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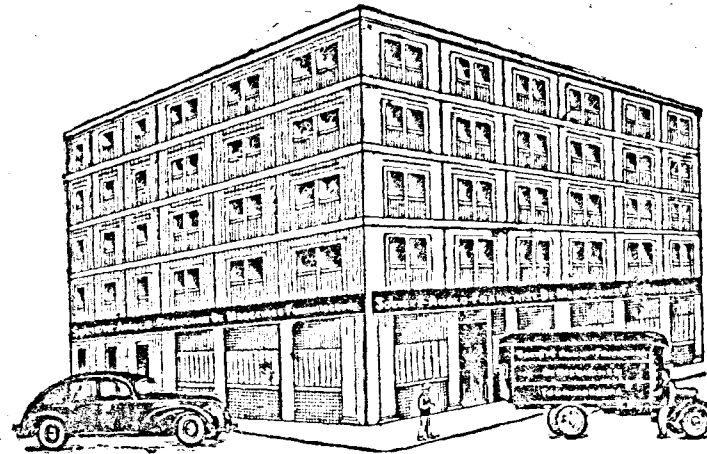
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MEDICAL SCIENCE

VOL. 9.

AUGUST 1944.

No. 5.

**Science in the New Era.*

NEW BODIES FOR OLD

Condensations of three articles on the latest medical miracles.

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Dyson Carter, writing in The National Home Monthly, Winnipeg, describes an amazing development in heart surgery :

New Hearts

We'll call her Helen. She was thirty-six. Suddenly she began having pains inside her chest. She collapsed while raking leaves on the lawn. Neighbours rushed her to the hospital. When her husband arrived the doctor said : "Your wife is very ill. She will never completely recover, even if she lives. You must prepare for the worst."

Helen survived. But only to live a semi-invalid existence at home; she would faint after the slightest exertion. She had been stricken by one of the worst scourges in the modern world—heart disease. Her particular malady was "coronary occlusion." This disease is incurable because it clogs up the small arteries in the heart and there is nothing much you can do about defects

that develop in blood circulation, especially right inside the heart. With coronary occlusion the victim gets one severe attack after another unless extreme precautions are taken, and the death rate from this disease has risen shockingly since the Great War.

So Helen was condemned. One day she went for a walk and collapsed. At the hospital they tried to keep her alive until her husband arrived. Four weeks later, however, she was still living. She walked home without any assistance, pain or discomfort. Actually without any heart disease. She was definitely and permanently cured of coronary occlusion.

Two surgeons had operated on her heart using a radical new technique that sounds fantastic. The young wife had been cured of an incurable disease—not with medicines, or rest, or diet—but with a shining scalpel and a spoonful of talcum powder!

NOTICE.

Owing to the German occupation of France, our Head Office has been transferred to London.

Through special arrangements by the manufacturers, all French medicines for which we are Agents are now being manufactured by reputable British firms, who have purchased the manufacturing rights for England and the British Empire for the duration of the war.

The Anglo-French Medical Agency (India) Ltd.

WRITE FOR GENERAL CATALOGUE.

Everyone knows that the heart is the pumping engine that circulates blood through the body, the pumping being done by the heart muscles. Food to rebuild the heart muscles, and oxygen to supply them with pumping energy, are brought to the heart by special blood vessels. Coronary occlusion means something wrong with the coronary arteries feeding the heart muscle—a stoppage of normal blood flow resulting in starvation of the heart, even though the rest of the body may be getting plenty of blood. When the blood supply is so badly cut down that the heart constantly labours even while the body rests, then coronary occlusion is in the final stages. That was the picture presented by Helen when she went to the hospital for the last time.

The surgeon first made an incision near the heart three inches long. He passed through several layers of the cartilage. The big mammary artery was exposed. He moved it carefully aside. And there, clearly visible was the pericardium—the membranous sac that sheathes the heart. It was quite loose. With forceps the surgeon picked up a fold of the pericardium and made a one-inch incision on it. A tiny tube was inserted through the cut. This sucked out the fluid which surrounds the heart. Then five cubic centimetres of the drug novocain were dropped on to the pericardium—to stop the quivering doctors call “fibrillation.”

For five minutes they waited while the drug de-sensitized the heart sheath. The novocain was then sucked out with the little tube. And the surgeon put his finger through the incision in the sheath, touched the living heart, gently pressed it as he felt for scars or adhesions. There were none. Then came the extraordinary procedure that seems almost unbelievable to the non-medical mind: Through the small opening in the pericardial sheath the surgeon drop-

ped two small teaspoonfuls of special sterilized talcum powder, sprinkling it over the heart. Quickly the two incisions were closed. When both had been sewn up the operating-room clock showed that less than twenty minutes had elapsed since the patient had been given anaesthetic.

Back in bed Helen was soon out of the anaesthetic and in a matter of hours noticed a definite lessening of pain. The next day, for the first time in months, she was able to relax in absolute freedom from pain. Heart “discomfort”—the heart disease symptoms so difficult to describe—decreased to the vanishing point. She walked out of the hospital four weeks after she had been admitted as incurable.

The explanation of this strange business is almost as startling as the technique itself. Just as any foreign substance inserted into living flesh will produce inflammation, so the talcum powder (pure hydrous magnesium silicate) causes intense inflammation in the heart tissues around it. Within eighteen hours after the talc is introduced the different layers of the pericardial sac begin to adhere. Around this adhesion there is marked widening of the blood vessels. Rapid relief from pain is explained by the sudden increase in blood supply to the site of the inflammation. The patient gets a high fever that lasts as long as three weeks. But this is not dangerous as it is not caused by infection.

Experiments long carried out on animals have shown that the final result of the operation is a permanently increased blood supply to the heart muscle. The adhesion brings this about by causing certain arteries to grow from the pericardium into the heart muscle itself, in effect an entirely new source of blood for the vital pumping machine. The treatment does not attempt to open the blood flow in the blocked coronary

arteries, but provides entirely new ones. In other words, the surgeon gives Nature a prod—and Nature responds in a marvellous fashion.

The percentage of cures is high, considering that only completely incapacitated heart cases were accepted by the surgeons. But rigorous care must be exercised in selecting the patients who will be helped not harmed, and it is too early to hazard a guess as to how many heart disease sufferers will find relief in this weird new treatment.

New Ears

Dr. Edward Podolsky, a well-known New York medical man, describes the making of a new ear:

During the past few years ear specialists have been considering their deafened patients from a new and startling point of view. They are no longer content with burdening the deaf with instruments to help them hear again. They are considering new operations to give the deaf back their sense of hearing.

Surgical treatment for deafness is by no means a new procedure. Dr. Hunter, in the eighteenth century, performed a simple operation on the drum, following which he noted an improvement in hearing. Dr. Kessel, in 1876, removed the small bones in the ear, known as the stapes, and obtained rather fair results. About 1910, Dr. Barany produced temporary openings into the semi-circular canals with occasional temporary improvement in hearing. In 1913 Dr. Jenkins made an opening into the horizontal semi-circular canal and kept this opening from closing up again by grafting layers of skin around the edges. In 1920, Dr. Holmgren performed a very delicate operation, tunneling a new canal to the ear from the outside and covering this new canal with tissue to keep it from closing up. This method gave good but only temporary results.

From the laboratories of the experimental surgeons all these operations have been developed into a new operation, known technically as fistulization of the semicircular

canals. A hole is drilled behind the ear to connect with the ear-drum. The passage is then lined with grafted skin from the ear to keep it from closing up again. This operation is without hazard and it requires less than an hour to perform. Healing is accomplished in from two or three weeks. There is an immediate improvement in hearing which is permanent.

There is the case, for example, of the stenographer, aged 30, who had noticed gradually increasing deafness in the right ear for twenty years and increasing deafness in the left ear since an operation for appendicitis five years ago. The operation was performed. The only disagreeable symptom was dizziness which persisted for several weeks after the operation. In time the dizziness disappeared entirely and her hearing improved greatly. The patient was immensely pleased with the results of the operation. She was planning to buy a hearing aid, but now she feels that she can get along without it.

New Limbs?

A writer in the World's News, Sydney, forecasts the growing of new limbs:

A frog that had a forearm removed a few months ago has just finished growing a new forearm, with workable hand and wrist. He is not an isolated case; he is one of a batch of 100 in which amputated limbs have been regrown by Drs. Rose and Schotte of Amherst, U.S.A.

This was the first successful experiment in growing new limbs on adult frogs, although it was well known that tadpoles can grow new tails. Salamanders grow new limbs, and crabs new claws. Lizards will even shed a tail to bluff an enemy, and then grow a new one. But scientists had always believed that this power of regrowth was lost at the evolutionary level of the frog.

Rose and Schotte grew new limbs on frogs by adding small amounts of salt to the water in which they were kept, and by preventing too rapid closing of the amputation wound—in other words, allowing oxygen (in air or water) free access to it.

This feat may lead to a startling development. Why, when a human worker loses, say, a finger in a machine accident, can't he grow a new one? “Because his tissues are

too specialized," some scientists say. But they said that of frogs. "Because Man's a warm-blooded animal," say others. That's not convincing, either.

If you cut a worm in half, the tail half grows a new head, and the head end a new tail. Now, a worm is a set of self-contained segments, so the feat is not difficult; besides, he hasn't any brain or spine to re-grow. No one expects a beheaded man to grow a new head, or a dog divided in two to become two similar dogs. But if a leg is cut off a newt, a bud appears on the spot, and a new leg grows from the bud. Remove that leg, and still another grows. By transplanting the removed legs, freak newts with as many legs as spiders have been bred.

Biologists say a "field," a chemical memory of the removed leg, exists in the amputation stump and forces the growth of a new one. Why hasn't a human being got a "field" for a new leg when he loses one? May be he has, say biologists, but it doesn't get a chance. Nature apparently decided that complete regrowth was too risky in higher animals, so a new process, scarring, comes in.

In a wound of any size there is a quick growth of fibrous tissue, a kind of internal bandaging. This tissue forms a tight scar, which eventually shrinks, becoming white (the ordinary white mark that remains after, say, a deep cut). Nature's intentions were good, but scarring often bans movement in injured limbs after healings, and it is this binding up, or scarring, that prevents frogs from normally growing new limbs, says Schotte. The "field" is there, but it cannot bud because the fibrous scar binds it up, strangling its growth. Stop scarring, let the wound get oxygen, and the frog grows a new leg just like a newt or salamander.

This notion of a "chemical memory" of lost limbs may seem far-fetched, till one realizes that all chemical substances have memory. From a solution of salt, for instance, salt crystals form in one definite shape. Atomically it is an unvarying pattern, and the molecules of salt "remember" to arrange themselves this way. Similarly,

a growing limb is an arrangement of molecules, and its memory pattern must exist in the place it grew from. Strangely enough, "chemical reminders" have been found in living tissues, substances called "organizers" which jog the surrounding cells to grow into various patterns. Hans Spemann found the first "organizer" in living tissue, and awarded the Nobel Prize for its discovery. Today organizers are commonplace; biologists extract them from living tissue with ether, even make them in the laboratory from coal tar. But an organizer is only a hint or jog; the tissue's own memory does the rest. Can scientists wake up the memory of lost arms and legs in amputation stumps by jolting them with organizers? May be so—if scar-tissue can be checked.

Let's visit a Regeneration Hospital of the future. Here's the Limb Ward. "John Watson, arm caught in machinery, amputated." The patient's shoulder is encased in a glass cylinder, through which fluid circulates. From the shoulder the new arm buds have already passed the elbow. John is happy and feels no pain, as the bud is anaesthetized. He got his injection of "organizer" three weeks ago, and just lies and watches his new arm grow.

Farther on, one sees people growing new legs, toes, fingers. Here's a middle-aged woman, once crippled with arthritis. Surgeons have removed the stiff limbs in turn. New ones with smooth-working joints have budded in their place.

Move on to the New Organs Ward. Here is a man growing a new liver. His old one had a cancer in it. Once that would have been fatal but surgeons of 1980 may remove such organs, leaving a small stump, which gets an organizer injection. While the new liver's growing the patient gets liver extract, synthetic bile, and all the other chemical substances needed in a liver's absence, and doesn't suffer from its loss. Kidneys are grown the same way, one at a time.

Only a dream; but a dream which those budded-arm frogs of Rose and Schotte bring a little closer to scientific reality.

—(0)—

Horseplay

Aberdeen, Washington: Having shot an elk, Harry Long hiked several miles to camp and got a horse on which to carry the meat. While he was carving up his kill, preparatory to loading it, another hunter—this one slightly near-sighted—crept and shot the horse.

Automatic Postman

The "mailomat," a sort of automatic letter-box, has appeared in New York.

To post a letter the user drops coins into a slot, twists a dial to select the postage value, and puts the letter in.

The machine stamps and postmarks the letter.

* Stout Cortes, it appears, was the father of the "penny bar."

Chocolate From Mexico

By A. E. Ballard

The most munificent gift one empire ever gave her bitterest rival was—chocolate. The British Empire literally owes every bean to the Spaniards who first discovered the tree in Mexico and later started plantations in their other colonies. From these came the trees which formed the nucleus of the British plantations. At the present time Latin America and the British Empire between them produce about 98 per cent of the world's supply.

Actually, Columbus was the first white man to see the cacao bean. He took some back with him to Spain. Cortes and the men who conquered Mexico with him in 1521 were the first Europeans ever to taste the new drink. One of them, Bernal Diaz del Castillo, recorded that "the emperor [Montezuma] took no other beverage than the *chocolatl*, a potation of chocolate flavoured with vanilla and other spices, and so prepared as to be reduced to a froth of the consistency of honey, which gradually dissolved in the mouth, and was taken cold."

The Mexicans themselves were very partial to it. At one banquet Montezuma's attendants brought in 50 jars of

chocolate, which the Emperor and his Spanish guests drank out of golden goblets. Mean-while, the guards and attendants consumed 2,000 jars of what Linnaeus called, two centuries later, the food of the gods" (*Theobroma cacao*.)

Where or when the Aztecs, who arrived in Mexico City in 1324, acquired their taste for chocolate, is not known. Von Humboldt, in his account of his travels in South America, wrote: "We met no tribe on the Orinoco that prepared a beverage from the seeds of the cacao tree. The savages suck the pulp of the pod and throw away the seeds." His belief that the tree was indigenous to the forests of the Amazon and Orinoco seems to have been correct.

Cortes saw at once the commercial possibilities of the new drink, which was both stimulant and stand-by, and also a speedy remedy for scurvy.

The Mexicans, however, had never heard of sugar, which the Spaniards had already planted in the West Indies. When this was added to the chocolate it completely altered the nature of the

drink The Spaniards kept the secret of its preparation for over a hundred years.

Very soon cacao trees sprang up in other Spanish colonies. There were plantations in Trinidad as early as 1525, and from these came the first trees planted in Ceylon in 1834. In 1560 Spanish planters introduced cacao into the East Indies, and a little later they started plantations in Fernando Po. Trees were taken from this island to the Gold Coast in 1879 to found the British plantations which now yield 45 per cent of the total world export of cacao.

In Latin America the Spanish *conquistadores* found the cacao tree growing wild in Brazil, Ecuador, and Mexico. Plantations were started in Venezuela in the seventeenth century, and in Bahia in 1780. Today cacao is also grown in Colombia, Peru, and Central America.

From the first the unfamiliar Mexican words caused misunderstanding. The Aztecs called the tree *cacauatl*, and the drink *chocolatl*. From these two words come the English *chocolate*, *cocoa*, and the more unfamiliar *cacao*.

Cacao is the raw material which is produced when *cacao* beans are ground down into a semi-liquid mass. As this was too fatty to be pleasant, a Dutchman, Van Houten, devised a process for pressing out about 65 per cent of this fat, which is known as *cacao* (or incorrectly, *cocoa*) *butter*. When this has been done, *cocoa* remains. To make

chocolate, sugar and cacao butter is added.

From a distance an orchard of cacao trees does not look unlike an English apple orchard. The trees, planted 300 to an acre, grow 20-25 feet high. In Brazil there are over 100 million trees in area one fifth the size of Europe, producing in 1938 125,000 tons of beans.

Cacao pods are cut very carefully from the trees with a knife on the end of a pole, which is called a *podadera*, or cocoa hook. When the pods have been cracked, the beans and pulp are scraped out and left to ferment for three to five days. During this process the pulp turns to liquid and drains away. The beans are then dried in the sun for three or four days. In Venezuela clay is scattered over them, and they are dried and polished by the feet of the natives, who dance on them whilst they sing their traditional songs. In Ecuador the beans are dried on strips of matting made of split bamboo, called *barbecues*, while in Bahia most of the beans are dried by artificial heat. "Estufas," as these are called, fetch a high price because they are not subjected to the vagaries of the weather during the drying process.

Chocolate is made today in a bewildering variety of forms and flavours, but, apart from the extraction or addition of cacao butter, the process of manufacture is essentially the same as when Cortes watched it four centuries ago.

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