living, and also to contribute to the common development of the human race.

Given the increasing needs of the under-developed countries, it should be considered quite normal for an advanced country to devote a part of its production to meet their needs, and to train teachers, engineers, technicians and scholars prepared to put their knowledge and their skill at the disposal of less fortunate peoples. (48)

Superfluous wealth. We must repeat once more that the superfluous wealth of rich countries should be placed at the service of poor nations. The rule which up to now held good for the benefit of those nearest to us, must today be applied to all the needy of this world.

Besides, the rich will be the first to benefit as a result. Otherwise their continued greed will certainly call down upon them the judgement of God and the wrath of the poor, with consequences no one can foretell. If today's flourishing civilizations remain selfishly wrapped up in themselves, they could easily place their highest values in jeopardy, sacrificing their will to be great to the desire to possess more. . . (49)

A World Fund. . . At Bombay, We called for the establishment of a great **World Fund,** to be made up of part of the money spent on arms, to relieve the most destitute of this world. What is true of the immediate struggle against want, holds good also when there is a question of development. Only world-wide collaboration, of which a common fund would be both means and symbol, will succeed in overcoming vain rivalries and in establishing a fruitful and peaceful exchange between peoples. (51)

Aid without strings. There is certainly no need to do away with bilateral and multilateral agreements: they allow ties of dependence and feeling of bitterness, left over from the era of colonialism, to yield place to the happier relationship of friendship, based on a footing of constitutional and political equality.

However, if they were to be fitted into the framework of world-wide collaboration, they would be beyond all suspicion, and as a result there would be less distrust on the part of the receiving nations. These would have less cause for fearing that, under the cloak of financial aid or technical assistance, there lurk certain manifestations of what has come to be called neo-colonialism, in the form of political pressures and economic suzerainty aimed at maintaining or acquiring complete dominance. (52)

Arms race an intolerable scandal. Besides who does not see that such a fund would make it easier to take measures to prevent certain wasteful expenditures, the result of fear or pride?

When so many people are hungry, when so many families suffer from destitution, when so many remain steeped in ignorance, when so many schools, hospitals and homes worthy of the name remain to be built, all public or private squandering of wealth, all expenditure prompted by motives of national or personal ostentation, every exhausting armaments race, becomes an intolerable scandal.

We are conscious of Our duty to denounce it. Would that those in authority listened to Our words before it is too late! (53)

Dialogue among all peoples. This means that it is absolutely necessary to create among all peoples that dialogue for whose establishment We expressed Our hope in Our first Encyclical *Ecclesiam Suam*. This dialogue between those who contribute wealth and those who benefit from it, will provide the possibilty of making an assessment of the contribution necessary, not only drawn up in terms of the generosity and the available wealth of the donor nations, but also conditioned by the real needs of the receiving countries and the use to which the financial assistance can be put.

Developing countries will thus no longer risk being overwhelmed by debts whose repayment swallows up the greater part of their gains. Rates of interest and time for repayment of the loan could be so arranged as not to be too great a burden on either party, taking into account free gifts, interest-free or low-interest loans, and the time needed for liquidating the debts. Guarantees could be given to those who provide the capital that it will be put to use according to an agreed plan and with a reasonable measure of efficiency, since there is no question of encouraging parasites or the indolent.

And the receiving countries could demand that there be no interference in their political life or subversion of their social structures. As sovereign states they have the right to conduct their own affairs, to decide on their policies and to move freely towards the kind of society they choose.

What must be brought about, therefore, is a system of co-operation freely undertaken, an effective and mutual sharing, carried out with equal dignity on either side, for the construction of a more human world. (54)

World peace at stake. . . This common task will not succeed without concerted, constant and courageous efforts. But let everyone be convinced of this: the very life of poor nations, civil peace in developing countries, and world peace itself are at stake. (55).

Equity in trade relations. The efforts which are being made to assist developing nations on a financial and technical basis, though considerable, would be illusory if their benefits were to be partially nullified as a consequence of the trade relations existing between rich and poor countries. The confidence of these latter would be severely shaken if they had the impression that what was being given them with one hand was being taken away with the other. (56)

Increasing disproportion. Of course, highly industrialized nations export for the most part manufactured goods, while countries with less developed economies have only food, fibres and other raw materials to sell. As a result of technical progress the value of manufactured goods is rapidly increasing and they can always find an adequate market.

On the other hand, raw materials produced by under-developed countries are subject to wide and sudden fluctuations in price, a state of affairs far removed from the progressively increasing value of industrial products. As a result, nations whose industrialization is limited are faced with serious difficulties when they have to rely on their exports to balance their economy and to carry out their plans for development. The poor nations remain ever poor while the rich ones become still richer. (57)

Liberalism in question. In other words, the rule of free trade, taken by itself, is no longer able to govern international relations. Its advantages are certainly evident when the parties involved are not affected by any excessive inequalities of economic power: it is an incentive to progress and a reward for effort.

That is why industrially developed countries see in it a law of justice. But the situation is no longer the same when economic conditions differ too widely from country to country: prices which are "freely" set in the market can produce unfair results. One must recognize that it is the fundamental principle of liberalism, as the rule for commercial exchange, which is questioned here. (58)

Obstacles to overcome: Nationalism. Among still other obstacles which are opposed to the formation of a world which is more just and which is better organized toward a universal solidarity, We wish to speak of nationalism and racism.

It is only natural that communities which have recently reached their political independence should be jealous of a national unity which is still fragile, and that they should strive to protect it. Likewise, it is to be expected that nations endowed with an ancient culture should be proud of the patrimony which their history has bequeathed to them. But these legitimate feelings should be ennobled by that universal charity which embraces the entire human family.

Nationalism isolates people from their true good. It would be especially harmful where the weakness of national economies demands rather the pooling of efforts, of knowledge and of funds, in order to implement programmes of development and to increase commercial and cultural exchange. (62)

Racism. Racism is not the exclusive lot of young nations, where sometimes it hides beneath the rivalries of clans and political parties, with heavy losses for justice and at the risk of civil war. During the colonial period it often flared up between the colonists and the indigenous population, and stood in the way of mutually profitable understanding, often giving rise to bitterness in the wake of genuine injustices.

It is still an obstacle to collaboration among disadvantaged nations and a cause of division and hatred within countries whenever individuals and families see the inviolable rights of the human person held in scorn, as they themselves are unjustly subjected to a regime of discrimination because of their race or their colour. (63)

For a unified world. We are deeply distressed by such a situation which is laden with threats for the future. We are, nonetheless, hopeful: a more deeply felt need for collaboration, a heightened sense of unity will finally triumph over misunderstandings and selfishness.

We hope that the countries whose development is less advanced will be able to take advantage of their proximity in order to organize among themselves, on a broadened territorial basis, areas for concerted development: to draw up programmes in common, to co-ordinate investments, to distribute the means of production, and to organize trade.

We hope also that multilateral and international bodies, by means of the reorganization which is required, will discover the ways that will allow peoples which are still under-developed to break through the barriers which seem to enclose them and to discover for themselves, in full fidelity to their own proper genius, the means for their social and human progress. (64)

CONTINUED ON PAGE 36

"Freedom from misery, the greater assurance of finding subsistence, health and fixed employment; an increased share of responsibility . . .in security from situations that do violence to their dignity as men; better education—in brief, to seek to do more, know more and have more in order to be more: that is what men aspire to now..."

Photo © Mireille Vautier

Artisans of their own destiny. Such is the goal we must attain. World unity, ever more effective, should allow all peoples to become the artisans of their destiny. The past has too often been characterized by relationships of violence between nations; may the day dawn when international relations will be marked with the stamp of mutual respect and friendship, of interdependence in collaboration, the betterment of all seen as the responsibility of each individual.

The younger or weaker nations ask to assume their active part in the construction of a better world, one which shows deeper respect for the rights and the vocation of the individual. This is a legitimate appeal; everyone should hear it and respond to it. (65)

Development, the new name for peace. Excessive economic, social and cultural inequalities among peoples arouse tensions and conflicts, and are a danger to peace... Peace cannot be limited to a mere absence of war, the result of an ever precarious balance of forces. No, peace is something that is built up day after day, in the pursuit of an order intended by God, which implies a more perfect form of justice among men. (76)

An end to isolation. The peoples themselves have the prime responsibility to work for their own development. But they will not bring this about in isolation. Regional agreements among weak nations for mutual support, understandings of wider scope entered into for their help, more far-reaching agreements to establish programmes for closer co-operation among groups of nations—these are the milestones on the road to development that leads to peace. (77)

Need for a world authority. This international collaboration on a world-wide scale requires institutions that will prepare, co-ordinate and direct it, until finally there is established an order of justice which is universally recognized.

With all Our heart, We encourage these organizations which have undertaken this collaboration for the development of the peoples of the world, and Our wish is that they grow in prestige and authority.

"Your vocation," as We said to the representatives of the United Nations in New York, "is to bring not some people but all peoples to treat each other as brothers. . . Who does not see the necessity of thus establishing progressively a world authority, capable of acting effectively in the juridical and political sectors?" (78)

Progress of the human family. Some would consider such hopes Utopian. It may be that these persons are not realistic enough, and that they have not perceived the dynamism of a world which desires to live more fraternally—a world which, in spite of its ignorance, its mistakes and even its sins, its relapses into barbarism and its wanderings far from the road of salvation, is, even unawares, taking slow but sure steps towards its Creator. This road towards a greater humanity requires effort and sacrifice; but suffering itself, accepted for the love of our brethren, favours the progress of the entire human family. . . (79)

Universal solidarity. We have desired to remind all men how crucial is the present moment, how urgent the work to be done. The hour for action has now sounded. At stake are the survival of so many innocent children and, for so many families overcome by misery, the access to conditions fit for human beings; at stake are the peace of the world and the future of civilization. It is time for all men and all peoples to face up to their responsibilities. (80)

TO BUILD

by René Maheu

Director-General of Unesco

THE Encyclical is addressed to the Church and, more generally, to all men of goodwill. Unesco, a strictly secular organization, is essentially a world-wide venture in goodwill. The Holy Father may be certain that his message will evoke a particularly favourable response in this Organization . . .

I should like, on behalf of Unesco, to convey my sincere appreciation to the Holy Father who, in this vital document, has reaffirmed the truly fundamental importance which should be attached to literacy, and who has recognized the value of the efforts being made to combat the under-nourishment of men's minds which is no less debasing than under-nourishment of their bodies. I see in this an assurance of the Church's active co-operation in the campaign for basic education and functional literacy which Unesco is striving to promote throughout the world.

But, just as the cause we serve goes far beyond our action, limited as it is by the inadequacy of our resources and too often hampered by our own shortcomings, so what

A NEW ORDER IN THE WORLD

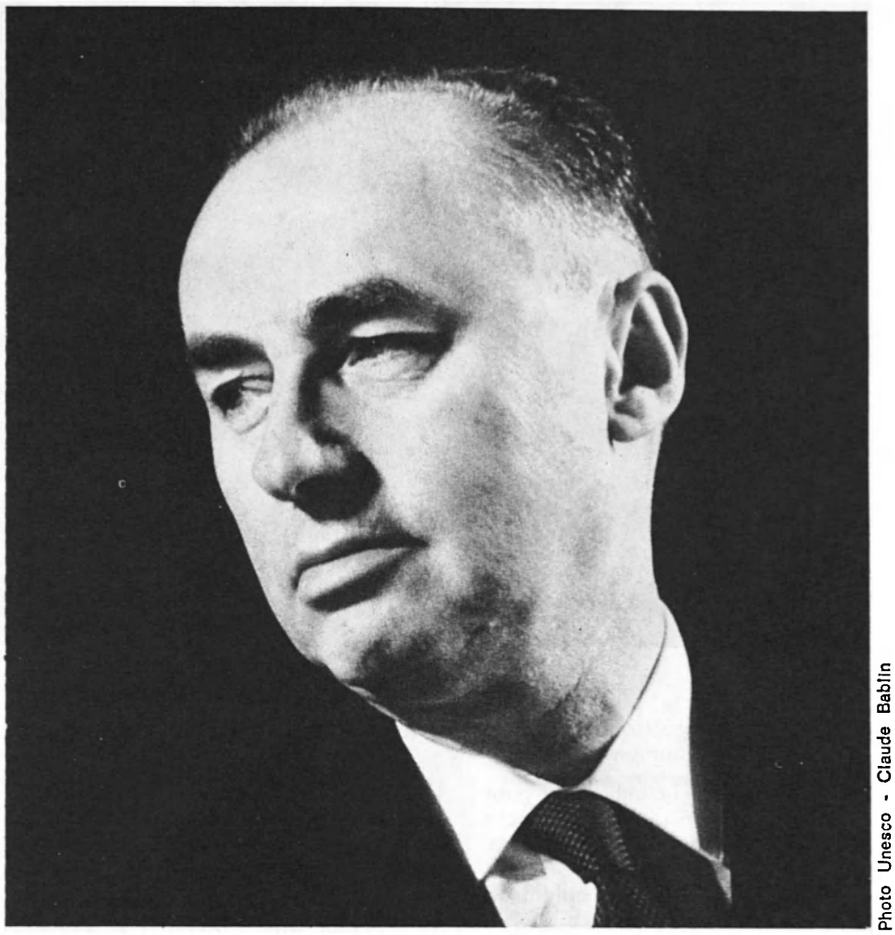

Photo Unesco - Claude Bablin

touches us most in the Encyclical, beyond the support and assistance extended to our work, is the profound agreement which clearly emerges in the spirit, and sometimes almost in the letter, between the views of the Holy Father concerning the problems, aims and methods of development and those which Unesco has constantly promoted since the beginning of this decade. I should like to draw attention to the essential points on which we find this harmony of views.

First of all, concerning *the nature of the problem.* Like His Holiness Paul VI, we believe that development is, in the strictest sense of the terms, a work of "justice and peace".

For the Twentieth-century world, underdevelopment is what the social question was for the countries which were carrying out their industrial revolution in the Nineteenth century. As the Encyclical makes clear, it is in fact the same problem that is involved, but extended to the scale of the world as a whole: the old problem of inequity in the organization of society. "Too many are suffering, and the distance is growing that separates the progress of some and the stagnation, not to say the regression, of others."

There is no true remedy for this inequitable situation other than measures—increasingly urgent measures—to secure justice. This should not be interpreted as meaning arrangements to make bitter poverty bearable and inequity less shocking; what is needed is the establishment of an order which will gradually reduce and ultimately eliminate the causes of this inequity and poverty. Above all, we must see that we do not have "one group making progress at the expense of the other", since this betokens a radical injustice affecting the basic structures and conditions of social dynamics.

But if development is a work of justice, it is also a work of peace, and here the most elementary and the most general interest combines with the loftiest duty.

The weakness of the poor presents a dangerous temptation to the greed and the lust for domination of the powerful. And exploitation and domination in turn engender revolt. It would be wrong to delude ourselves concerning the apparent tranquility that has followed the accession to political independence of so many countries which but yesterday were still subject to colonial rule. Deep currents are stirring in the developing countries as they make the bitter discovery that the independence so ardently desired is still relative.

This deprived section of mankind has lost nothing of its extraordinary capacity to endure poverty; on the other hand, it is less and less ready to accept inequity precisely because of its newly-acquired political awareness. History records many terrible outbursts of righteous anger from the oppressed; the world has been shaken by similar upheavals even in the present century.

Among the distinguished thinkers to whom the Pope appeals to study our troubled world, I know of some who are asking themselves anguishing questions about what the next decade will bring, when overpopulation, hunger, poverty and racial antagonisms reach their peak at the same time and combine to form one great tragic problem. They are increasingly aware that development is the only way of avoiding upheavals on a planetary scale.

Development is also—indirectly but nevertheless essentially interconnected with it—the best way of converting force to peaceful purposes . . .

I am quite aware that the world conflicts of modern times have set the most highly developed countries in opposition and that, in many respects, these conflicts have derived from the contradictions inherent in development itself. But this was a development of power, seeking constantly to possess more, and not a development of humanity, seeking to "be more".

Development, as we now understand it—the development which calls for assistance to the weak within the context of a just and rational organization of mankind as a whole—cannot be achieved or even conceived unless objectivity rules the mind and brotherhood the heart, these being the very principles of the will to peace. And if it is true that economic necessity will one day compel us to choose between universal development and the headlong arms race, it is even more evident that the profound, whole-hearted commitment of the rich and powerful nations with all their resources to the work of development would represent, and result

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Between this hand learning the rudiments of writing (right) and mechanical "hands" used to handle radioactive materials in a nuclear research laboratory (far right) lies the immense gap separating the world of illiteracy from the world of science. Education alone can assure the implantation of science in the developing countries whose economic progress will reduce the present imbalance in the world's standards of living.

Photo Unesco - D. Seymour

The human mind on the march

in, a general conversion of mankind to peace.

The second point of agreement that I should like to note is the *conception of development.* We in Unesco also believe that "in order to be authentic, (development) must be complete: integral, that is, it has to promote the good of every man and of the whole man" . . .

To proclaim the overriding need for the integral development of what is human is, in concrete terms, to affirm the primacy of the individual in the process of development, as the subject, agent and end of that development.

It implies the condemnation of technocracy, which is the cult of efficiency measured by standards that leave the individual altogether out of account and which, as the Encyclical puts it so well, "can beget evils no less redoubtable than those due to the liberalism of yesterday". In more general terms, it implies subjecting economics to ethical considerations, or rather infusing humanism into economics so that, abandoning the abstract for the concrete, it may take on new life. "Economics and technology have no meaning except from man whom they should serve". Finally and above all, it means recognizing—that is to say, demonstrating—that there can be no real development except that brought about within himself by a man's independent efforts. "Man is only truly man in as far as, master of his own acts and judge of their worth, he is author of his own advancement", which amounts to saying that the only true progress is endogenous.

The requirements of practical action, no less than the essentially humanistic mission it has to fulfil, have made Unesco increasingly aware of these essential truths, which clearly reveal the significance of Unesco's particular contribution to development. Once it is realized that the only development is that of man, through man and for man, then it becomes evident that education, science and culture are the foundation and the culmination, the driving force and the justifying end of development in its essence. It has been said that development is primarily a state of mind; we might go further and say that development is the human mind on the march in history.

Education, which is preparation, science, which is discovery and explanation, culture, which is examination and assimilation, represent the decisive phases and aspects of this progress of the mind. It is for this reason that we find them, at the most essential level, in the gradual unfolding of development. Everything begins with education, since no appropriation, utilization or development of nature and society is possible without education: hence the universal priority accorded to it.

The implantation of science is the key operation in development; it differs very greatly from the mere import of techniques which, even if it leads to local progress—generally superficial and seldom lasting—perpetuates the economic and intellectual dependence of the developing peoples. Finally, it is abundantly clear that there can be no development from within except where scientific civilization has taken root, in other words, where science has ceased to be an alien magic and has become culture.

This, then, is the humanistic conception of integral development which we share. Yet perhaps the most remarkable statement of views in the Encyclical is the declaration, knitting together the whole, that *there can be no progress towards the complete development of the individual man without the simultaneous development of all men in the spirit of solidarity.* And of that, too, we in Unesco are profoundly convinced. Indeed, that belief is the very reason for our existence.

It is therefore an immense source of satisfaction and encouragement for us that the Holy Father should lay such stress, as he did before the General Assembly of the United Nations, on the necessity for a world authority and on the urgent need, in the meantime, to increase the resour-

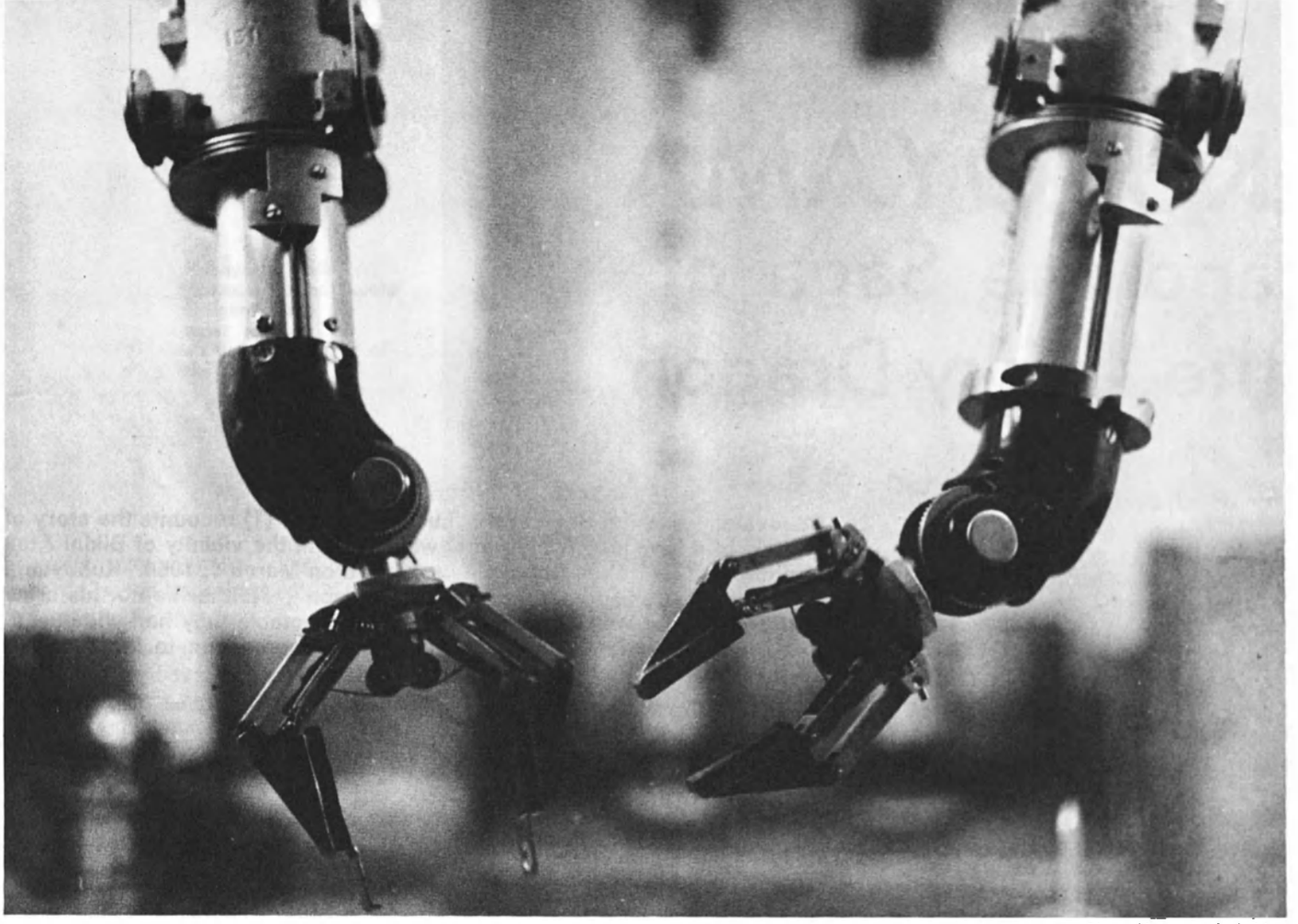


Photo Unesco - Jack Ling

ces, activities and prestige of the international organizations concerned with development.

It is very true that the efforts of these institutions can do more than any other form of aid to bring about, as desired in the Encyclical, " a system of co-operation freely undertaken, an effective and mutual sharing, carried out with equal dignity on either side, for the construction of a more human world ". Not because greater resources are available for those efforts—as we know, that is very far from being the case—but, first and foremost, because they alone are completely disinterested. And also because they are better suited to the nature of the task, which is the organization of a new order in the world . . .

If I have drawn attention, even at the risk of repeating the obvious, to the main points of a fundamental harmony of views on development between the Encyclical and the ideas on which Unesco's action and its very existence are based, it is in no way merely to record for history the fact—significant as it is!—that a Church now resolutely open to the world and an intergovernmental institution which is becoming increasingly aware of the spiritual dimension of its intellectual and practical undertaking have come together in the service of man.

It is, firstly, in order to be able to give the Sovereign Pontiff a clear assurance that his ideas will meet with particular understanding within Unesco. It is also, and perhaps above all, to convey to him my conviction that Unesco, at its own level, and without departing from its own principles and methods, will spontaneously answer his appeal with action . . .

For myself, though I cannot prejudge what that action will be, I will say that I share the anguish of the appeal and endorse its fervour.

Yes, I believe that "the hour for action has now sounded" and that "at stake are the peace of the world and the future of civilization". It is my ardent desire that the peoples should feel this, and governments understand it, while there is still time.

So far as governments are concerned, would it be too much to express the hope—which I can do only in my personal capacity—that in the near future a conference of the world's responsible leaders may be held at the highest level to consider the problems of development, not separately, sector by sector, as is usually done, but as a whole, with a view to finding radical overall solutions ?

I mean a conference which would reorganize the relations between the wealthy nations and the poor nations, like the conferences held after great world conflicts to reorganize the relations between the powers, but one more deserving than were those settlements and partitions, of the fair name of Peace Conference, since the object would be to forestall violence by justice, not to repair its effects by force after the catastrophe.

Such a conference would have to deal, among other things, with the question of trade relations between industrialized countries and underdeveloped countries, the present inequity of which the Holy Father has so rightly emphasized. It could also take steps—and no doubt would quite naturally be led to do so—to strengthen very considerably, if necessary by rationalizing it, the system of international organizations which can play a decisive part in the building of a more just and more fraternal world order.

Of course, any intergovernmental action of this kind is possible only if every citizen, every person feels personally concerned by development and takes it upon himself as a universal task. In the developed countries particularly, it would be a good thing for all those holding positions of responsibility to have had personal experience of the nature and methods of development, and indeed of service in its cause. The conversion of every individual to that work of universal salvation, development, is the great spiritual mutation which is essential for mankind today.

Development, as I have said, is a state of mind. It is above all a matter of conscience. It was very necessary to remind the world of this.

Extracts from the speech by Mr René Maheu, Director-General of Unesco, on the occasion of the presentation, by Mgr Joseph Zabkar, Permanent Observer of the Holy See to Unesco, of a signed copy of the Encyclical, Populorum Progressio, *addressed by Pope Paul VI to Mr Maheu.*

KUBOYAMA and the Saga of the 'Lucky Dragon'

by Richard Hudson

Drawings by Ben Shahn

"Kuboyama—and the Saga of the 'Lucky Dragon'" (1) recounts the story of the crew of a Japanese fishing boat which was in the vicinity of Bikini Atoll when the first Hydrogen Bomb was exploded on March 1, 1954. Kuboyama was radio operator on board the "Lucky Dragon". Neither he nor his crew mates realized the nature of the apocalyptic spectacle they had witnessed. But the people of Japan and the entire world were soon to learn of the fate that awaited Kuboyama.

KUBOYAMA'S last journey to sea got under way on Friday January 22, 1954, shortly before noon, when the *Fukuryu Maru* (Lucky Dragon) headed out from Yaizu.

The crew had been told they were going south into seas near the Solomon Islands. But Fishing Master Misaki and the vessel's owner, Nishikawa, had decided that the *Lucky Dragon* would fish near Midway Island, over 2,500 miles to the east of Japan.

They had pored over the carefully kept records of Japanese fishing boats and had been favorably impressed by the good catches of albacore, or "American tuna" as they called them in that area. They were reluctant to tell the crew, however, since they knew there would be strong objections to fishing in those notoriously stormy waters.

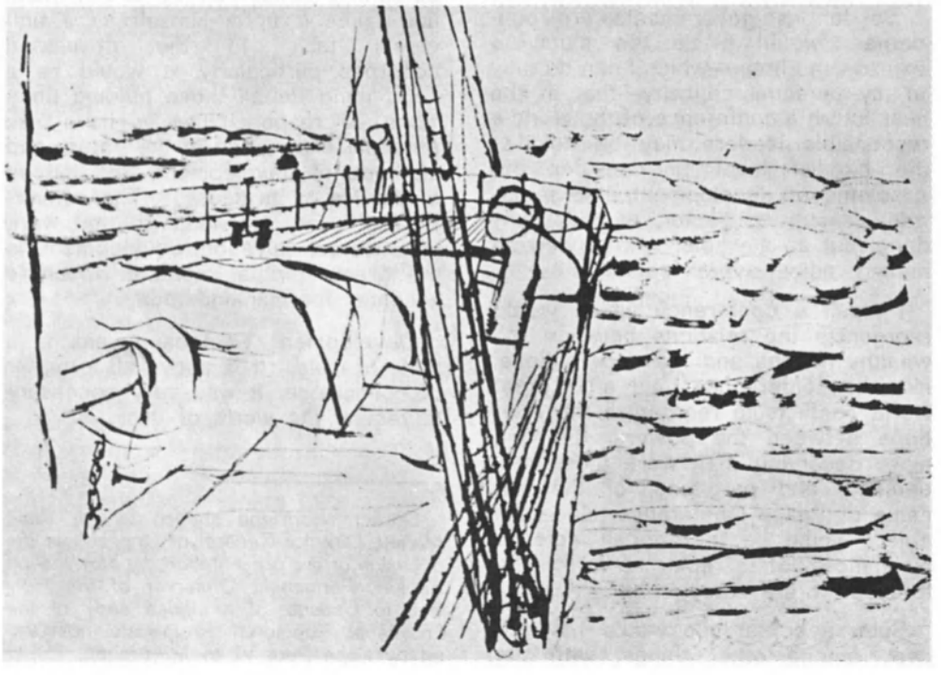
According to custom, Captain Tsutsui, Chief Engineer Yamamoto and Radioman Kuboyama should all have been consulted in selecting the fishing grounds. Kuboyama voiced angry doubts as to whether the *Lucky Dragon* was sturdy enough to withstand the battering that she might run into in storms around Midway. Yamamoto expressed fears that his engine might break down, which in rough seas could be disastrous. Tsutsui objected too, but he could not overrule his fishing master. The real boss aboard a Japanese tuna boat is the fishing master. The *Lucky Dragon* continued on its course toward Midway.

Long before dawn on February 7, some two hundred miles south-west of Midway, Misaki climbed to the bridge, rang the ship's bell, and ordered the waiting deck hands: "Begin to throw out the lines!"

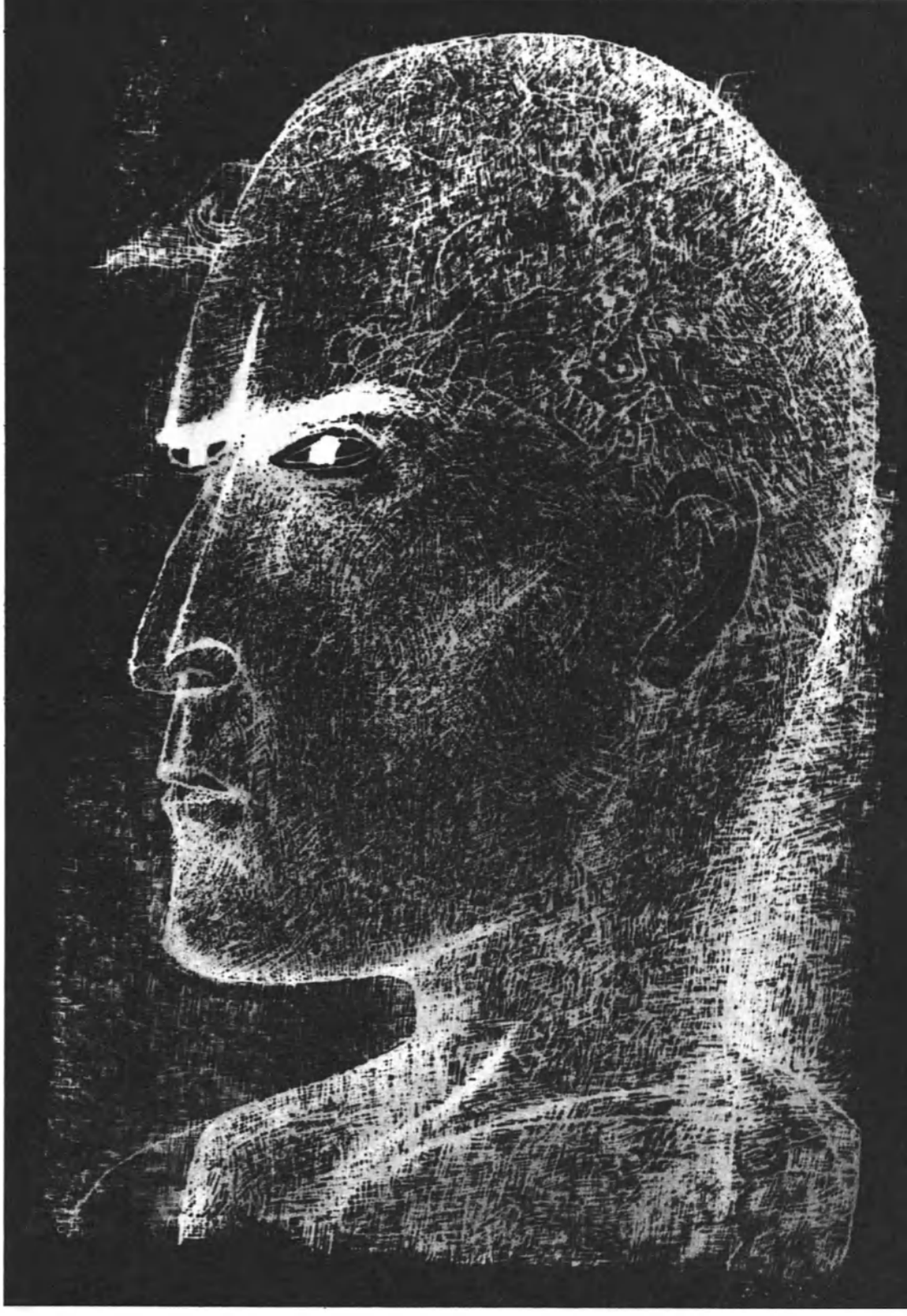
The *Lucky Dragon* moved ahead at her top speed of seven knots. Working under electric lights, the crewmen laboured to pay out the line fast enough. Other crewmen rapidly baited big steel hooks with eight-inch-long frozen mackerel that had been stored in the hold since they sailed from Yaizu. A lighted buoy attached to one end of the long line went out first and then, after every three hundred yards of line, a green glass buoy with a bamboo pole and flag on it followed.

After nineteen of the green buoys had been dropped, a second lighted buoy went down. Then more green buoys, another lighted buoy and so on. Almost four hours later the one long line was out, extending away from the *Lucky Dragon* about thirty miles. It hung in a series of festoons about two hundred feet below the surface, suspended by float lines from three

(1) This text is reproduced from "Kuboyama and the Saga of the 'Lucky Dragon'" by Richard Hudson, published in New York and London by Thomas Yoseloff and copyrighted © 1965 by A.S. Barnes and Co., Inc., New York ($5,95; 42/-stg.). Mr Hudson's story is based on an earlier book entitled "The Voyage of the 'Lucky Dragon'", by Ralph E. Lapp (Harper and Row, New York).



On Friday, January 22, 1954, a Japanese fishing vessel, the "Lucky Dragon" set out from the small port of Yaizu to fish for tuna in the Pacific, over 2,500 miles to the east of Japan. None of the fishermen suspected that a terrifying experience awaited them in the Pacific.



Kuboyama, radio operator on the "Lucky Dragon", was the most popular and shrewdest member of the crew.

hundred buoys. More than fifteen hundred baited hooks waited for passing tuna with appetites.

The crewmen ate their breakfast of rice, soup, and tea with savour, speculating on how the first throwing of the lines would come out. Four hours after the last buoy had been dumped over, they began to retrace their previous course to haul in their catch.

The fishermen watched the buoys with intense interest as they recovered their lines. The men worked thirteen hours, until after midnight, before the lines were all in. The catch totaled fifteen fish weighing altogether only a few hundred pounds. They had put out more than that in bait. The crew grumbled, blaming Misaki for bringing them to Midway rather than to the Solomons.

THE following day winds caused a rough sea, so that lines could not be thrown. The day after that, long before daylight, the lines went out for the second time. Two hours before sundown it was discovered that the main line had parted. Had the lines become caught on coral that sometimes juts sharply toward the surface in these seas? Or had currents sucked the lines into entanglements on the ocean bottom itself? Whatever the explanation, the breaking of the main line was a disaster. The fishermen cursed their luck and, especially, they cursed Misaki for bringing them here. But their bitterness did not detract from the diligence of their search for the buoys that might mean recovery of the lines.

The *Lucky Dragon* searched that night and the following two days, finding only a few buoys with short lengths of line attached. The day after that, Misaki gave up the search. With almost half his line lost, he called together the captain, chief engineer, radioman, boatswain, and chief deckman to determine their course of action. They would of course continue fishing, for they still had enough line and fuel to make a respectable catch.

"I believe we should go north," Misaki said. "There are high-priced fish there."

"This old ship could not stand the rough seas of the north," Kuboyama objected.

"The main bearing of the engine has already burned out once," Yamamoto said. "It would be very dangerous if this should happen again in a storm such as is common in the north."

The others sided with Kuboyama and Yamamoto, who proposed instead that they go south to the calmer seas of the Marshall Islands. There should be big-eyed tuna there, they argued. At length Misaki agreed.

With its fortune running true, the Lucky Dragon turned south to avoid storms and quickly ran into a bad one. Engine trouble followed. But when clear skies finally did appear, the spirits of the crew rose and fishing was resumed.

On March 1 a few minutes after three o'clock in the morning Misaki gave the order to start fishing. It was still dark when the throwing of the lines was completed two and a half hours later. Misaki ordered the engine cut, and the *Lucky Dragon* drifted silently in the sea.

Some of the crew were sleeping; others were below deck preparing for breakfast. The few who were topside were suddenly amazed when a huge incandescence arose on the western horizon. Yellowish white light flash-

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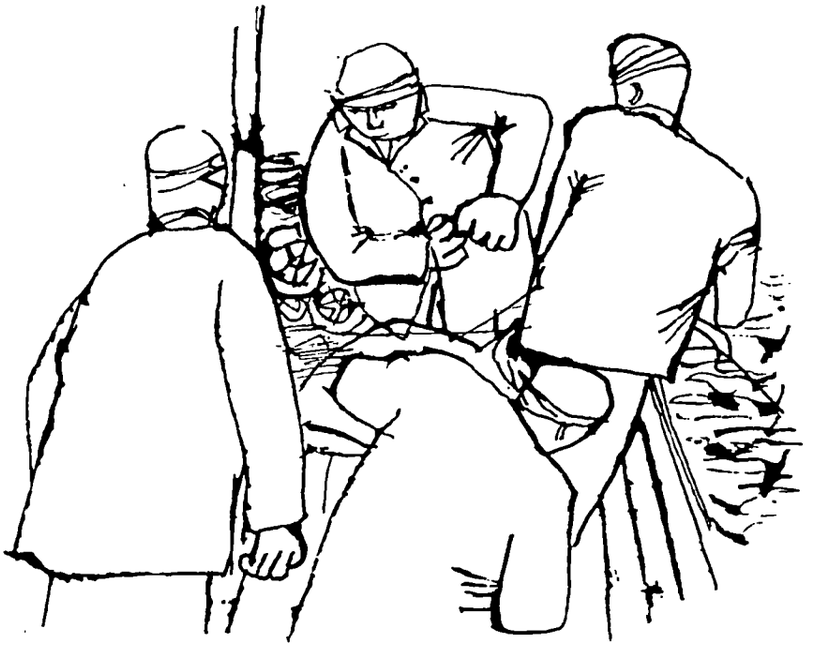


After running into difficulties while fishing near the Midway Islands, the "Lucky Dragon" turns south to try its luck near the Marshall Islands.

'The sun rises in the West!' the fishermen exclaim

ed over the sea and against the clouds that partially covered the sky. The brilliance became a glaring yellow, and then a blazing orange. The fisherman watched in awe. One of them rushed below and excitedly told his shipmates, "The sun rises in the west!"

"What could this be?" the men asked each other frantically. Almost immediately it was suggested that they might have witnessed a *pika-don* —a compound word meaning "thunderflash" that entered the Japanese language after the bombing of Hiroshima. "But if it's a *pika-don.*" Kuboyama wondered, "where is the mushroom in the sky?" True, there was no mushroom, and soon the great light began to fade. Some of those who had been sleeping, like Captain Tsutsui, found that by the time they reached the deck pre-dawn darkness had returned.

Just as the men were beginning to calm down, about seven minutes after the beginning of the flash, the *Lucky Dragon* was seized with a violent shaking. A few seconds later two reports that sounded like distant rifle shots were heard. The sailors threw themselves to the deck and covered their heads.

WHEN quiet returned, the debate was resumed over the strange occurences. Some suggested that the U.S. Navy might be holding gunnery practice. Others guessed again that they must have seen a *pika-don.* Shrewd Kuboyama made a simple calculation based on the difference in time between the sighting of the flash and the arrival of the sound wave that shook the *Lucky Dragon.* "We must be about 87 miles away from where the flash took place," he said. Misaki consulted his charts. About 85 miles away, in the direction from which the light had come, lay Bikini Atoll. Whatever the flash was, it had come from Bikini.

Since the long line was still out, a decision had to be made. Should it be cut so the *Lucky Dragon* could leave the area immediately? Many thought so. They were afraid that if there had been a bomb test an American reconnaissance aircraft might spot them, and the crew watched the sky anxiously. They recalled that when a small Japanese fishing boat had disappeared without trace in fair weather in 1952, it had been rumored that American guns had sunk it. They felt sure that the Americans would not hesitate to provide a similar fate for the *Lucky Dragon.*

Misaki consulted the officers; then he ordered the lines hauled in. The crew made haste to get the job done.

After they had been working about two hours, a strange fog formed in the sky. Then a drizzle of very small whitish flakes began to fall on the *Lucky Dragon.* The fishermen brushed them out of their eyes, noses, mouths, hair. "It is a sandstorm at sea!" exclaimed one.

Kuboyama took off his straw hat to observe the ashlike particles. Could they be salt? He tasted a flake. It had no taste, nor did it have an odour. The radioman noted that the ash had become so thick on the deck that he left footprints as he walked.

Leaning over his charts, Misaki considered a sample of the ash. It had substance. It might be volcanic; it might be coral... He recalled the eruption of Krakatoa, which had spread cinders for thousands of miles around, But his charts showed no active volcanoes in the area. Captain Tsutsui, who was steering, suggested that if the morning's flash had been a *pika-don,* then it might be coral dust that was falling on them. Misaki's charts could not confirm this either. The *Lucky Dragon* was outside the restricted area that fishing boats were not supposed to enter. Eniwetok, which the Maritime Safety Board had warned them about, was three hundred miles to the west. Could the Americans have had a bomb test at Bikini instead?

Some of the deckhands complained that the white dust hurt their eyes. Nevertheless, the work went ahead, and after six hours the line was all in. Only nine fish were caught, seven of them big-eyed tuna. These were cleaned on deck, with the white ash coming down on them steadily. Finally the flakes stopped falling. The *Lucky Dragon* headed north on its homeward journey.

SEA spray and breezes carried away most of the thin blanket of white ash that covered the main deck and other exposed surfaces. But the flakes clung in corners, in crevices of the deck and hull, in the wet lines, and in the rims of portholes. Most of the men took baths. Kuboyama, who remained uneasy about the mysterious dust, went below with the others to wash himself thoroughly.

The men talked more of their poor catch than of the white dust. They would arrive in Yaizu when prices for fish were high, but they would have little to sell. This would mean hard times for their families, and this worried them.

Chief Engineer Yamamoto, who had been on deck during most of the drizzle of ashes, had felt nausea at lunch time and had not eaten. In the engine room he had difficulty reading the dials. He took a nap to restore

himself, but when he awoke he felt worse. His eyes were clogged with a sticky discharge, and the engine room dials were harder than ever to read.

Other members of the crew had similar symptoms. At dinner time many of them complained of not being hungry. To bolster their drooping morale Kuboyama produced a bottle of sake that he had hoarded for a special treat. The men drank it, but it did not help.

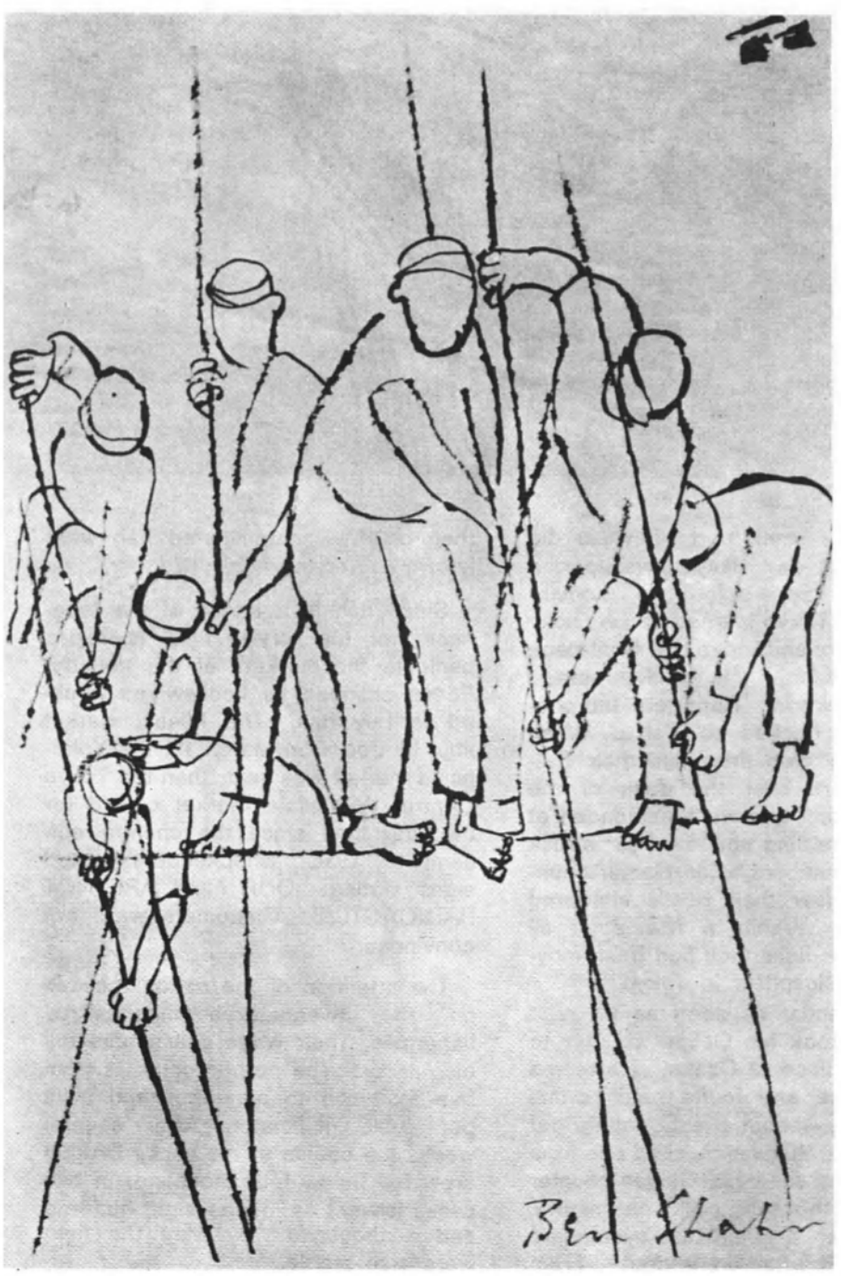
In succeeding days, the crew continued to wonder about the "sandstorm" they had seen at sea. One sailor gathered a sample of the dust in a piece of paper and gave it to Kuboyama. As he accepted it, the radioman admired its whiteness—"like the coral of an atoll"—and suggested that they must have it examined after their return to Yaizu. Kuboyama put the packet under his pillow, where he slept on it every night until they reached port.

A variety of ailments befell the crew. At first they complained of itching skin, especially around the hands and neck. Their faces turned a leaden colour, darker than the robust hue of a tropical sun tan. There were complaints of fever, nausea, loss of appetite, general weakness, diarrhœa, scalp sores, and runny eyes. Yet none of the crew was confined to bed for the entire homeward voyage.

The feeling grew that they had indeed seen a *pika-don*. Kuboyama read in one of his books about the bombing of Hiroshima to see if he could uncover a clue as to why there was so much illness among the crew. But at Hiroshima all the people injured had been within a few miles of the explosion. The *Lucky Dragon* was 85 miles from Bikini on March 1, so how could there be a connexion?

His last doubts vanished during a talk with Boatswain Kawashima. When Kawashima happened to scratch the side of his head, his hand came away with a tuft of black hair on it. "My hair is falling out!" he exclaimed. The sailors were amused. Kuboyama playfully snatched at Kawashima's head, and he too pulled off a wad of hair. Before long the clutches of his companions had shorn Kawashima of most of the hair on the left side of his head.

Kuboyama soon found out that others of the crew also had falling hair. Then he recalled that loss of hair was one of the symptoms of "atomic bomb disease" after the attacks of Hiroshima and Nagasaki. He wondered if somehow the strange ash had caused the men to be hurt by radioactivity. He sought out Misaki to discuss his thoughts. They agreed that the men should go to the hospital immediately after landing.



The fishermen recover their lines suspended 200 feet below the surface by float lines from 300 buoys. On about 30 miles of line with 1,500 hooks they caught only 15 tuna.

ON Sunday, March 14, after fifty-one days at sea, the *Lucky Dragon* drew into her home port of Yaizu. The owner, Nishikawa, and a few others were on the pier to meet her. Nishikawa was much more disturbed by the sickness of the crew than by the small catch and the loss of line. He was shocked by the muddy colour of their faces.

Kuboyama did not follow his own advice. Instead of going to the hospital he first dropped off some wireless equipment at a friend's house and then he continued home. He held a towel around his face so that people would not stare at him because of his strange pigmentation. For the same reason he entered his own home by the back door.

"Daddy's home!" called out one of his three daughters. As he embraced his wife and children, Miyako, his oldest daughter, said with surprise in her voice, "How black Daddy is. He looks like a Negro."

After a while the children went out-

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At 3 a.m. on March 1, 1964, the crew of the "Lucky Dragon" saw an immense fiery light on the western horizon. One man suggested it might be a "pika don" (thunderflash), as the Japanese call an atomic explosion. The ship was only 85 miles from Bikini Atoll.

The port of 'crying fish'

side to play, and then Kuboyama told his wife about the atomic explosion they had seen and the white ash that had fallen on them. "Don't worry," he said, "I will be all right." In a while he left, saying he was going to the doctor. But instead he returned to the *Lucky Dragon*, where he made some repairs to his wireless.

Some of the crew did go to the hospital. The doctor, who did not have a Geiger counter, told the fishermen they had no serious trouble. But Misaki urged that two of the men be sent to Tokyo to see an expert on atomic sickness. The doctor in charge reluctantly agreed to write a letter of introduction to such an expert for them.

The pair caught an early train the following day to Tokyo. In the hospital the doctors were startled when they held a Geiger counter to one of the fishermen's heads; it clicked loudly, showing he was radioactive. They decided to go to Yaizu to see the rest of the fishermen.

Since the small port of Yaizu did not have its own daily newspaper, it was two days before the *Yomiuri Shimbun* in Tokyo learned of the *Lucky Dragon* story and broke it in front-page banner headlines. It quickly spread around the world. Reporters and photographers flocked to Yaizu. When scientists arrived they held their Geiger counters over the deck of the *Lucky Dragon* and were astounded at the fierce rattling sound. Fear struck the crew members when Geiger counters held near their heads chattered ominously. Within a few days all twenty-three fishermen had been moved to two hospitals in Tokyo.

One scientist as soon as he read the story, took his Geiger counter to the marketplace at Osaka. He tested various tuna and found only normal radioactivity—about twenty counts per minute. But then he checked one from Yaizu that caused his Geiger counter to emit two thousand clicks per minute. It made such a noise that bystanders gasped. "The fish are crying!" From then on, the contaminated fish were known as "crying fish."

Since fish is a staple of the Japanese diet, the "crying fish" caused a panic in the markets of the country. Prices slumped as housewives refused to buy fish. The Misaki market shut its doors on March 19; the Yokohama market was next; then the Tokyo Central Wholesale Market closed for the first time since the cholera epidemic of 1935. Shopkeepers posted signs stating: OUR FISH ARE NOT RADIOACTIVE. Customers were not convinced.

The attention of the nation focused on the twenty-three hospitalized fishermen. Their white cell counts fell alarmingly. The normal count is from five thousand to nine thousand cells per cubic millimeter. After several weeks the counts of the *Lucky Dragon* crew fell below four thousand; in two cases it went as low as eight hundred and a thousand. By May the men were also sterile.

Toward the end of June more than two-thirds of the crew including Kuboyama came down with jaundice. Kuboyama's recovery was slower than the rest but by August 5 he felt well enough to be the crew's spokesman at a press conference. Then the radioman's condition took a turn for the worse. On September 1 he told his wife, "It's no use any more. My sufferings are too great."

Kuboyama slipped into unconsciousness, and was put on the critical list. He rallied several days later to the point where he could eat and recognize his friends. But on September 20 he was again in critical condition, although fully conscious. He said, "My body feels like it is being burned with electricity. Under my body there must be a high tension wire."

The family again gathered at his bedside. "I will get well," he told his mother. "Promise me so," she said, and he replied, "Yes, I will hold out." It was late in the afternoon of September 23 when Kuboyama began his last fight for life. His family, his fellow fishermen and his doctor were with him as he fought.

Shortly before seven o'clock that evening, the doctor examined Kuboyama with his stethoscope. He turned to the family and said quietly, "It is his last moment." The doctor buried his face in his hands and sobbed.

"Aikichi, you break your promise!" his mother cried. Kuboyama was silent. His eyes opened and his face stared vacantly. Kuboyama's wife touched a tiny cup of water—the symbol of a last earthly drink—to his lips. Kuboyama was dead.

Everyone present including the fishermen who had so loved him wept without restraint. The crowd that had gathered outside the hospital to pray for the fisherman was told of his death. Moments later the news was flashed by radio and television. Throughout the night messages of sympathy including many from ships thousands of miles at sea, arrived at the hospital. The following day the American ambassador sent a letter of condolence with a check for a million yen to Mrs. Kuboyama.

Kuboyama's body was cremated and his ashes placed in an urn. His widow, dressed in the traditional black kimono with the family crest, carried the urn in the funeral procession in Yaizu. His eldest daughter clutched a wooden mortuary tablet on which were inscribed the words, "The soul of the deceased Aikichi Kuboyama" while his second girl carried a photograph of her father. At the end of the ceremony two hundred university students sang "A-Bomb Never Forgiven" and a score of white pigeons were released in the air. Then the urn was placed in a marble vault in the mountainside above Kuboyama's native Yaizu where it remains today.

Why did Kuboyama die?

Fatalists will say that Kuboyama was on a collision course with death and that there was nothing he could do about it. Is the world likewise on a collision course with death? Are we sailing our ships of state into waters upon which death will rain from the sky? There have always been wars and we have changed nothing so as to make war impossible; therefore it is logical that there should be a war. A war in which most or all of us will perish.

On September 1, Kuboyama told his wife: "It's no use any more. My sufferings are too great."

Or can we reject fatalism and determine our own destiny? Can we understand the historical forces that threaten us and bend them to our will? Can we smash down these weapons that have grown too terrible for man to endure? Can we build a world order in which the hostilities among men and nations will be dealt with through law not force? Can men of all colours, religions, economic systems and ideologies live together on this planet without engaging in mass murder?

These are the questions that face us as a society and that face each of us as individuals. Are we as helpless before them as was Kuboyama? If the answer is Yes, then the radioman will have been the first of many millions of victims of the thermonuclear age. But if the answer is No, then we may be able to count him as the last victim.

All over Japan people waited anxiously for news of the 23 crew members of the "Lucky Dragon" who had been hospitalized suffering from radiation poisoning.

MAN DOES NOT LIVE BY POLITICS ALONE

by Jawaharlal Nehru

Photo Unesco - Lesage

THE MAN WITH THE ROSE. *India's distinguished statesman, Jawaharlal Nehru (1889-1964) played a leading role in the work of the United Nations and in meetings between nations. The rose that he usually wore in his buttonhole remains a symbol of his faith in a universal humanism which inspired all his efforts for peace and for the accession of his country to modern life. "Man does not live by politics alone," he said at Unesco's General Conference at New Delhi, in 1956. Visiting Unesco in 1962, two years before his death, Jawaharlal Nehru declared that today the spirit of tolerance is more necessary than ever before. "Science and technology are necessary," he said, "but a spiritual background no less so." In September 1966, Unesco and the Government of India jointly organized a round table on the role of Jawaharlal Nehru in the modern world. Earlier this year a Nehru Memorial Exhibition was held in Unesco House, Paris. On these pages we publish major passages from an address that Jawaharlal Nehru delivered at the Inauguration of the Indian Council for Cultural Relations in New Delhi on April 9, 1950.*

NATIONS, individuals and groups talk of understanding one another and it seems an obvious thing that people should try to understand one another and to learn from one another. Yet, when I look through the pages of history or study current events I sometimes find that people who know one another most, quarrel most. Countries which are next door to one another in Europe or in Asia somehow seem to rub one another up the wrong way, though they know one another very thoroughly. Thus knowledge, by itself, does not lead to greater co-operation or friendship.

This is not a new thing. Even the long pages of history show that. Has there been something wrong in individual nations or in the approach to this question? Or is it something else that has not worked as it should have done? When we talk of cultural relations, the question that immediately arises in my mind is—what exactly is the "culture" that people talk so much about?

When I was younger in years, I remember reading about German "kultur" and of the attempts of the German people to spread it by conquest and other means. There was a big war to spread this "kultur" and to resist it. Every country and every individual seems to have its peculiar idea of culture.

When there is talk about cultural relations—although it is very good in theory—what actually happens is that those peculiar ideas come into conflict and instead of leading to friendship they lead to more estrangement. It is a basic question—what is culture? And I am certainly not competent to give you a definition of it because I have not found one.

One can see each nation and each separate civilization developing its own culture that had its roots in generations hundreds and thousands of years ago. One sees these nations being intimately moulded by the impulse that initially starts a civilization going on its long path. That conception is affected by other conceptions and one sees action and interaction between these varying conceptions.

There is, I suppose, no culture in the world which is absolutely pristine, pure and unaffected by any other culture. It simply cannot be, just as nobody can say that he belongs one hundred per cent to a particular racial type, because in the course of hundreds and thousands of years unmistakable changes and mixtures have occurred.

So culture is bound to get a little mixed up, even though the basic element of a particular national culture remains dominant. If that kind of thing goes on peacefully, there is no harm in it. But it often leads to conflicts. It sometimes leads a group to fear that their culture is being overwhelmed by what they consider to be an outside or alien influence. Then they draw themselves into a shell which isolates them and prevents their thoughts and ideas going out. That is an unhealthy situation, because in any matter, and much more so in what might be called a cultural matter, stagnation is the worst possible thing.

Culture, if it has any value, must have a certain depth. It must also have a certain dynamic character. After all, culture depends on a vast number of factors. If we leave out what might be called the basic mould that was given to it in the early stages of a nation's or a people's growth, it is affected by geography, by climate and by all kinds of other factors. The culture of Arabia is intimately governed by the geography and the deserts of Arabia because it grew up there. The culture of India is influenced obviously, as we see in our own literature, by the Himalayas, the forests and the great rivers of India among other things. It was a natural growth from the soil.

Of the various domains of culture like architecture, music and literature any two may mix together, as they

CONTINUED ON PAGE 48

Learning more about a civilization's historic past makes for easier understanding of its present characteristics. Art, like literature, is a major road of communication between cultures. This visitor to the Museum of Teheran appears to be in earnest conversation with the statue of a human-headed bull, 2,500 years old, that once crowned a pillar in the city of Persepolis.

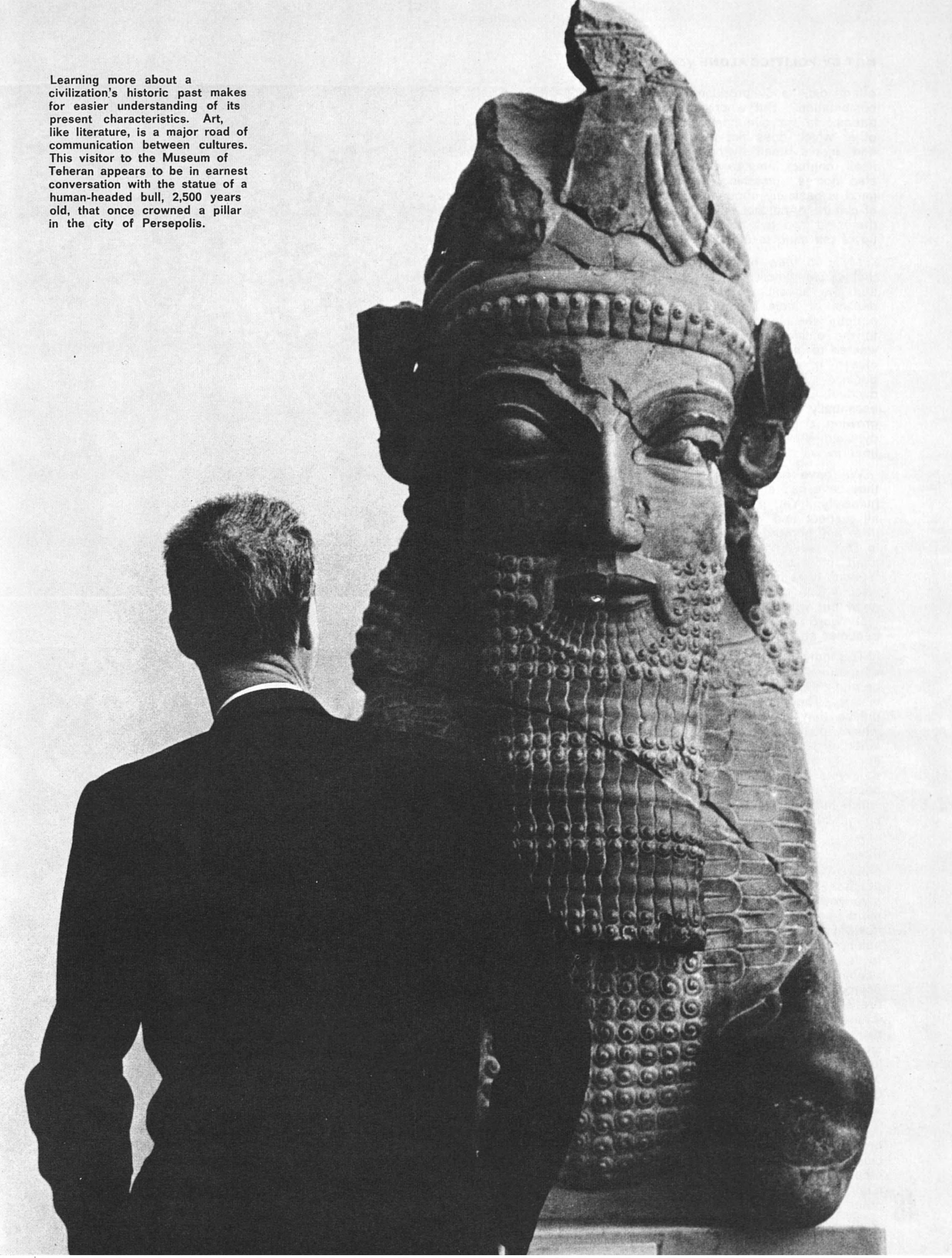

Photo Unesco - Dominique Roger

often did, and produce a happy combination. But where there is an attempt to improve something or the other which does not naturally grow and mould itself without uprooting itself, conflict inevitably arises. Then also comes something which to my mind is basically opposed to all ideas of culture. And that is the isolation of the mind and the deliberate shutting up of the mind to other influences.

My own view of India's history is that we can almost measure the growth and the advance of India and the decline of India by relating them to periods when India had her mind open to the outside world and when she wanted to close it up. The more she closed it up, the more static she became. Life, whether of the individual, group, nation or society, is essentially a dynamic, changing, growing thing. Whatever stops that dynamic growth also injures it and undermines it.

We have had great religions and they have had an enormous effect on humanity. Yet, if I may say so with all respect and without meaning any ill to any person, those very religions, in the measure that they made the mind of man static, dogmatic and bigoted, have had, to my mind, an evil effect. The things they said may be good but when it is claimed that the last word has been said, society becomes static.

The individual human being or race or nation must necessarily have a certain depth and certain roots somewhere. They do not count for much unless they have roots in the past, which past is, after all, the accumulation of generations of experience and some type of wisdom. It is essential that you have that. Otherwise you become just pale copies of something which has no real meaning to you as an individual or as a group.

On the other hand, one cannot live in roots alone. Even roots wither unless they come out in the sun and the free air. Only then can the roots give you sustenance. Only then can there be a branching out and a flowering. How, then, are you to balance these two essential factors? It is very difficult, because some people think a great deal about the flowers and the leaves on the branches, forgetting that they only flourish because there is a stout root to sustain them. Others think so much of the roots that no flowers or leaves or branches are left: there is only a thick stem somewhere. So, the question is how one is to achieve a balance.

Does culture mean some inner growth in the man? Of course, it must. Does it mean the way he behaves to others? Certainly it must. Does it mean the capacity to understand the other person? I suppose so. Does it mean the capacity to make yourself understood by the other person? I suppose so. It means all that.

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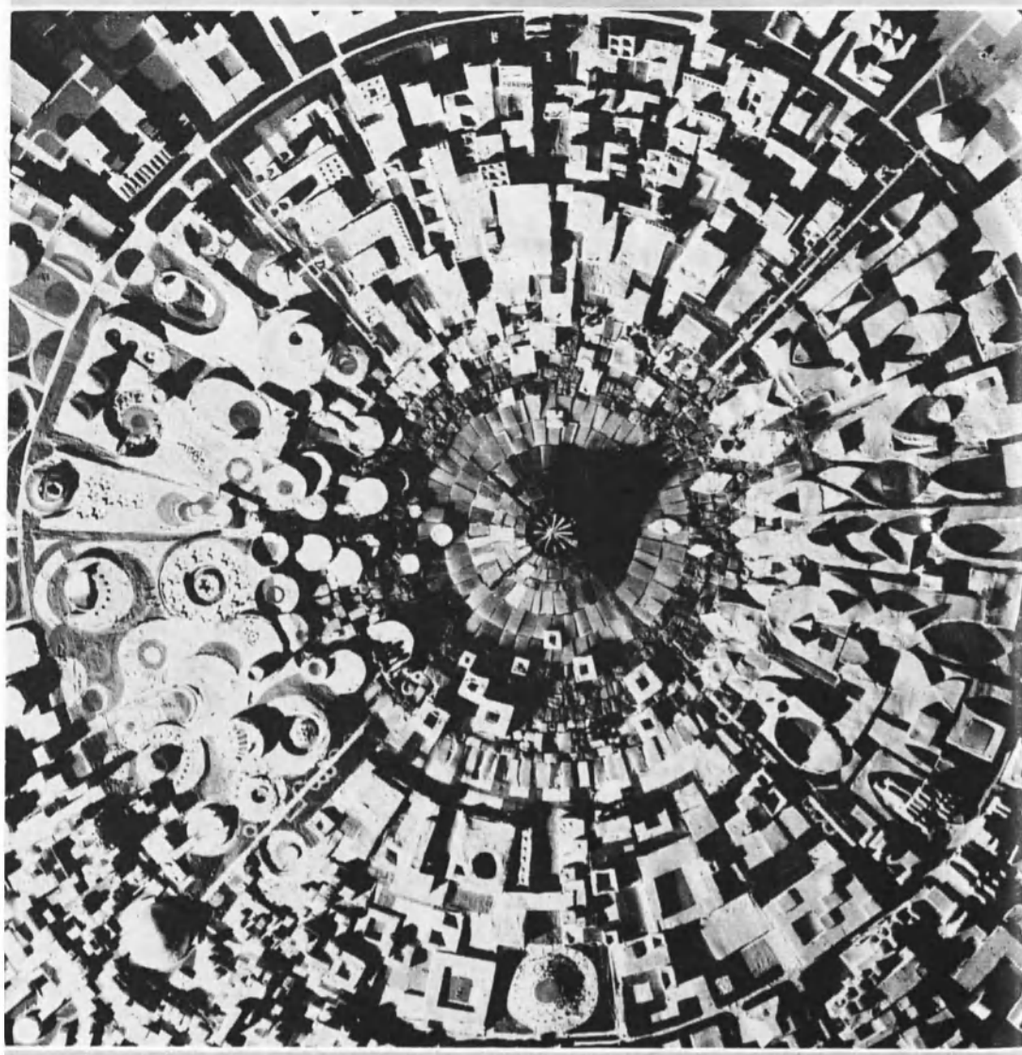
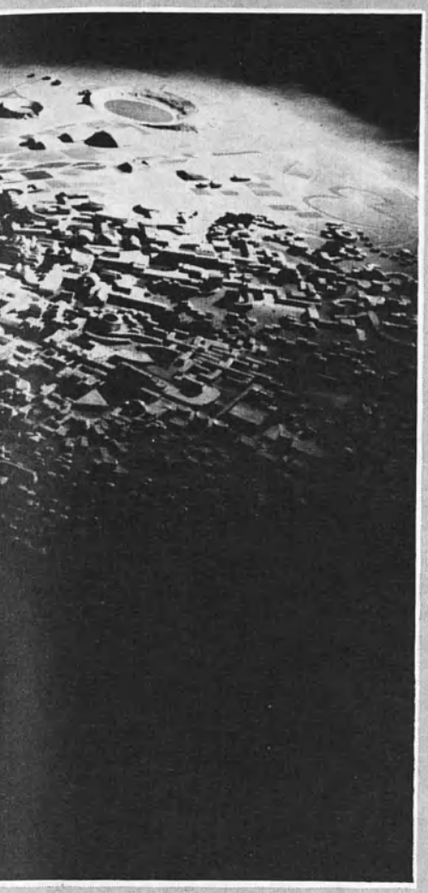


AUROVILLE: INDIA'S INTERNATIONAL CITY OF CONCORD



A project to build an international city of peace and harmony for men and women of all countries, irrespective of creed, ideology or nationality is now being planned in India. Named Auroville, after the Indian spiritual leader and philosopher, Sri Aurobindo, who died in 1950, it would be built near Pondicherry on the Bay of Bengal. Designed to house a community of 50,000 people, it would seek to foster the ideals and teachings by which Sri Aurobindo sought to contribute to international understanding and the promotion of peace. As shown in these photos of a model of the project, Auroville would be concentric in shape and its main streets, converging towards the heart of the city (above and left), would meet at a Park of Unity, in which a Sanctuary of Truth would dominate the city from a crown of gardens (right, rear of photo). Four zones—residential, international, cultural and industrial—would be built over the next 15 to 20 years. In the International Zone pavilions of all nations and of the Indian states would serve as embassies of the culture, arts and handicrafts of each country. In the zone designed to illustrate the cultural wealth of each civilization, Academies of Arts and Science would welcome artists and scientists from all parts of the world. The proposal to build Auroville was made in connexion with the commemoration of Unesco's 20th anniversary in 1966 when the idea was applauded by Unesco's General Conference.

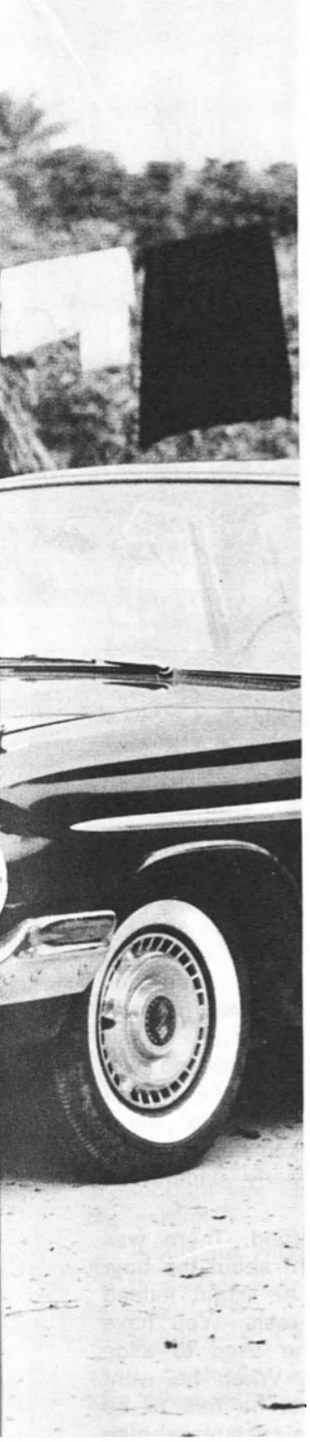
NOT BY POLITICS ALONE *(Continued)*

What is a scientific approach to life's problems? It is one of seeking truth by trial and error and experiment

A person who cannot understand another's viewpoint is to that extent limited in mind and culture, because nobody, perhaps barring some very extraordinary human beings, can presume to have the fullest knowledge and wisdom. The other party or the other group may also have some inkling of knowledge or wisdom or truth, and, if we shut our minds to that, then we not only deprive ourselves of it but we cultivate an attitude of mind which, I would say, is opposed to that of a cultured man.

The cultured mind should have the capacity to understand another viewpoint fully even though it cannot always agree with it. The question of agreement or disagreement only arises when you understand a thing. Otherwise it is blind negation which is not a cultured approach to any question.

I should like to use another word—science. What is a scientific approach to life's problems? I suppose it is one of examining everything, of seeking truth by trial and error and by experiment, of never saying that this must be so, but trying to understand why it is so and, if one is convinced of it, of accepting it, of having the capacity to change one's notions the moment some other proof is forthcoming, of having an open mind which tries to imbibe the truth wherever it is found. If that is culture, how far is it represented in the modern world and in the nations of today? Obviously, if it was represented more than it is, many of our problems, national and international, would be far easier to solve.



Symbol of the spread of today's technological civilization, a visiting automobile excites the interest of an African village child. Civilizations, cultures and ways of life today mingle as never before. And problems created by their interpenetration are increasingly giving way to the desire for mutual understanding.

Photo © G. Bern - Rune Hassner

Almost every country in the world believes that it has some special dispensation from Providence, that it is of the chosen people or race and that others, whether they are good or bad, are somewhat inferior creatures. It is extraordinary how this kind of feeling persists in all nations of the East as well as of the West without exception. The nations of the East are strongly entrenched in their own ideas and convictions and sometimes in their own sense of superiority about certain matters.

Anyhow, in the course of the last two or three hundred years, they have received many knocks on the head and they have been humiliated, they have been debased and they have been exploited. And so, in spite of their feeling that they were superior in many ways, they were forced to admit that they could be knocked about and exploited. To some extent, this brought a sense of realism to them.

There was also an attempt to escape from reality by saying that it was said that we were not so advanced in material and technical things but that these were after all superficial things, but nevertheless, we were superior in essential things, in spiritual things, in moral values. I have no doubt that spiritual things and moral values are ultimately more important than other things, but the way one finds escape in the thought that one is spiritually superior, simply because one is inferior in a material and physical sense, is surprising. It does not follow by any means. It is an escape from facing up to the causes of one's degradation.

Nationalism, of course, is a curious phenomenon which at a certain stage in a country's history gives life, growth, strength, and unity, but at the same time, it has a tendency to limit one, because one thinks of one's country as something different from the rest of the world. The perspective changes and one is continuously thinking of one's own struggles and virtues and failings to the exclusion of other thoughts.

The result is that the same nationalism, which is the symbol of growth for a people, becomes a symbol of the cessation of that growth in the mind. Nationalism, when it becomes successful, sometimes goes on spreading in an aggressive way and becomes a danger internationally.

Whatever line of thought you follow, you arrive at the conclusion that some kind of balance must be found. Otherwise something that was good can turn into evil. Culture, which is essentially good, becomes not only static but aggressive and something that breeds conflict and hatred when looked at from a wrong point of view. How you are to find a balance I do not know. Apart from the political and economic problems of the age, perhaps, that is the greatest problem today, because behind it there is a tremendous conflict in the spirit of man and a tremendous search for something it cannot find.

We turn to economic theories because they have an undoubted importance. It is folly to talk of culture or even of God when human beings starve and die. Before one can talk about anything else one must provide the normal essentials of life to human beings. That is where economics comes in. Human beings today are not in the mood to tolerate this suffering and starvation and inequality when they see that the burden is not equally shared. Others profit while they themselves only bear the burden.

We have inevitably to deal with these problems in economic and other ways but I do think that behind it all there is a tremendous psychological problem in the minds of the people. It may be that some people think about it consciously and deliberately and others rather unconsciously and dimly, but that this conflict exists in the spirit of man today is certain. How it will be resolved I do not know.

One thing that troubles me is this: people who understand one another more and more begin often enough to quarrel more and more. Nevertheless, it does not follow from this that we should not try to understand and that is something which really cannot be done in the context of the modern world. Therefore, it becomes essential that we try to understand one another in the right way. The right way is important. The right approach, the friendly approach, is important, because a friendly approach brings a friendly response.

I have not the shadow of a doubt that it is a fundamental rule of human life that, if the approach is good, the response is good. If the approach is bad, the response is likely to be bad, too. So, if we approach our fellow human beings or countries in a friendly way with our minds and hearts open and prepared to accept whatever good comes to them—and that does not mean surrendering something that we consider of essential value to truth or to our genius—then we shall be led not only towards understanding but the right type of understanding.

So I shall leave you to determine what culture and wisdom really are. We grow in learning, in knowledge and in experience, till we have such an enormous accumulation of them that it becomes impossible to know exactly where we stand. We are overwhelmed by all this and, at the same time, somehow or other we have a feeling that all these put together do not necessarily represent a growth in the wisdom of the human race.

I have a feeling that perhaps some people who did not have all the advantages of modern life and modern science were essentially wiser than most of us are. Whether or not we shall be able in later times to combine all this knowledge, scientific growth and betterment of the human species with true wisdom, I do not know. It is a race between various forces.

I am reminded of the saying of a very wise man who was a famous Greek poet :

What else is Wisdom? What of man's [endeavour or
God's high grace, so lovely and so [great?
To stand from fear set free, to breathe [and wait,
To hold a hand uplifted over Hate,
And shall not Loveliness be loved for [ever?

(from Euripides' "Bacchae").

TISTOU
of the green fingers

by Maurice Druon
of the Académie Française

Drawings by Jacqueline Duhème

In "Tistou of the Green Fingers", the French author, Maurice Druon, has written a story for children and grown-ups alike of enchanting originality. Tistou discovers that he has green fingers. Seeds blown by the wind, lying fallow in crannies and crevices blossom at his touch. Tistou uses his green thumbs in mysterious and astonishing ways—to abolish slums, make the animals in the zoo happy and cure the sick. In the passages we present below from this charming yet profound tale, Tistou uses his remarkable gift to put an end to war.

IT sometimes happens that, when grown-ups raise their voices, little boys do not listen.

"Do you hear what I'm saying, Tistou?"

And Tistou would nod his head, saying, "Yes, yes" in order to seem obedient, though he had not heard a single word.

But as soon as grown-ups lower their voices and start talking secrets, little boys at once listen as hard as they can and try to understand what was not meant for their ears. All little boys are alike in this, and Tistou was no exception.

For some days past, there had been a good deal of whispering in Brightbourne. There were secrets in the air, the very carpets of the Shining House were redolent of them.

Mr. Father and Mrs. Mother sighed deeply as they read the newspapers. Carolus, the manservant, and Mrs. Amelia, the cook, gossiped in undertones at the washing-machine. Even Mr. Turnbull seemed to have lost his trumpeting voice.

MAURICE DRUON, *the French novelist, was born in Paris in 1918. His numerous works include plays, essays and novels. His books have been translated into many languages. Among the best known are: "Les Grandes Familles" ("The Curtain Falls", Hart-Davis, London, and Scribner, New York, 1959); "Les Rois Maudits" ("The Accursed Kings", a historical group of several volumes; Hart-Davis, London and Scribner, New York, 1956); "Les Mémoires de Zeus" ("The Memoirs of Zeus", Hart-Davis, London and Scribner, New York, 1964). "Tistou of the Green Fingers" has been translated into 11 languages. Maurice Drouon was elected to the Académie Française in 1966.*

"As they read the newspapers, Tistou caught words of ill omen: 'tension'... 'crisis'... The next day another word was on everyone's lips: 'war'."

Tistou caught words of ill-omen on the wing.

"Tension..." said Mr. Father, his voice grave.

"Crisis..." replied Mrs. Mother.

"Worsening..." added Mr. Turnbull.

Tistou thought they were talking of illness; he was very concerned and went off, his fingers at the ready, to find out which member of the household could be ill.

A turn in the garden proved to him that he was wrong: Whiskers was in perfect health, the thorough-bred roans were gambolling in the field, Gymnast showed every sign of being in perfect condition.

But the next day another word was on everyone's lips.

"War... it was inevitable," said Mr. Father.

"War... poor people!" said Mrs. Mother, sorrowfully shaking her head.

"War... and there we are! Just another one," said Mr. Turnbull. "It only remains to be seen who'll win."

"War... how terrible! Shall we never have done with them?" groaned Mrs. Amelia, on the point of tears.

"War... war... always wars", repeated Carolus, the manservant.

Tistou thought of war as something improper since people spoke about it with lowered voices, as something ugly, a grown-up disease worse than drunkenness, crueller than poverty, more dangerous than crime. Mr. Turnbull had already mentioned war to him and shown him the Brightbourne War Memorial. But since Mr. Turnbull had spoken rather loudly, Tistou had not properly understood him.

Tistou was not afraid. There was nothing of the coward about the boy; in certain respects he might indeed have been thought rash. You have already seen how he used to slide down the banisters. When he went to the river to bathe, he had to be stopped diving off the champions' high dive ten times in succession. He would take a run and launch himself into the air, his arms widespread, in a swallowdive.

But his idea of war had nothing to do with courage or fear. He merely found the idea intolerable, that was all.

He wanted information. Was war really as horrible as he imagined it to be? Obviously, the first person to consult was Whiskers.

"I hope I'm not interrupting you, Mr. Whiskers," he said to the gardener, who was clipping a box hedge.

Whiskers put down his shears.

"Not at all, not at all, my boy."

"Mr. Whiskers, tell me, what do you think about war?"

The gardener looked surprised.

." I'm against it," he replied, tugging at his whiskers.

Drawings by Jacqueline Duhême. © Rupert Hart-Davis, London

"Have you actually seen gardens annihilated by war?", asked Tistou. "Yes", replied Mr. Whiskers, "I've seen a garden full of flowers die in two minutes."

"Why are you against it?"

"Because... because even a little, unimportant war can annihilate a very big garden."

"Annihilate, what does that mean?"

"It means destroy, abolish, reduce to dust."

"Really? And have you actually seen gardens... annihilated by war, Mr. Whiskers?" asked Tistou.

It seemed barely credible. But the gardener was not joking. He stood with bent head, his thick white eyebrows contracted in a frown, twisting his whiskers in his fingers.

"Yes, yes, I've seen it happen," he replied. "I've seen a garden full of flowers die in two minutes. I saw the greenhouses smashed into a thousand pieces. So many bombs fell in that garden that it was no use ever thinking of cultivating it again. Even the earth was dead."

Tistou felt his throat contract.

"And whose garden was it?" he asked.

"It was mine," said Whiskers, turning away to hide his grief, and picking up his shears.

Tistou was silent for a moment. He was thinking. He was trying to imagine the garden about him destroyed as Whiskers's garden had been, the greenhouses broken and the earth barren of flowers. Tears came to his eyes.

"Well, I shall go and tell everyone about it!" he cried. "Everyone must know. I shall tell Amelia and I shall tell Carolus..."

"Oh, Carolus is worse off than I am. He lost his country."

"His country? He lost his country in a war? How is that possible?"

"Well, it's what happened. His country has completely disappeared. He could never find it again. That's why he's here."

"I was quite right in thinking that war is a horrible thing, if you can lose your country in it like you lose a handkerchief," Tistou thought.

"There's even worse than that," Whiskers added. "You mentioned Amelia, the cook. Well, Amelia lost her son. Others have lost arms or legs, or their heads even. Everyone loses something in a war."

It occurred to Tistou that war was the greatest and most horrible disorder that could happen in the world, since everyone lost in it what they loved best.

"What can be done to prevent its happening?..." he wondered. Mr. Turnbull must be against war, since he hates disorder so much. I shall talk to him about it to-morrow."

Mr. Turnbull was sitting behind his desk. He had recovered his trumpet-like voice and was shouting into three telephones at the same time. It was clear that Mr. Turnbull was a very busy man.

"It's always the same when a war breaks out somewhere in the world," he said to Tistou. "Our work at Brightbourne is doubled at once."

And, indeed, Tistou had noticed that morning that the factory siren had blown for twice the usual length of time and that twice the usual number of workers had appeared. The nine chimneys were making so much smoke that the whole sky was darkened.

"I'll come back when you're not so busy," said Tistou.

"What did you want to ask me?"

"I wanted to know where this war has broken out."

Mr. Turnbull rose to his feet and led Tistou to an enormous globe of the world. He turned it round and placed his finger on the centre of it.

"Do you see this desert?" he asked. "Well, it's there."

Under Mr. Turnbull's finger Tistou saw a pink, lozenge-shaped expanse.

"Why has the war happened there, Mr. Turnbull?"

"It's not very difficult to understand."

When Mr Turnbull said something was not very difficult to understand,

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"Mr. Whiskers, what do you think about war," asked Tistou. "I'm against it," replied the gardener.

Tistou has a lesson in geography, followed by a lesson in business; the conflict between the Go-its and the Get-outs spreads in an unforseen manner

Tistou's heart sank; it was generally very complicated indeed. But this time Tistou was determined to listen attentively.

"Not at all difficult," repeated Mr. Turnbull. "This desert belongs to nobody..."

"To nobody," Tistou repeated to himself.

"...But on the right is the country of the Go-its, and on the left the country of the Get-outs."

"Go-its... Get-outs..." Tistou repeated to himself once more; he was really being very attentive.

"...Well, some time ago the Go-its announced that they wanted this desert; the Get-outs replied that they wanted it too. The Go-its sent a telegram to the Get-outs telling them to go away. The Get-outs replied by radio that they forbade the Go-its to remain in occupation; so now their armies are on the march and when they meet there'll be a battle."

"What is there in that pink lozenge... I mean in that desert?"

"Nothing at all. Stones..."

"So they're just going to fight for stones?"

"They want to own what's underneath."

"What's under the desert?"

"Oil."

"What do they want oil for?"

"They want it so that the others can't have it. They want oil, because oil's an essential material for making war."

Tistou had known that Mr. Turnbull's explanations would become very difficult to understand.

He shut his eyes in order to think better.

"If I've understood properly, the Go-its and the Get-outs are going to fight a war for oil because oil is an essential material for fighting wars." He reopened his eyes.

"Well, it's stupid," he said.

Mr. Turnbull's ears turned scarlet.

"Do you want to get O for your lesson, Tistou?"

"No," replied Tistou, "but what I do want is that the Go-its and the Get-outs should not fight."

This proof of goodheartedness for the moment ameliorated Mr. Turnbull's anger.

"Of course, of course," he said, shrugging his shoulders. "No one wants war, ever. But it has always existed..."

"What can I do?" wondered Tistou. "Put my fingers on the pink lozenge?"

"Is the desert far away?" he asked.

"Half-way between here and the other side of the world."

"So the war can't spread as far as Brightbourne?"

"It's not impossible. Once a war's begun, one can never tell where it will end. The Go-its may call a Great Power to their assistance, the Get-outs ask help of another. And the two Great Powers will fight. It's what's called an extension of the conflict."

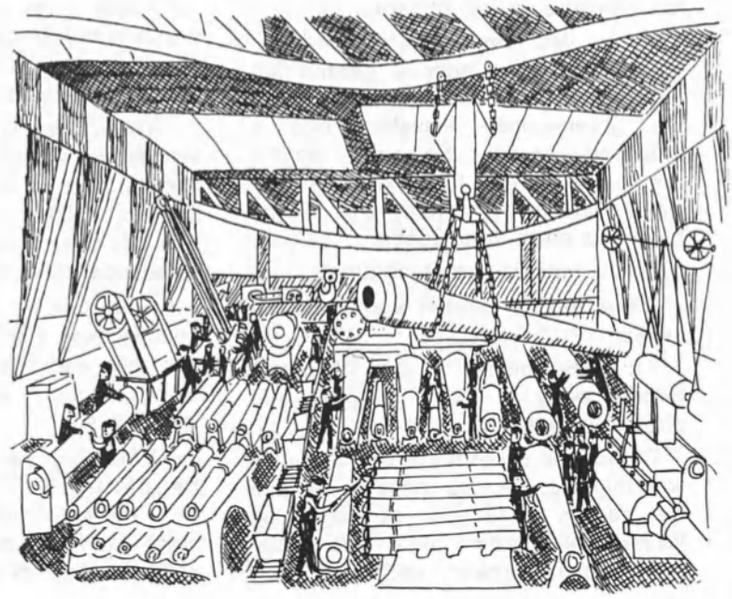
Tistou's head was positively buzzing. "Yes", he said to himself. "War's really like some appalling sort of couch-grass growing on the face of the globe. What plants can I use to fight it with?"

"We'll now go to the factory," said Mr. Turnbull. "You'll see it working to capacity; it'll be an instructive lesson for you."

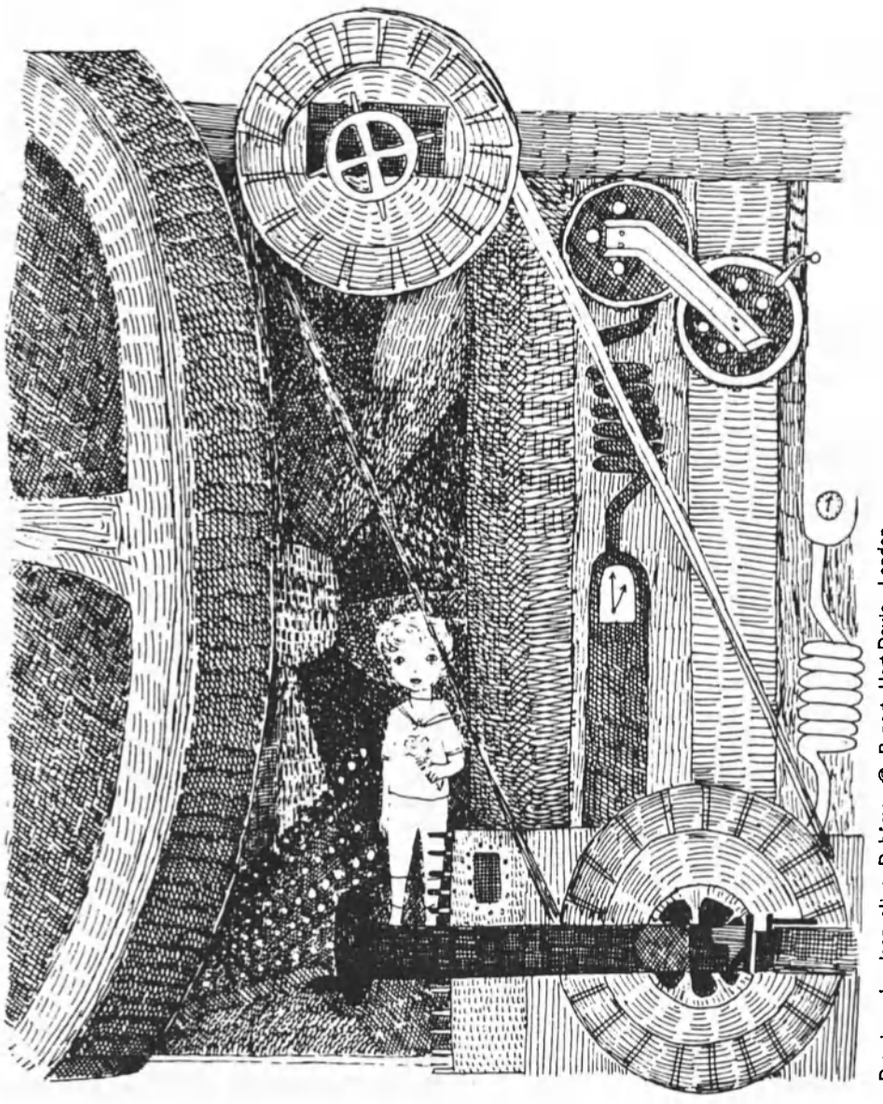
He shouted some orders into his three telephones and then accompanied Tistou downstairs.

Tistou was at first deafened by the noise. The steam-hammers were banging away with all their might, the machines were humming like a million spinning-tops, chains were clanging; one had to shout to make oneself heard, even with a voice like Mr. Turnbull's.

Tistou was blinded by the fountains of sparks rising on all sides; molten



"The armaments were being packed up with as much care as if they had been china."



Drawings by Jacqueline Duhême. © Rupert Hart-Davis, London

steel gushing down to the floor like huge burning brooks; the heat was appalling, the workmen seemed small and black against the huge background of the factory.

After the foundry, Tistou visited the burnishing, turning and fitting departments, the departments where rifles, machine-guns, tanks and trucks were made, for Mr. Father's factory made everything required for making war in the way of arms and munitions.

The following day was the day for despatching and the armaments were being packed up with as much care as if they been china.

Finally, Mr. Turnbull showed Tistou two huge guns, as long as cathedral spires. They were as bright and gleaming as if they had been covered with butter.

Suspended on chains, the guns moved slowly through the air; then they were lowered gently, gently, on to truck-trailers which were so long you couldn't see the end of them.

"Those are the guns which have brought wealth to Brightbourne, Tistou," said Mr. Turnbull proudly. "With every shell they fire they can destroy four homes as big as yours"

This information did not appear to impress Tistou with a similar pride.

"So," he thought, "each time one of these guns fires, there'll be four Tistous without a home, four Caroluses without a staircase, and four Amelias without a kitchen... Those must be the things by which people lose their gardens, their countries, their legs or members of their families... Well, really!"

And the hammers were pounding and the furnaces glowing white hot.

"Whose side are you on, Mr. Turnbull?" Tistou asked, shouting at the top of his voice because of the appalling din.

"What's that?"

"I said: whose side are you on in this war?"

"Oh, the Go-its," Mr. Turnbull shouted back.

"And my father?"

"He is, too."

"Why?"

"Because they've been our loyal friends for a long while."

"Of course," thought Tistou, "if one's friends are attacked it's quite right to help them defend themselves."

"So those guns are going to the Go-its?" he went on.

"Only the one on the right," shouted Mr. Turnbull. "The other's for the Get-outs."

"How do you mean, for the Get-outs?" cried Tistou indignantly.

"Because they're good customers, too."

So one Brightbourne gun would be firing against another Brightbourne gun, and a garden would be destroyed on each side!

"That's business," Mr. Turnbull added.

"Well, I think your business is horrible!"

"What's that?" asked Mr. Turnbull, lowering his head because the noise of the steam-hammers drowned Tistou's voice.

"I said that your business is horrible, because..."

A terrific box on the ear stopped him short. The conflict between the Go-its and the Get-outs had been suddenly extended to Tistou's ear.

"That's what war's like! You ask for an explanation, you give your opinion — and what happens? You get a box on the ear! Supposing I made some holly grow in your trousers, what would you say then?" thought Tistou, as he gazed at Mr. Turnbull with his eyes full of tears. "That's it, holly in his trousers, or perhaps thistles... !"

He clasped his fingers together... And it was then that the idea, the great idea, came to him.

The business lesson, as you can well imagine, came to an end there. Tistou got two Os, and Mr. Turnbull

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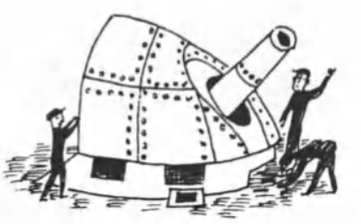


Surprising pieces of news follow hard upon each other

reported him at once to Mr. Father. The latter was extremely disappointed. His Tistou, who was one day to succeed him and become the master of Brightbourne, was really showing very little propensity for controlling so splendid a business.

"I shall really have to talk to him very seriously," said Mr. Father. "Where is he?"

"He's gone to take refuge with the gardener, as usual," replied Mr. Turnbull.

"Very well, we'll see about that later. At the moment we must finish the packing."

Because of the urgent orders, the factory was working without stopping. All night long, the nine chimneys wore great, red, glowing crowns.

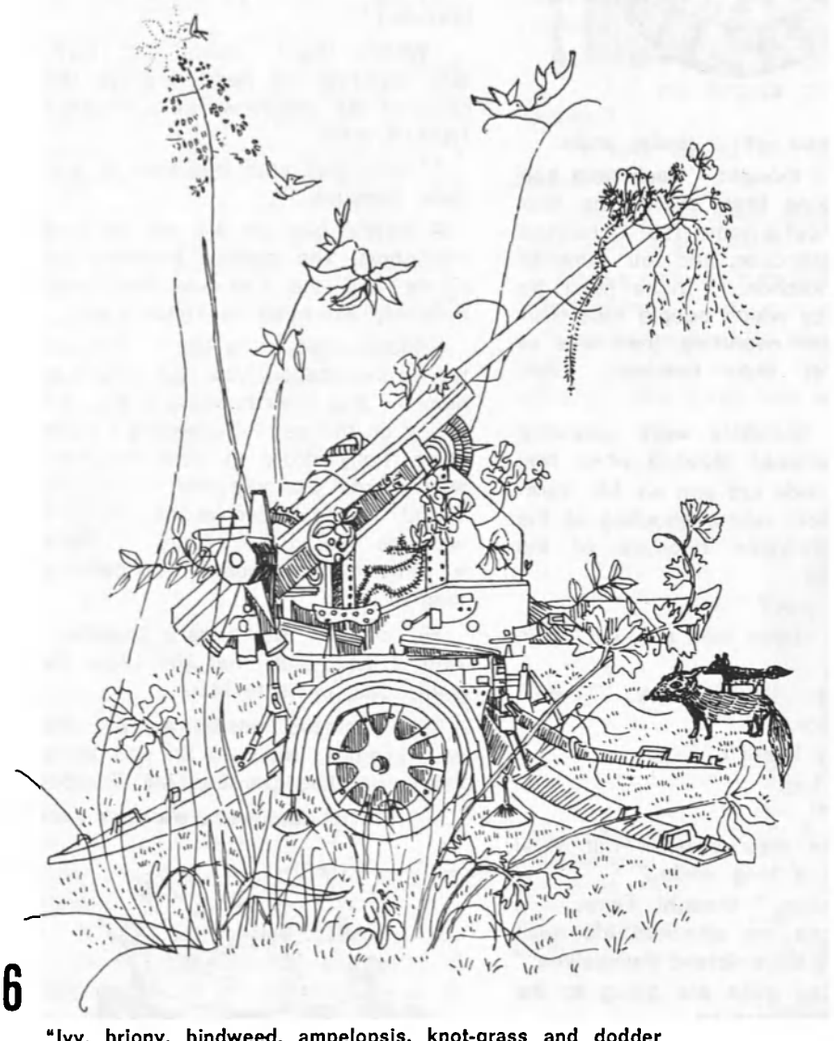
But, that night, Mr. Father, who had not even taken time off to dine and was watching the work of the departments from a little glass tower, was pleasantly surprised. Tistou had returned to the factory and was walking slowly along the line of packing-cases containing rifles, then he climbed into the trucks, leaned over the engines and slipped in among the big guns.

"Well done, Tistou," Mr. Father said to himself. "The boy's trying to make up for his double O. Splendid! There's still some hope for him!"

And, indeed, Tistou had never appeared so serious and so busy before! His hair was standing straight up on end. He was continually putting his hand in his pocket and pulling out little pieces of paper.

"It even looks as if he were taking notes," thought Mr. Father. "I hope he doesn't pinch his fingers among those machine-guns. He's a good boy when all's said and done, and quick to see when he's at fault."

There were surprises in store for Mr. Father.



"Ivy, briony, bindweed, ampelopsis, knot-grass and dodder formed an inextricable skein about the guns."

Everyone knows that newspapers always talk of war in capital letters. These letters are kept in a special tray. And it was precisely before this capital-letter-tray that the editor of the *Brightbourne Star*, a well-known daily newspaper, was standing in some hesitation.

The editor kept turning about, sighing and wiping his forehead, which is always a sign of emotion and perplexity. The man was most disturbed.

Sometimes he took out a big capital letter, the kind that is kept for important victories; but immediately put it back again. Sometimes he took out a medium-sized capital letter, the kind that is kept for wars which are not going very well, for campaigns which show no signs of coming to an end, or for unexpected retreats. But this size of capital letter would not do either; he put it back in the cupboard.

At one moment he seemed to have made up his mind to use very small capital letters, the kind that are used for announcements which put everyone in a bad temper, like sugar shortage or new tax on jam. But these would not do either. And the editor of the *Brightbourne Star* sighed all the more. He was really very disturbed indeed.

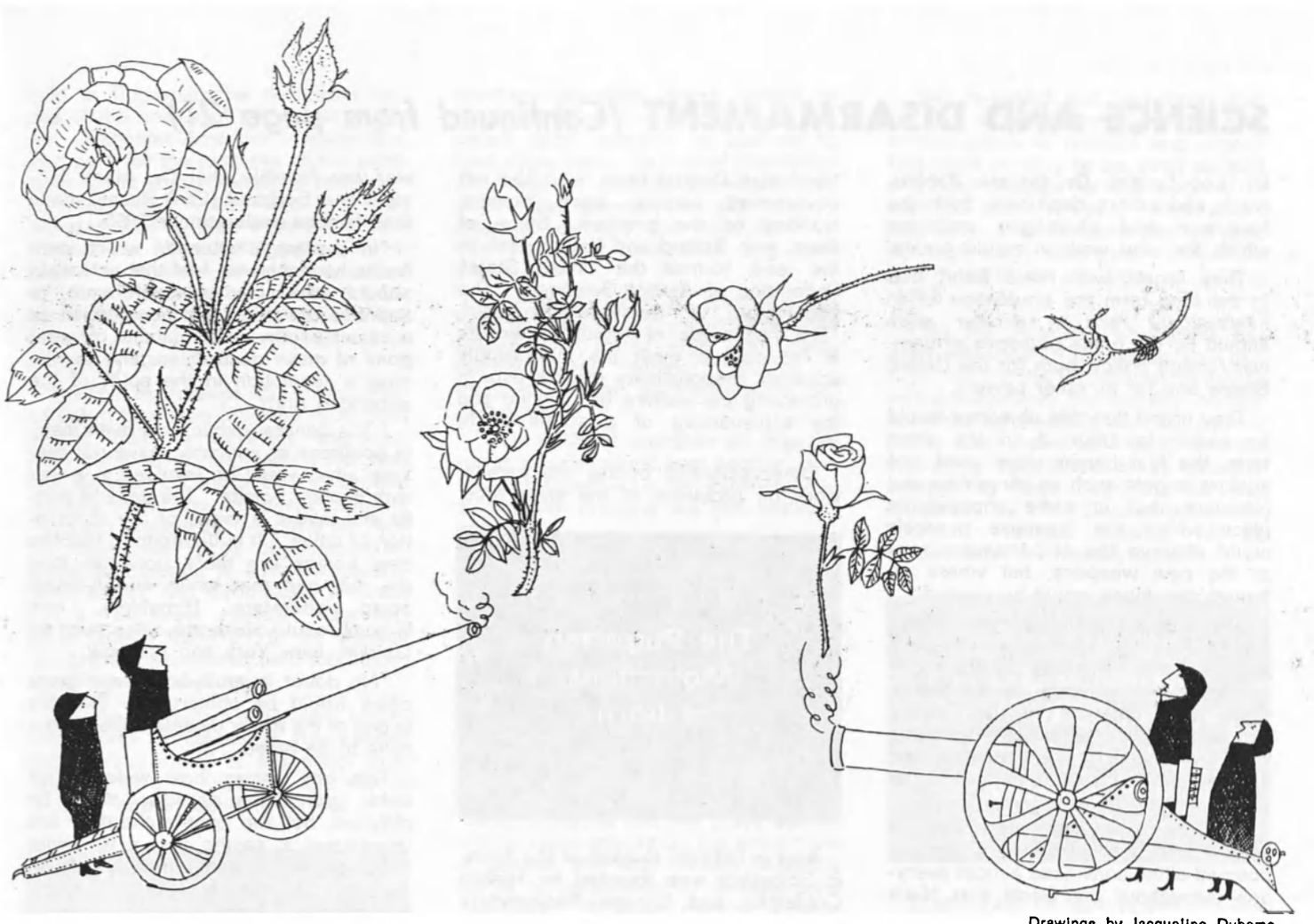
He had to tell the inhabitants of Brightbourne, his faithful readers, a piece of news that was so unexpected, and so serious in its consequences, that he did not know how to set about it. The war between the Go-its and the Get-outs had miscarried. And how was one to admit to the public that a war could just stop like that, without a winning or a losing side, without an international conference, without anything at all?

The poor editor would have loved to have been able to print right along the top of his first page some sensational headline such as LIGHTNING GO-IT ADVANCE or HEAVY GET-OUT OFFENSIVE.

But this was out of the question. The reports from the pink patch on the map were definite: the war had not taken place and the reason for its failure to do so cast doubts upon the quality of the arms delivered by the Brightbourne factory, upon Mr. Father's technical competence and that of this workshops and workers.

In fact, a disaster had occured.

Let us try, with the editor of the



Drawings by Jacqueline Duheme
© Rupert Hart-Davis, London

"A rain of foxgloves, bluebells and cornflowers had fallen on the Go-its positions and they had replied, inundating the Get-outs with buttercups, daisies, and cowslips. Peace between the Go-its and the Get-outs was concluded on the spot."

Brightbourne Star, to reconstruct these tragic events.

Climbing, romping, clinging plants had taken root in the cases of arms! How had they got there? Why? No one could explain.

Ivy, briony, bindweed, ampelopsis, knot-grass and dodder had formed an inextricable skein, matted with the glue of the black henbane about the machine-guns, sub-machine-guns and revolvers.

Neither the Go-its nor the Get-outs had been able to unpack their cases.

The correspondents, in their despatches, emphasized the particularly harmful qualities of burdock, which had fastened itself by means of the little hooks upon its burs to the bayonets. What could be done with rifles that flowered, with bayonets that you couldn't poke and whose efficiency was completely destroyed by pretty bunches of flowers? They had to be thrown away.

Equally useless were the magnificent trucks, which had been so conscientiously camouflaged with grey and yellow lines! Brambles, goose-grass and several varieties of nettles, the stinging variety in particular, were growing in abundance upon their seats. The drivers all got nettle rash, and were thus the only casualties in the war. White-coated nurses made these soldiers, whom cruel itchings prevented from sitting down, lie still while they applied warm compresses.

And here must be recorded a really pitiful incident caused by balsam. That a modest wild flower should be able to create a panic among soldiers is perfectly comprehensible if you know that balsam has pods which explode at the slightest touch.

The engines were all full of it. Balsam swarmed in the carburettors of the armoured cars, in the tanks of the motor-bicycles. At the first contact of the selfstarter, at the first kick at the starting-pedal, there was a growing, spreading sound of dull explosions which, if they did no harm, nevertheless had a shattering effect on the morale of the troops.

What of the tanks? Their turrets were blocked up. Eglantine mingled with gorse and herbbennet enclosed their mechanism in a mass of roots, clusters, stalks and thorny branches. The tanks were also, therefore, useless.

A rain of foxgloves, bluebells and cornflowers had fallen on the Go-its' positions and they had replied, inundating the Get-outs with buttercups, daisies and cowslips. A general had had his cap knocked off by a bunch of violets.

Countries are not taken with roses, and battles of flowers have never been looked on as very serious engagements.

Peace between the Go-its and the Get-outs was concluded on the spot. The armies retired and the desert, a pink-coloured lozenge, was left to the sky, to solitude and to freedom.

This text from "Tistou of the Green Fingers," by Maurice Druon is published by kind permission of the author and publishers. Translated from the French by Humphrey Hare. Published in Great Britain and © 1958 by Rupert Hart-Davis, London. The book has also been published in the United States under the title "Tistou of the Green Thumbs" © 1958 Charles Scribner's Sons, New York. Other editions exist in German, Italian, Spanish, Japanese, Swedish, Dutch and Danish.

SCIENCE AND DISARMAMENT *(Continued from page 21)*

Dr. Leo Szilard, Dr. Eugene Rabinowitch and others dealt with both the long-term and short-term problems which the new weapon would create.

They urged, with Niels Bohr, that in the long term the prevention of an international race in nuclear arms should be the prime objective of post-war foreign policy, both for the United States and for all other powers.

They urged that this objective would be easier to attain if, in the short term, the first bombs were used, not against targets such as Hiroshima and Nagasaki, but in some unpopulated place where the Japanese generals could observe the stupendous power of the new weapons, but where no human casualties would be caused.

Szilard and Rabinowitch and others fought for this short-term objective with passion. But not all their colleagues were agreed. In the event, those who objected to the use of Hiroshima and Nagasaki as the targets were over-ruled by the President and the Secretary of State, in whose hands the final decision lay.

But when the bombs were used in August 1945, the holocausts in the two doomed cities convinced almost everyone throughout the world that Niels Bohr was right—all nuclear weapons must be abolished under international control. On the initiative of the British Prime Minister, Mr. (now Earl) Attlee, the General Assembly of the United Nations set up a United Nations Atomic Energy Commission (UNAEC), and charged this commission with the task of drafting the necessary treaty.

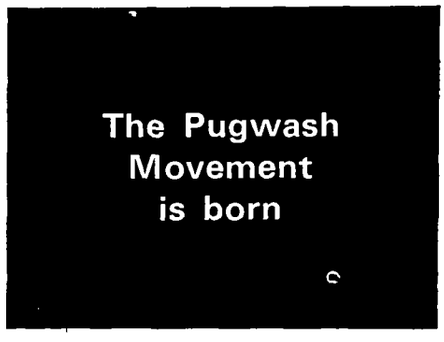
At its first meeting, the United States Government proposed the basic principles on which a treaty might be made. This proposal was put forward by the United States delegate, Mr. Bernard Baruch, and has always since been known as the "Baruch Plan". In fact, it was the work of Dr. Robert J. Oppenheimer, who had been the leader of the team that made the first atomic bomb.

It may be doubted whether the plan in its original form would have been adopted or proved workable; it proposed an International Atomic Energy Authority, which would own and operate all the world's nuclear plants.

At the time, however, most scientists believed that something on these lines was needed. The UNAEC adopted the Oppenheimer plan as the basis of its work, and for nearly three years many of the most eminent scientists (1) in the world debated every aspect of the proposal in the utmost detail. They showed a persevering devotion which proved their ardent desire to obtain a satisfactory result. Their final failure does not alter the fact that eminent scientists in government employ had made a bold effort to solve the problem their war-time work had created.

Meanwhile, other scientists of the Manhattan District team, who had left government employ, were likewise working on the problem. Some of them, with Szilard and Rabinowitch in the lead, formed the United States Federation of Atomic Scientists. The constitution of the federation said: "The Federation of Atomic Scientists is founded to meet the increasingly apparent responsibility of scientists in promoting the welfare of mankind and the achievement of a stable world peace."

Other scientific bodies did parallel work on problems of the arms race.



Also in 1945 the *Bulletin of the Atomic Scientists* was founded by Hyman Goldsmith and Eugene Rabinowitch. For twenty years it has done solid and brilliant work on armament problems; it has mobilized the interest of scientists in disarmament, and has given them a platform for the serious discussion of the issues involved.

But after the failure of the Oppenheimer plan, many of the scientists in government employ came to accept the nuclear arms race as an inevitable fact of life. They concentrated their efforts on developing the fission-fusion, or hydrogen, bomb and on bringing out a large range of "tactical" nuclear weapons of all kinds. Some of them —Professor Isidor Rabi, Dr. Hans Bethe, Dr. Jerome Wiesner, Sir John Cockcroft—still preached the doctrine of controlled disarmament; others wrote and spoke against disarmament, and against a test ban.

The latter category argued, first, that deterrence by nuclear weapons was the surest safeguard against aggressive war; and second, that nuclear war was feasible, and would not obliterate mankind, nor even the combatant nations involved (2).

It was in protest against this acceptance of a nuclear arms race and against the conception that nuclear war was feasible, that Dr. Albert Einstein and Bertrand (Earl) Russel made their famous declaration in 1955:

"In the tragic situation which confronts humanity, we feel that scientists should assemble in conference to appraise the perils that have arisen as a result of the development of weapons of mass destruction, and to discuss a resolution in the spirit of the appended draft...

"The general public, and even many in positions of authority, have not realized what would be involved in a war with nuclear bombs. The general public still thinks in terms of the obliteration of cities. It is understood that the new bombs are more powerful than the old, and that while one A-bomb could obliterate Hiroshima, one H-bomb could obliterate cities such as London, New York and Moscow.

"No doubt in an H-bomb war great cities would be obliterated. But this is one of the minor disasters that would have to be faced...

"No one knows how widely such lethal radioactive particles might be diffused, but the best authorities are unanimous in saying that a war with H-bombs might quite possibly put an end to the human race... Many warnings have been uttered by eminent men of science and by authorities in military strategy. None of them will say that the worst results are certain. What they do say is that these results are possible, and no one can be sure that they will not be realized... Here, then, is the problem which we present to you stark and dreadful and inescapable: Shall we put an end to the human race; or shall mankind renounce war?"

Impact on world opinion

This Einstein-Russell appeal ended with a resolution urging the governments of the world to find peaceful means of settling all the then-existing, and all future international disputes. It was signed by other famous scientists: Max Born, Percy Bridgman, Leopold Infeld, Joseph Miller, Linus Pauling, Joliot-Curie, Joseph Rotblat, Cecil Powell and Hideki Yukawa. It had an enormous impact on world opinion.

Among other results, the manifesto led to the creation of the Pugwash Movement. The Pugwash Movement has been, and remains, the most important collective effort of scientists to arouse governments and people to the menace of nuclear war, and to the necessity for general controlled disarmament as the only real long-term safeguard for mankind. (See article, Unesco Courier, Nov. 1964 - Editor.)

The novel and vitally significant feature of the Pugwash Movement is that it brings together the leading scientists from both Eastern and Western Europe. The first meeting was

(1) The following were among those who took part in the work of the commission: Dr. R. Oppenheimer, Dr. Charles Thomas, Dr. J. B. Conant, Sir James Chadwick, Sir Charles Darwin, Sir George Thomson, Sir William Penney, Professor F. Joliot-Curie, Professor F. Perrin.

(2) Dr. Edward Teller has elaborated this view in a recent book *The Legacy of Hiroshima*, by E. Teller and Allen Brown, New York, Doubleday, 1962.

held in Pugwash, the birthplace and one of the homes of Mr. Cyrus Eaton, the Canadian-American millionaire, who paid for the journeys of the participants and who entertained them during their stay. Those who took part included leading men from the United States, the United Kingdom, France and other Western countries, together with prominent members of the Academy of Sciences of the Soviet Union, of Poland, and of other member states of the Warsaw Pact.

The first conference was so successful that it has been followed by sixteen others, held in different countries. Each conference has made some new and significant contribution to general thinking about the armament problem. Pugwash studies of the need for, and the difficulties to be surmounted in, a test ban helped to advance government action. Mr. Gromyko's proposal for a "minimum nuclear deterrent" (now usually referred to as nuclear "umbrella") was based on a discussion at a Pugwash meeting.

But the movement's greatest contribution was contained in the general declarations made at the major conferences held in Kitzbühel and Vienna in 1958, and in London in 1962.

'The risk of local conflicts growing into major wars is too great...'

The Vienna Declaration is still regarded as the Pugwash "credo". It said, in part:

"We meet in Kitzbühel and in Vienna at a time when it has become evident that the development of nuclear weapons makes it possible for man to destroy civilization and, indeed, himself; the means of destruction are being made ever more efficient.

"It is sometimes suggested that localized wars, with limited objective, might still be fought without catastrophic consequences. History shows, however that the risk of local conflicts growing into major wars is too great to be acceptable in the age of weapons of mass destruction. Mankind must therefore set itself the task of eliminating all wars, including local wars.

"... if, in a future war, a substantial proportion of the nuclear weapons already manufactured were delivered against urban targets, most centres of civilization in the belligerent countries would be totally destroyed, and most of their populations killed. This would be true whether the bombs used derived most of their power from fusion reactions (so-called 'clean' bombs) or principally from fission reactions (so-called 'dirty' bombs). In addition to destroying major centres of population and industry, such bombs would also wreck the economy of the country attacked, through the destruction of vital means of distribution and communication.

"We believe that, as scientists, we have an important contribution to make toward establishing trust and co-operation among nations. Science is, by long tradition, an international undertaking.

"The ability of scientists all over the world to understand one another, and to work together, is an excellent instrument for bridging the gap between nations...

"... education should stress improvement of all forms of human relations and should eliminate any glorification of war and violence."

At the London Conference in 1962, 250 leading scientists from thirty-six countries took part. They unanimously adopted a declaration which said, in part:

"Our chief concern is to prevent war, and to relieve humanity of the fearful anxieties and the grave economic burdens caused by the arms race. A general war with nuclear weapons would be a disaster of unimaginable magnitude. It would destroy a large fraction of the people now alive, and jeopardize the conditions of life of the survivors.

"Throughout the world competition in armaments absorbs an immense amount of talent and resources. This is wasted, because, so far from giving security, it increases the risk of war...

"Disarmament and a stable peace are essential conditions for making a new society in which poverty could be abolished. The prospect of such a world is no longer Utopian. The technical and scientific triumphs of our times have already far outstripped the boldest dreams of recent generations and knowledge increases ever more rapidly.

"In our Conference we have therefore concentrated attention on the complex problems of disarmament... The experience of our Conference leads us to believe that scientists have a special contribution to make to the solution of these problems... Scientists of all nations have a commanding duty to help their fellow citizens to understand that war is obsolete, and what steps can ensure peace. They should, we believe, recognize their responsibilities to promote disarmament, and should invite Governments, learned societies and other institutions to support them in this task."

The London Conference ended its declaration with these notable words: "We are now at a stage in which general statements of principles are not enough; action is needed...

"We re-assert our conviction that the goal of full disarmament and permanent peace is realistic and urgent. This work is truly to be seen as part of a long struggle for the progress of mankind, and it is one in which scientists have a responsible part to play. We call upon scientists everywhere in the world to join with us in this task."

That the Pugwash Movement has been managed with wisdom and skill is proved by the fact that its influence with governments has steadily increased, while its standing with the general public has improved. Many eminent men have contributed to its success; outstanding have been the services rendered by its Secretary-General, Professor Joseph Rotblat, of St. Bartholomew's Hospital, London.

11,000 scientists from 40 countries petition for a test-ban treaty

It would not be right to end this section without recalling the special contributions made by two individual scientists—contributions which are particularly relevant to the theme of this article.

In 1958, Dr. Linus Pauling of the California Institute of Technology organized a petition to the United Nations on the subject of nuclear tests. The petition urged that the "added amount of radiation" resulting from tests constituted a danger to human health, and was liable to cause "an increase in the number of seriously defective children that will be born in future generations."

It further argued that a test ban "could serve as a first step towards a more general disarmament" and the "ultimate effective abolition of nuclear weapons." This petition was drafted by Dr. Pauling, together with a circular letter inviting scientists throughout the world to sign it. All the secretarial work was done by Dr. Pauling and his wife and all the postage and stationery were paid for from his private purse.

When the petition was presented a few weeks later to the Secretary-General of the United Nations, it bore the signatures of more than 11,000 leading scientists from more than forty countries. They included thirty-six Nobel Prize winners, and thirty-five Fellows of the Royal Society. There is no doubt that the petition helped powerfully to persuade President Eisenhower to approve the Geneva negotiation which began in 1958, and

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which ultimately resulted in the Moscow Test Ban of 1963 (1).

The second individual contribution of which mention must be made is an article published in the United States journal *Foreign Affairs*, in January 1962.

The article is entitled "Judgement and Control In Modern Warfare", and it was written by Sir Solly Zuckerman, who, as already mentioned, was then, Chief Scientific Adviser In the British Ministry of Defence. Sir Solly raised the fundamental question whether any nuclear weapon, "tactical" or "strategic", could be used in a populated area without disaster to all concerned, including the troops that used it first. Discussing a British Army Exercise known as "Spearpoint", which took place in October 1961, in Northern Germany, Sir Solly wrote:

"In a war game involving just three NATO Corps, nuclear weapons were used against military targets only, in an area of 10,000 square miles which contained no large towns or cities. In this 'battle', lasting only a few days, it was assumed that the two sides together used a total of between 20 and 25 megatons in not fewer than 500 and not more than 1,000 strikes.

It turned out that 3.5 million people would have had their homes destroyed if the weapons were air-burst, and 1.5 million if ground-burst. In the former case, at least half the people concerned would have been fatally or seriously injured (i.e., 1.75 million). In the case of ground-burst weapons, all 1.5 million would have been exposed to a lethal radiological hazard, and a further 5 million to serious danger from radiation" (2).

The strange apathy of mankind to the threat of thermo-nuclear war

Sir Solly goes on to point out that in a real land battle there would also be nuclear "interdiction" attacks outside the area of local engagement, and that nuclear attacks would be made by both sides on distant airfields or missile sites. All this, he argues, would create such chaos on the battlefield that it would be impossible—as, indeed, it proved in "Spearpoint"—for the General Staff to keep control of what was happening or to pursue any intelligible military plan.

But Sir Solly foresees a still graver peril. Stressing the danger, in the context of a NATO land battle, of "tripwires which unwittingly set into operation the whole panoply of strategic deterrence", he continues:

"Let us be quite clear about this. There are those in the West who already believe that the use of any nuclear weapons in a war involving NATO would mean the opening of a third World War. There are indications that the Soviet leaders believe the same thing. If this view is right, all freedom of choice may be lost, and all possibility of exercising judgement and control in a future war between the great powers."

Sir Solly's argument leads him to the conclusion which has been quoted above, but which, in view of its crucial importance, will bear repetition:

"The very existence of nuclear weapons is thus the most urgent challenge that has ever been presented to military judgement and control. As weapons to deter aggression, they serve a very precise purpose; the context of field warfare in which they might be used is an entirely different matter... One may fairly ask what meaning there is to the idea of using nuclear weapons 'to defend our territories and peoples'. One can deter with nuclear weapons. Can one defend?"

Sir Solly is here saying in polite language what Professor Rabi said more crudely in 1958 : "There is a dangerous misconception which is glossed over by the use of the word 'tactical' in reference to bombs of the explosive power of thousands of tons of TNT. Such bombs used in profusion would destroy the country which is the scene of a battle as completely as Hiroshima was destroyed... Although such bombs can be used tactically in war in a desert or at sea, or over very sparsely populated territory, the situation is quite different in Western Europe or in some of the heavily populated countries on the borders of the Communist complex" (3).

The evidence given in the last section shows that many scientists, both in government service and outside it, have made genuine and sustained efforts to bring home the dangers of the present arms race to their ministerial and military chiefs, and to the public at large. Yet it is obvious that, so far, they have failed.

On the last day of 1957, Professor Isidor Rabi said: "The facts about modern warfare have just not penetrated; and that goes for the heads of governments, for otherwise they would ponder these facts every day as the daily number one problem" (4). . . . . .

The average citizen has been even less concerned; his apathy and ignorance are one of the strangest mysteries in the history of democratic society. Writing five years after Rabi, Professor Warren E. Olsen said: "Despite statements by such diverse figures as Norman Cousins, Herman Kahn, Harrison Brown, and former President Eisenhower concerning the imminence of a third World War, the unspeakable toll of lives such a war would entail, and the probability of killing untold millions who have no part in the East-West quarrel, recent surveys indicate that few Americans are deeply troubled by the threat of a thermonuclear holocaust" (5). The same is probably true of almost every nation, except the Japanese.

OPERATION 'VOX POPULI'
A call for a world movement of opinion

Nor have the scientists made much progress in their efforts to persuade the governments to carry out disarmament, and to abolish war.

These depressing facts do not mean that the Pugwash Movement should give up its work, or that other scientists are justified in regarding that work as useless or Utopian. On the contrary, the challenge of the London Pugwash Declaration quoted above is even more topical than it was in 1962:

"Scientists of all nations have a commanding duty to help their fellow citizens to understand that war is obsolete, and what steps can ensure peace. They should, we believe, recognize their responsibilities to promote disarmament, and should invite governments, learned societies and other institutions to support them in this task."

And again: "We re-assert our conviction that the goal of full disarmament and permanent peace is realistic and urgent. This work is truly to be seen as part of a long struggle for the progress of mankind, and it is one in which scientists have a responsible part to play. We call upon scientists everywhere in the world to join with us in this task."

Today with wars and crises in various continents, the task is even more urgent than it was when the London

(1) Other notable contributions to disarmament thinking and literature by individual scientists have included books by Professor Max Born, Dr. Ralph Lapp, Dame Kathleen Lonsdale, Bertrand Russell and Sir Robert Watson-Watt. Outstanding is Sir Robert Watson-Watt's *Man's Means to his End*. Sir Robert makes a devastating analysis of the present arms race and its dangers, and sets out the case for disarmament with great cogency. Sir Robert is the discoverer of radar, which enabled the Royal Air Force to defeat Hitler's Luftwaffe In the Battle of Britain.

(2) *Foreign Affairs*, New York, January 1962.

(3) *News of the World*, 15 July 1958.

(4) *New York Times*, 1 January 1958.

(5) *Bulletin of the Atomic Scientists*, March 1963.

This monument, erected in memory of the thousands of children killed by the explosion of the first atomic bomb, on August 6, 1945, stands in the Peace Park at Hiroshima.
Photo © Siegfried Sammer, West Berlin

Declaration was written. But if there is to be any hope of practical success, the task must be undertaken on a far vaster scale, with far greater resources, and with far more ambitious hopes, than have inspired the movements started since 1945.

What is the task?

It is to make the average citizen in every country understand the urgent danger in which he stands today; to persuade him that the armaments which create the danger must be abolished; and to evoke, to lead, and to organize his demand for swift and radical action.

It is to rid the world of a threat to civilization even greater than that of Hitler's Nazism in 1939, and to do so by creating a tidal wave of informed opinion. It might be called: "Operation *Vox Populi:* The Challenge of the Peoples to Militarism and Death." The operation should be thought of as having no less urgency and importance than the Manhattan District Project had in 1939. It should have the same claim on the services of scientists of the highest rank.

The international committee. An international committee should be formed of men of world repute, some, if not all, of whom have themselves played a prominent part in military research, and in the application of scientific methods to the conduct of military operations in time of war. In other words, they should be men who will command the respect of their fellow scientists, of governments, of General Staffs, and of the public.

The committee should be widely representative of nations from both Eastern and Western Europe. It should include, among others, representatives from the United States, the U.S.S.R., France, the United Kingdom, Italy, India, Japan, and if possible, China.

The members of the committee would, of course, have to give their whole time and energy to their supremely important task. They should be given leave of absence from their normal employment, whether it be in government service, in the universities, in scientific institutes, or in industry. This leave of absence should be for one, two, or more years, as the successful conduct of the operation might require. Their posts should, of course, be kept open for them, whenever they desired to return.

The committee should have the same freedom from financial restrictions as the scientists who worked in the Manhattan District Project; it should have whatever sums of money it might judge to be required. It should have at its disposal whatever was needed in qualified scientific personnel, in administrative and secretarial manpower, and in other expert help.

Before these practical aspects of the operation and its organization are discussed, it may be useful to set out in more concrete form the substance

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of the message for which the operation is to mobilize support.

The substance of the case. The following are the main issues on which world opinion requires a clear and decisive lead from scientists:

1. The real nature of the present weapons of mass destruction—nuclear, chemical and biological—and the scale of the casualties and destruction which their use would involve.

2. The question, raised by Professor Rabi and Sir Solly Zuckerman, whether any nuclear weapons, even of the smallest "tactical" category with which the armies are equipped, can be used without disaster—disaster both to the civil population of the area where the weapons are used, and to the armed forces which use them first.

3. The probable future development of weapons of offence if the arms race goes on and military research continues to receive the vast resources now placed at its disposal.

4. The possibility of active defence against the weapons of mass destruction, whether by anti-missile missiles, or in other ways. This should include a study of the cost of any possible system of active defence, its probable efficacy or inefficacy, and the risk of increased fall-out which it might involve.

5. The possibility of passive, or "civil" defence against nuclear attack, by shelters, evacuation, etc. This should include a study of the cost of such passive defence, of its efficacy and its effect on the social standards and industrial efficiency of any country that made a serious attempt to carry it out.

6. The danger of accidental or unintended nuclear war, whether as the result of mechanical failure in the systems of weapon control and command, or of human failure (mental breakdown) in the officers or ministers in charge of them. Warnings of the possibility of accidental war are often given in general terms; but glib statements of a reassuring nature are also often made, based on the infallibility of the "fail-safe" system, of the "permissive link", etc. The great complexity and cost of these safeguarding devices proves in itself how real is the danger of accident; and no one who understands the matter denies that it is possible that they may fail. This is a subject on which the peoples have been kept in almost total ignorance. But they have a right to know the risks they face; a detailed and authoritative statement is urgently required.

7. The character of the new strategic jargon in current use in discussions of nuclear war. This should include a study of the psychological and political assumptions (or fallacies) of most of the so-called "analyses" of nuclear strategy carried out by individual "experts" or by "institutes" or "corporations" of various kinds. The study should examine the assertion made by expert government "consultants" that the NATO Command have approved a war-plan which accepts 200 "mega-deaths" (200 million dead), apart from the more numerous victims of fall-out.

11 DECISIVE QUESTIONS

8. A study of the so-called "technical" difficulties of conventional, nuclear, chemical and biological disarmament, with detailed technical proposals as to how these difficulties can be overcome in a general international treaty. This should include a study of the technical, political and psychological problems of international inspection and control, and should suggest the detailed methods, of whatever kind, by which faithful observance of the obligations of the disarmament treaty can be reasonably ensured. Ill-informed and tendentious debate has obscured the whole subject of inspection in a miasma of suspicion and doubt.

9. A study of the short-term effects of general disarmament on the employment prospects of the 50 million men and women now engaged throughout the world in national armed forces or in the manufacture of armaments.

10. A forecast of the gain to human welfare if the brain power and resources now given to armaments and preparations for war were diverted instead to work for the betterment of health, for the promotion of intellectual and artistic achievement, and for the increase of usable wealth.

11. An estimate of the gain to science, and therefore to humanity, if all present restrictions on international scientific collaboration were removed by the disarmament treaty, and if all scientific research of every kind were open to the world.

The four stages. There should be a memorandum (or book) on each of the eleven subjects specified above, and on any additional aspects of the armament problem which the international committee might judge to be required.

The authors of each memorandum should be specialist scientists, whose authority on the subject with which they dealt would be unchallengeable. On each subject there should be co-authors from both Eastern and Western Europe. The authors would be chosen by the international committee and would work under the committee's general direction.

Taken together, the memoranda would make a detailed and unanswerable case for the conviction expressed by the participants in the Pugwash Conference of 1962: "The goal of full disarmament and permanent peace is realistic and urgent." They would constitute a body of doctrine on which the whole operation would be based.

The manifesto. When the preparation of the memoranda was complete, the international committee would publish them and secure the widest possible distribution for them.

The committee should then draw up a relatively brief manifesto, setting forth the main conclusions to be drawn from the memoranda. The manifesto would state succinctly the real dangers of the arms race; the urgent necessity of a world-wide disarmament treaty under international control; the conviction of the authors that a safe and practicable treaty could be speedily drawn up; and the benefits to all nations which such a treaty would bring.

The committee should secure the signatures of eminent scientists for the manifesto—perhaps 100 leading men from each of the major countries, and a corresponding number from smaller countries.

The manifesto would then be published with the great collective authority of these famous personalities behind it.

The mass endorsement of scientists. The international committee would next endeavour to secure massive support for the manifesto from the scientists of all nations. Every man or woman with adequate scientific training (e.g., with a university degree in one or more scientific disciplines) should be invited to give his, or her, support. The purpose should be to attract the adhesion of as large a proportion as possible of the scientists of the world. A million signatures would not be too high a target.

The world petition. The international committee would then proceed to organize the world expression of popular opinion, which it is the purpose of the operation to evoke.

It cannot be doubted that, if the first three stages outlined above were substantially successful, the greater part of the intellectual leaders of every country—writers, politicians, university professors, the teaching profession, lawyers, doctors, etc.—would be aroused by the scientists' warning about the dangers of the arms race, and would be ready to accept the drastic, world-wide, internationally inspected disarmament proposed.

With the adhesion of these intellectual leaders, it should be possible to organize a world petition far greater and more comprehensive than any ever drawn up before. There would be no disposition among the ordinary citizens of any nation to challenge the authority of the scientists, or to reject their appeal. The signatories of the world petition, hundreds of millions of them, would pledge themselves to support their respective governments in any action which these governments might take to draw up and execute a treaty of general disarmament without delay.

Towards a world petition with hundreds of millions of signatures

Scientists' aversion to manifestos. It has been suggested that the scientists of the world would be unwilling to adopt the plan proposed above because they have a natural and a deeply ingrained aversion to manifestos, and to other simplified expositions of facts and arguments on which they may feel doubts or reservations.

It is, of course, true that scientists, more than other men, desire exact precision, and that, faced with grave political or social issues, they may think it probable that there are refinements of argument that are not susceptible of popular exposition.

But the scientists who drew up the Vienna and London Pugwash Declarations felt no such doubts about the armament problem. They saw it as a naked choice between an intensifying arms race in nuclear, biological and chemical weapons, with constantly recurring crises, on the one hand; and peaceful co-existence based on disarmament and world law, on the other.

Without hesitation, they chose peaceful co-existence, disarmament and world law. What scientist need quibble about the niceties of the argument, when it was Einstein who launched the Pugwash Movement, and, with his dying breath, called on mankind to revolt against the use of nuclear weapons, and to abolish all armaments and war?

Long-term education. Some people believe that general disarmament under international control would make such a revolutionary change in world affairs, and in the relations of nations, that all danger of war would disappear. Others consider that the risk of international conflicts would remain, and that the ideas of militarist thinking might revive.

Those who take the second view hold that education in all countries should be adapted to the changed conditions of a disarmed world. The Vienna Pugwash Declaration had most important things to say in support of this proposition.

Dr. Peter Hodgson has graphically described what he thinks would be required: "What is needed is some continuing action that will steadily grow in importance. Education is the key. Is it not possible to arrange for all this to be taught in schools? Could not 'Survival in the Nuclear Age' replace 'The Wars of the Roses' in Britain's General Certificate of Education history syllabus? It could well be made a compulsory subject. Could not more international schools be founded to help the education of a new generation who will work and think in international terms? Could not Studentships and Fellowships and Colleges be founded to further continuing studies and work on the problem? This would ensure that the impetus and interest generated by 'Operation *Vox Populi*' is not lost, but forms the basis of a continuing effort for lasting peace."

It may well be hoped that, if "Operation *Vox Populi*" succeeded, such a reform of education could be obtained...

The whole of this article has been founded on the Vienna and London Pugwash Declarations which have been quoted above. Those declarations set forth the conviction of many most eminent scientists from many countries that the whole philosophy of power politics is out of date; that the arms race is a grotesque and very perilous anachronism; that in the nuclear age, and with modern means of transport and communication, the vital interests of nations are not in conflict, but are common interests which they share and which they can only promote by common action.

This article is an attempt to show how the new philosophy of the Pugwash scientists might be made part of the accepted thinking of civilized mankind. It would require a supreme effort from scientists themselves; a massive acceptance of the Pugwash assertion that they have a "commanding duty to help their fellow scientists to understand that war is obsolete", and that, if they could be persuaded to "recognize their responsibilities to promote disarmament", they might exercise a decisive influence on the course of history.

But is there still enough time?

Everything depends on whether the scientists are ready to undertake the task. They, and they alone, can rouse the nations from the "dogmatic sleep" which allows the arms race to go on. But they must recognize the revolutionary character of what they have to do. One of the most eminent of them, Professor Max Born, writing for fellow scientists, said not long ago:

"Our hope is based on the union of two spiritual powers; the moral awareness of the unacceptability of a war degenerated to mass murder of the defenceless, and the rational knowledge of the incompatibility of technological warfare with the survival of the human race.

"The only question is whether we have enough time to let these realizations become effective. For the present situation is highly unstable, and becomes, through its own mechanisms, increasingly dangerous day by day. The failure of an individual, or an apparatus, the blind passion of a leader, the ideological or national delusions of the masses can at any moment lead to a catastrophe...

"All of us must fight against official lies and encroachments; against the assertions that there is protection from nuclear weapons through shelters and emergency regulations; against the suppression of those who enlighten the public about it; against narrow-minded nationalism, "gloire", passion for great power; and we must especially fight against those ideologies which pronounce the infaillibility of their doctrines and thus separate the world into irreconciliable camps.

"There is still hope, but it will only come true if we stake everything on the battle against the diseases of our time." (1).

"If we stake everything!"
"The only question is whether we have enough time."

(1) Professor Max Born, *Bulletin of the Atomic Scientists*, April 1964. "Max Born is one of the founders of modern physics, and was awarded the Nobel Prize in 1954", the *Bulletin* says. Professor Born worked on military research for Germany during the First World War.

This text is a slightly abridged version of an article published in Unesco's quarterly, "Impact of Science on Society", No 4 1965.

UNESCO and the search for peace

UNESCO'S general concern with peace and disarmament is based on its Constitution, whose preamble affirms in its opening words: "That since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed."

The preamble to the Constitution emphasizes the importance of promoting equality in the access to educational, scientific and cultural facilities —a task implying close links between Unesco's efforts and those of the United Nations in the cause of social and economic development.

The Unesco Constitution, however, defines the relationship between social and economic development and the promotion of peace by stating that peace cannot be based exclusively on political and economic arrangements between governments, but must be founded upon the intellectual and moral solidarity of mankind. This means that Unesco's action for peace has to reach individual men and women.

Unesco does not itself undertake professional research. Unesco's scientific departments and services seek to promote and encourage research at the national, regional and international levels, and to facilitate scientific communication across political and cultural borders.

In its very earliest programmes Unesco devoted considerable attention to a series of problems presented under the heading of "Study of International Tensions", which soon expanded into research projects on international and intra-national social tensions. A large number of psychological, sociological and economic studies were carried out within this framework from 1947 to 1956, of which the following are a few examples:

— **How Nations see each other,** by William Buchanan and Hadley Cantril; Urbana, University of Illinois Press, 1953. *

— **In the minds of men,** by Gardner Murphy; New York, Basic Book Service, 1953. *

— **Democracy in a world of tensions,** by Richard McKeon; Stein Rokkan, ed.: Chicago, University of Chicago Press, 1951. *

— **Tensions affecting international understanding,** by O. Klineberg; New York, Social Science Research Council, 1950. *

— **Tensions that cause wars,** by G. W. Allport, G. Freyre, G. Gurvitch et al.; Hadley Cantril, ed.; Urbana, University of Illinois Press, 1950. *

The older studies carried out under Unesco's programme are only partly relevant to present-day peace research. More recent ones which come very close to peace research proper and therefore lead up to present preoccupations are:

— **International social science journal:** Peace research, Vol. XVII, no. 3, 1965. Compromise and the settlement of conflicts, Vol. XV, no. 2, 1963. The social Sciences and peaceful co-operation, Vol. XII, no. 2, 1960. * (see page 67.)

— **International social science bulletin:** Techniques of mediation and conciliation, Vol. X, no. 4, 1958. *

Unesco has launched a series of studies which began with a survey of the institutional framework within which scientific research on peace and disarmament at the international level is currently pursued in Unesco's member states.

It was this basic concern with institutional organization and the exchange of information on current research among the various national institutions that led to the compilation of an International Repertory of Institutions specializing in research on peace and disarmament and to the establishment of a new non-governmental organization, the "International Peace Research Association" (IPRA), whose "Newsletter" on current peace research is published with Unesco's assistance.

This Association has also recently

* Out of print. We refer readers to their local library.

INSTITUTIONS FOR RESEARCH ON PEACE AND DISARMAMENT

Seven international organizations are working exclusively on peace research:

- **International Peace Research Association,** Groningen, Netherlands.
- **Peace Research Society,** Philadelphia, Pennsylvania, U.S.A.
- **European Co-ordination Centre for Research and Documentation in the Social Sciences,** Vienna, Austria.
- **International Centre for Inter-Group Relations,** Paris, France.
- **International Institute for Peace,** Vienna, Austria.
- **Pugwash Conference for Science and World Affairs,** London, U.K.
- **World Federation for Mental Health,** Geneva, Switzerland.

⁂

In December 1966, national institutions specializing in peace research or partly engaged in peace research numbered 73. They were distributed as follows:

— 32 in North America (U.S.A. and Canada).

— 39 in Europe (Bulgaria, Czechoslovakia, Denmark, Finland, France, Federal Republic of Germany, Eastern Germany, Greece, Netherlands, Norway, Poland, Romania, Spain, Sweden, U.S.S.R., U.K. Yugoslavia).

— 1 in Asia (India).

— 1 in Latin America (Mexico).

The number of peace research institutions will undoubtedly increase as new peace research centres and sections, founded by universities or other institutions, expand and co-ordinate their resources and activities.

been commissioned to make an exhaustive study and an analysis of existing hypotheses on peace and disarmament. From the latter phase of this study it may be possible to establish a typology of such hypotheses. The results of this study will be published.

Interest in the institutional framework of peace research has also brought about further and closer co-operation between Unesco and the Pugwash Conference on Science and World Affairs. Two scientific studies are being carried out in close collaboration with the Continuing Committee of the Pugwash Conference, the first bearing on the legal and political aspects of intervention, and the second dealing with the problem of guarantees.

Another study is a limited survey, based on public opinion data, of the image of a world in the process of disarmament (see page 5).

Unesco activities relating to peace research will be further expanded in 1967-1968. Among other studies, a critical appraisal will be made of the extent to which university courses in international law and international relations take into account the concept of living peacefully together. This study will be made by some ten countries with different social and political systems.

A major event during Unesco's 20th anniversary celebrations in November 1966 was the round-table meeting at which a score of distinguished international figures, including three Nobel Peace Prize winners (Lord Boyd Orr, Linus Pauling and Philip J. Noel-Baker) appraised Unesco's contribution to peace.

Appreciating "the valuable contribution Unesco has made to peace in its first 20 years", and considering present world problems (among others, the arms race, inequality of living standards, the population explosion...), the participants appealed to all peoples and all governments "to reject war once and for all as an instrument of their international policy".

Unesco is to produce in 1967-1968 a world anthology of writings designed to strengthen peaceful relations between peoples. The first anthology will be devoted to the theme, "The Horrors of War" and will comprise passages from works by great writers, from letters and from accounts of eyewitnesses of war. Unesco National Commissions in member states have been asked to submit texts for inclusion in the anthology.

The educational and scientific activities of Unesco which, though not dealing specifically with peace and disarmament, nevertheless have a relatively direct and constant bearing on peace, are those connected with the implementation of the Universal Declaration of Human Rights.

This applies particularly to Article 2 of the Universal Declaration, which proclaims that everyone is entitled to all the fundamental human rights "without distinction of any kind such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status".

Almost since its inception, Unesco has undertaken a wide range of educational activities and scientific studies whose aim has been to promote the extension of human rights. Scientific studies, for example, have been the basis for a number of basic declarations relating to problems of racial discrimination:

— **The race concept. Results of an inquiry;** 2nd edition, Unesco, 1958. * This book gives a report of the discussions which led to the adoption, by an international meeting of experts in 1951, of a declaration on the concept of race and racial differences. The General Conference of Unesco in 1960 called for a revision of this declaration in the light of the most recent scientific knowledge. Two international meetings were convened in Moscow in 1964 and in Oxford in 1965 to re-examine respectively the biological aspects of race and the social and cultural aspects of human rights. The conclusions of the first meeting were published under the heading **Biological aspects of Race.** in the **International social science journal** (Vol. XVII, no. 1, 1965).

Other studies dealing with different aspects of the race question include:

On genetic and biological aspects:

— **Race and biology,** by L. C. Dunn; 7th ed., Unesco, 1965. ($0.60; 3/6.) * *

— **Race mixture,** by Harry L. Shapiro; 3rd., ed. Unesco, 1965. ($0.60; 3/6.) * *

— **The significance of racial differences,** by G. M. Morant, 4th ed., Unesco, 1961. ($0.30; 1/6.) * *

On sociological, psychological and historical aspects:

— **Race and culture,** by Michel Leiris; 6th ed., Unesco, 1965. ($0.60; 3/6.) * *

— **Race and psychology,** by Otto Klineberg; 6th ed., Unesco, 1965. ($0.60; 3/6.) * *

— **Race and society,** by Kenneth L. Little; 5th ed., Unesco, 1965. ($0.60; 3/6.) * *

— **Racial myths,** by Juan Comas; 6th ed., Unesco, 1965. ($0.60; 3/6.) * *

— **The defence of human rights in Latin America** (16th - 18th centuries) by Silvio Zavala; Unesco, 1964. ($0.70; 3/6.)

— **Race and class in rural Brazil,** by C. Wagley, ed.; 2nd ed., Unesco, 1963. ($2.00; 10/-.)

— **Contacts de civilisations en Martinique et en Guadeloupe,** by Michel Leiris; Reprint, Unesco, 1961. ($1.75; 9/6.)

— **Race relations and mental health,** by Marie Jahoda, 2nd ed., Unesco,

* * Studies reprinted in a single volume, "The Race Question in Modern Science", 1956 and 1959 (out of print).

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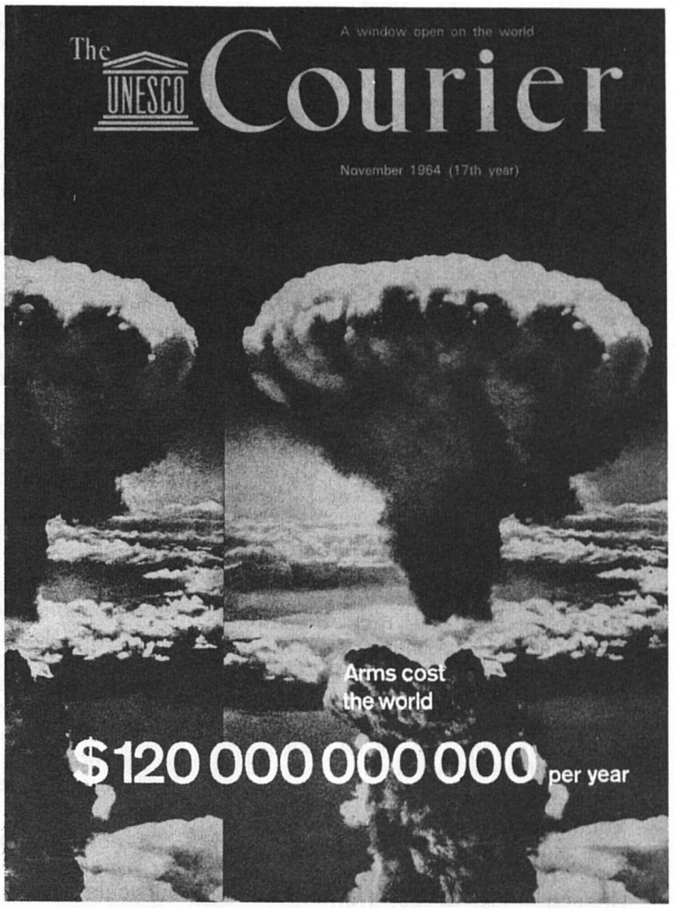

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1961. ($0.50; 2/6.)

— Recent research on racial relations, **International social science journal,** Vol. XIII, no. 2, 1961. *

— **The roots of prejudice,** by Arnold M. Rose. 7th ed., Unesco, 1963. ($0.30; 1/6.) * *

— **Race and history,** by Claude Lévi-Strauss; 4th ed., Unesco, 1961. * **

— **Les élites de couleur dans une ville brésilienne,** by Thales de Azevedo; Unesco, 1953. *

On religious aspects:

— **The Catholic Church and the race question,** by Yves M. J. Congar; reprint, Unesco, 3rd ed., 1966. ($0.50; 2/6.)

— **Jewish thought as a factor in civilization,** by Leon Roth; 2nd ed., Unesco, 1961. ($0.50; 2/6.)

— **Buddhism and the race question,** by G. P. Malalasekera and K. N. Jayatilleke; Unesco, 1958. ($0.50; 2/6.)

— **The ecumenical movement and the racial problem,** by W. A. Visser't Hooft; Unesco, 1954. *

On legal aspects:

— **Equality of rights between races and nationalities in U.S.S.R.,** by I. P. Tsamerian and S. L. Ronin; Unesco, 1962. ($1.50; 1/6.)

— **Racial Equality and the law,** by Morroe Berger; Unesco, 1954. *

Among studies dealing with educational aspects of the race problem, one of the most important was that carried out, under the auspices of Unesco, by Cyril Bibby, entitled:

— **Race, prejudice and education;** London, Heinemann, 1959. (9/6.)

Unesco has actively promoted international understanding through education.

It has organized international seminars to study the most effective methods of developing such education in schools; it has been concerned with the production of specially designed teaching materials and aids; and it has collaborated with governments and professional associations for the improvement of school textbooks from the point of view of international understanding.

Among other examples are the recent experimental project for the international exchange of geography textbooks for revision and comment by experts, and a similar project for history textbooks now being planned. In addition experts are made available to governments (on request) and to Unesco-aided teacher training institutions.

A notable instance of direct action by Unesco for the improvement of curricula and methods in this field of education is the programme known as the Associated Schools Project, which has now been in operation for more than ten years.

It consists of a network of co-ordinated pilot projects in schools in different countries (about 400 primary and secondary schools and teacher-training institutions in 50 countries).

Its purpose is to test ideas on education for international understanding under differing circumstances and to exert a direct influence on education generally by developing knowledge of world affairs, of international co-operation in problems of world significance, of other cultures and ways of life, and of the principles of human rights.

The project has influenced educational practice outside its own area of application and has demonstrated that teaching for international understanding need not add to the load of school programmes but in fact may enrich the content and increase the impact of ordinary curricula.

It has contributed to the development of methods and research and techniques of evaluation for such teaching and, by arousing the interest of educational authorities in the problem, has paved the way for broad national programmes in this field.

Unesco's continuing activities with adult education and youth organizations and movements include considerable emphasis on the promotion of international understanding. The following are a few examples:

— **Evaluation of the Major Project: The Major Project and school education;** reprint of articles from Orient-Occident bulletins, Vol. VIII, Nos. 2 and 3, April and June 1965.

— **International understanding at school;** Unesco, 1965.

— **Note on organization of programmes in the primary school,** Unesco, 1965.

— **Organizing programmes of education for international understanding,** Unesco, 1965.

— **Youth and peace;** Unesco, 1964.

— **Teaching about the Orient,** by David T. Ivor; Unesco, 1961.

(These six publications are available free of charge.)

— **Telling the UN story: new approaches to teaching about the United Nations and its related Agencies,** by Leonard Kenworthy; Unesco, 1963. ($2.00; 6/-.)

Some of the studies on socio-economic development and technological change touch only incidentally upon problems of international tensions, conflict or danger of war, whereas others specifically refer to these problems. Examples of the more direct approach are:

— **Social implications of the peaceful uses of nuclear energy,** by Otto Klineberg, ed.; Unesco, 1964. ($2.00; 10/-.)

— **The nature of conflict,** International Sociological Association; Unesco, 1958. *

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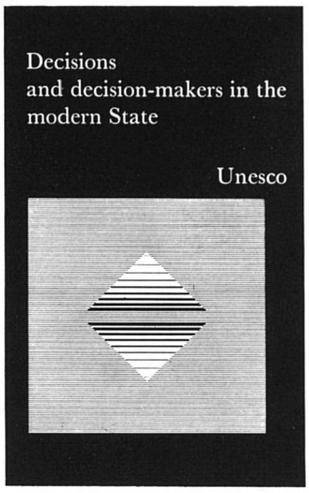

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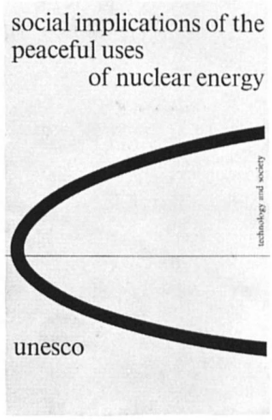

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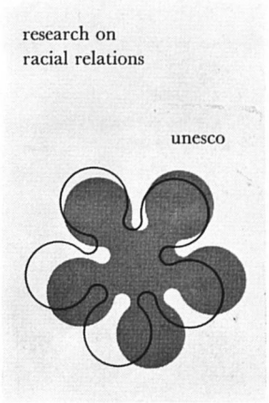

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Grandfather and grandson in an Iranian village.