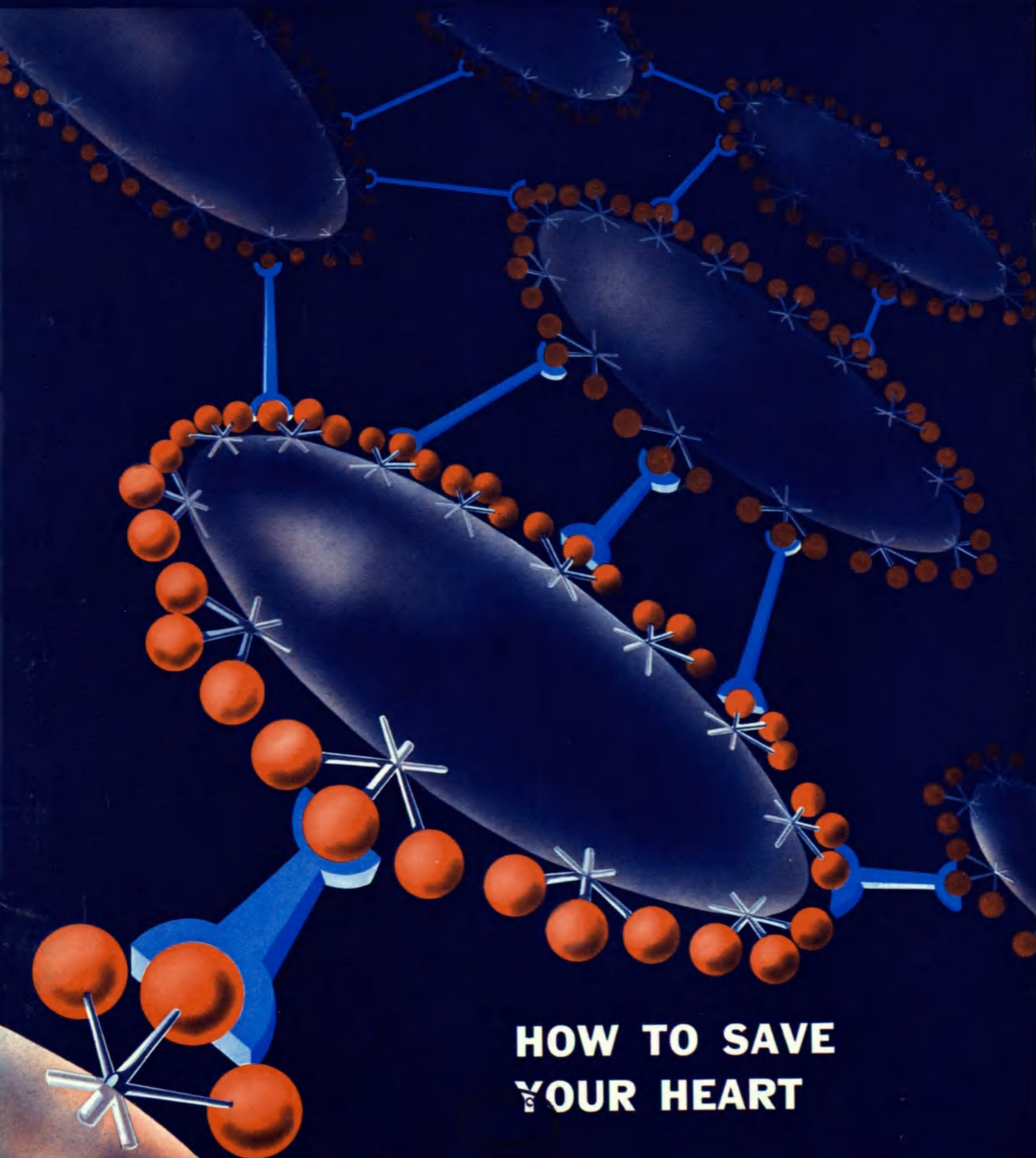
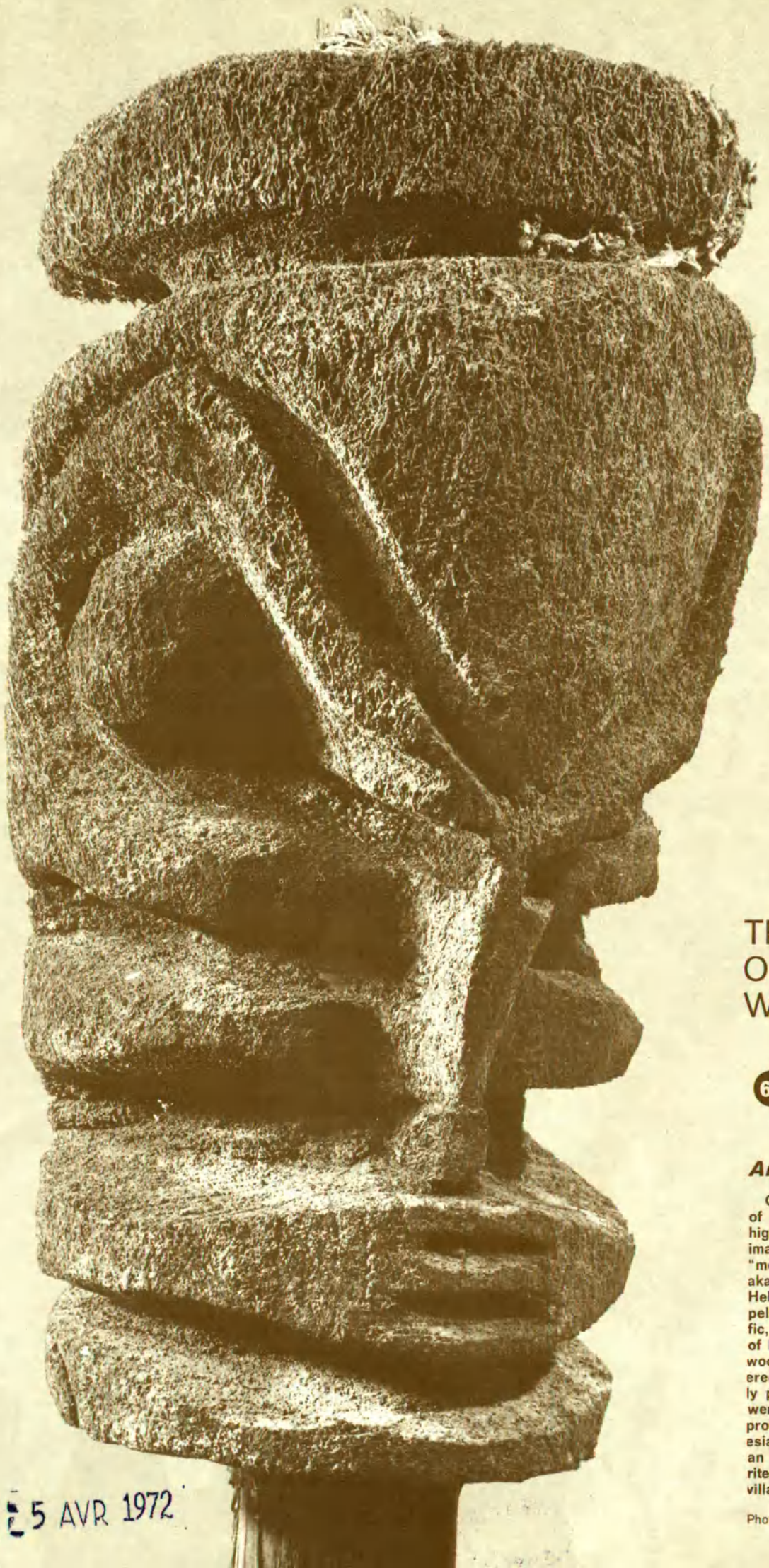
A window open on the world

The UNESCO Courier

April 1972 (25th year) - U.K.: 13p - North America: 50 cts - France: 1.70 F



HOW TO SAVE YOUR HEART



TREASURES OF WORLD ART

65 New Hebrides

Ancestor image

Carved from the trunk of a tree-fern, this 73 cm high Melanesian ancestor image once dominated the "men's house" in a Kanaka village in the New Hebrides, a volcanic archipelago in the South Pacific, some 500 miles west of Fiji. The rough-textured wood used was often covered with clay and brightly painted. Such carvings were erected to provide protection for the Melanesian dwellings and played an important part in the rites and ceremonies of village secret societies.

The UNESCO Courier

APRIL 1972
25TH YEAR

PUBLISHED IN 12 LANGUAGES

English
French
Spanish
Russian
German
Arabic
Japanese
Italian
Hindi
Tamil
Hebrew
Persian

Published monthly by UNESCO

The United Nations
Educational, Scientific
and Cultural Organization

Sales and Distribution Offices
Unesco, Place de Fontenoy, Paris-7e.

Annual subscription rates: £1.30 stg.; $5.00 (North America); 17 French francs or equivalent; 2 years : £2.30 stg.; 30 F. Single copies : 13 p stg.; 50 cents : 1.70 F.

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The UNESCO COURIER is published monthly, except in August and September when it is bi-monthly (11 issues a year) in English, French, Spanish, Russian, German, Arabic, Japanese, Italian, Hindi, Tamil, Hebrew and Persian. For list of distributors see inside back cover.

The Unesco Courier is indexed monthly in the Readers' Guide to Periodical Literature, published by H. W. Wilson Co., New York, and in Current Contents - Education, Philadelphia, U.S.A.

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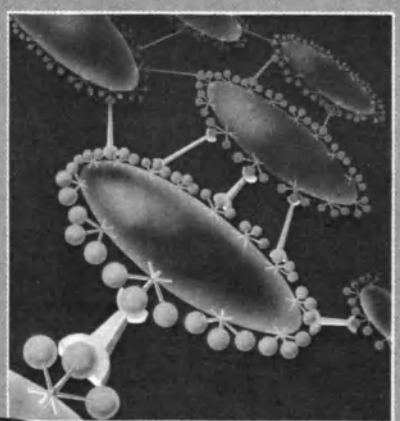


E. S. Drawing by Elisa Patergnani
Photo © Rassegna, Milan

HOW TO SAVE YOUR HEART

On the occasion of World Health Day, April 7, 1972, the "Unesco Courier" devotes this issue to cardiovascular diseases—a major health problem of the modern world. The issue was prepared in collaboration with the World Health Organization and the editors of "World Health". In our cover illustration, the artist has depicted the process of agglutination in the blood. Research into the biology of the blood contributes to an understanding of cardiovascular diseases.

N° 4 - 1972 MC.72-2-276 A

APRIL 7
WORLD HEALTH DAY

"YOUR heart is your health" —that is the theme for World Health Day, 1972.

Public health measures against infectious diseases are obvious to everybody. Urgent action is now needed against diseases of the heart and blood vessels, which are the main cause of death in so many countries throughout the world. High blood pressure, vascular lesions of the central nervous system and congenital malformations, for example, are common everywhere. Ischaemic heart disease (See Mini-dictionary, starting page 10) is associated with affluence, while rheumatic heart disease and heart diseases of infectious origin are more common among less privileged groups. Some causes of heart diseases, such as Chagas' disease, are concentrated in certain parts of the world.

Although the increasing burden of cardiovascular disease of atherosclerotic origin is to some extent associated with the rising age of the population, ischaemic heart disease is becoming more and more frequent in younger subjects.

Enormous progress has been made in science and technology and important social and economic achievements have been accomplished. Yet health indicators warn us that all is not well with our civilization and that its harmonious continuation depends, to an extent which might surprise some, on the solution of major health problems such as the cardiovascular diseases. The prevention of those diseases will require some far-reaching changes in our way of life and in order to make them possible we must be sure that we call upon all the scientific and technical means at our disposal.

Photo © P. Almasy, Paris

"Pour la vie" (for a lifetime) say the words in French carved on the tree.

Photo © Urs F. Kluyver, Hamburg

Much more than we realize, the health of our hearts is in our own hands. The time has come for community action to control high blood pressure, to prevent rheumatic heart disease, to give proper care to persons with myocardial infarction or cerebral stroke, to treat respiratory diseases that often lead to chronic heart failure, and to diagnose and treat malformations of the circulatory system in children as early as possible.

We need better nutrition and healthier living habits. Much more concentrated research is necessary to clarify the unknowns of atherosclerosis and ischaemic heart disease. Since some predisposing factors are already present in young people, prevention needs to be concentrated on the young adult, and even on the child and adolescent by promoting their optimum development.

We need better care for all stricken by heart disease. In many places there are excellent hospitals with modern equipment and trained personnel; but everywhere there is difficulty in rapidly providing the right care to all those who need it.

This calls for increasing international effort, government support, active participation of health workers and of the public. If all these forces will universally unite, we may soon be able to live a better, a healthier and a longer active life.

I hope that World Health Day 1972—the Day of the Heart—will give impetus to world-wide co-operation in the conquest of cardiovascular diseases.

Remember: "Your heart is your health."

Dr. M.G. Candau
Director-General
of the World Health Organization

THE HEART— YOURS FOR LIFE

by Zdenek Fejfar

The popular conception of cardiovascular diseases as a necessary evil of middle and old age is false on two counts. Children do have heart ailments, and, while cardiovascular disease is an evil, it is not a "necessary" one.

As with many other problems in today's world, a number of cardiovascular diseases begin at a young age. This goes without saying for congenital malformations of the circulatory system. Acute heart disease associated with common child infections like diphtheria still appears from time to time, particularly in connexion with epidemic outbreaks.

Rheumatic heart disease has roots in streptococcal sore throats of children. In some tropical and subtropical areas, particularly with crowding and inadequate hygienic conditions, crippling rheumatic heart disease is very common among children and young people in hospital wards. Various other heart diseases occurring in tropical and sub-tropical areas, such as endomyocardial fibrosis (a fibrous thickening that constricts the cavities of the heart), or Chagas' heart disease, begin in childhood and sometimes lead to irreversible cardiac failure even before adulthood is reached.

Functional disorders of the heart, such as cardiac neurosis, are often recognized in children or adolescents and are frequently induced by a chance discovery of an innocent murmur. If this is incorrectly explained as a heart disease the stigma may persist throughout life. Neurosis usually reflects the hypersensitivity of the child as well as the neurotic atmosphere in the family.

CONTINUED PAGE 6

ZDENEK FEJFAR, *of Czechoslovakia, is head of the Cardiovascular Diseases Unit of the World Health Organization, Geneva. He was previously director of research at the Cardio-Pulmonary Laboratory of Prague University.*

More and more evidence indicates that "middle age" heart ailments also have their roots in childhood. For example, this is true of hypertension which accompanies some kidney diseases.

Ischaemic or coronary heart disease, the scourge of today's technologically advanced society, may be due to unhealthy habits which begin in childhood. Several reasons support this belief. The most severe manifestations of ischaemic heart disease—acute myocardial infarction causing damage to the heart muscle, or sudden unexpected death—are now occurring in younger people with greater frequency. Coronary atherosclerosis, impeding the flow of blood through the arteries which is the commonest lesion leading to coronary heart disease, begins in childhood. Blood cholesterol levels in children from countries with frequent ischaemic heart disease are higher than in places where heart disease in adults is rare.

The habits which are involved in the development of atherosclerosis and ischaemic or coronary heart disease are acquired in childhood and adolescence. They include overeating, particularly rich foods with saturated fat and purified carbohydrates, lack of adequate physical activity and smoking.

The social environment of a child or adolescent may also contribute to the development of adult heart disease in a modern society often demanding a pace of daily life which exacts a heavy toll. For example, the insecurity of a child who suffers from lack of tenderness or inadequate care from his parents may carry over uncertainties of life to school and later on to work and lead to maladjustment throughout life and eventually to disease.

Some of these factors are difficult to control, others can be handled with relative ease, although changing life habits usually requires far more effort than treating symptoms of the disease with a drug. Some preventive measures were accepted a long time ago by the medical profession and the community. These include early recognition and treatment of congenital malformations, of streptococcal and other infections, or prevention of cardiac rheumatism.

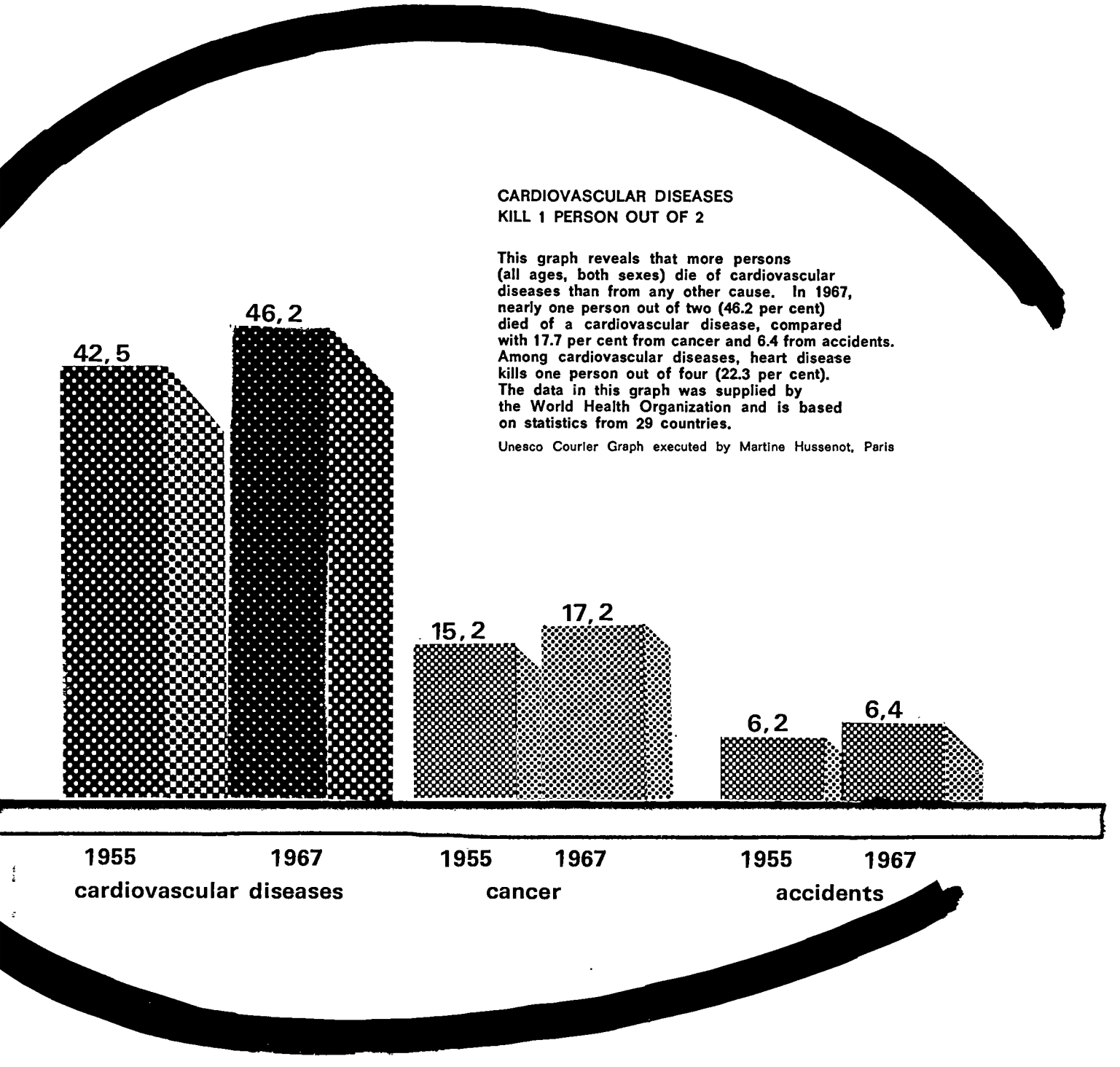
Health examinations in schools and education of both children and their parents help a great deal to raise the awareness in the community. However much more effort is needed to reduce the chances of severe atherosclerosis and ischaemic heart disease in adults. It means increasing the emphasis on investigating causes of the diseases, on the recognition of known predisposing factors, and on introduction of appropriate actions in children and adolescents to assure optimal conditions for their healthy development.

It also means adoption of healthier habits as early in life as possible in order to set a pattern for the future. The important rôle of the family first and school later should be more widely recognized and appreciated, be it for adoption of adequate dietary habits, or in sensitive understanding and advice on how to overcome the many smaller or bigger problems of daily life of the young.

Regular physical education, with emphasis on sports, must be encouraged to counterbalance hours of sitting at school and in front of the television screen. Furthermore, the young sportsman is not only less inclined to smoke, but he is also less apt to develop into a sedentary animal attached to the seat of his motor vehicle. He carries with him into adult life a higher physical fitness which may easily be regained even after years of low physical activity, and which should help him to keep fit longer than the untrained "soft" type.

The disturbed youth of today—less inclined to compromises than their parents—apparently suffer from the "achievements" of our civilization. In this sense the burden of cardiovascular disease cannot be lifted until the ecological balance of society is restored and a more sensible adaptation of man to his environment is achieved. The habits of childhood often linger for a lifetime. ■

One person out of four dies of heart disease



by Jean Lenègre

Ischaemic disease (from the Greek iskhaimos—literally "that which stops the blood") occurs when the supply of blood to any part of the body is considerably reduced or cut off.

The most common of all the ischaemic diseases is ischaemic disease of the heart. The term covers those diseases or disorders which result from a major reduction in the blood supply to all or part of the heart.

This may be brought on by various diseases and by various mechanisms. For example, a narrowing of the aortic orifice may interfere with the flow of blood to the coronary arteries which supply the heart walls and muscles.

In almost 90 per cent of cases, ischaemic heart disease is due to atherosclerosis, a general disease of the walls of the large arteries which shows a marked tendency to attack the arteries forming the coronary tree.

The direct causes of atherosclerosis remain a mystery but an increasing number of facts about the disease are known.

Coronary atherosclerosis is far more common in men than in women, but while almost all patients under the age of 40 are men, this ceases to be true as people grow older; from 60 on, and more particularly after 70, it strikes equally at both sexes. Thus women are in general affected later in life than men.

It occurs more frequently with age. Coronary atherosclerosis before the age of 20 is most unusual and is fairly

CONTINUED NEXT PAGE

JEAN LENEGRE, *who died in February at the age of 68, was professor of clinical cardiology at the Faculty of Medicine in Paris. A world authority on heart diseases, he was formerly president of the French Cardiological Society and president of the European Cardiological Society (1960 to 1964). Prof. Lenègre was the author of many studies on cardiovascular diseases and a member of several medical associations in other countries, including the Royal College of Physicians, London.*

uncommon up to the age of 40. Between 45 and 50, there is a substantial increase, most cases occurring between 50 and 80.

It runs in certain families whose members, particularly the males, may for generation after generation be the unfortunate victims of the disease.

In industrialized countries such as the U.S.A. or Great Britain, coronary atherosclerosis is by far the most frequent cause of death. It is responsible for 50 to 60 per cent of all deaths from cardiovascular disease, which itself accounts for more than half the total number of deaths. Coronary atherosclerosis kills three out of every thousand inhabitants of these two countries every year, not to speak of the one million work-days lost annually in the United States alone.

The figures for Canada, Australia, the Federal Republic of Germany and the Scandinavian countries are proportionally almost as high. In these countries it is the No. 1 health problem—a plague of modern society.

The same applies to France, possibly to a lesser degree. However, in spite of the frequency of cardiovascular diseases, the efforts made at prevention remain far below what is required. If the same effort were made in France to prevent cardiovascular diseases as is made for tuberculosis or cancer, mortality would indisputably decline.

Over the past twenty years, doctors have been making a tremendous effort to find out what causes hardening and narrowing of the arteries (atherosclerosis), and how heart disease develops from atherosclerosis. Although they still have not found the whole "scientific truth" about the direct causes of the disease, they are getting nearer to it and have brought to light a certain number of "clues" to the mystery.

■ Since some families show a marked predisposition to coronary atherosclerosis, hereditary or genetic factors have been suspected. Heredity most probably influences the disease in a variety of ways. Disorders of the metabolism and enzyme disorders such as an excess of cholesterol in the blood or diabetes mellitus and some endocrine defects, may all play their part. However, it is unlikely that the heredity factor is a simple mechanism of gene mutation.

■ Statistics show us that high blood pressure is a predisposing factor: at least 25 per cent of men and 50 per cent of women with coronary heart disease suffer from high blood pressure. Even a mild degree of hypertension in an adult may have serious consequences.

■ In the same way diabetes can be said to predispose to atherosclerosis. Typical diabetes mellitus is actually present in over 10 per cent of patients suffering from coronary heart disease. Certain diabetic conditions, where one of the parents, usually the mother, has a history of diabetes and/or the results given by blood sugar tests are clearly abnormal, are even more frequent. Hidden defects in sugar metabolism are often found in association with abnormalities of fat metabolism. Thus, some patients should follow a "diabetic" diet and cut out simple sugars and fruit so as to lower abnormally high blood levels of cholesterol, triglycerides or lipids.

■ A theory that high cholesterol levels may be responsible for coronary atherosclerosis has been gaining ground over the last fifty years. More and more frequent reports have appeared of its coexistence with other diseases of a completely different nature such as diabetes. All these diseases, however, have a common denominator—a permanently raised blood cholesterol level. Even when no other disease is present, patients suffering from coronary atherosclerosis are found to have a higher blood cholesterol level than normal healthy individuals of the same age.

The incidence of coronary heart disease varies widely from country to country but studies show that such factors as race, climate and geographical situation are less closely related to its distribution than diet and the level of economic development.

■ Obesity, or excess fat, is almost invariably due to overeating, although in some cases another factor may operate—such as an inherited family tendency to put on weight more easily when calorie intake is high. In certain individuals every calorie in excess of the number required to satisfy the body's metabolic requirements is stored in the form of fat and leads slowly but surely to increasing obesity.

The significance of obesity in coronary heart disease has been variously assessed. It may not be the main factor but there is no doubt that it plays some part. This is borne out both by the statistical tables compiled by life insurance companies, which show how life expectancy falls as body weight increases, and by clinical studies, some of which have shown that deaths from cardiovascular disease are twice as frequent among those who are overweight as among comparable individuals whose weight is normal (60 per cent as against 30 to 35 per cent).

■ Other factors have been suspected of causing coronary atherosclerosis, among them cigarette smoking, espe-

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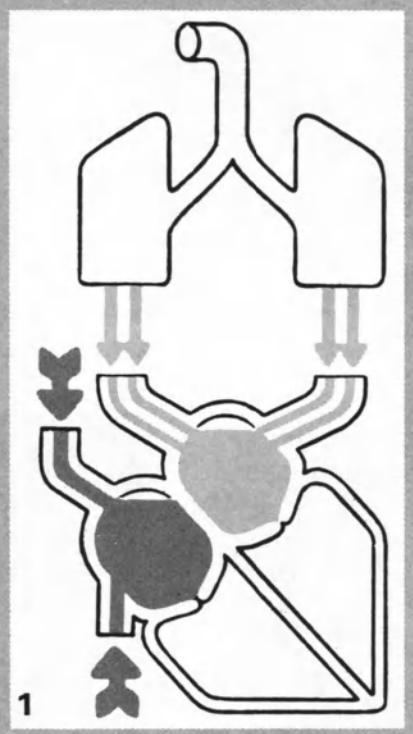

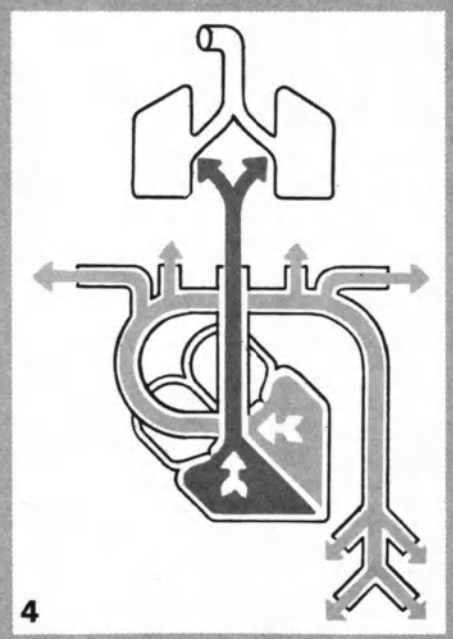

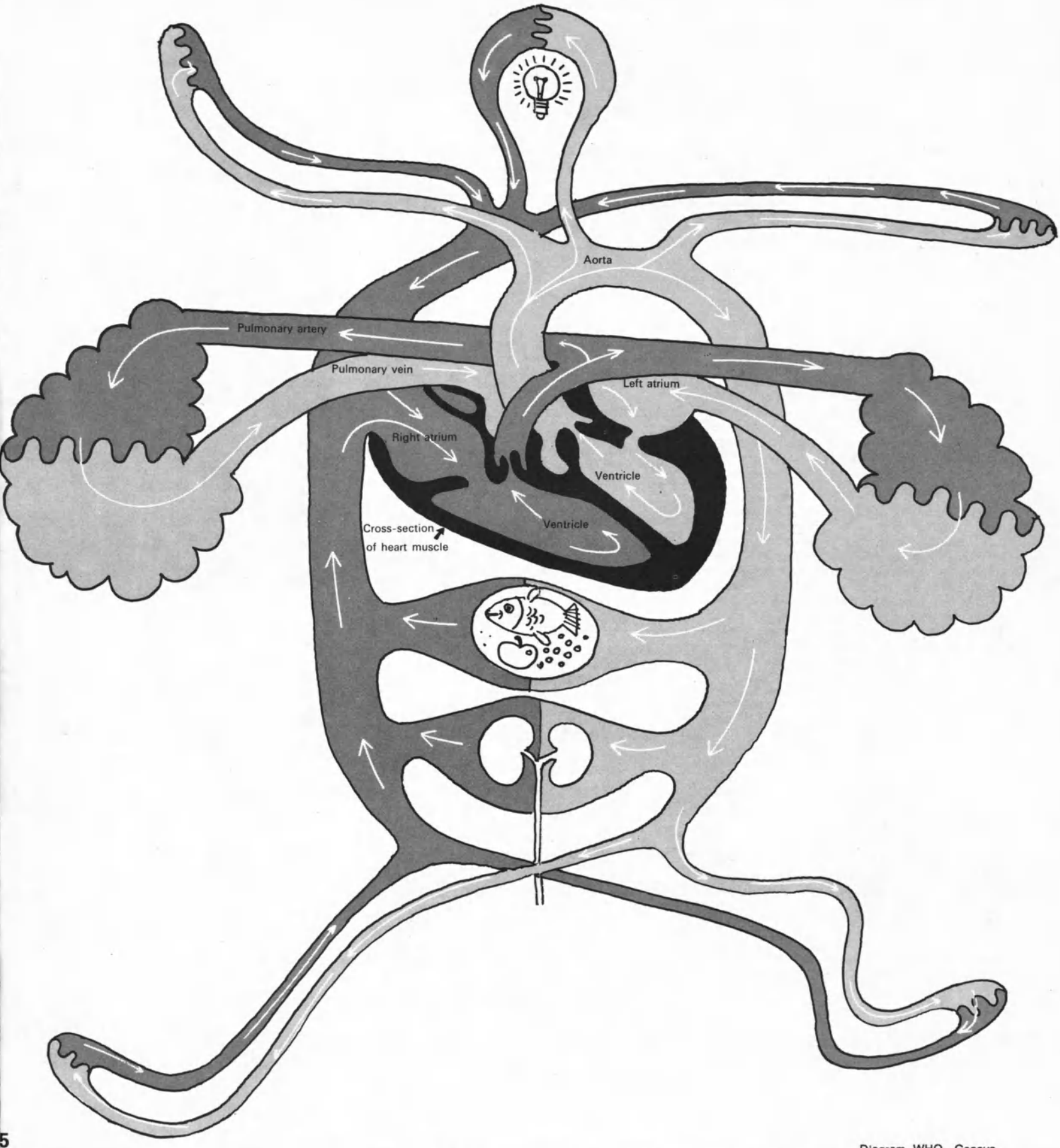

Diagram WHO, Geneva

The pump that must not fail

The heart, a machine more efficient than any made by man, contracts an average of 70 times a minute, 100,000 times a day, 36 million times a year. No bigger than a fist, it can send from five to 30 litres of blood a minute into the arteries, depending upon how much energy you are using. Diagrams on these pages show how this remarkable pumping system works. Blood flowing through the veins is shown in dark grey and blood flowing through the arteries in light grey. 1: Used blood from the veins and re-oxygenated blood from the lungs enter the right and left atrium respectively. 2: The used and re-oxygenated blood is then pumped into the right and left ventricles. 3: The ventricles are now filled with blood. 4: Used blood from the right ventricle is pumped into the lungs for re-oxygenation while fresh blood from the left ventricle sets off on its journey to feed the body's oxygen-hungry cells. 5. The amazing, closed-circuit, circulation system that keeps the body going. Oxygen and nutrients are transferred from the blood to body tissue by thousands of tiny capillaries that snake out to every corner of the body.

MINI-DICTIONARY ON CARDIOVASCULAR DISEASES

Aneurysm

Widening of a portion of an artery. Aneurysm of the aorta occurs in upper or lower part of the aorta, due to atherosclerosis or to syphilis. Dissecting aneurysm of the aorta: an aneurysm in which blood penetrates through a tear of the inner layer into the aortic wall, disrupting its tissues; fatal unless immediately treated.

Angina pectoris

Pain occurring centrally in the front of the chest, brought on by effort (e.g. exercise, emotion, ingestion of food, exposure to cold). It is felt as a tight, heavy, constricting or crushing pain, but may also be numbing or burning, and may radiate to the left arm or both arms, round the chest, or into the neck or jaw. A few minutes of rest or a tablet of nitroglycerine give quick relief. It is a symptom of ischaemic heart disease (coronary heart disease).

Arrhythmia

Any irregularity of heart rhythm. Some arrhythmias are entirely harmless, others may indicate that heart disease is present. Arrhythmias occurring in acute ischaemic heart disease call for emergency treatment.

Arteriosclerosis

Thickening, hardening and loss of elasticity of arterial walls, usually due to atherosclerotic changes. The arteries may become narrower and impair blood flow.

Atherosclerosis

Lesions on the inside of the arteries with fibrous and fat deposits that lead to thickening, hardening, narrowing or even obliteration of the arteries and thus impede the flow through the arteries.

Bradycardia

Unusually slow action of the heart.

Cardiac arrest

Cessation of the heart's contractions. It may take the form of a complete standstill of the heart muscle, or of rapid, chaotic individual twitching of the heart muscle cells (fibrillation of the ventricles). The patient must be resuscitated immediately.

Cardiac neurosis

Disturbed functioning of the heart, though the heart itself is not organically diseased.

Cardiomyopathies

Diseases of the heart muscle of various, often obscure, origin. The dominant feature is the great enlargement of the heart with diminished function (cardiomegaly). Chagas' heart disease is a cardiomyopathy in which the cause is known.

Cerebrovascular diseases

Any brain disease caused by impaired blood flow. The main forms are cerebral haemorrhage, cerebral thrombosis and cerebral embolism.

Cerebral embolism

Occlusion of a brain artery by some circulating particle, usually a small blood clot detached by blood flow from the heart; it results in stroke.

Cerebral haemorrhage

Bleeding in the brain because of a ruptured artery. Hypertension is its commonest cause; many cases could be prevented by adequate treatment of hypertension.

Cerebral thrombosis

Clotting within a brain artery. It deprives part of the brain of blood and oxygen causing damage to the brain cells. Cerebral thrombosis is the most common condition underlying stroke.

Chagas' disease

A disease endemic in parts of rural Mexico and Central and South America, caused by a parasite that is insect borne. The insect bites its victim and defaecates. When the victim scratches himself, the parasite enters the blood stream. The disease may lead to serious heart damage. No cure has been developed. Prevention entails improved living conditions and sanitation, as well as insect control.

Coarctation of the aorta

Narrowing of the upper portion of aorta, a relatively frequent congenital heart disease that can be cured surgically.

Coronary arteries

Arteries that supply blood to the tissues of the heart.

Coronary heart disease

(See Ischaemic heart disease.)

Embolism

Occlusion (blockage) of a blood vessel by a detached clot or by some other particle, including bubbles of air or other gas and particles of fat.

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Photo WHO

Who wants to run the risk?

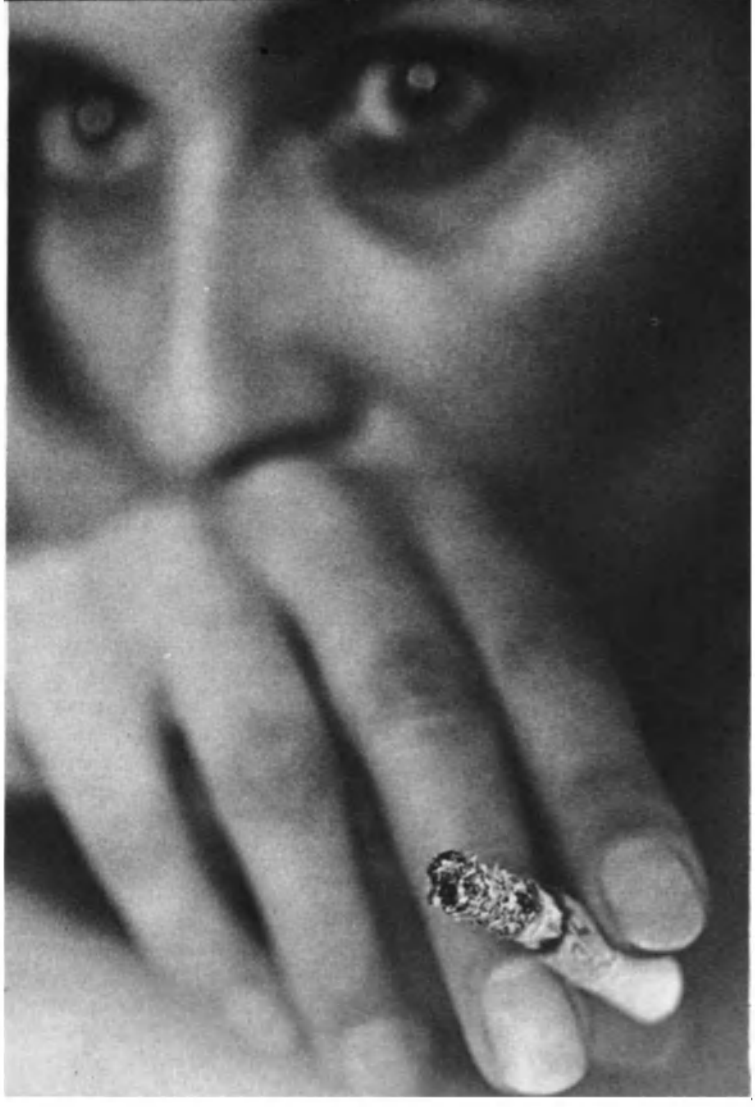

Photo Richard Frieman © Fotogram, Paris

How to reduce coronary risk

- Stop smoking cigarettes.
- Stop eating too much.
- Reduce the amount of saturated fats in the diet, by cutting down fat meats and fat meat products (sausages, salami, etc.), dairy fat and hardened margarine.
- Avoid egg yolk; chicken is healthier than eggs.
- For preference eat cereals, vegetables, fruit, fish, salad and use cooking oils and soft margarines.
- Have your blood pressure checked at least every five years; if it is too high, stick to the treatment prescribed.

M. J. Karvonen
Director, Institute of Occupational Health
Helsinki, Finland

It is unquestionable that there is a relationship between cigarette smoking and mortality from heart disease. Recent studies have sought to determine whether certain predisposing factors exist (such as stress) which make the same people liable both to become cigarette smokers and to be prone to heart disease. It has been found that cardiovascular mortality is higher in areas where the drinking water is soft, and specialists are trying to determine whether some "protective" substance present in hard water (photo left) is absent in soft water. Obesity (photo below right) as well as the stresses of modern society and sedentary life (photo below) have both been implicated as causes of heart disease although some doubt has been placed on these as true risk factors by some medical authorities.

Photo © De Andrade - Magnum

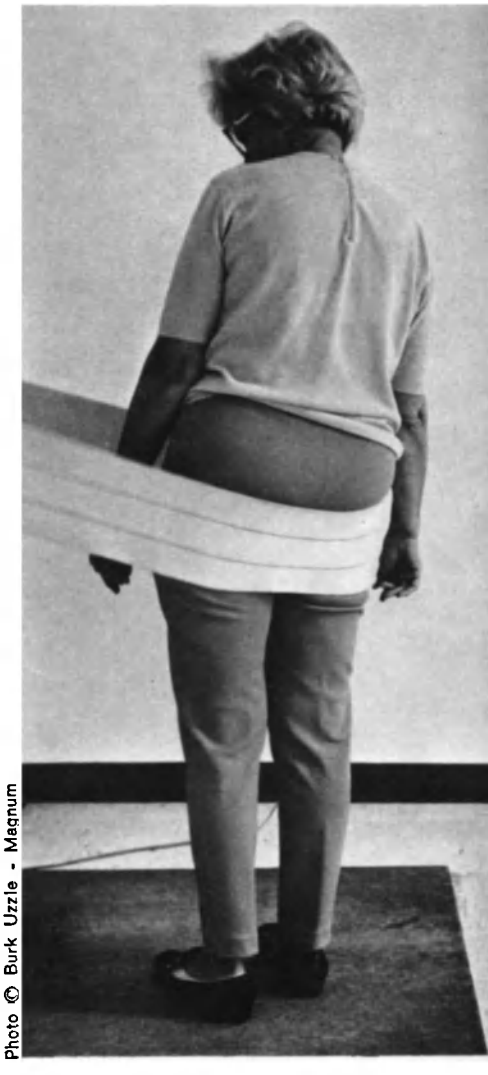

Photo © Burk Uzzle - Magnum

MINI-DICTIONARY *(Continued)*

Endocarditis

Disease of the internal layer of the heart, especially the heart valves, caused by rheumatic fever, bacteria or other agents, leading to leakage and narrowing of the valves (insufficiency and stenosis). Both conditions may be combined and either or both the mitral and aortic valves may be affected.

Endomyocardial fibrosis

A tropical cardiomyopathy characterized by massive fibrosis (scarring) of the inner wall of the ventricles leading to the deformation of the cavities and impaired pumping of the heart.

Essential hypertension

Hypertension of unknown origin, the most common form of consistently elevated blood pressure. In some patients the disease is progressive, leading to complications such as heart, kidney or brain damage, but which may be prevented by adequate treatment.

Extrasystoles

Premature contractions of the heart that occur independently from the basic rhythm of the heart: a variety of arrhythmia, usually harmless and insignificant.

Haemorrhage

Bleeding from any blood vessel.

Heart block

General term for conditions in which the bioelectric current that activates the heart muscle cells is delayed (or interrupted) somewhere along its path. More specific terms (e.g. atrio-ventricular, bundle branch block) refer to the site of impairment. Some types of block are innocuous, others may point to serious disease.

Hypertension

High blood pressure, abnormal elevation of arterial blood pressure as a result of narrowing of the small arteries: this increases resistance to the flow of blood and thus may overwork the heart.

Ischaemic heart disease

Cardiac disability from insufficient supply of blood to the heart muscles; in most cases caused by advanced atherosclerosis in the coronary arteries.

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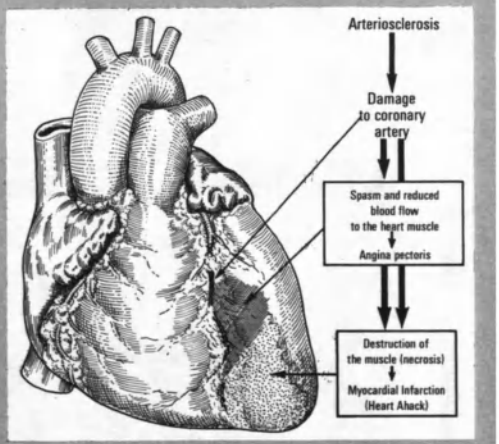

Drawing Arlé Dorn

cially when the smoke is inhaled. Almost all the statistics agree that mortality from various diseases is much greater among smokers than among non-smokers. This is true for lung cancer, chronic bronchitis, ischaemic diseases of the lower limbs and, although perhaps to a lesser degree, coronary thrombosis.

■ Sedentary habits, the stress and strain of modern life, and some psychological and emotional factors may also play a part, though this is not yet fully proved and requires further study.

The very fact that coronary heart disease strikes more frequently in nations that are economically rich and whose populations are predominantly sedentary and well-fed has led to atherosclerosis in general, and coronary atherosclerosis in particular, being considered as a disease of the privileged—the price we pay for belonging to what has rightly been called the "consumer society".

What, then, lies behind this sharp increase in coronary heart disease? It has sometimes been alleged that the increase is more apparent than real since, with the improved diagnostic methods at our disposal, it is possible to diagnose forms of the disease today which formerly would not have been recognized.

It has also been said that the increased incidence of the disease in the second half of life is due above all to the fact that we now live longer. The proportion of men who die from cardiovascular diseases in relation to other causes of death varies from country to country as follows: 21 to 37 per cent die at age 40; 33 to 51 per cent die at age 50; 39 to 57 per cent die at age 60; 48 to 62 per cent die at age 70.

There is thus some truth in these allegations. But Ostler, who a century ago in one year met only rare cases of angina pectoris among his many patients, was as capable of diagnosing it as we are today. Moreover, it is difficult to explain away the increasing number of cases among people under 40.

While we have only a sketchy knowledge of the direct causes of atherosclerosis we do know quite a lot about the structure of the lesions associated with it. They consist of diffuse and segmentary changes in the arteries, remarkable in that they show a predilection for the male sex and the middle-aged.

The first anatomic changes occur early in life, from 10 or 20 onwards. The yellowish fatty streaks which appear in the internal lining of the artery are small at first and remain inactive for many years—almost indefinitely in most cases. With the passing of time, slowly and imperceptibly, the lesions develop, showing a preference for certain regions and particularly for the arteries forming the coronary tree.

Within these regions, they most frequently attack the point at which the main body of an artery divides or curves. In these areas, the insoluble lipid substances circulating in the blood (cholesterol and fatty acids) are precipitated on to the internal wall of the artery and form yellowish deposits which in turn are soon covered by a gradually thickening fibrous shell.

Thus an atherosclerotic plaque is formed which infiltrates deeply into the arterial wall, eroding or compressing the middle muscular coat of the artery and, what is more serious, bulges out into the blood channel, which becomes progressively narrower as the atherosclerotic plaque grows larger.

This narrowing of the arteries progresses very slowly. The failing blood supply to a certain extent is compensated for by blood supplied from other coronary arteries.

The narrowing usually begins to interfere with the functioning and nutrition of the heart muscle in persons aged between 50 and 70. The normally slow course of the disease—progression as the arteries narrow, alternating with regression as the supplementary circulation comes to the aid of the failing heart—may be accelerated by the formation of a coronary thrombosis.

A clot of blood suddenly forms around or near an atherosclerotic plaque, completely blocking the artery, and the supplementary circulation is unable to meet the extra demand for blood. That part of the heart muscle which depends on the blocked coronary artery becomes acutely anaemic and this condition usually brings on a heart attack.

This can be defined as complete ischaemia of a particular area of the heart wall—usually part of the wall of the left ventricle. The stricken area ceases to contract, fails to assist the ventricular pump in its work, degenerates and, over a period of several months, is transformed into a fibroid scar, incapable of taking any further part in the working of the heart.

When the narrowing of the coronary arteries or in some cases their progressive blockage reaches a stage where the circulation is no longer able to compensate fully, any occasion

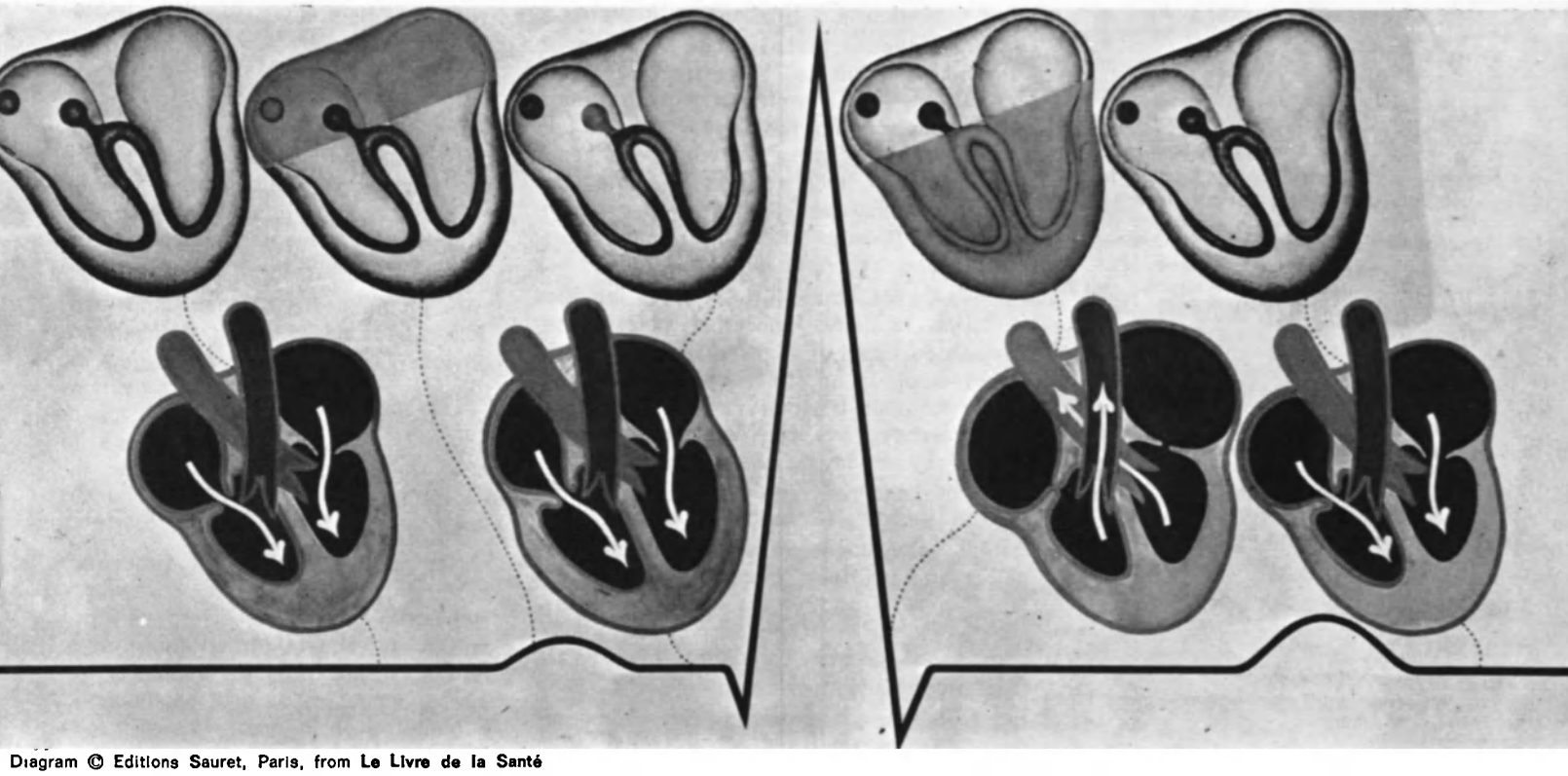

Diagram © Editions Sauret, Paris, from **Le Livre de la Santé**

When the heart skips a beat

Diagram © Bunji Tagawa - Scientific American

The electrocardiograph detects and records the electrical impulses that develop in the heart and spread through its muscles with each heart-beat. To make a recording, the impulses are gathered at points on the skin corresponding to precisely determined areas of the heart. Wires are usually attached to the wrists, ankles and various parts of the chest. Diagram above shows one normal sequence in the electrocardiogram of a healthy heart with its small bump, inverted "V", small bump. Arrows show flow of blood through the heart during different stages of contraction. Upper row of heart diagrams shows electrical impulse phases. Electrocardiogram on left shows an irregular heart beat (arrow).

when the heart is called upon to increase its output may reveal the diseased state of the muscle tissues of the heart.

This usually happens when one makes a big physical effort, especially walking. After one has walked a short distance of a hundred yards or less, especially in cold weather or at a brisk pace up a hill, or after a heavy meal, the coronary insufficiency shows up as a short-lived pain in the chest.

This pain, known as angina pectoris, comes on suddenly, varies in intensity, and is usually felt in the centre of the chest. There is a tight feeling in the chest but no loss of breath. Nevertheless, it is unpleasant enough to bring one to a halt or make one slow down sharply. The pain goes as quickly as it came—usually in less than two minutes.

Its passing is often accompanied by stomach gurglings or by belching, which gives the mistaken impression that one is suffering from indigestion, especially if one has just had a meal. The pain often occurs while one is walking but it may also appear for no apparent reason while resting.

Some persons may suffer several attacks in one day, others only two or three in a month. In between these painful attacks (always very brief and never lasting more than five to ten minutes) there is no feeling of illness or discomfort and one usually says "everything is fine".

Between attacks, medical examinations often show no signs of abnormality, the heart appearing normal under the stethoscope and X-ray. The electrocardiogram is the best method of diagnosis. In a third of cases it reveals abnormalities; in a further third, the electrocardiogram is not absolutely normal but the irregularities are slight and non-typical; in the remaining third, the electrocardiogram taken at rest is quite normal. When the electrocardiogram is normal, negative or difficult to interpret, it is best to give a controlled exercise tolerance test, after which any irregularity present should show.

When the arteries become so narrow that the flow of blood approaches the minimum required by the heart muscle, then the heart, which normally needs a lot of oxygen to function and is not getting it, reaches a critical stage.

Pains in the chest become more or less continuous, coming on after ever slighter exertion and sometimes even when the person is at rest. The aggravation of the disease is apparent in an increase in the frequency, intensity and duration of the pains and sometimes even in definite changes in the electrocardiogram. One is now under constant threat of

CONTINUED NEXT PAGE

a heart attack (Myocardial infarction).

In these circumstances, any one of many "incidents" may cause the blood supply, and therefore the oxygenation and nutrition of the heart muscle, to fall below the minimum vital level and bring on a heart attack. The immediate cause may be unaccustomed physical effort (though this is rare) or a violent emotion such as anger.

A meal that is too heavy or too rich in fatty foods may affect the blood supply in various ways. It may precipitate an attack by upsetting the water-salt balance in the blood, by increasing the work load on the heart, or by modifying the blood chemistry and causing a sudden rise in the level of triglycerides and fatty acids.

Heavy cigarette smoking and inhaling and various "incidents" such as an attack of another unconnected illness —flu for instance, accidental injury or a surgical operation—may also trigger an attack.

In most cases however a major heart attack occurs suddenly and without warning. It may surprise the victim at work, while resting or, without any apparent reason, in bed at night. These cases of unexpected myocardial infarction, particularly when there are no warning signs such as recurrence of chest pain, are usually due to coronary artery thrombosis.

Whether preceded by a recrudescence of chest pain (in 40 per cent of cases) or apparently linked with an "incident" such as the ones described above (less than 10 per cent of cases) or striking suddenly and without warning, the heart attack is characterized by a violent bout of pain which spreads to the whole of the thorax, often radiates along the arms, and lasts not minutes but hours.

The immediate risk to a person suffering such a major attack is even greater than was once thought. Recent studies show that the victim often dies within an hour or two of its onset. If he survives this first critical period, myocardial infarction usually develops within the next few days—a consequence of the partial destruction of a segment of the wall of the left ventricle.

Once the pain has subsided, the arterial blood pressure falls and there is usually a temporary rise in temperature to about 38 or 39 degrees Centigrade (100 to 101 degrees Fahrenheit). Blood tests carried out in the first few days after an attack show abnormal amounts of certain substances (enzymes), indicating that some degeneration of the cardiac muscle cells has taken place. Their presence and the irregularities of successive electrocardiograms confirm the diagnosis.

There is nothing to do but to put the person to bed for three weeks or so with appropriate treatment and wait for the damaged heart tissue to heal.

Although heart disease, and especially coronary heart attacks, are obviously "Public Health Enemy No. 1", they are not always given the systematic treatment they require. This is probably because heart disease is often looked on as part of the inexorable "running-out" of a human life.

But nothing could be further from the truth. Heart disease, particularly ischaemic heart disease, strikes more and more frequently in all age groups. Its causes are often accidental, or the consequence of years of accumulated neglect. Yet in many cases it can not only be foreseen and prevented, but also cured. Proper treatment may limit or postpone its effects and keep the disease under control for many years.

Much of this treatment becomes critically urgent in the case of a major heart attack when, as often happens, the sick person's life is in immediate danger. Every minute counts and it is vital that the heart attack should be diagnosed correctly from the outset.

This calls for education not only of the public but also of doctors, whose medical training may not always have prepared them to undertake the modern and sometimes "revolutionary" treatment called for in these cases.

The classic treatment of a heart attack which forbade moving the patient during the acute stage and insisted on his being treated on the spot (often in his own home) is losing favour. This was perhaps logical in the days when treatment of myocardial infarct was largely a matter of "wait and see".

But today we know that the first few hours are by far the most dangerous and during this time "unnecessary" deaths may occur, not because of irreversible damage to the heart, but following a sudden disturbance of the heart's rhythm, such as ventricular fibrillation (chaotic twitching of the heart muscle cells) or cardiac arrest (a complete standstill of the heart muscle).

Such mishaps, against which we are helpless for lack of suitable equipment when the patient is treated at home, are often curable if treated

MINI-DICTIONARY *(Continued)*

Myocardial infarct or infarction

A manifestation of acute ischaemic heart disease: the occlusion of an artery of the heart cuts off the blood supply to a portion of the heart muscle. The affected tissue dies off injuring the heart. Symptoms are prolonged intensive chest pain, fall of blood pressure, and often shock. Many surviving patients can be rehabilitated to lead a fruitful life.

Neurocirculatory asthenia

Disturbance of the functioning of the heart and circulatory system, although no organic damage can be detected in the heart and vessels themselves. Patients experience a variety of symptoms and their physical performance may be decreased; there is no lasting impairment.

Pericarditis

A disease of the heart surface; rheumatic fever, tuberculosis, a great variety of infections and many other agents are its possible causes.

Renal hypertension

Elevated blood pressure due to kidney disease; some forms (if only one kidney is affected) are amenable to surgical treatment.

Rheumatic fever

A sequel to infection by Group A streptococci characterized by heart disease and/or acute pain and inflammation of the joints. The disease usually begins in childhood with an acute attack and may have a long-lasting course, since the patient is liable to recurrences brought on by new streptococcal infections: these aggravate the heart disease, but may be prevented by penicillin.

Rheumatic heart disease

Damage to the heart valves and heart muscle resulting from rheumatic fever. Because of endocarditis the valves may become crippled (see Endocarditis). The disease may occur without a history of acute rheumatic fever.

Stroke

A colloquial term for any cerebrovascular disease having an abrupt onset. The leading symptom is paralysis of one side of the body.

Tachycardia

Accelerated action of the heart. Paroxysmal tachycardia is a particular form of rapid heart action, occurring in seizures which may last from a few seconds to several days. There are several varieties of paroxysmal tachycardia, some of them harmless, others rather dangerous.

Thrombosis

Occlusion (blockage) of a blood vessel by clotting within the vessel itself at the site of occlusion. ■

in centres specializing in the handling of heart disease, where "re-animation" and "defibrillation" are standard procedure.

In view of the immediate risk, the patient should be transferred right away to one of these specialized "coronary units". This calls for a special ambulance service equipped to provide immediate intensive care and able to go into action as rapidly as a fire engine, and also the setting up of special units in most hospitals for the treatment of heart attacks.

These are by no means novel suggestions—such centres have been in operation in the hospitals of many cities for years. Any large modern hospital should find it possible to meet the cost of such a unit without overstraining its budget.

In the majority of cases, patients make a complete recovery from a first attack of myocardial infarction, and they may even be allowed to practise certain sports, provided that these cause them no physical discomfort or other difficulty. But even when "cured", myocardial infarction should never be taken lightly.

An infarct, even when healed, or indeed any anginal pain, however brief, coming on spontaneously or during exercise, may signal the presence of coronary atherosclerosis and indicate that certain precautionary measures should be taken.

The patient should be asked to avoid any physical effort which causes him discomfort and particularly any movement which brings on anginal pain. If pain does occur, a tablet of nitroglycerine should be crushed in the mouth without delay. This drug is harmless when taken in the recommended dosage and its effect is little short of miraculous. It may cause a headache in 5 to 10 per cent of cases (disagreeable but short-lived).

It is erroneously believed by many that nitroglycerine loses its powers if taken frequently; on the contrary, it continues to be effective indefinitely. Of all the drugs known today it is the most reliable, the most rapid and the most spectacular in its results: in 90 per cent of cases it relieves the pain of angina pectoris in less than one minute. No other drug can do this.

Other drugs, generally thought to be capable of dilating the coronary arteries, diminishing the labouring of the heart, or improving the metabolism of the myocardium by reducing its oxygen (and therefore blood) requirements, may be used with varying success to complete the treatment.

American surgeons have recently perfected an effective surgical method of restoring the blood supply to parts of the heart muscle that have been deprived of it, in cases where angina pectoris proves resistant to medical treatment.

To supply blood to the affected parts surgeons use a by-pass graft. A piece of the saphenous vein is taken from the patient's leg and one end is grafted on to the aorta, one of the major blood vessels, the other end being grafted on to the coronary artery beyond the point where it is blocked.

This operation, logical, simple to perform and involving little risk, has proved very effective in controlling and alleviating anginal pain in the chest, but it does not cure the coronary atherosclerosis that has caused a blockage of the artery.

Any treatment for heart disease must include advice on principles of general health and diet. This advice is of great importance, as much to persons already suffering from the effects of the disease as to those who, though apparently in good health, have been shown by clinical and biological tests to be affected by one or more of the "risk factors".

Among preventive measures, by far the most important are these three:

- stop smoking (in some cases, smoking is one of the major aggravating factors and should be stopped immediately and for good);
- lead a reasonably active life, avoid sedentary occupations, and exercise enough to keep the muscles in good condition;
- keep to a diet designed to counteract any metabolic disorder revealed by biological tests.

The old saying "Prevention is better than cure" applies to most cases and underlines the need to set up special centres for the diagnosis and prevention of atherosclerotic diseases in general and coronary heart disease in particular. With our present knowledge of "risk factors", a relatively simple examination should enable us to determine which persons in the community are "at risk", and to advise them what precautions to take.

If this advice is followed, one may hope that within the next few years there will be a dramatic fall in the number of victims of heart disease and particularly of coronary heart failure. ■

HIGH BLOOD PRESSURE

Hypertension is a rise in the systolic and diastolic arterial blood pressure above the normal. Systolic refers to the pressure at the artery wall when the heart is in contraction and drives blood into the aorta. Diastolic refers to the pressure when the heart is in relaxation. When the heart pumps rhythmically, blood pressure oscillates between the systolic and diastolic values. It changes to meet the needs of muscles and other organs. Systolic blood pressure is indicated by the first figure and diastolic blood pressure by the second.

A casual blood pressure of 150/90 is considered normal in a middle-aged adult, but other factors, including the patient's age, must be taken into account. A systolic pressure of 160 is a more serious matter at age 40 than at age 60. Although a person's blood pressure varies considerably during the day and night, it will vary particularly with emotional upset. Therefore, comparative measurements should always be taken under the same conditions.

Distribution of blood pressure among 44,000 people in Bergen, Norway, show the following averages (half the population below and half the population above):

Age	*40-49 yrs.*	*50-59 yrs.*	*60-69 yrs.*
Blood pressure in men:	**135/80**	**145/85**	**150/85**
Blood pressure in women:	**130/80**	**150/85**	**160/90**

These levels, however, may vary in different countries.

GEOGRAPHY OF HEART DISEASE

by
A.G. Shaper
and
Zdenek Fejfar

The human heart, that vital busy pump made of muscle interwoven with blood-vessels, is an organ about which we know much but need to find out far more. If it slows down and fails to supply any part of the body, that part may literally die; the result may be paralysis of an arm or a leg, or part of the brain may cease to function; if the heart itself is deprived of blood, death may occur.

Like any hard-worked machine, the heart is subject to mechanical failure from a variety of causes, some known, others obscure. The distribution of these ailments in the world's population is not uniform but varies according to sex, diet, area and economic status. A disease may also lead to different complications in different settings; for example, the main consequences of high blood pressure are different in developing and highly developed countries.

In most of the affluent societies of the world, the level of arterial blood pressure rises progressively with increasing age, especially after 40. Whether this is a normal pattern or should be regarded as an environmentally induced disorder remains a source of heated discussion. Studies of the aging process in developing countries may answer this question.

The Medical Research Unit in Wellington, New Zealand, has investigated several groups of Polynesians. The population of Pukapuka (Cook Island) does not show the usual rise of blood pressure with increasing age, but other groups of genetically similar Polynesians, now exposed to the modern affluent way of life, do; their blood pressure rises with age; arterial hypertension and complications are not uncommon.

Among the Maoris of New Zealand, the prevalence of hypertension is high and is still rising, while among the Europeans in New Zealand it has been falling; hypertension in the Maoris is frequently associated with a tendency towards gout. Tantalizing as these clues are, their true signifiance has yet to be determined.

The peoples of northern Kenya, the Samburu and the Rendille, lead a nomadic existence with their herds of cattle, camels, sheep and goats; they also show no increase in blood pressure levels with increasing age.

Studies carried out by the World Health Organization Cardiovascular Research and Training Centre in Kampala, Uganda, have shown that young men from these tribes who join the Kenya army show a significant increase in blood pressure in their second year of service.

One of the many changes associated with their transition from a nomadic life to the disciplined existence of the army is a considerable increase in salt intake, although other dietary changes and such factors as environmental stress may also play a part.

In the affluent countries it seems that people with high blood pressure are more likely to develop disease of the arteries and coronary heart disease. In the tropical countries, although long-standing and severe hypertension results in brain damage, heart enlargement and heart failure, or in kidney damage and kidney failure, severe atherosclerosis and coronary heart disease virtually do not occur.

A similar situation has been observed in China, Japan and Mongolia, as well as in many tropical countries, and shows that hypertension should be regarded as an aggravating factor in the development of coronary heart disease and not as a basic cause. There is clearly a tremendous need to study the natural history of hypertension in populations *not* prone to severe atherosclerosis.

The usual cause of the reduced blood supply is atherosclerosis of the coronary arteries, a process which leads to narrowing and distortion of the blood vessels. A sudden obstruction in one of these arteries will result in damage to the heart muscle which it supplies; this is acute myocardial infarction, often called by the general term "heart attack". It is the most common heart disease in adult man in all affluent societies.

Yet heart attack is rare in developing countries, with the apparent exception of small groups of people with a high level of responsibility and socio-economic advantage.

In the affluent societies, cigarette smoking, hypertension, diabetes mellitus, obesity and sedentary occupations are factors known to be associated with the development of coronary heart disease, yet these factors do not produce coronary atherosclerosis and coronary heart disease in the "average man" in the developing countries.

This is true even for middle-aged persons with long-standing hypertension, diabetes mellitus, obesity and sedentary occupations! The reasons are as yet not quite clear but there is a strong suggestion that all these "risk factors" are only *aggravating* factors which accelerate the development of atherosclerosis and its complications in communities already prone to this disease.

The relative importance of dietary factors and of physical activity patterns, which are perhaps expressed in the low blood-fat levels of these tropical communities with virtual freedom from coronary heart disease, is of considerable interest. Many claim that the basic causes of coronary heart disease cannot be adequately studied in the communities which suffer most from the disease because all individuals are exposed. Hence the usefulness of studying communities relatively free from it.

Particularly rewarding studies cover well-defined groups of people with considerable differences in the prevalence of coronary heart disease. For example, in Kampala, Uganda, the

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In some rural areas of Africa, among low income farmers, high blood pressure occurs as frequently as among city dwellers. Here, a doctor tests a farm-worker's blood pressure in a Dahomey village.

Photo WHO, Geneva

FACT IS STRANGER...

... THAN (SCIENCE) FICTION

A recent science-fiction film, produced in Hollywood and entitled "Fantastic Voyage", tells the story of a scientist seriously ill with brain damage. In a last desperate attempt to save his life, an experimental submarine and its crew of doctors, nurses, etc, are miniaturized and injected (top right) into the blood stream of the patient and undertake an extraordinary voyage through the heart up to the brain. Like any other foreign element, they are attacked by the body's defence mechanisms (above) as they search for the site of the malady under the anxious eyes of their "ground control" (below). Compare the film's décor with the real thing. Photo (left) shows an experiment in heart research: a stereoscan microscope view of normal human blood ten minutes after the introduction of a synthetic material. It shows red corpuscles imprisoned in a dense network of fibrin, leading to coagulation or clotting of the blood. A similar phenomenon of coagulation frequently occurs when blood flows through the synthetic materials currently used in the construction of artificial hearts and blood vessels. The search for a material compatible with human blood continues.

Photos 20th Century Fox, Paris

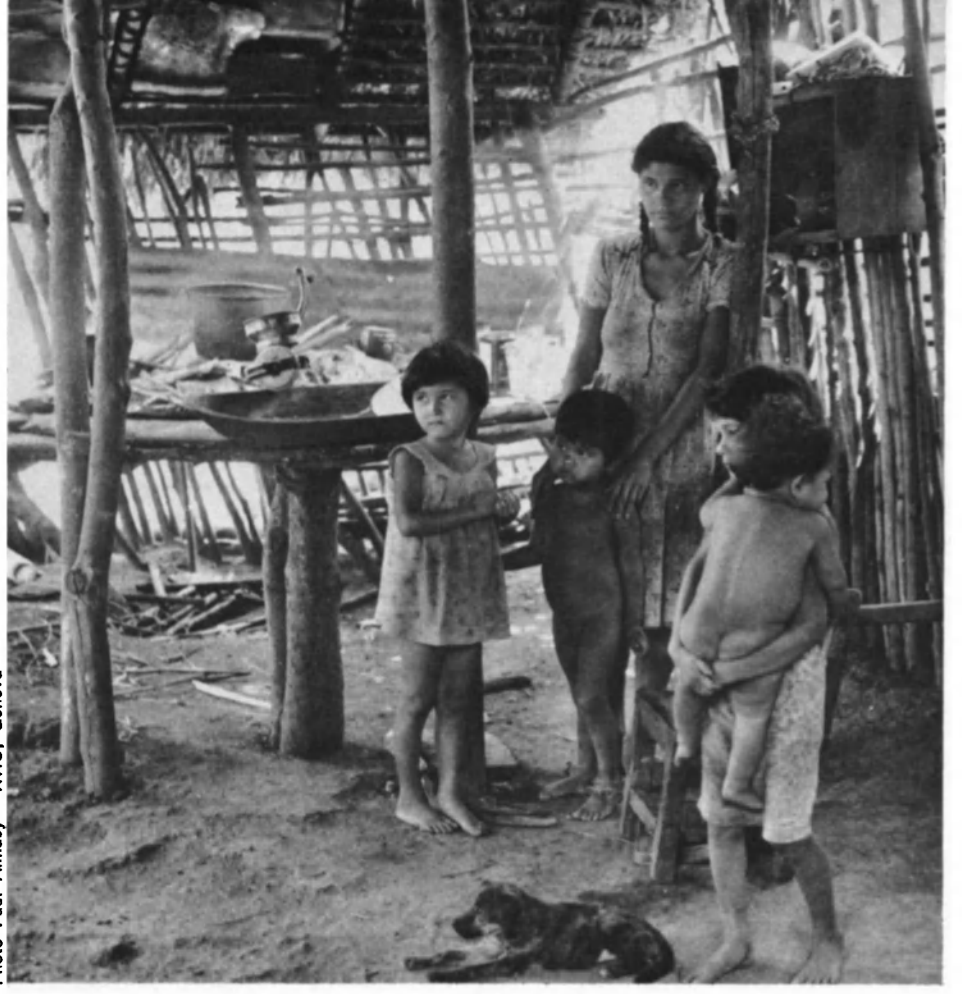

Photo Paul Almasy - WHO, Geneva

PYRAMID CLINIC

Rheumatic fever which can cause crippling damage to the heart is a disease which often strikes children. Thirty per cent of adult cardiac diseases are due to rheumatic fever contracted in childhood. In the U.S.A., about one million heart sufferers owe their ailment to this cause. In Egypt, the Pyramid Clinic, built almost in the shadow of the great pyramids near Cairo (right) treats and rehabilitates children suffering from disabilities of the heart and joints caused by rheumatic fever. It has already cared for some 10,000 children and provides primary school teaching and appropriate job training.

Chagas' heart disease is a threat to 35 million persons in Latin America, where it causes many deaths. It affects an estimated five million persons in Brazil and one million in Venezuela. Photo left shows inhabitants of a district where the incidence of Chagas' disease is particularly high.

GEOGRAPHY OF HEART DISEASE *(Continued from page 16)*

WHO Centre has emphasized the striking differences which are found in the fibrinolytic (clot-dissolving) system of subjects prone to coronary heart disease compared with subjects who are not. The African community in Kampala have no coronary heart disease, and at all ages have an active system for the breakdown of blood clots.

The Indian minority in Kampala, with an incidence of coronary heart disease similar to any "affluent" group, have a very poor clot-dissolving system when they reach middle age (40-60 years), and this inability to break down blood clots is significantly associated with body fatness, blood cholesterol levels and a tendency to diabetes. This may be a phenomenon of fundamental importance in the development of atherosclerosis and coronary heart disease, and furnishes another example of how the absence of a disease in a community may lead to the better understanding of the mechanisms of the disease elsewhere.

Food habits may play an important part in determining whether a community does or does not suffer from coronary heart disease.

In Singapore, where three-quarters of the population are Chinese and one quarter Malay and Indian, the Indian section of the community, whose eating habits are quite special, is the one most commonly affected.

In Fiji, coronary heart disease is not seen in the native Fijians, but is commonly diagnosed among resident Indians.

In Ceylon, where coronary heart disease is commonly diagnosed in relatively poor people on low-fat diets, considerable interest focuses on the fact that, although the total amount of fat consumed is low, it consists of coconut oil, a substance similar in certain ways to butter, i.e. highly saturated.

Clearly the nutritional peculariti es of tropical countries are of considerable concern to those involved in unravelling the mysteries of atherosclerosis and coronary heart disease.

A small proportion of those who suffer from certain streptococcal throat infections experience inflammation of the heart and swelling of the joints which may go unrecognized if symptoms are not striking: this is acute rheumatic fever. However, though the acute phase soon passes, permanent injury to the heart in the form of a thickening of the heart valves may result; this is chronic rheumatic heart disease.

There has been a remarkable decline in the incidence of rheumatic fever in highly developed communities in recent years through the treatment of streptococcal infections with sulphonamides and penicillin. Moreover, preventive regimens have considerably prolonged the life of subjects with chronic rheumatic heart disease, and surgical correction of the valvular deformities has become a well-established treatment.

In many developing countries, particularly in the tropical and subtropical regions, the reverse situation can be seen. Severe rheumatic heart disease is being recognized with increasing frequency and it is the most widespread and serious chronic heart disease in children and young adults.

Poor social and economic conditions, inadequate hygienic and therapeutic measures as well as increasing urbanization appear to be far more important than climate. The high proportion of children in the population and the rapid progression from onset of the disease to severe permanent damage of the heart valves and irreversible heart failure make this a serious problem.

Tropical physicians and pathologists are familiar with the presence of advanced rheumatic heart disease in children below the age of ten, and considerable evidence indicates that the prevalence of chronic heart disease is increasing in many tropical countries.

Despite the frequency of chronic rheumatic heart disease in the tropics and sub-tropics, surprisingly little acute rheumatic fever is diagnosed in these areas. Surveys carried out by WHO consultants suggest that the clinical features of acute rheumatic fever may be different in the tropical countries

Photo D. Henrloud - WHO, Geneva

and that the natural history of rheumatic heart disease may be modified by environmental factors.

It is widely accepted that acute rheumatic fever is caused by streptococcal infection, usually manifested as a sore throat, and that treatment of the infection can prevent rheumatic fever. A question which requires study in the tropical situation is whether streptococcal skin infections, which are very common and often precede acute kidney disease, may also result in rheumatic fever.

At the WHO seminar on cardiovascular diseases due to infections, held in Manila in November 1968, the preventive aspects of rheumatic fever and rheumatic heart disease were fully discussed.

In Malaysia, Singapore, Cambodia, Hong Kong, the Philippines, Australia and New Guinea, there is a significant amount of rheumatic fever and particularly rheumatic heart disease. The severity of streptococcal infection and the degree of the immune response to streptococci are factors influencing a high rheumatic disease incidence.

Reports from countries in the western Pacific region showed a wide range in the magnitude of the problem; according to some reports, the situation may be considered under control, for example among the European population of Australia and New Zealand; elsewhere a severe problem is recognized, for example in the Philippines, Hong Kong and Singapore.

Persons who have recovered from an attack of rheumatic fever remain susceptible throughout their lives and thus require continual medical supervision. However, if their infections are promptly treated with antibiotics, serious damage to the heart can be prevented.

In most of the western Pacific region, existing health services are able to dispense long-acting penicillin to those already suffering from rheumatic fever in order to prevent serious relapse and heart damage. But the main obstacles to actually doing it are lack of a clearly defined programme, the lack of free medicine, and lack of public awareness.

Of the many parasites which may damage the heart, the most serious is *Trypanosoma cruzi* which is responsible for Chagas' heart disease. Carlos Chagas, a Brazilian physician, described this condition for the first time in 1909 as being common in central Brazil although the disease had been locally recognized in many regions well before this time.

Chagas' heart disease can be regarded as one of the plagues in several countries of Latin America and there are areas in which as much as half of the population is infected. The parasite is transmitted to man by a biting bug; the acute phase of the illness occurs within two weeks of the entry of the parasite.

Apart from fever and typical signs at the site of entry of the parasite, there may be acute myocarditis (inflammation of the heart muscle) with enlargement of the heart and heart failure. In most cases, this phase passes unrecognized and the first symptoms appear many years later when the damage has been done and the disease has become chronic. Although the heart is the most frequently damaged organ, in some endemic areas, particularly in Argentina and Brazil, characteristic disturbances in the digestive tract are also common.

The basic problem of *chronic* Chagas' heart disease is a disturbance in the conduction system of the electrical impulses which are responsible for the harmonious pumping activity of the heart. Various types of rhythm irregularities and even interruption of impulse conduction and heart block are common, and may lead to stoppage of the heart beat in an apparently healthy subject. In other subjects, damage to the heart muscle is gradual and progressive, sometimes resulting in decreased pumping ability of the heart and enormous dilatation, and ending in heart failure.

There is no specific treatment for Chagas' heart disease. Prevention, however, is possible by interrupting the transmission of the parasite by the proper use of insecticides and especially by the improvement of housing and living conditions. These are vital tasks for the public health authorities in the endemic areas.

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RESULTS OF AN INQUIRY IN SWEDEN

by Gösta Tibblin

Sven Johnsson, a 58 year-year-old machinist, works in the busy port city of Göteborg, Sweden's second largest city. He was raised in a small town several hundred kilometres to the north and came to Göteborg as a young man. Sven's formal education stopped at the age of 14. Both his parents died young, and Sven was forced to go to work before he had completed his secondary school education.

Sven is a heavy smoker. His excessive drinking is the cause of constant domestic difficulties. It has also been responsible for trouble at work.

A few months ago, Sven had a heart attack at the factory and was taken to the hospital. A thorough physical examination showed that his heart was enlarged and that his vital capacity, or lung function, was lower than it should be. He was also suffering from breathlessness and chronic bronchitis. Certain blood lipids, such as serum cholesterol and triglycerides, were higher than normal.

Sven Johnsson is not a real person. He is a composite drawn from a study of cardiovascular patients. The investigation covered 843 men living in Göteborg, which is a good place to do such a study as the population is stable, and accurate records make the statistician's task easier.

Since we already knew that the risk of heart attack increases with age, we chose only middle-aged men born the same year, 1913. When the study began in 1963, none of them had any signs of heart trouble, but by 1971, some 36 had had heart attacks. Their backgrounds disclosed several common denominators, all described in the portrait of Sven Johnsson. Smoking and alcohol problems were risk factors which cropped up most often.

This "Men born in 1913" study, which

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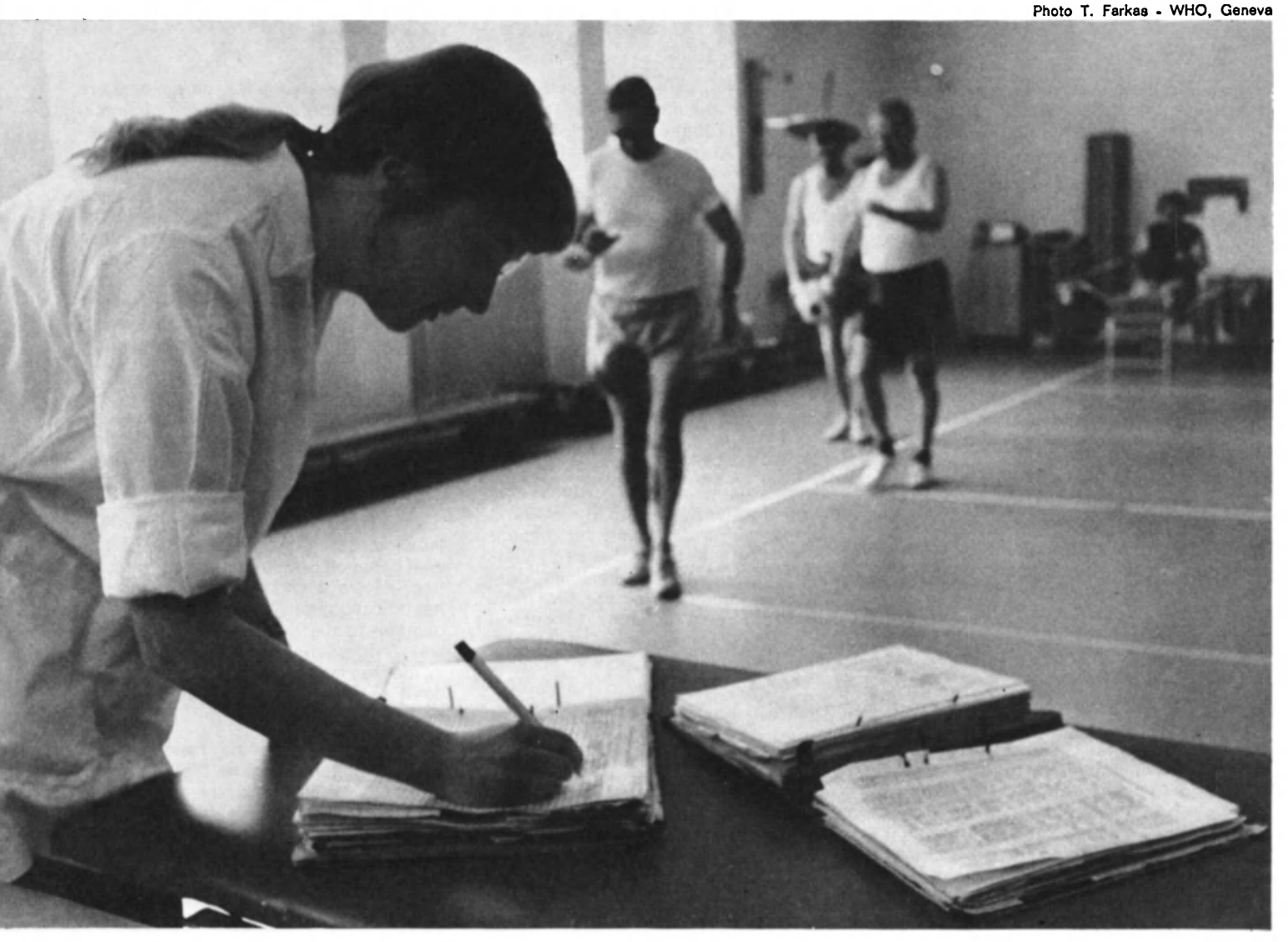
Photo T. Farkas - WHO, Geneva



is continuing, is only part of a large-scale programme for cardiovascular disease control in Göteborg. The second part is an attempt to *prevent* ischaemic or coronary heart disease. Some 10,000 men aged between 45 and 55 were chosen at random to receive preventive treatment. The treatment is designed to reduce three of the risk factors—high cholesterol, high blood-pressure and smoking. Another 20,000 men were selected as controls and given no treatment.

The 10,000 risk factor subjects are treated at the Section of Preventive Cardiology at Sahlgren's Hospital, which serves the whole of Göteborg. The anti-smoking part of the programme is still in the development stage, but after three months of treatment 40 per cent of the participants stopped smoking completely. Those who have difficulty giving up the habit come to information sessions and group meetings. They are sometimes given individual treatment as well. Chewing-gum flavoured with nicotine is sometimes helpful as a physical aid.

Among the patients receiving treatment for hypertension, or high blood-pressure, some drop out after a while. Here again certain common social and emotional factors are present. The patient who drops out has usually discovered only recently that he has hypertension. He has less education than the others, and a lower income.

We have tried to reduce the drop-out rate by developing a special programme for these newly detected cases. It begins with a slide-session and a tape that describes what hypertension is and what can be done about it. General discussion follows, with questions encouraged. Later, the patients are called in at regular intervals for re-examination and follow-up visits, to stimulate attendance for treatment while prevention is still possible. A good physician-patient relationship is important, so we try to make sure that these "doubtful" patients always see the same doctor.

All cases of heart attack and stroke that occur in Göteborg are reported and entered in a register, so by comparing the register with our records we can tell whether these cases have received preventive treatment. In about four or five years, we should learn how much of an influence our preventive efforts have had.

Meanwhile, we are trying to improve after-care for people who already have myocardial infarction. When the programme began in 1967 we discovered that care after patients left hospital was very uneven. Some were receiving intensive and specialized physical training, but others nothing at all. Just as many patients died in the first year after an attack as died in hospital at the time.

Coronary care units using new techniques have greatly increased survival chances for heart attack patients. By giving regular check-ups and supervision *after* their release from hospital, we hope to improve these chances still further.

When we first set up the infarction clinic, we had to limit it to patients under 55 years of age at the time of their attack, but now we cover all those under 67. We leave the actual treatment in hospital to the doctors there, and take over when the patient goes home. Apart from regular physical check-ups, psychological and social factors are of the utmost importance in the recovery phase, and we have to educate the patient's family as well as the patient.

The staff of the infarction clinic includes a psychiatrist and two psychologists. Patients are invited to bring their wives or husbands to discuss their condition. We explain the treatment of complications and point out the risks which could lead to another attack. All these patients were originally smokers. Half of them stop smoking completely a year after they begin treatment.

Nearly 1,000 patients are in follow-up treatment at the infarction clinic. Many of them do supervised exercises which help us to judge the right time for them to return to work. When a patient knows his physical capacity and how he can best make use of it, he gains in reassurance and confidence. Then he can gradually return to an active life, at work and in his leisure hours. The results so far indicate that patients who persevere with physical training lead a healthier life.

Survival rates can be improved if patients know the warning signs of infarction. Many people die suddenly from ischaemic heart disease outside hospital. Most have signs of previous infarction or have had chest symptoms a week before their death. These symptoms should have been recognized as early warning signals. Patients who have had one infarction, and their relatives, must watch out for any recurrence of symptoms so that action can be taken in time.

Hypertension is a frequent early warning sign. Five per cent of the population over 50 are hypertensive. Early recognition of high blood-pressure is the most promising of all preventive aids at our disposal.

A modern health service is expensive and must be efficient. The cardiovascular programme in Göteborg offers a chance to compare costs and benefits of the various forms of care we provide, and to find the answers to many questions. How many intensive coronary care units and infarction out-patient clinics do we need? How many can we afford? What is the value of primary as compared with secondary preventive care? Does health education save lives? When we know these things we shall be able to provide an improved service to heart patients, and give many people a longer lease of life. ■

Göteborg, Sweden's second largest city, has carried out a major study of cardiovascular disease since 1963. At the city's Sahlgren Hospital, some 10,000 men aged between 45 and 55 are given special treatment aimed to reduce three risk factors of heart disease—high cholesterol, high blood pressure and smoking (details in article this page). Left, a physiotherapist at the hospital studies the reactions of heart patients to physical exercise.

DOES HIGH STANDARD OF EQUAL HIGH RATE OF

by Dan Behrman

A high standard of living can mean a high rate of death from heart disease. Not only that, but "labour-saving" occupations are not necessarily life-saving.

These are the conclusions that one is tempted to draw from the recently-published results of a study on how heart attacks strike a county in the southern United States. They shed a glimmer of light on the problem of coronary heart disease—that is, myocardial infarction and angina pectoris—as a companion to highly-developed societies.

The story of the study goes back more than ten years when Dr. Curtis G. Hames, a general practitioner in Evans County, Georgia, observed that his black patients appeared to suffer coronary heart attacks much less frequently than whites, even though Evans County lies in the so-called "coronary belt" of the United States running from Virginia through Georgia.

He was not the first to make such an observation. Other physicians had noted the apparent immunity of blacks to coronaries and had attributed it to racial differences. But Hames' curiosity drove him further.

As he reported in *Archives of Internal Medicine*, recently published by the American Medical Association, it led to a community study of Evans County with support from the American government and the nearby University of North Carolina.

Evans County must be a quiet place, judging from what the *Archives of Internal Medicine* says about it. It lies sixty miles inland from the Atlantic Ocean on a coastal plain of red clay and sandy soil. Pine forests ramble over much of its area (at its greatest diameter, the county measures 19 miles). Not much industry to speak of, there's a sewing factory giving jobs to 500 and another plant that makes... fruitcake.

In 1960, when the study began, the population of Evans County was 6,952 and, by 1970, it had gone up to only 7,290. Obviously a stable community, and a good one for a long-term health study. Two-thirds of the population live in completely rural surroundings. Two-thirds, too, are white and one-third black.

During an 18-month period between 1960 and 1962, every Evans County resident over the age of 40 and half the residents between 15 and 39 were given complete physical examinations, 3,102 in all.

These examinations bore out what Dr. Hames had noticed. Coronary heart disease was a rarity for black men, it hit them only half as often as it did whites. But the study brought out a new factor: whites on the bottom half of the social ladder were not being affected any more than blacks.

Summarizing the findings in the *Archives*, Dr. John C. Cassel, of the University of North Carolina, commented that they could not be attributed to other factors such as blood pressure, blood cholesterol levels, cigarette smoking, body weight or diet.

But the state of a man's heart appeared to be linked to what he did for a living or, in Dr. Cassel's words, "these occupational differences suggested that possibly physical activity exerted a protective effect and that variations in the level of physical activity between the various ethnic and social class groups accounted, *at least in part*, for the difference in their rates."

This looked promising, but not after a first glance at the results of a follow-up study made between 1967 and 1969 covering nearly 99 per cent of those who had been originally examined.

This study showed that vulnerability to coronary heart diseases was now affecting nearly all whites equally. The doctors reasoned that the younger men on the bottom were under greater pressure—in any case, their blood pressure was greater—because they were climbing up.

Yet the difference between blacks and whites persisted during the follow-up study. Was it then a matter of race after all? Researchers looked hard at the figures. They saw that, as Dr. Cassel wrote, "the only circumstance in which white men had as low rates as blacks was when they were both sharecroppers." He added that the only difference between white sharecroppers and other white men was that they had to work a lot harder physically, as hard as black sharecroppers do.

White or black, a sharecropper does a hard day's work. A visitor to one Evans County farm reported that the tenant was up before the sun. He ate a big breakfast—bacon and eggs fried in hot lard (enough to make some people die just at the mere thought of so much animal fat), coffee and bread—then he and his wife went out to work. At seven in the morning, they were caring for some 30,000 baby chickens on the farm.

When they stopped for lunch, they filled up on starches and carbohydrates—a stew of cheap beef, rice and turnip greens. Then back to work until after six, more fats and starches for supper, and an evening around the television set.

The visitor also reported that this sharecropper chews tobacco, takes a drink of whisky from time to time, but never takes a vacation. Yet his chances of developing coronary heart disease after the age of 40 are less than a third as high (31 per 1,000 during the 1960-62 period) as those of a professional man or a top executive earning $20,000 a year, enjoying a three-week vacation, but sitting at a desk all day long. In that bracket, the coronary rate was 96 per 1,000.

The mere virtues of rural living do not explain the difference, for the white farm owner was almost as vulnerable to heart attack as the city executive. Dr. Cassel, the professor, turned to Dr. Hames, the family doctor, for an explanation and this is what he was told.

The men who had been labelled high

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LIVING DYING?

social class, while living in a rural environment were in fact living a very "urban" way of life.

In contrast to their fathers, they were not living by the sun but by the clock; they were commuting to work in small industries, their wives were driving in car pools, and even if they were farm owners, they were no longer private entrepreneurs but "employees" of some larger company.

Further there was some evidence that an increasing proportion of white men in Evans County, even those labelled low social class, were beginning to participate in this 20th-century urban "way of life" as the county was rapidly changing from a rural agrarian to a more industrialized economy.

However, it would be a mistake to take the results of the Evans County study as a plea for poverty (in fact, it isn't—the unemployed, the poorest of all, got more heart attacks than the sharecroppers) or a plea for a high-starch diet.

What it does seem to show is, as Dr. Cassel says, that physical activity is a protection against coronary heart disease, *but only* above some "threshold value" which is exceeded by farmers and particularly sharecroppers, white and black. Physical activity increases the diameter of the blood vessels in the heart and this is a "plausible biological explanation" for its role, state the Evans County researchers.

They are less certain about where this "threshold value" lies, a subject of great controversy in the medical profession. Studies made elsewhere do not settle it. In one factory in a large American city, active workers suffered from coronary heart disease just as much as their sedentary colleagues, even though they were expending over 50 per cent more calories.

In Evans County, the study also showed that social instability seemed to go hand-in-hand with vulnerability to coronaries. In the lowest social classes, men were more likely to get heart attacks if they were moving upward than if they were stable. However, in the higher brackets, it was those up above who seemed to be less in danger.

It may be that in both cases, whether stable on the very top or the very bottom of the social and economic ladder, a man knows exactly where he stands and worries less about where he is going. But that is only a guess... ■

Photo © Gary Renaud-Holmes-Lebel, Paris

DEEP IN THE HEART OF GEORGIA. A farmer in the southern United States where a recently completed 10-year study into the frequency of coronary heart attacks suggests that cardiac health and hard physical work go together, regardless of race.

A daily dozen a day to keep cardiologists away

by Evgeni I. Chazov

A study carried out on men aged from 50 to 59 by the Myasnikov Institute of Cardiology, in Moscow, shows that one man in five suffers from coronary heart disease and nearly one in four has high blood pressure (hypertension).

It also reveals that these diseases now occur more frequently in younger persons. Deaths from cardiovascular diseases in men aged from 35 to 44 have risen sharply, and a serious increase is noted in even younger men.

According to the Myasnikov Institute, which collaborates with the World Health Organization as a cardiovascular research centre, atherosclerotic changes in the vessels of the heart and aorta are also on the increase among younger persons.

This finding is borne out by research at Riga (Latvia) where doctors investigating the deaths of persons between the ages of 30 and 39 who had suffered from atherosclerosis found that on the average 22 per cent of the internal surface of the abdominal aorta was affected by the disease.

This disease, however, becomes far more serious after the age of 40 and complications such as heart attacks and strokes may well occur.

Observations have revealed two important factors: where one lives and how one lives. While 2.2 per cent of workers over the age of 40 in Moscow fall victims to heart attacks, the figure for a comparable group of workers in Ufa, in the southern Urals, is only 0.6 per cent. This suggests that the faster pace and different pattern of life in the capital may increase vulnerability to heart attacks.

Current research in the U.S.S.R. points to the influence of certain environmental factors on the appearance and development of several diseases of the heart. In many rural areas, hypertension is found only half as often as in the towns. In some parts of eastern Siberia, for example, angina pectoris among smokers over the age of 30 was observed in 27 persons out of 1,000, whereas in non-smokers of the same age group the proportion was only 16 per thousand.

In some parts of Uzbekistan, the frequency of coronary heart disease among local people who eat vegetable fats has been compared with that among immigrants who eat mainly animal fats. Among local men over the age of 30, only 3.2 per cent had coronary atherosclerosis; among the immigrants the percentage was 8.8 per cent.

Occupation seems also to play a part in the appearance of coronary disease and heart attacks. Among technical engineering personnel, the rate is twice that of workers whose jobs apparently cause less mental strain. This situation, however, is changing, since nowadays jobs tend to become more and more complex and often lead to increased nervous tension.

The importance of mental factors has been confirmed many times. Among 200,000 workers and employees in Moscow, high blood pressure was found most frequently among workshop engineers, foremen, dispatchers and technicians, of whom 7.2 per cent were affect-

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EVGENI I. CHAZOV *is a corresponding Member of the U.S.S.R. Academy of Medical Sciences. In 1969, he was awarded a State Prize for developing new methods of treatment for coronary heart disease. He is the author of many publications and research studies on the problems of cardiovascular disease. Prof. Chazov, who is 41 years old, is now Deputy Minister of Public Health of the U.S.S.R.*

It is all too easy for the harassed city-dweller to neglect his body, already enduring the stress and pollution of modern industrialized life. The value of moderate physical exercise as a means of preventing heart disease is now widely recognized. Some 50 million people belong to physical culture organizations in the Soviet Union (photo left). Below left, workers at a ship-building yard in Nagasaki, like most other workers in Japan, do their "daily dozen" during working hours. Below right, a "health farm" for women near San Francisco, U.S.A. Exercise is also needed to restore a victim of a heart attack to normal physical activity. Right, patients in an Israeli hospital exercise themselves back to fitness supervised by a physiotherapist.

Photos WHO, Geneva

TIME OUT FOR A HEARTY WORKOUT

Photo Paolo Koch ©, Rapho, Paris

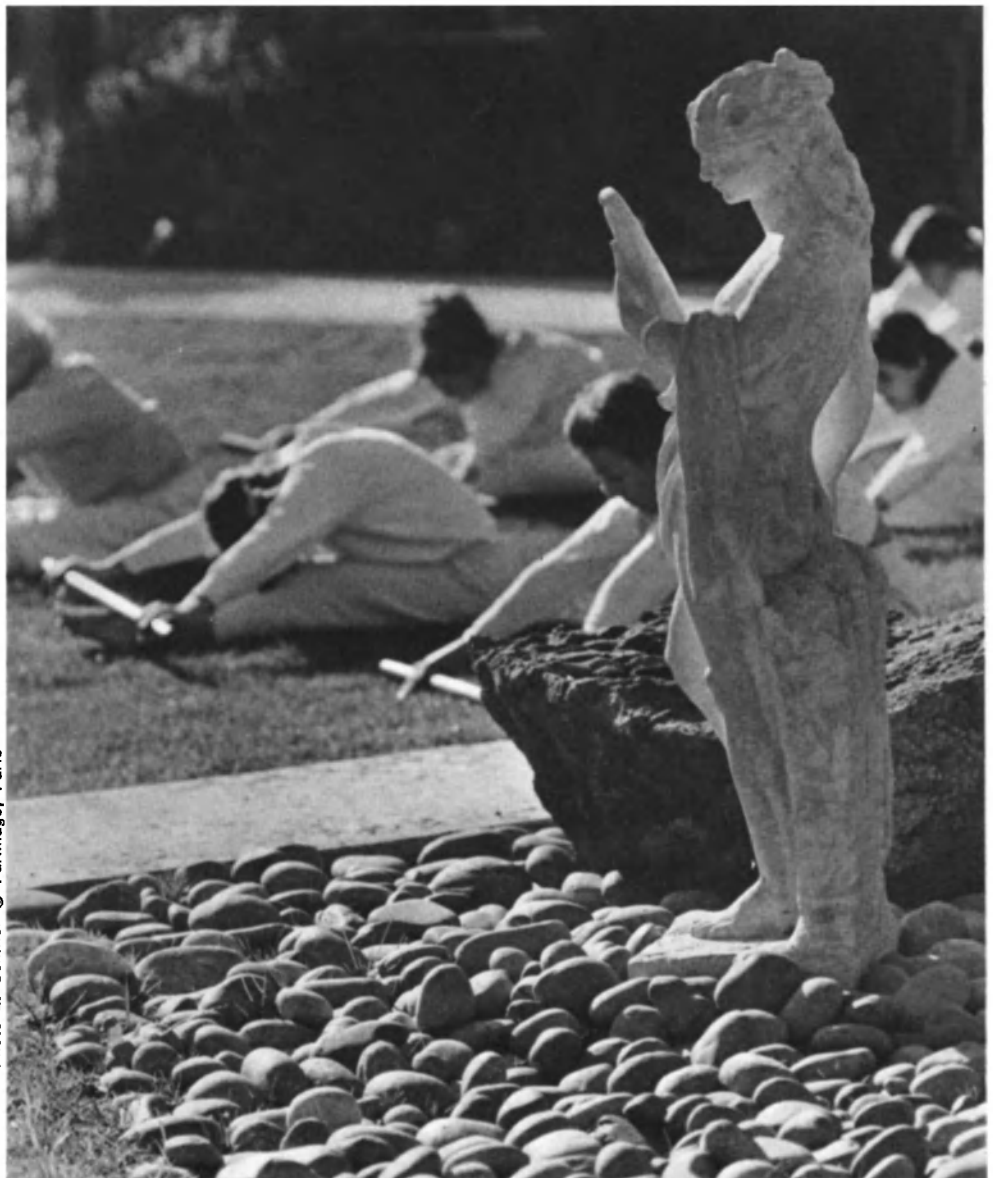

Photo L. Schiller © Parimage, Paris

ed. The next group consisted of engineering constructors, workers in the technical control sectors and accountants, of whom 6.2 per cent were affected.

High blood pressure often occurs among workers exposed to excessive noise, vibrations or other unfavourable conditions. For example, the percentage of cases of high blood pressure was 6.9 among polishers, and 5.7 among electrical fitters. The disease is also common among bus and taxi drivers.

Among women, high blood pressure is frequent among telephonists and telegraphists, who work "under pressure". It is less frequent among women in textile factories.

Studies carried out in eastern Siberia, where very strong liquor is drunk, and in Georgia, where dry wines are mainly consumed, have shown no relationship between the occurrence of coronary atherosclerosis or ischaemic heart disease and the consumption of alcohol, although alcohol undoubtedly plays a part in the appearance of cardiac insufficiency.

The tendency to have heart attacks at an earlier age is found in many countries. The explanation may be that atherosclerosis of the coronary arteries starts to develop nowadays much earlier. This, in turn relates to a number of factors: reduced physical activity, dietary changes and greater emotional strain brought about by technological development and the frantic tempo of modern life.

The part played by stress in heart attacks is particularly obvious. At the Myasnikov Institute of Cardiology, we studied the events that led up to the heart attack in many of our patients. The attack was immediately preceded in 20.5 per cent of cases by an acute emotional shock; in 35 per cent by a state of emotional tension lasting several days; in 30 per cent by prolonged overwork; but in only 4.5 per cent by a physical effort.

Preventive measures go beyond the purely medical framework and are very largely social in character. The U.S.S.R. has a large network of treatment centres, spas and rest homes, organizations for physical culture and travel associations. Special attention is also given to the improvement of environmental health, the promotion of balanced diets and similar measures.

Physical culture organizations have a membership of some 50 million, including not only young people, but many of middle and even advanced age. Some eight million persons come to State centres for rest, preventive examinations and treatment.

Another institution which plays an important part is the preventorium in industry. For a month or a month and a half, manual and office workers may spend time there after work under the supervision of doctors who test their blood pressure, carry out laboratory analyses and prescribe treatment, diets or gymnastics.

In this way, preventive therapy—gymnastics, the improvement of sleeping habits or of diet—can be carried out without the worker having to interrupt his job. There are many such preventoriums in the U.S.S.R.; at present they have over 100,000 beds.

We are very much against the sort of life in which the individual, after an eight-hour working day, takes refuge in trashy books, or stretches out on a sofa in front of the television set, or sits drinking with friends.

A passive, sedentary life, totally lacking in any creative effort, in physical activity or intellectual stimulation, is at the origin of disturbances in the metabolism of fats and carbohydrates, and leads to further disturbances in the nervous system. In this way, conditions are created for the development of atherosclerosis, coronary insufficiency and vascular spasms.

Sleeping long enough is another important point. Sleep should be part of a well-regulated life, and not the result of taking sleeping pills.

We attach great importance to human relationships, to character formation, and to education in the widest sense of the term. The spirit of comradeship, tact, discretion, self-control and respect for others are not merely moral obligations, but are fundamental for the education of a healthy generation. They are also important in the prevention of cardiovascular diseases.

Education in this sense should start at school. It is important that children should be taught to master their emotions.

In the prevention of heart diseases, an important role can be played by health education, and special scientific research institutes have been created in the U.S.S.R. for this purpose.

In conclusion, a word about heart transplantations. It is obvious that such operations illustrate the remarkable possibilities of modern medicine. Yet there is no doubt that heart transplants cannot provide any broad solution to the problem of cardiovascular diseases.

Frankly, I believe that the search for methods to prevent atherosclerosis, heart attacks or high blood pressure offer greater promise than 100 or even 1,000 brilliantly successful heart transplants. ■

Your heart in the year 1990

by George Teeling-Smith
Director of the Office
of Health Economics, London

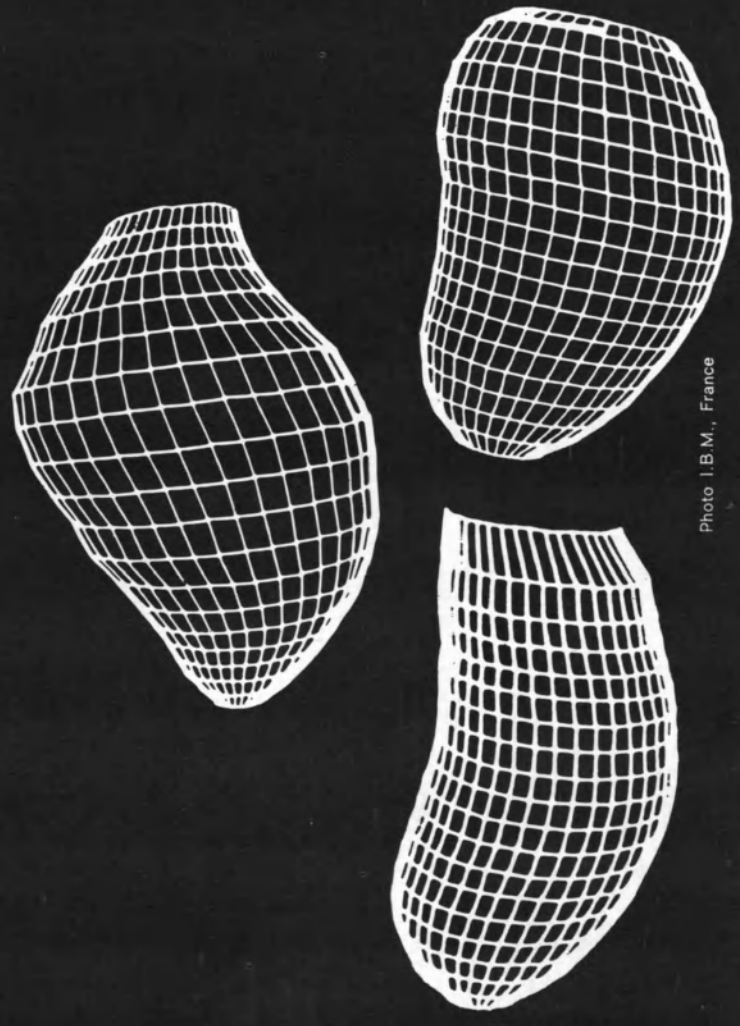

Photo I.B.M., France

VISUAL 'STETHOSCOPE'

By linking an X-Ray machine with a computer, American medical research workers have devised a new, experimental diagnostic tool that will enable doctors to "see" a patient's heart-beat. The X-Rays pick up the traces of a special contrast fluid previously injected into the heart and the computer re-constitutes a visual image (above) of the heart in each stage of contraction.

We present below a forecast on heart disease and vascular diseases in the 1990s—their prevention, diagnosis and treatment. The forecast is adapted from a broad analysis produced by the Office of Health Economics in London. The full study, carried out under the supervision of its Director, George Teeling-Smith, ranges over many branches of medicine from allergic disorders and cancer to mental illness and virus infections. On page 30, the Soviet cardiologist, Prof. Igor Shkhvatsabaya, Director of the Myasnikov Cardiological Institute, in Moscow, comments on these forecasts.

Coronary heart disease

By 1990, the possibility of preventing coronary heart disease by most of the currently mooted methods will at least have been thoroughly explored.

BLOOD LIPIDS (fats). The effectiveness of one important cholesterol-lowering medicine will be known by 1975. A definitive answer concerning the benefits to be obtained from dietary changes affecting blood lipids will not be available before 1980, if then. There is a very strong and fairly general expectation that lower blood lipid levels are more likely to be achieved by medicines than by dietary changes. By 1975, we should have medicines to decrease the body's absorption or synthesis of lipoproteins. Whatever means of affecting blood lipids is adopted, a screening process, probably including young adults and children, will identify those with abnormal blood levels.

HIGH BLOOD PRESSURE. The results of various trials will soon result in routine screening being offered. By 1980, people will probably be given a blood pressure screening every year, possibly even by self-measurement. Safe and effective medicines for the control of a high blood pressure will be available, perhaps given in fixed-dose regimens.

Some five to ten per cent of the middle-aged men screened will be found to need lipid control; some two per cent of middle-aged and old people screened will need control of blood pressure. It is estimated, however, that only 50 per cent of those needing such controls will adopt and persevere with treatment. In addition, some 25 per cent of persons who have had an attack of coronary heart disease will receive treatment aimed at reducing blood lipid levels.

DIABETES. The association of diabetes with coronary heart disease (and with strokes and disease of the limb arteries) is already established, and by 1975, trials will have proved the value of anti-diabetic treatment in preventing the occurrence of these diseases in borderline diabetics. Once such proof is available, then, as with high blood lipid levels and a raised blood pressure, widespread preventive measures will be undertaken.

OBESITY. The treatment of obesity is already regarded as a medical task, and medicines which effectively "burn off" excess calories without other undesirable side effects should soon be available. This approach is more likely to be effective than educational measures to improve dietary habits.

CIGARETTE SMOKING. Present evidence incriminating cigarette smoking will be stronger by 1975 and, by 1990, cigarette consumption, at least in high-risk subjects, may be only 50 per cent of present levels.

OTHER RISK FACTORS. Other known or suggested risk factors include lack of exercise, an inherited tendency to the disease, and stress; these may be less amenable to control. To combat stress there may be ways of controlling the heart action, when necessary, so that emotional overloading does not occur.

EARLY TREATMENT. In order to combat the very high mortality in the first hour after coronary thrombosis, a form of treatment may be developed that could be used immediately the patient is seen by his family doctor, or possibly even by the patient himself as soon as he had a symptom suggesting an attack. This would give protection for some hours against the dangerous disturbances of the heart's rhythm that commonly occur in this condition. If the patient is to be able to apply the treatment himself, it would have to be extremely safe, since it would often be mistakenly used for minor conditions.

CONTROL OF SHOCK. Better blood plasma substitutes and better pharmaceutical control of shock will also help in the treatment of the disease once it has gained a footing, as will electrical pacing of the heart. These advances will come mostly from the experience gained in intensive coronary care units which will continue for some years but which may, if safe efficient therapy can be derived, be a passing phase.

ANGINA PECTORIS (a condition allied in various ways to coronary thrombosis). More effective, long-acting preparations, which might improve the blood supply to the heart muscle, and medicines designed to prevent anginal attacks while not depressing the heart muscle will both be developed by 1975.

NEW MEDICINES FORECAST. By 1975, new medicines should be available to increase the blood's ability to dissolve the fibrin of blood clots. On the other hand, there is probably a less promising future for anti-coagulant medicines. Other new medicines forecast include some that will increase the strength of contraction of the heart muscle while not affecting the heart's rhythm adversely, and new diuretics (medicines that stimulate urination) suitable for cases resistant to present diuretics or less liable to cause a loss of potassium from the body. Myocardial infarction will probably be treated by direct injection through the skin into the heart of tissue culture extracts containing capillary vessel buds and growth-stimulating substances making revascularization surgery unnecessary.

SURGERY. In a small proportion of the very large number of cases surgery will still be needed. Artificial hearts should be perfected by 1990 and may replace human and animal transplants because of availability. Some experts believe that pig hearts will be increasingly used for heart transplantation, the specially bred pigs being "immunized" beforehand against a rejection of their hearts by the human recipients.

PREDICTION AND PREVENTION. By 1990, it should be possible to predict which people are going to have an attack of coronary thrombosis within a matter of days and to minimize their chances of dying from a sudden disturbance of heart action. Great advances should be made in cardiological diagnosis. This should make it possible to carry out automated predictive studies, for example at three-monthly intervals. These could indicate whether the heart was performing easily or haltingly. Even if this particular approach does not prove successful, it should bring benefits by re-orienting the medical profession to a predictive approach to heart disease. There is disagreement as to the effect of the various preventive measures on the incidence and mortality of coronary heart disease; the forecasts range from "an important fall" to no very marked change in the national coronary mortality rate despite all the methods of prevention adopted.

Vascular diseases

The problems of vascular disease are in many ways similar to those of heart disease.

HYPERTENSION. Substantial progress cannot be expected until there is a better understanding of the underlying mechanisms of vascular changes and the causes of hypertension (high blood pressure). This is likely to come within ten years. It should then be possible to use naturally occurring hypotensive agents to control hypertension. Immediate advances in vas-

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cular diseases will depend on better peripheral vascular diagnostic procedures, probably based on ultra-sonic techniques.

TRACE ELEMENTS. Another possible form of progress will be the identification of trace metals and other "micro-nutrients" whose absence may be responsible for vascular damage. Once these are identified, and tests have been developed to indicate their presence, replacement therapy should be possible for individuals in whom they are lacking. This may be available by 1975 or 1980. A better understanding of the general aging process and its effect on the blood vessels should be achieved by 1990.

ENVIRONMENTAL FACTORS. It is also likely that other environmental causative agents will be identified and (as with smoking at present) the challenge will be to change national habits to reduce exposure to such causes.

SURGERY. In the immediate future, surgical techniques will improve, and lasers, for instance, will be used to burn away diseased tissue. The next step forward will be in the field of vascular replacement, first with grafts from humans and then with grafts from animal banks and finally with grafts from tissue culture extracts such as chick-embryo growth extract mixed with vascular buds which will be developed from a small piece of specially treated patient's tissue.

THROMBOSIS. Early in the 1970s, "thrombo-prophylaxis" should be possible by separating anti-thrombotic and anti-coagulant properties. Specific fibrin-dissolving enzymes should be available to prevent thrombus (blood clot) formation.

HIGH-RISK SUBJECTS. There will remain the problem of identifying high-risk individuals and pre-symptomatic cases and getting social acceptance for large-scale preventive medication in these individuals. This need for early identification of vascular or blood changes is particularly important, first because many acute bouts of vascular disease are rapidly fatal and second because the changes which have occurred by the time symptoms appear are often irreversible. Specifically, the brain damage caused by a vascular catastrophe will still be untreatable by 1990.

Conclusion

The pessimistic view is that the conquest of many diseases of middle-age (and particularly coronary heart disease) will leave growing numbers to suffer in old age from progressively destructive vascular disorders and deterioration of their nervous system. The more optimistic view is that despite the great difficulties the causes of vascular disorders also will be understood, and that the medical profession and the public will accept the consequent implications of early diagnosis and long-term therapy for those at risk. In this way vascular diseases could be effectively controlled by the 1990s. ■

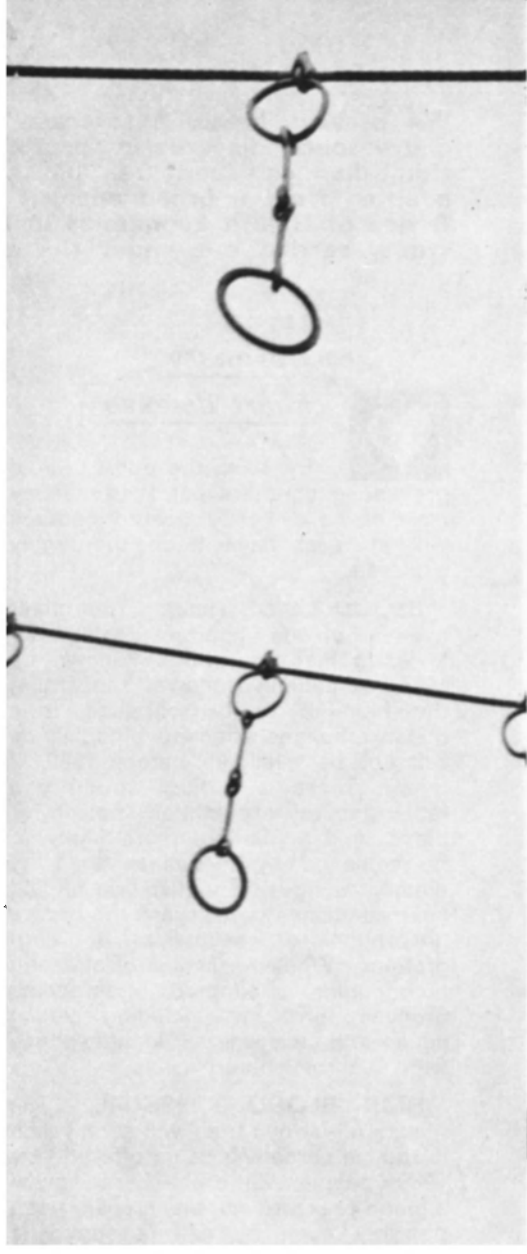


Photo Nobuyuki Masaki © Parimage, Paris

OUNCES OF PREVENTION BY THE 21st CENTURY

by
Igor K. Shkhvatsabaya
Director of the Myasnikov Institute of Cardiology, Moscow

One must obviously agree with the experts' conclusion that methods for preventing heart disease will have been thoroughly explored before the end of the century, and that by 1975, or thereabouts, the pharmaceutical industry will be producing medicines to lower the proportion of cholesterol in the blood.

Yet to my mind the experts seem to have picked out isolated facts from a series of different discoveries, grouped them—somewhat arbitrarily, it seems to me—and then tried to sketch in, on that basis, an overall picture of all future trends in cardiology.

It seems likely, for instance, that predictions about the use of grafts from animals (heterografts) in human heart-transplant operations will prove to be unrealistic, though this does not apply to partial transplants.

The experts' forecasts on smoking also seem to me somewhat questionable.

A question worth examining is why cardiovascular diseases are now the leading cause of death in the world, after having ousted cancer from that unenviable position.

While there can be no simple answer to this question, one thing is obvious: the heart occupies a unique place and function in the body. It is the focal point of stress from many forces. It reacts to the slightest change in the body's environment and is extremely sensitive to every occurrence in daily life. Doctors accordingly find it hard to master the problems of heart disease.

In recent years, heart diseases have "grown younger", as shown by the increasing number of cases among young persons. Changes in our way of life or improvements in diagnostics

are not alone a sufficient explanation of this. Heart diseases are the result of a whole series of influences acting on man's organism.

Past experience has convinced cardiologists that there is a very close relationship between high blood pressure (hypertension), deterioration within the blood vessels (atherosclerosis), and damage to the heart due to a faulty supply of blood to the heart muscles (ischaemic disease). These processes are interconnected and influence each other.

Hypertension actively provokes atherosclerosis. Increased blood pressure can lead to a heart attack. And atherosclerosis may trigger the development of hypertension.

This implies that by treating one ailment we can affect the development of another. It took cardiologists a great deal of time and effort to reach this simple conclusion. Yet this "systems approach" is a vital factor in forecasts concerning cardiovascular diseases.

So before turning to prospects in the fight against heart disease, I would like to say a word on hypertension and its treatment in the future. I think that by 1975 we shall be able to stabilize the pathological process of high blood pressure in many, if not all cases. We can expect that two or three years after such stabilization has been achieved, people suffering from this disease will find that their capacity to work has greatly improved. There will be less need for hospital treatment, and far fewer complications and fatal cases.

Forecasts offer even more hope to people afflicted by the disease in its early stages. Between five and seven years from now, it seems likely that medicine, through a combination of treatment and advice, will be able to help innumerable victims of heart ailments by bringing about a "recession" of the disease and in some cases curing it completely.

Over the next ten years doctors will be able to fight "pre-disease" more effectively; that is, they will eliminate conditions leading to hypertension. Fifteen years ago this hardly seemed possible. During the second half of the 1950s medicine was only taking its first steps towards an understanding of the way arterial hypertension appears, and how it evolves.

New discoveries about the origin and development of hypertension have been made during the past ten years, and fairly effective forms of treatment have been developed. Doctors now dispose of a varied arsenal of medicines which have a very important selective effect on the crucial links in the progress of the disease.

Medical treatment is six to eight times more effective nowadays than

CONTINUED NEXT PAGE

it used to be, and the life expectancy of patients has almost doubled. During the next ten years we shall be able to apply more new methods, with mathematical models and computers playing an important rôle.

In the more distant future, cybernetic systems will be more widely applied to safeguard public health. They will enable health checks to be made on a massive scale—not only among existing heart patients but also for those who are prone to heart disease. This means that by about 1990, "risk factors" will have been reduced to a minimum. In some cases they are likely to be completely eliminated and in others their effects will be reduced.

One has to admit that atherosclerosis is still an extremely serious problem and, in my opinion, the situation will not change for some time to come. Indeed, medicine will need to concentrate much of its effort in the future on the fight against atherosclerosis; the disease becomes more acute and occurs more frequently with advancing age, and every year the number of persons reaching the 55-60 age group is increasing.

As is often the case in science, the most urgent problem is also the hardest one to solve. Yet the outlook today is encouraging as is shown by the methods of diagnosis now in use and based on specially designed instruments and bio-chemical techniques

Furthermore, medicines are now available for correcting the faulty metabolic processes that lead to atherosclerosis. Doctors are able to reduce fairly effectively the amount of cholesterol and other fatty substances in the blood. They can also correct deteriorations in the exchange processes of substances such as carbohydrates and albumen, and they can restore the correct degree of permeability to the blood vessel walls.

Given the present pace of technical progress and recent advances in pharmacology, we should be winning the fight against atherosclerosis by about 1985 or 1990. But this will require an enormous effort.

We can be even more hopeful and optimistic as regards the problems of defective coronary arteries and heart attacks. A few years after World War II, these diseases increased considerably in the Soviet Union. It is now clear that great progress has been made during the past five to seven years.

Deaths have fallen by almost half and complications have also decreased. Statistics show that some 80 per cent of all patients can resume an active life during the first year after the disease began. This should surely encourage us to be optimistic about the future.

By about 1980 the situation will improve considerably. The most important task is to find effective ways of foreseeing and preventing heart attacks. Statistics compiled by the Institute of Cardiology of the U.S.S.R. Academy of Medical Sciences show a sharp reduction in cases of recurrent heart attacks among patients who have been under medical observation for three years. The number of working days lost has been nearly halved and

GEOGRAPHY OF HEART DISEASE *(Continued from page 21)*

At a meeting of the British Cardiac Society held in Oxford in 1946, Drs. Bedford and Konstam described a most unusual form of heart failure in African troops serving in Asia. The soldiers were mostly from West Africa, their average age was 20-30 years.

They were all cases of heart failure and were found to have greatly enlarged hearts. Seventeen of forty patients under observations died and came to autopsy. The description of these hearts stimulated widespread interest in unusual forms of heart disease in the tropics.

In the more common forms of heart disease, the heart's function is impaired by damaged valves, or by an increased load on the heart due to hypertension or disease of the coronary arteries. There are, however, disorders in which the main feature is a disease of the heart muscle itself; these conditions are now widely known by the collective term "cardiomyopathies". Many of the hearts described by Drs. Bedford and Konstam were of this kind, and subsequent reports have contributed greatly to the recognition of heart-muscle disease in the rest of the world.

In the more affluent societies, a diseased heart muscle usually goes with poor blood supply, and the true cardiomyopathies have only recently been sorted out from the coronary heart diseases. Damage to the heart muscle may be produced by a wide variety of agents, some infective, some toxic, and even by nutritional deficiencies, hormonal upsets and metabolic disorders. Frequently, however, the cause of the damaged heart muscle is uncertain or unknown.

Apart from alcohol, certain food additives and preservatives are now known to damage the heart muscle cells. Outbreaks of cardiomyopathies with high mortality have occurred recently in heavy beer drinkers in Canada. The beer had been treated with cobalt and papain; such unforeseen cardiac accidents are a warning of our need for a deeper knowledge of the normal mechanisms of the heart muscle cells.

In comparison with the incidence of rheumatic heart disease or arterial hypertension, the cardiomyopathies occur with relative infrequency, although in some areas they are of considerable importance. In Ibadan, Nigeria, and among the African population of Johannesburg, South Africa, about one-third of the patients with clinical heart disease are considered to have heart muscle disease, while in Kampala, Uganda, only about 10 per cent are included in this category.

At autopsy examination, about 4 per cent of hearts in Kampala, Jamaica and Japan have this form of cardiomyopathy, while in Cali, Colombia, it runs as high as 12 per cent. Studies in many parts of Africa, in South America and in southeast Asia all indicate that unexplained enlarged hearts are a significant health problem; reports from Jamaica also point to a high prevalence of cardiac enlargement which is not due to coronary artery disease.

Endomyocardial fibrosis (EMF), in which a fibrous thickening constricts the cavities of the heart, particularly the ventricles, is a tropical cardiomyopathy in the true sense of the term; its occurrence as an endemic problem is confined to the tropical parts of the world.

The disease has been intensively studied in Nigeria, Uganda and other countries within the tropical belt of the African continent, and in southern India, Ceylon, Malaysia, Brazil and Colombia. The occurrence of EMF in Europeans who have lived for long periods in West Africa and the very occasional report of EMF in subjects who have never lived in or visited the tropics are important clues whose meaning has not yet by any means been grasped.

The disease apparently begins in childhood but by the time a diagnosis is made, heart damage is usually already serious and the patient is in a state of heart failure. Predominantly a disease of children and young adults, it is found in all age groups. There is no specific treatment beyond the general management of heart failure and, as the cause is unknown, prevention is not yet possible.

deaths have also considerably decreased. Thus a heart attack with its related complications is not necessary fatal.

The most frequent cause of sudden death is a serious disturbance of the heart rhythm in the form of a rapid twitching of the heart muscle cells, when the contractions of the heart virtually cease, thus arresting the pumping action which causes the blood to circulate.

Though at this point a state of clinical death occurs, this can be reversed if the disturbance in the heart rhythm is eliminated in time with the aid of an electrical defibrillator. Most ambulances, hospitals, clinics and health centres are now equipped with this apparatus. By 1980 (or by 1985 according to more cautious estimates) deaths from disturbances of the heart's rhythm during a heart attack will be exceptional.

Let us hope that in the 21st century, cardiology will become simply a branch of preventive medicine. ■

Igor K. Shkhvatsabaya

In many ways, EMF appears to have a natural history similar to that of rheumatic heart disease. Studies in Kampala have also demonstrated a very significant concurrence of EMF and rheumatic heart disease in patients on whom autopsies have been made. This has lead to the hypothesis that EMF may be a disorder similar to rheumatic heart disease, another hypersensitivity disorder of the heart. Streptococcus, filariasis and malaria may also be factors in the development of this disease.

There is a scientific philosophy according to which many problems of the highly developed world can best be solved away from the complexity and confusion of modern industrial societies; it may be as important to study communities apparently free from a disorder as those in which almost everyone is prone to it.

As the preceding examples have shown, there may be something in the African or Asian diet, or way of life, which has some protective influence against the major killing heart diseases of Europe and North America.

If the factor lacking in the one or present in the other proves to be decisive, then ways of preventing some common causes of death will be found. This type of comparative study is a way in which mankind can make use of its diversity for the common good. ■

A. G. Shaper and Zdenek Fejfar

UNESCO NEWSROOM

Books for All

A big effort for International Book Year is being made in Switzerland where this poster, bearing the Year's symbol and its slogan "Books for All", is used to announce Book Year events. The poster was produced by the Swiss National Commission for Unesco and the Press and Information Division of the Swiss Booksellers and Publishers Organization.

BOOKSHELF

RECENT UNESCO BOOKS

■ **Looking at Unesco.** A booklet for the general public, 1971, 107 pp.

■ **The Performing Arts in Asia,** edited and with introductions by James R. Brandon, 1971, 168 pp (90p, $3).

■ **Cultural Policy in Yugoslavia,** by Stevan Majstorovic, (Studies and documents on cultural policies) 1972, 81 pp (60p, $2)

■ **The Theory and Practice of Programmed Instruction,** by Jerry Pocztar. A guide for teachers (monographs on education series), 1972, 179 pp (£1.20, $4)

UNICEF CHILDREN'S BOOKS

■ **Shaer of Afghanistan** by Judith Spiegelman, photos by Jack Ling, 1969 ($3.50)

■ **Ketut, Boy Woodcarver of Bali,** by Judith Spiegelman, photos by Mallica Vajrathon and Henky Pantoc, 1971 ($3.95)

■ **Dayapala of Ceylon,** by Judith Spiegelman, photos by Hector Sumathipala and Gamini Jayasinghe, 1970 ($3.95)

■ **Two Brothers of Peru,** by Jack Ling and Judith Spiegelman, 1969 ($3.50)

■ **Galong, River Boy of Thailand,** by Judith Spiegelman, photos by Mallica Vajrathon, 1970 ($3.95)

■ **Ali of Turkey,** by Judith Spiegelman, photos by Levent Bimen, 1969 ($3.50)

Unicef children's books are published by Julian Messner, New York, a division of Simon Schuster, Inc.

Drug-taking 'epidemic'

Drug abuse in many countries has reached almost epidemic proportions and is a danger to health and society, says the International Narcotics Control Board in its recent annual report. In a special warning about cannabis ("a serious and growing danger in many countries") the report says that research shows that the effects of cannabis consumption include "variation in perception of time and space, disinhibition, dulling of attention, fragmentation of thought and an altered sense of identity."

Protecting our cultural treasures

Proposals for an international convention to safeguard the world's cultural and natural heritage will be made to Unesco's General Conference when it meets in October 1972. The measures proposed will set international standards for the protection of monuments, groups of buildings and natural sites and will outline national plans for safeguarding cultural property.

Computerized museums

Local museums may soon be able to call up on a screen images of exhibits in museums all over the world, according to the Unesco quarterly "Museum". In a special issue (Vol XXIII, No 1), the magazine describes experiments in the Fed. Rep. of Germany, U.S.A., France, U.K. and Sweden aimed at setting up central banks of museum data, first on a national scale, then expanding to form a world network.

$340 million food aid target

With demands for food aid outstripping its resources, the World Food Programme has set a budget target of $340 million for 1973-74—$40 million more than in 1971-72. Since it was set up in 1963, the U.N.-FAO World Food Programme has approved over 500 food aid projects in 84 countries, costing over $1,077 million, and has undertaken 144 emergency operations in 70 countries, at a cost of $107 million.

Flashes

■ *Three new states—Bahrain, Qatar and Oman—recently joined Unesco, bringing its membership to 128.*

■ *The first regional conference of Ministers of Culture from European countries will be held at Helsinki (Finland) in June 1972.*

■ *The World's medical schools have increased from 682 to 918 in the past ten years, reports WHO. Of the 236 new schools, Brazil has opened 53, India, 40, and U.S.A., 21.*

■ *The number of young people studying abroad rose 300 per cent between 1950 and 1968, when 430,000 students were taking full-time courses in other countries, according to the recent Unesco study, "Statistics of Students Abroad".*

Letters to the Editor

THE FIRST HOSPITALS

Sir,

Your issue devoted to Iran (Oct. 1971) featured an article entitled "The Scientific Legacy of Iran", by Desmond Stewart, a British authority on Asian cultures.

It says that one of the greatest legacies left by the Persians in the field of medicine is their conception of hospitals. This statement is not entirely correct. H.G. Wells, in *The Outline of History*, states that Asoka, Indian Buddhist Emperor, built hospitals both for man and animals in the 3rd century. There were courses in medicine in Buddhist centres of learning and the personal physician of the 4th century, patricidal King Ajasatta of Magadha (North India) sent him for higher studies in medicine to the Wickremasela Buddhist University in Ghandara (N.W. India).

Hospitals existed in Ceylon in the 3rd century B.C., and Buddhist temple walls in Ceylon proudly depict a 2nd-century Singhalese physician-king operating on an ulcer of a poisonous snake, after anaesthetizing it. These facts are recorded in the *Maha-wansa* — the great Chronicle of Ceylon.

Therefore the earliest concept of hospitals may be the product of both Persian and Indo-Ceylonese influences, or the latter may have preceded the former as the incipient concept of hospitals may be due to Buddhistic inspiration, for the Buddha (6th century B.C.), while nursing a sick monk, called on his followers thus: "He who nurseth the sick nurseth me". This is said to have influenced Buddhist kings to build hospitals in Buddhist Asia from the 3rd century B.C.

Dr. Buddhadasa P. Kirthisinghe,
Maha Bodhi Society of India and the World Fellowship of Buddhists
New York, U.S.A.

Desmond Stewart's reply: *"The modern hospital is the lineal descendant," I wrote, "of the Islamic 'maristan', seen by Crusaders in the Holy Land and visitors to Egypt. It derived from Persia." If I say that the present Queen of England is the lineal descendant of Queen Victoria, this does not mean that other ancestors may not include Charles I and even William the Conqueror! Of course the Persians did not invent medicine, and I nowhere said that.*

Besides the Buddhist heritage there are two other ancestors of great importance: Pharaonic Egypt, where operations on the skull were carried out in very ancient times, and Pergamum in what is now Turkey. (I visited the great Aesculapium there some years back and was in particular struck by a room in which mentally sick patients were put at night and then whispered to down whispering shafts: an interesting anticipation of Aldous Huxley's hypnopaedia.)

But the Europeans were unable to contemplate the Aesculapium, the hospitals of Asoka or the clinics of the Pharaohs. What they did see were Islamic "maristans", derived from Persia. Those "maristans" undoubtedly derived in part from Buddhist India and Ceylon. I made the point elsewhere in my essay that the Persians of the period in question were in touch with Indian thought. They knew Sanskrit.

Persia's great contributions were very much due to her position at the crossroads between the west and the very creative east.

REALITIES OF APARTHEID

Sir,

In my view, the "Unesco Courier" should not have published the extracts from South Africa's apartheid laws ("Inequality before the law in South Africa") in its Nov. 1971 issue. Why not give the people of South Africa time to change things, instead of publishing in your columns a text so far removed from reality, for example, as paragraph 3 of the section on Education: "A white man who spends a few hours each week in his own home teaching his African servants to read is guilty of a criminal offence."

Ronald Jakobitz
Basel, Switzerland

We can assure our correspondent of the reality of the texts we published, taken without exception from laws still in existence in South Africa. The example quoted is from section 9 of the Bantu Education Act, No 47, of 1953—Editor.

THE FIG-TREE OF THE RUINS

Sir,

Your colour photo "The fig-tree of the ruins reigns supreme at Angkor" ("SOS Angkor", Dec. 1971) moved me to write the following:

How often repeated are destruction and [waste,
While footsteps are echoing so softly in [space,
Echoing footsteps in the process of time
Are a message to seekers of archaolo-[gical finds.
Each echo so silent, yet whispering the [way,
Each empty footstep professing its day.
In the absence of present—to the future [of now,
Are recordings of movements and [moments outgrown,
Sounds mocked by seasons of mutilated [time,
Evidence smothered by centuries of grime.
How often repeated are destruction and [waste,
While footsteps are echoing so softly in [space.

S.E. Persinger
Davenport, Iowa, U.S.A.

RIDDLES OF MALTA'S PREHISTORY

Sir,

I was pleased to see the article on the "Venus figures" of Malta (Feb. 1972 issue). The photographs are magnificent, but the text reproduces an account which is no longer accepted by most prehistorians and I feel that your readers are entitled to up-to-date information. Most of the new information is derived from the excavations conducted by Dr. David Trump at the site of Skorba; it affects our understanding of both the culture sequence and the absolute chronology of Maltese prehistory.

The culture sequence. The excavation at Skorba established stratigraphically that the Zebbug phase was earlier than the Mgarr phase and not later, as had formerly been thought. It also produced evidence for two previously unknown phases between Ghar Dalam and Zebbug, which Dr. Trump has called Grey Skorba and Red Skorba.

Absolute chronology. There is some confusion in the article about the absolute chronology of the Maltese sequence. In fact this has been fairly well established by a series of ten C14 (radiocarbon) dates—seven from Skorba, one from Mgarr and two from Tarxien—of which eight form a consistent sequence and two are anomalous.

The C14 chronology suggests that the first phase (Ghar Dalam) should be dated c.4200-3800 B.C. (not 2500-2100 B.C., as quoted by Mr. Almasy) and in fact the latest phase of the temple period (Tarxien) has a date c.2400 B.C. Moreover, even this chronology now seems too short, since recent work has shown that the C14 time scale diverges from the real time scale (calculated by counting the tree-rings of the enormously long-lived bristlecone pine, *Pinus Aristata*) by varying amounts at different periods. A calibration scale has been prepared for C14 dates back to c.4500 B.C., so it is possible to calculate approximately the real date in calendar years represented by C14 dates within this range.

The result for the Maltese sequence is startling: the first settlers seem to have arrived c.5000 B.C. and the temple building period was probably over before c.2500 B.C. In the light of this chronology, the Maltese temple culture appears not simply a remarkable development, but also an astonishingly precocious one.

Ruth D. Whitehouse
London, U.K.

RACE AND I.Q.

Sir,

I have just finished reading Prof. Klineberg's article "Race and I.Q." in the *Unesco Courier* (Nov. 1971). It is a good piece, intelligently written and soundly based. I like it better than some of the recent writings on the same subject in other periodicals. I notice that the article contains examples from a number of peoples on this troubled earth of ours, but none about the Chinese, Koreans, Japanese, Indians, Ceylonese, etc. Has no research been done by their scientists?

L. Carrington Goodrich
Professor Emeritus of Chinese
Columbia University, U.S.A.

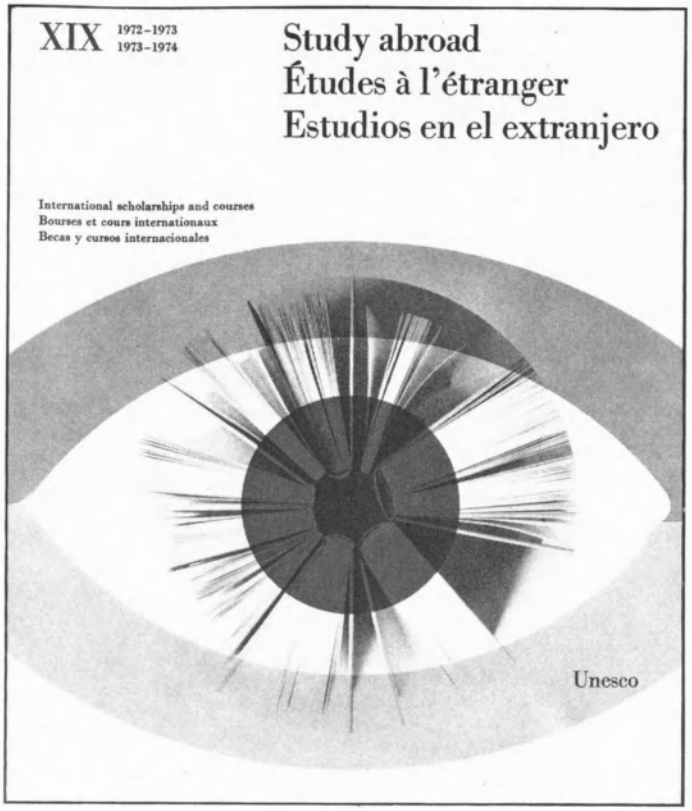
ANYTHING GOES

Sir,

The modern cultural climate seems not only to accept everything uncritically, but to offer sometimes very high rewards to the mediocre. Music and singing seem, more than any other of the art forms, to be accepted without criticism. Singers with no voice, mouthing meaningless lyrics receive the adulation due to the trained singer of real talent.

Horst Senftleben
Bremen, Fed. Rep. of Germany

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE. — Dépôt légal. 1er Trimestre 1972. - C 1



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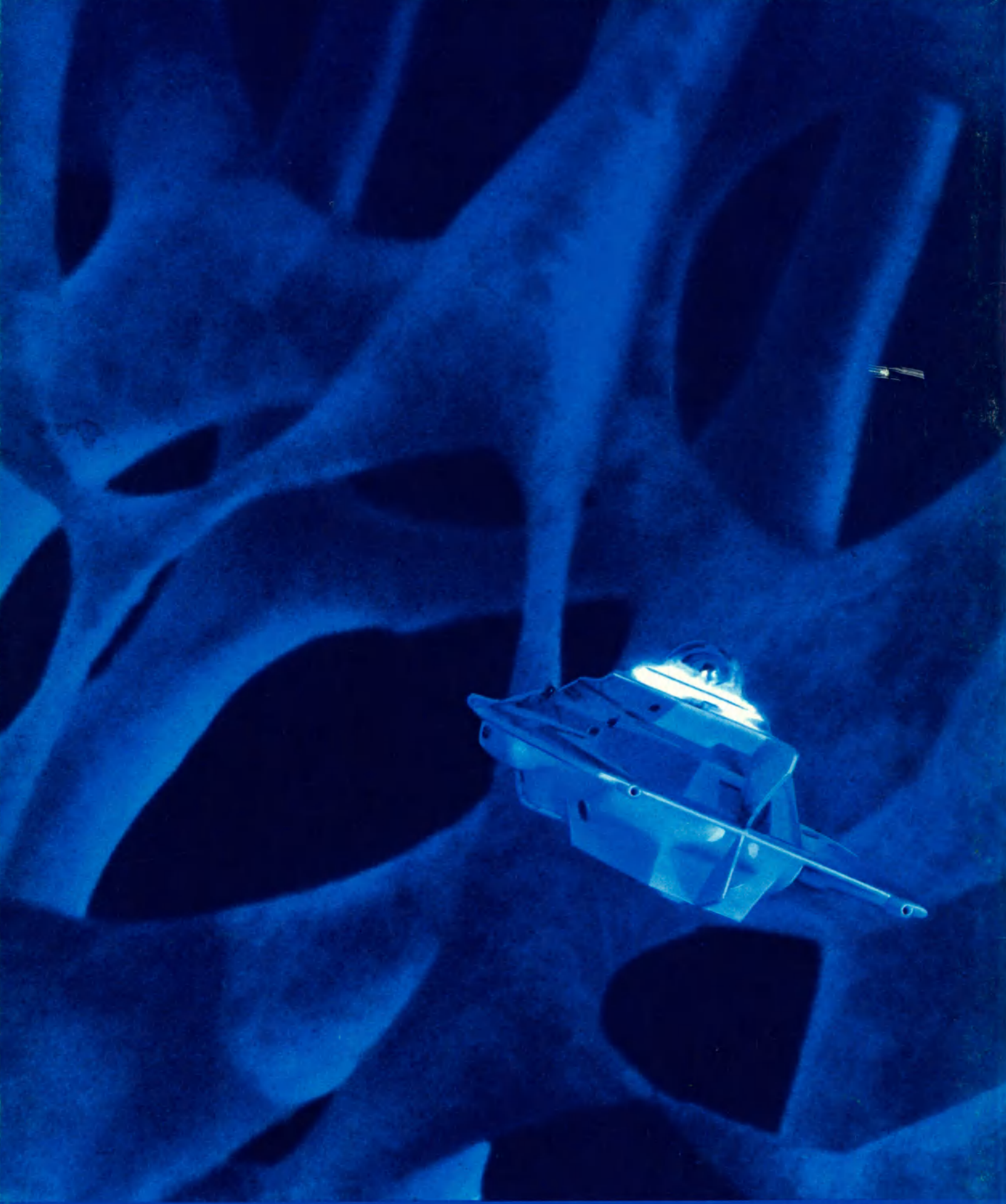

Photo 20th Century Fox, Paris

Science Fiction takes a fantastic voyage through the human blood stream

(See centre pages)