



WORLDS of SCIENCE FICTION

FEBRUARY 1957

All Stories New and Complete

Editor: JAMES L. QUINN

Assist. Editor: EVE WULFF

Art Editor: MEL HUNTER

SHORT NOVEL

ABBR. by Frank Riley 4

SHORT STORIES

NOR DUST CORRUPT by James McConnell 54

THE OLD GOAT by Charles L. Fontenay 67

ULTIMATE MELODY by Arthur C. Clarke 70

WAR GAME by Bryce Walton 76

THE FLOATER by Kenneth O'Hara 82

CRONUS OF THE D.F.C by Lloyd Biggle, Jr. 94

THE RUMBLE AND THE ROAR
by Stephen Bartholomew 108

ARTICLE

PROGNOSIS FOR TOMORROW by Alan E. Nourse, M.D. 47

FEATURES

EDITOR'S REPORT 2

WHAT IS YOUR SCIENCE I.Q.? 69

SCIENCE BRIEFS 115

HUE AND CRY 118

COVER:

The Titan Flagpole Painter by Mel Hunter

IF is published bi-monthly by Quinn Publishing Company, Inc. Volume 7, No. 2. Copyright 1956 by Quinn Publishing Co., Inc. Office of publication, 8 Lord Street, Buffalo, New York. Entered as Second Class Matter at Post Office, Buffalo, New York. Subscription \$3.50 for 12 issues in U.S. and Possessions; Canada \$4 for 12 issues; elsewhere \$4.50. Allow four weeks for change of address. All stories appearing in this magazine are fiction; any similarity to actual persons is coincidental. Not responsible for unsolicited artwork or manuscripts. 35c a copy. Printed in U.S.A.

EDITORIAL AND BUSINESS OFFICES, KINGSTON, NEW YORK

Next (April) issue on sale February 12th

Is Man on the way to perfect health and

longevity? Will tomorrow's citizens be

free of plagues, disease and deformity?

PROGNOSIS FOR TOMORROW

BY ALAN E. NOURSE, M. D.

THERE are a number of people in medicine these days who seem to feel that we are now in the midst of the Golden Age of medical discovery, and I don't believe a word of it.

"But look at what we've accomplished in the last half century!" they will cry indignantly. "We've routed infectious diseases with the use of antibiotic drugs. We've given life and hope to diabetics. We've solved the riddle of poliomyelitis. We have proved that the human heart can be opened by the surgeon's knife and closed again with impunity. Give us enough money, enough workers,

and enough education and we could wipe malaria from the face of the Earth in fourteen days flat. We've made more progress in diagnosis, treatment, and cure of human illness in the past fifty years than in the preceding fifty centuries! If this isn't the Golden Age, then what is? Why shouldn't we expect to continue at this pace until *all* human illness has fallen to the blade?"

Well, why shouldn't we?

There is a very simple and fundamental reason why we shouldn't expect to, and won't, continue medical progress at the same wild gallop that has characterized the past fifty years of work. We have come within sight of discoveries that will make the achievements of the past half century look pale by comparison—only to find the road blocked off by a great barrier. Nothing we have done in the past will help us to surmount that barrier, but we have reached a point where no other road will do. Far from rushing untrammelled through a Golden Age, medical research has reached the crossroads, and must find some fundamental answers before it can go on.

In essence, medical workers in the past fifty years have been going about the countryside slaying all the little dragons they could find. They have been commendably successful—so much so, indeed, that there aren't very many little dragons left to slay. But it just happens that there are some *big* dragons around that we haven't even touched yet. We don't even know for sure what they look like,

much less how to go about slaying them. And these dragons are killers—the group of disorders generally known as the *degenerative diseases*, responsible among themselves for the vast majority of human death:

Arteriosclerosis and heart disease. Hypertension. Cancer. We have names for them. That's about all that we have.

Of course, there are certain things we do know about these diseases—important things to consider in thinking about the future of our attempts to track them down. First, *none* of these diseases can be expected to yield to medical research in the abrupt, dramatic manner of past medical triumphs. The reason lies in the peculiar nature of these disorders.

With the infectious diseases, or poliomyelitis, we were dealing with specific micro-organisms, vulnerable to specific drugs, medications, or antibodies capable of slowing or stopping their growth. With diabetes mellitus a specific enzyme system was found to be at fault, for which a key enzyme could be supplied artificially once it was discovered and identified. But the degenerative diseases are not specific disorders of any organ or enzyme system. They are *generalized diseases involving multiple organ systems*. In each of them we are dealing not with a sick kidney or a sick liver, but with a sick human body, suffering from a widespread malfunction of the fundamental physiological and biochemical processes of life.

We can see, then, why no specific,

simple, encapsulated answer is likely to be found for any of these vicious disorders. We've tried that already, and failed. Physicians have, for example, run the whole gamut of drugs which should, theoretically, bring down high blood pressure—but their patients continue to die of hypertensive cardiovascular disease. We have tried everything imaginable to stop the wild, erratic growth of malignant cancer cells—but the cancers keep right on growing. We have even resorted to surgery to try to replace the sclerotic blood vessels in human hearts—but we haven't found any way to stop the steady march of arteriosclerosis in the aging human body.

Gradually it has become apparent that the answers we need so desperately will never be found this way. These diseases will be stopped only when we understand *what they are* and *why they happen*; to reach this goal it will be necessary for men to ferret out a complete basic understanding of the physiological and biochemical nature of life itself.

This, then, is the great barrier to the Golden Age of medicine. It will not be surmounted in the next decade, nor even the next. We may well stand on the brink of a "barren age" of medical progress—fifty or sixty years, maybe a hundred, of futile searching—before this great barrier begins to crumble. It will cost us stupendous sums of money and the finest minds we can possibly recruit from the present and future generations, for we will find the answers only if we can develop and sustain the greatest concerted

search in the history of mankind.

But the reward will be far greater than the mere ability to prevent or cure a group of human ailments. The knowledge we acquire in such a search will give us the weapons we need to fight the last enemy—Death—on his own grounds. It will place relative immortality within our reach: a useful, productive human life-span measured in centuries rather than in decades.

This will be the Golden Age of medicine. It could come in our time.

I CERTAINLY DON'T wish to suggest, from the above, that I anticipate a Mexican stand-off in medicine for the next fifty years or so. There will be progress of one sort or another, and plenty of it. For one thing, *all* the little dragons aren't slain yet by any means. A few of them that remain are quite unpleasant enough to deserve the continued attention of medical researchers for many years to come. Some, indeed, have never been truly dead, but continue to twitch their tails from time to time in a most annoying fashion. Others, only recently discovered, are drawing much attention to themselves—such nasty customers as the disease called lupus erythematosus, first recognized in the early 1930's, a country cousin of rheumatic fever and rheumatoid arthritis, but distinguished by its proclivity for killing teen-aged girls and young women. For another thing, and perhaps more important, many research programs now under way show great

promise of providing at least some hope of palliation until the final answers are found.

But if the answers coming from the laboratories and clinics in the next half century are not as startling and revolutionary as those in the past, we can anticipate that certain social and economic changes directly related to medicine will be. Some of these changes have already begun, and their endpoint can be foreseen; others haven't started yet, but are as logical as they are inevitable.

First, we will see the emergence of greater and greater degrees of specialization and super-specialization among practitioners of medicine. The sheer bulk of information and knowledge needed for successful diagnosis and treatment of illness will force this trend to continue and grow. As a result, the concept of the "GP" and the "family doctor" will vanish completely, grieved for a while but soon forgotten. In its place clinic groups of trained specialists will burgeon, offering a far higher quality of medical care for far more people than the general practitioner could hope to supply. As an unfortunate but inevitable corollary, medical education will take longer and cost more in a time when more and more medically trained men and women are desperately needed.

Side by side with the trend toward super-specialization (have you ever heard of a pituitary osmoreceptorologist? A specialist in the function of Paccinian Corpuscle? You haven't? We've got 'em!) another phenomenon, already present,

will develop and expand rapidly: the consolidation of medical clinics and research laboratories into huge, centralized medical centers. Although such centers will grow up chiefly because of economic pressures, they will offer tremendous advantages to medical researchers. Diagnostic and research equipment, as it becomes more refined, also becomes more expensive. X-ray and fluoroscopic equipment, clinical laboratory facilities, electron microscopes, radioactive isotope facilities—all can be shared by many groups of workers in a centralized location, whereas their cost would be prohibitive in smaller installations. What is more, a large, consolidated medical center could effectively use another tool to ease the almost insurmountable task of following current medical literature: electronic memory storage and computer mechanisms could be maintained, with trained crews to summarize medical journal material, catalogue it, store it, and make it quickly available to save researchers the days, weeks and months of almost totally unproductive reading they are so often forced to do just to keep up to date.

Naturally, such installations will cost money, and lots of it. They will become not only research centers but centers for diagnosis, treatment, and hospitalization of hundreds of thousands of patients annually. Medical insurance programs will help foot some small part of the bill, but sooner or later government support to help allay the costs of medical care and research will become mandatory. When that hap-

pens it will come, paradoxically, *without* political control over the use of the money. This idea of paying the Piper without any say about the tune to be played may well be revolting to a national government—just about as revolting as the very thought of government subsidy is to the medical profession—but stark necessity will force an uneasy truce. Medical work, with its basically humanitarian aims and goals, must not be allowed to become a political issue—witness the grisly example of Dr. Salk's vaccine—and yet the search for the answers we must have will be too costly for private support. A truce will have to be made, and the resulting compromise may well be unique in the 3000-year history of high finance!

We will see other strange bedfellows appearing. Already the radiologist is hard put to tell whether he is a physicist specializing in medicine or a medical doctor specializing in physics. There was a time when the biochemist and the physiologist would have laughed at the suggestion that the electronic engineer might be able to offer them help; now they seek him out to build diagnostic and research machines for them. Lions and lambs, together they go, and the result is a broader scope for each, and perhaps a greater hope that the answers will, finally, be reached.

THIS IS ALL very nice, you may say, but it doesn't help Granny with her rheumatism very much right now. There is every reason to believe that within a few decades

we will have answers that will put an end to Granny's rheumatism once and for all—but what about the meantime? Unfortunately we don't have those answers yet, and we do have Granny. It will hardly do to stand by and wring our hands as we wait, so to speak, for Armageddon.

So the search goes on for answers applicable to human diseases and disorders here and now—palliative answers perhaps, almost always incomplete and tentative answers, but *some* kind of approach at least. This, then, will be the area of visible progress in the forthcoming "barren age" of medicine.

Again, we will see developments in two regions: the refinement of diagnostic and therapeutic techniques already known; and the search for techniques and methods not yet discovered. In the first category, it seems very likely that we will see massive enlargement and refinement of the gawky, impractical present day mass-screening techniques for the early detection of such diseases as pulmonary tuberculosis, cancer, gastro-intestinal ulcer, hypertension and kidney disease. Such mass-screenings have already been undertaken in certain of our cities—massive programs of chest X-rays to "screen" significant segments of the population for pulmonary tuberculosis, to cite a single example. Such programs have invariably been considered impractical for wider use—but with our backs to the wall, *any* technique that offers hope of earlier diagnosis of cancer, for example, must be examined most carefully. Ways can

be found to surmount the monumental cost of such programs; indeed, another decade or so may see mass-screenings as a basic annual requirement of all hospitalization and life insurance contracts.

In the past quarter century we have seen surgery come into its own with the development of techniques once thought to be either impossible or recklessly dangerous. Cardiac surgery, for instance, is now refined to such a degree that surgery of the heart is commonplace, and greater and greater daring is paying big dividends. But at best surgery of today is a pretty coarse proposition—excision of large masses or diseased organs, repair of large faults, incision and drainage of wounds and abscesses. Surgery has always been limited by the necessity of maintaining natural circulation of blood to the vital organs while the operation goes on. But the next quarter century will see great progress in overcoming this barrier to surgical activity. Artificial kidneys and heart-lung machines will become part of every surgical armamentarium. Artificial liver circulation systems may even be developed. With such devices, in conjunction with hypo-thermic anaesthesia methods and drugs capable of slowing metabolic processes throughout the body, micro-surgical techniques would be feasible. Tiny instruments, remotely controlled under microscopic visualization could be used, for instance, to separate cancer cells from surrounding normal tissue on a cell-by-cell basis, or for repair or replacement of tiny, deep-seated blood vessels in vital organs. At-

tempts have already been made to “seed” new coronary blood vessels into human hearts to replace diseased vessels, without significant success; micro-techniques would allow implanting and grafting of tiny, healthy vessels deep in heart muscle to replace the old, sclerotic vessels. Portions of liver or kidney could be excised or repaired without damage to surrounding healthy cells. Technically impossible today, such procedures may become commonplace as soon as the proper tools are made. Here again the medical researcher and the engineer will work cheek by jowl to do a job neither can do by himself.

Cancer is, of course, the target of concerted attack from all sides in medicine today. The many faces it shows, its inexorable march to fatality once started, the very alien nature of its growth within the human body, all make it a fearful enemy to human life. Yet, paradoxically, the very nature of cancerous growth—wild, disordered, spreading to any type of tissue within the body, even surviving transplantation from body to body—may provide another weapon against the diseases of degeneration: the artificial culturing and transplanting of whole prosthetic organs to replace old, dying ones. Again, an exciting challenge, technically impossible today, which may come within the realm of reason tomorrow.

As for new drugs, the parade continues, often to the exhaustion of our patience. But along with the new drugs, new concepts of drug usage are slowly emerging. The

strange behavior of the adrenal cortical steroids and other hormonal substances are suggesting tantalizing new possibilities to medical researchers. Imagine a drug which gives the best therapeutic effect when it is taken by the *doctor* rather than the patient! Yet this is exactly the way the lysergic acid derivatives are being used in dealing with schizophrenia. Gradually the classical uses of drugs are being reinforced by unknown and untried methods of use.

IN THE foregoing I have deliberately avoided much comment on the future attack on mental illness, chiefly because I cannot find a good, solid, logical jumping-off place from which to start speculating. Speculation might be interesting, but it would necessarily be wild, and right now I'm trying to keep my feet within kicking distance of the ground.

But in speculating on any future development in medicine or allied fields we must recognize the presence of another factor at work—a factor so staggeringly important that it is perhaps the single greatest shaper of the future, yet so unpredictable that it utterly defies speculation. This factor has been called *the principle of serendipity*. In his essays Horace Walpole described the journeys of three hypothetical Princes of Serendib (an ancient name for Ceylon) who traveled in quest of things they never succeeded in finding, but discovered along the way many things which turned out to be better than what they

were looking for. The lucky coincidences that occur and lead to the great medical discoveries, the unpredictable variables that make any speculation seem timid and conservative—this factor of serendipity exercises an overwhelming influence on the direction of medical progress. Penicillin was discovered by grace of serendipity: the spores of *penicillium notatum* which blew in Fleming's window were nothing more than an annoying contaminant of his bacteria cultures, and it took him twelve years to realize what had actually happened to him—but it changed history when he finally woke up. Practically every medical discovery in history has had some degree of serendipity involved. It is a process which is constantly at work—erratic, undependable, upsetting orderly experiments in the most annoying fashion, yet opening doors we never even dreamed existed before.

So speculation is only of limited value even when based on the firmest ground. Nevertheless, I feel sure that one thing is clear: medicine today stands at the crossroads. We are emerging, only now, from a great darkness, and ahead we can see the barest glimmer of light. The Golden Age of medicine, when it arrives, will bring problems of unimaginable proportions; the social and economic implications of physical immortality are stupendous. It will bring the potential for wisdom, or for cataclysm. It will bring the stars within reach. We stand on the brink of discovery—we will live to see it, to participate in it. ● ● ●