MEN AND MEDICINE

"OLD ARISTOTLE"—Part I

• In one of his letters Charles Darwin of evolutionary fame wrote:

"From quotations which I had seen, I had a high notion of Aristotle's merits, but I had not the most remote notion of what a wonderful man he was. Linnaeus and Cuvier have been my two gods, though in very different ways, but they were mere schoolboys to old Aristotle."

This is quite a different opinion from that ordinarily held. To most of us Aristotle is a rather vague yet somehow formidable figure known chiefly from books and from college courses in Western Civilization and in Introductory Philosophy. To others Aristotle and his systematics were the incubi, the restraints to progress, which had to be thrown off before the Renaissances from the twelfth century onward could flower into the Scientific Revolution of the sixteenth century, leading inevitably to our modern times with their population and information explosions, their means to destroy this world while we seek to begin extraterrestrial travel. Which is the true Aristotle, the great man of Darwin's evaluation, the dim figure of our college courses, the hindrance to progress of the Middle Ages?

Whatever one's opinion of Aristotle, whether good or bad, there is little doubt that this was one of the men who shaped our world, one who influenced the pattern of the development of our civilization. Such an important figure has had books devoted to him, to his thoughts and to his work, and the active production of studies on Aristotle is by no means complete. (One of the typical recent works of this sort is *Aristotle* by J. H. Randall, published by the Columbia University Press in 1960 and republished as a Columbia Paperback Edition in 1962.) Because of the importance of Aristotle in scientific and medical thought at least two articles will be devoted to him. This first will deal with his life, his school and his biological thought. The second will outline some features of his influence on the world of yesterday and today and especially on scientific thought.

Born of Ionian stock in Stagira in Thrace, Aristotle (384-322 B.C.)—called the Stagirite after his birthplace—was the son of the Ascelepiad Nicomachus who was physician at the court of the Macedonian king, Amyntas II. Tradition has it that Aristotle early learned to dissect and that he helped his father in the healing techniques which the Ascelepiads had at their disposal. This is supposed to have given him an interest in biology which is one of the most striking features of his career. It is said that after his parents died, his education was supervised by Proxenus of Atarneus. At the age of 17 or 18 Aristotle went to Athens and shortly thereafter enrolled in Plato's Academy. Different versions of Aristotle's pre-academy period in Athens has him wasting his money on wine, women and song or, as suggested by his enemies Timaeus and Epicurus, practicing medicine.

Aristotle spent in the Academy the twenty years until Plato's death in 347 B.C. This was the period between Plato's sixty-first and eighty-first years; his philosophy was developed in full form and the doctrine of ideas was strongly advocated and actively taught. It is not remarkable that Aristotle acquired elements of Platonic thinking which were to persist and mark his own philosophy. In Aristotle's later years in Plato's Lycaeum he is said to have written some dialogues, unfortunately lost, which are believed to have demonstrated the independence of thought which was to distinguish his later works.

On the death of Plato, his nephew Speusippus became head of the Academy. Aristotle joined two old associates from the Academy—Erastus and Coriscus—in the city of Assos, ruled by his friend Hermias, a former student of Plato. For three years Aristotle taught, wrote and studied; Theophrastus, the father of botany, being perhaps his best known pupil. At some date in this period Aristotle married Pythias, the niece and adopted daughter of Hermias. They moved to Lesbos in 344, Aristotle spending two further years in the study of natural history and marine biology. In 342 Philip II of Macedon called Aristotle to his court to tutor his son Alexander, later to conquer the world, then only 13 years old. Six years were passed with Alexander, but how much tutoring was actually done by Aristotle is not certain since Philip made his son Regent at the age of 16. When Alexander ascended to the throne on the death of Philip in 336 B.C. by assassination, Aristotle returned to Athens.

The Lycaeum was the school which Aristotle founded in Athens in 335 B.C.; like the Academy of Plato it survived until suppressed by the Emperor Justinian in A.D. 529, having then a life of 864 years. This resembled an English college in many ways; it had regular dinners, owned its own plate and had its manuscript collection in a library as well as a museum of natural objects. Here Aristotle taught to his own students in the morning and gave public lectures in the afternoon. His free time was devoted to pure science and to investigation. The Lycaeum had a covered walk or Promenade *(Peripatos)* and Aristotle's pupils were called Peripatetics. It has been suggested that much of the teaching was done while strolling or walking and that the name Peripatetic derived from this.

At the death of Alexander in 323

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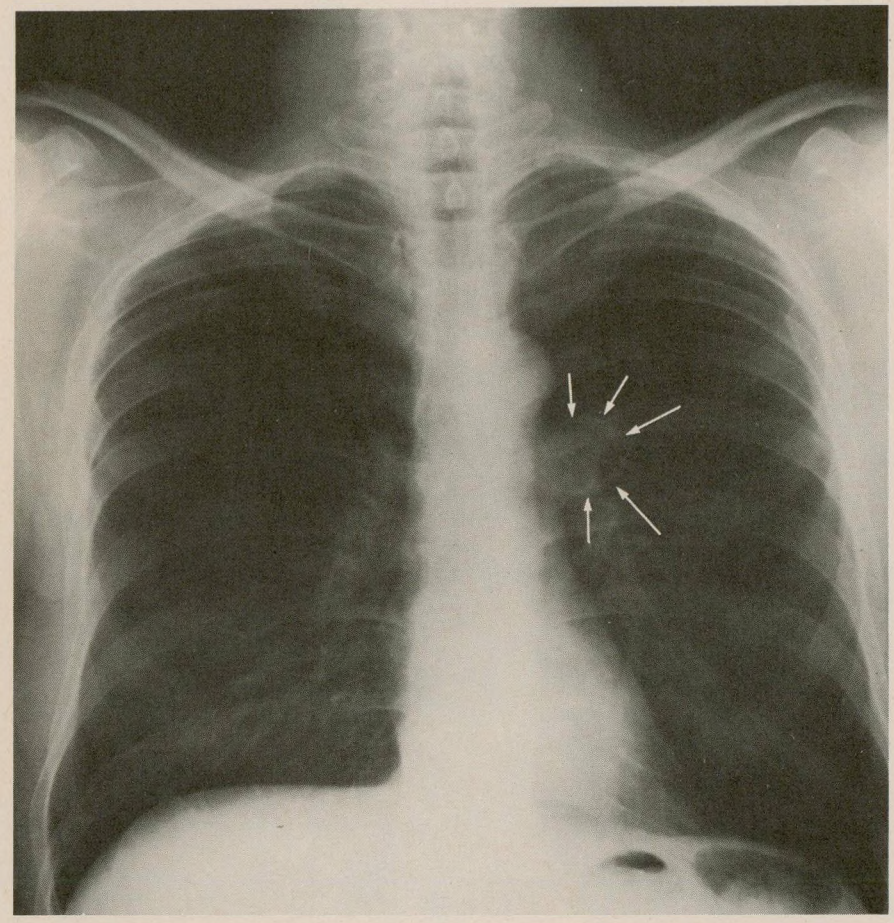

Pseudocavity: an example of confluent vascular shadows suggesting the presence of a cavity.

Since most of the "lesions" suggested by confluent shadows are of this latter type, the test of comparing multiple projections will prevent interpretive errors in the vast majority of cases.

This same reasoning incidentally is sometimes helpful in another sense in the interpretation of a clinical roentgenogram. For example, it may help to distinguish a "phantom tumor" (a fluid collection in a fissure) from a mass lesion of the lung. Since a carcinoma of the lung almost invariably produces a nodular (three dimensional mass) in the lung field, its representation is usually comparable in all projections. Fluid loculated in a fissure is essentially a planar "mass," however, and hence is likely to present a shadow in the lateral view which is linear and is much smaller than one would expect from the size of the shadow it produces in the frontal projection.

Again, it must be emphasized that the roentgenogram is a completely objective record of the structures of the human body. Attention to basic principles of shadow formation permits the physician to interpret this record with accuracy.

B.C., Athens led by Demosthenes rose in revolt against Antipater, Alexander's delegate and Aristotle's patron. Aristotle fled to Euboea, his mother's home in Chalcis in Ionia, and there he died the next year in 322 B.C. at the age of 62.

Aristotle has been called the first of the Professors. He was primarily a teacher. His extant writings show none of the literacy grace of Plato, nor was Aristotle fortunate as Socrates to have a Plato to immortalize his thoughts. What has come down to us of the works of Aristotle resemble lecture notes rather than complete books prepared for publication. Fragments of obviously different dates in the development of Aristotle's thought are jumbled together. For many centuries one of the main tasks of scholars has been the deletion of works incorrectly attributed to the Stagirite. These materials have moreover had a chequered history in that they were lost and rediscovered, not once but several times. Furthermore, texts of Aristotle's works have been preserved often in considerably distorted forms with commentaries by later authors included in the manuscripts and on the other hand portions of the Stagirite's work have been ascribed to other authors. Both errors have required long, careful and percipient study to determine which were Aristotle's own.

In addition, the teaching of Aristotle became fossilized in his own Lycaeum shortly after his death. What was the result of careful research, and could and should have stimulated further investigation, came to occupy the place of dogma, to be studied, taught and expounded but having in effect the stultification of the very type of study which had produced it.

How then was it possible for Aristotle to influence the thinking of men not only in the Ancient World but up until the sixteenth and seventeenth centuries? To begin with, Aristotle assimilated previous thought and the study of the earlier Ionians and the Pythagoreans, both scientists and philosophers, and synthesized an orderly and understandable world which persisted in the mind of man long after the basic material on which this conspectus was based had been lost from sight. Some scholars in most of the succeeding generations recognized the

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source of the view and ascribed it to Aristotle, though with some unfortunate additions. The Organon, or Instrument, which Aristotle forged for scientific discourse—Formal Logic, and its chief tool, the syllogism—remained extant and were incorporated in Boethius where they survived the fall of Rome and the Dark Ages. By a happy trick of fate, the expulsion of the Nestorian heretics from Byzantium early in the Christian era carried Aristotle's work into Arabia. Translated into the native languages, studied and analyzed by a number of sages, the works of Aristotle were preserved and returned to Europe through Sicily and Spain by the Mohammedans. They arrived in time to participate in the Renaissance of the thirteenth century and later, to send the scholars back to Greece to seek out the original Greek texts, and to assist in the major philosophical synthesis of St. Thomas Aquinas.

Aristotle (384-322 B.C.) is, by common consent, ranked among the greatest of men. In this century it has been said " . . . there is no main subject of philosophy or science on which he (Aristotle) had not said something still worth the hearing." His interests ranged through biology, poetry, politics, geometry, astronomy, mechanics, meteorology, optics, geology, cosmology, logic and metaphysics and in each of these fields he made major contributions. To Dante he was "the Master of those that know" while Darwin in the nineteenth century was, as was pointed out, amazed at the knowledge of Aristotle, his prescience and his breadth. Actually, the reputation of this philosopher-scientist has waxed and waned over a broad range, from praise bordering on adoration to the most severe criticism, more than perhaps that of any other man. This by itself is an indication of the influence of Aristotle on scientific thinking and on philosophy.

The biology of Aristotle is undoubtedly his major and most valuable lasting contribution to the sciences. It makes up over 30% of his preserved material. The origin of this biological interest may be found in Aristotle having been the son of a physician, a member of the hereditary group of healers called Ascelepiads, and having had the opportunity of observing the care of patients and operations and perhaps even dissections in his youth. His beginnings in natural history are dated to the period between 347 and 342 B.C. when having left Athens, he was in Atarneus and on the island of Lesbos. Whatever its origins and whenever the beginnings, Aristotle's biology is one of his strongest areas. It has been suggested by many students that the biological viewpoint of Aristotle influenced in turn his other works and that his descriptions of states in the *Politics* reflected the analyses used in his descriptions of animals.

Aristotle separated living things from nonliving, but he said that they merged almost imperceptibly into each other. This by itself was a major step since earlier thinkers were hylozoists, everything was alive to them. All matter for Aristotle was made up of combinations of the elements of Axaximander, air, water, fire, and earth, in varying specific proportions. The form or essence determines what this matter is to be and in the case of living things the form is the soul or *psyche*. Aristotle described a "Ladder of Nature" with the more primitive, barely alive matter being in the plants, possessing abilities to grow, to decay, to feed and to reproduce. Animals contain the properties of plants and the animal and the vegetative and sensitive souls; man can think on the basis of possession of a rational soul. Whether the humans possess three souls to Aristotle or only one I leave to the philosophers.

An extension of Aristotle's biological teaching may be stated in the following two quotations, both from Book II of the *Physics*.

"If therefore artificial products are for the sake of an end, so clearly are the natural products."

This introduces the idea of purpose into biological thought quite clearly and has been the basis of considerable and continuing argument. We say, for example, that the stomach has special glands arranged for the digestion of food and when we say this we speak in Aristotelian terms. The final cause for Aristotle could be recognized in each living thing, in its parts and in its actions. Further, to quote again,

". . . the form must be the cause in the sense of 'that for the sake of which'."

In other words, shape is caused by function, the internal organization of a part is caused by its purpose, by its final cause. This early statement of the structure of an organism being determined by the function which it serves, that organization equates with teleology (*teles*=purpose, *logos*=knowledge), sparked a controversy still in existence. This way of thinking influences and determines the teaching in Galen's work (second century A.D.) and because of Galen's influence affects in turn medical teaching and thinking to Harvey (seventeenth century) and longer.

Aristotle's philosophy of final causes as applied to biology and the difficulty which the modern man encounters when he tries to apply it to different problems, disease for one, as Sherrington did with malaria, cannot be allowed to diminish Aristotle's essential greatness as the founder of biology. Certainly, generations of biologists have made important discoveries in asking themselves the question "why?"; "why" this structure, "why" this activity or this occurence. This consideration of final cause, that for the sake of which something is or is done, is useful in everyday life and many tools and instruments are still described in terms of purpose (e.g., saw, screwdriver) as a momentary reflection will recall. Besides the idea of purpose which Aristotle contributed to biology, and the precise categorization of descriptors which lead to the development of the concepts *genus* and *species* on which biological classification depends, the recorded descriptions of animals as found in the remains of Aristotle's works represents by itself a truly collossal achievement. Many of Aristotle's descriptions are of animals not yet identified but many hundreds of the descriptions have been matched with existing animals and frequently features were described by Aristotle which have been doubted until relatively recent confirmation. Classification for Aristotle meant arranging all observable features—locomotion, covering, type of birth, habitat, etc.—and describing animals in these terms, itself a formidable task. That some of Aristotle's classifications and the facts on which they were based were fallacious should not minimize the value of the work. Finally, many terms in use in biology and medicine can be found first in Aristotle, ranging from aorta to selechia, from cetacea to entomology to the word physician itself.

J. F. A. McManus, M.D.,
Indiana University School of Medicine

MEN AND MEDICINE

"Old Aristotle"
Part 2

• This "wonderful man. . . ., Old Aristotle," as Charles Darwin called him, has a profound influence on our world today, nearly twenty-three centuries after his death. As Douglas Bush says:

> The wholesale introduction of Aristotle in the twelfth century enabled St. Thomas to build his great structure of rational theology; it also started the stream of scientific rationalism which was to undermine that structure; and these two movements, especially the latter, may be said to have given the modern mind its direction.

What was it that Aristotle taught and how did it come to influence our world? How did Aristotle view his world and how were these ideas to modify our history?

Aristotle's best known achievement was his philosophy. This is broader than what the term commonly includes today and can be separated into three parts: (1) The Physics, or natural sciences, which deals with change and motion in natural things, (2) Mathematics, considering things abstracted from change and matter, existing only as abstractions or concepts derived from material things, and (3) Metaphysics, or First Philosophy, which considers immaterial substances, Beings, which had a separate existence. It is interesting that the First Philosophy came to be called Metaphysics (probably appropriately enough since it deals with nonmaterial things while the material is the subject of the Physics) because it was placed after or beyond—meta—the Physics in an early ordering of Aristotle's work by Andronicus of Rhodes in the first century B.C.

The idea of causes of different types was fundamental in Aristotle's philosophy and important in subsequent thought to and through the Middle Ages and beyond. Suppose we ask ourselves "what is the cause of a certain statue set up as a memorial in a park?" Viewed from different viewpoints we can imagine the sculptor who made the statue as a cause, the marble of which it is made as another, the idea or mental picture of the statue in the sculptor's mind as another, and the memorial, to somebody or something, as yet another. These are Aristotle's four causes: the sculptor is the Efficient Cause, the stone is the Material Cause, the mental picture in the mind of the sculptor is the Formal Cause and the purpose for which the statue is made is the Final Cause.

The doctrine of Final Causes is that which is most interesting and controversial in science. The biologist particularly finds it useful to ask "why" this structure or function is present when he is examining and analyzing some vital phenomenon in an attempt to understand it. Most structures and functions are present in living things because they serve a purpose in this line of reasoning, for examples the gastric glands for the digestion of food and the peculiar pulmonary alveolar structures which appear uniquely adapted for gas exchanges between body fluids and the atmospheric air. However, when this same type of thinking is applied to mechanics, to astronomy or to chemistry the effect tends to be actually injurious, leading to speculation rather than to observation and experimentation. While it is probably being too critical to say with Francis Bacon that

> Final causes are like Vestal Virgins, dedicated to God and sterile

it is true that progress in the physical sciences especially, and very greatly in the biological sciences, derives more from asking "How?" rather than "why"?

Aristotle was a scholar, great as a synthesizer and selector; he finds in the works of the earlier philosophers and speculative scientists the materials from which his philosophy was built. Plato is said to have called him, somewhat slurringly, the "Reader," *i.e.*, not an original thinker, and it is true that frequent references to his predecessors are found in his works. Often the only or the main information on the early Ionian and Pythagorean savants is to be found in Aristotle. He traced his ideas historically, giving for example in the first book of his Physics the earlier concepts of Motion and its principles, and in the first book of his Metaphysics the early ideas on Causes.

Aristotle emphasized the empirical fact and the living things as opposed to his predecessors, Socrates, who emphasized the End of man, and Plato, who distrusted reality and fled from it. Whereas Plato had studied the world as a whole and as "Ideas," Aristotle studied the specific things, the reality of concrete facts and substances. He formed a basis for an inventory of things in the universe and on the inventory which was produced the special sciences have been developed. This precise observation and description were new things in Aristotle's world; from these data Aristotle built generalizations by induction to produce laws which could be then used to explain

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other observations. This essentially modern and rational method was not, unfortunately, always applied even by Aristotle to circumstances in which empirical data had been or could be acquired.

A primary and major contribution of Aristotle is a new precision of definition by the use of *Categories,* substances, qualities, relations and other means of description. He introduced the concepts of Genus and Species, the basis for the next attempts at classification of living things in the eighteenth century. His work called *Interpretations* showed how two terms or categories could be combined and from his Universals, the conceptual counterparts of Plato's Ideals, he invented the syllogism, one of the permanently useful logical devices of all time. In many different forms the syllogism, despite its inadequacies and misuse, has served as a magnificent means of making efficient the thinking of man.

Aristotle's philosophy was based on these precise definitions, on the syllogism, on the doctrine of four causes and finally on clear concepts of Substance and of Motion. For Aristotle, substances imply an underlying matter prepared to receive attributes which became actual with the form or essence. The form or essence, that by virtue of which a thing is what it is, was the *physis* or nature or active principle. The form was responsible for a thing existing as a Being, as opposed to Non-Being and was further the actualizer of potential which had a very real existence in the matter, even before the realization of potential by the form. A logical development of the idea of matter and form was the pseudo-science of Alchemy, from which our modern chemistry developed. One large ambition of the alchemists for centuries was the transmutation of *base* metals such as iron or copper into gold. This was a reasonable object according to Aristotelian thinking and led to the development of many experimental procedures and instruments still in use. The *Bain Marie* as the water bath is called in France is named after its inventor Mary the Jewess, an alchemist of ancient Alexandria. If only the form or essence needed to be changed, centuries of alchemists could and did logically hope for transmutation.

The Aristotelian philosophy was applied to the whole world and became the first System of Thought. As Comford said, it is

> . . . a colossal monument of rationalism, a compact and all-embracing structure furnished with an answer to every question.

This all-embracing aspect of Aristotle's system was at once its strength and its weakness; here was a most amazing construction beginning with the very Foundations of belief and the basic processes of thinking which was elaborated to explain all natural phenomena and even man himself. It was strong because it answered a multitude of questions but it was weak because it seemed to answer *all* questions.

As we think of knowledge today on any aspect of man and the universe it is considered to be open-ended; more is yet to be added. This Aristotle himself seems to have believed but, whether he did or not, it is important to realize that Aristotle's system was taken and used as a complete explanation of everything, that it appears indeed to have had a tendency to restrict enquiry because a reasonable explanation was available already in Aristotle.

It has been said repeatedly and reasonably that progress in science with the development of the modern world could come only after Aristotle's Cosmology and Aristotle's ideas on motion were contradicted and disproven. These fundamental features of Aristotle's teaching, both overthrown by Galileo, will be recounted briefly.

In Aristotle's Cosmology, or view of the Universe, the spherical earth was at the center, *i.e.,* his cosmology was geocentric. Like all the substances in it the earth was made up of proportions of earth, air, fire and water. The central earth was primarily surrounded by other spheres of, in order, water, air and fire with the habitable areas of the world having become elevated into and through the sphere of water. The air was surrounded by the sphere of fire and that in turn by seven other spheres which carried the seven visible moving planets—the moon, Mercury, Venus, the Sun, Mars, Jupiter and Saturn. The sphere external to this was the Empyrean, it held the fixed stars. External to this was nothing. The Planets moved around the central earth by virtue of rotation of the spheres, first mathematical existents to Eudoxus, Plato's pupil, and made into crystalline transparent spheres by Aristotle. Galileo, it will be recalled, supported and argued for Copernicus' sun-centered or Heliocentric Universe, our modern view.

Like Aristotle's cosmology, his ideas on Motion held sway in the minds of man until overthrown by Galileo. All bodies were naturally at rest and furthermore it was held that all had their natural direction of motion. Earth and water possessed Gravity, tending to seek the center of the earth, while air and fire possessed Levity and tended to travel away from this point. These were the directions of natural motion for Aristotle; any other motion such as that of the thrown stone was violent and unnatural. Since the natural state of a body was at rest any motion continued only as long as the cause of the motion was acting, just as that of the cart which moves only when the horse moves. Continued motion through air such as that of the thrown stone or the arrow released from the bow was explained by Aristotle by turbulence produced in the air ahead of the object, which turbulence then travelled around to behind the object and shoved it forward. Butterfield calls the problem of motion which has been resolved by the law of inertia, "of all the intellectual hurdles . . . the most stupendous in its consequences." Out of the modern ideas of inertia and its corollary impetus have come the Newtonian Universe with its contradiction of Aristotle but it is interesting that Randall indicates that Aristotle's view of motion as a process is more akin to modern physics than is the tidy Newtonian picture.

Aristotle's Cosmology and his ideas on Motion served to explain the phenomena, to "save the appearances," for nearly two thousand years. Man found in these hypotheses of Aristotle a reasonable explanation of the world around him and of "the stars in their courses." To all the generations until the great Renaissance had flowered in the sixteenth century, with its scientific revolution, Aristotle was the Philosopher and the world was Aristotle's world. Averroës, the Arabian, the Commentator of the Middle Ages, said of Aristotle,

> Aristotle's doctrine is the sum of truth because his was the summit of intelligence. It is therefore well said that he was created and given us by Divine Providence, so we should know what it is possible to know.

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MEETINGS: highlights and comments

Progress in Neuropsychopharmacology

The fourth meeting of the **International Collegium of Neuropsychopharmacology** was held in Birmingham, England, from August 31 to September 3, 1964. It was attended by 325 biochemists, pharmacologists, electroencephalographists, and psychiatrists from 16 countries. The scientific program, which consisted of plenary sessions, workshops, and over 150 papers, was devoted primarily to the mode of action of the psychotropic drugs.

The meeting was opened by Prof. Hans Hoff (Vienna) who delivered an erudite Presidential Address in which he reviewed the history of psychopharmacotherapy, what has been achieved with the psychoactive drugs, and what needs to be accomplished in the near future. He emphasized that although these drugs have benefited many patients, we have no idea how they work. He denied that they are antipsychotic. This opinion was supported by Dr. Max Hamilton (Leeds) who spoke on the psychological effects of psychopharmaceuticals in man. He stressed that the primary effects of these medicines are not on cognitive functions. They suppress motor over-activity and do not act on thought disorders, delusions and hallucinations. They benefit acute rather than chronic psychoses. The psychological changes produced by drugs, Dr. Hamilton said, are difficult to understand because we do not know or understand the underlying pathological process in psychoses.

Dr. Jonathan Cole (Bethesda) discussed the clinical mode of action of neuroleptic drugs. He reported the results of a controlled trial comparing chlorpromazine, thioridazine, fluphenazine, and placebo in acute schizophrenics treated in nine hospitals for 6 weeks. It was found that all drugs were superior to the placebo but that there was little difference between the drugs. Dr. Cole called the phenothiazines "antischizophrenic" and emphasized that they should not be considered just tranquilizers.

Dr. Walter Poeldinger (Basle) pointed out it is not possible to give an exact description and definition of the so-called antipsychotic action and that, as evidenced by the discussion at this meeting, psychiatrists might be divided into those who accept this term and those who do not. He proposed that the psychopharmaceuticals be classified as follows: Psychotropic drugs without 'antipsychotic' action. These would be hypnotics, stimulants, minor tranquilizers and nonhypnotic sedatives. Psychotropic drugs with 'antipsychotic' action. This would include: (1) the major tranquilizers or neuroleptics—nonhypnotic sedatives with antipsychotic/antischizophrenic action, (2) antidepressants—psychotropic drugs with antipsychotic/antidepressive action, (a) thymoleptics—tricyclic antidepressants, and (b) thymerethics—monoamine oxidase inhibitors, (3) psychotropic drugs with 'psychotomimetic' action—psycholytics, psychodysleptics, and hallucinogenic drugs.

The psychopharmaceuticals have benefited many patients but there are still large numbers of people who have not been helped. According to Dr. Henry Brill (New York), these include: (1) chronic anergic deteriorated schizophrenics, some of whom improve under drugs but not enough to permit discharge from hospital; (2) pseudoneurotic schizophrenics and pseudopsychopathic schizophrenics such as Lee Oswald was; and (3) genuine psychopaths. Many French psychiatrists stated that a new phenothiazine, Neuleptil, seems to be especially good for treating antisocial characters. Dr. H. Berzewski (Berlin) and his associates reported that Neuleptil is a potent neuroleptic which like trifluoperazine and fluphenazine tends to cause a high incidence of extrapyramidal reactions. They found this drug to be as antischizophrenic as other potent phenothiazines.

"The Effects of Phenothiazine on the Human Electrocardiogram" was the subject of a report by Dr. T. A. Ban (Montreal) and his associates. Using a Latin square design, they administered to 6 psychiatric patients, thioridazine, chlorpromazine, and trifluoperazine, in increasing doses for a 16-day period with a two-week free interval prior to the commencement of the next medication. Each drug was used in 4 dosage levels and each increase of dosage took place after 4 days of drug administration. In each case the total daily dosage administered in 4 equally divided doses were: thioridazine and chlorpromazine 200, 400, 800, and 1200 mgs.; trifluoperazine 8, 16, 32 and 64 mgs. There were no changes in serum sodium, potassium, blood pressure or pulse rates. Chlorpromazine and trifluoperazine caused relatively minor changes in the ECG including slight prolongation of the Q-T interval and some blunting or reduction of voltage in the T waves. Thioridazine induced in all 6 subjects blunting and notching of the T waves with or without prolongation of the Q-T interval. In some cases notching produced a double hump appearance in which a T wave of reduced voltage formed the proximal hump and a positive U wave of increased voltage formed the distal hump. These two components were often fused together so that the termination of the T wave and hence calculation of the Q-T interval was difficult or impossible to measure. All changes produced were reversible and disappeared spontaneously after termination of therapy.

Dr. Ban and his associates also recorded ECG's in 110 chronic psychotic patients receiving chlorpromazine, levomepromazine, thioproperazine, trifluoperazine and thioridazine in high doses over a 4-month period. All of these drugs caused changes in the ECG in some patients but a significantly higher number of ECG's were found to be pathological in patients on thioridazine

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Next Month:

SPECIAL ARTICLES

Leukemia by Joseph F. Ross, M.D.

Standards for Control of the Child with Diabetes by Robert Kaye, M.D., and Lester Baker, M.D.

Vertigo by Frank A. Elliott

Melanoma: A Curable Form of Cancer by Gordon McNeer, M.D.

CLINICAL NOTES: **Intussusception** by John Raffensperger, M.D.

ALSO: Other articles and features on clinical, laboratory and roentgenographic diagnosis.

Men and Medicine—continued

One is always tempted to draw conclusions from the great errors of a great man for this combination is the essence of Tragedy. Instead let us realize that Aristotle's Cosmology and his ideas on motion served the proper functions of hypotheses, they gave a reasonable explanation of phenomena and they gave place in time to more "correct" hypotheses. Our own Cosmology is altering as our Universe expands and multiplies and as new methods for its exploration are added while the Newtonian mechanics is giving over to Relativity with the Heisenberg uncertainty principle, lit darkly by the reflection of heat from a black object. It is to be hoped that our errors are no greater than those of Aristotle; devoutly to be wished in science are logical thought, precise observation and careful description of phenomena according to the rules laid down by him.

Having indicated some imperfect hypotheses of Aristotle it is only fair to the memory of this outstanding genius to conclude this article with some of his wisdom. Examples of this are numerous, one coming readily to mind being the familiar phrase "One swallow does not make a summer" which originates in Aristotle. Another flash of genius is displayed where he says "And the animal organism must be

> conceived after the similitude of a well-governed commonwealth . . . so in animals there is the same orderliness . . . and each part naturally doing his own work as nature has composed them."

It is interesting to recall that the ideas of homeostasis and of cybernetics are important currently and that the latter term of Weiner's derives from the Greek word *cybernos* or governor.

Finally, the following quotation from Aristotle represents in a superior fashion the strivings of those who seek out the secrets of nature

> The search for Truth is in one way hard and in another easy. For it is evident that no one can master it fully nor miss it wholly. But each adds a little to our knowledge of Nature, and from all the facts assembled there arises a certain grandeur.

This quotation appears on the final page of each number of the News Report of the National Academy of Sciences–National Research Council. ■

Meetings—continued

(77.3%), than in patients on the other drugs. They concluded that "modification of the ECG patterns in patients treated with phenothiazines, particularly with thioridazine medication, should impose strict observation of the patient and possible discontinuation of the medication. The changes in the ECG are comparable to those seen in quinidine intoxication and in hypopotassemia."

Dr. N. W. Imlah (Birmingham) and his associates reported on an investigation designed to test the following hypotheses in depressed patients: (1) that antidepressant drugs will have a synergistic action when combined with ECT. Accordingly the use of such drugs will reduce the amount of ECT required to produce an equivalent response and/or improve the quality of the response; (b) the continued administration of antidepressant drugs after the administration of ECT will significantly reduce the tendency to relapse. One hundred and fifty inpatients were selected on the basis that they were suffering from depressive illnesses of sufficient degree to warrant the use of ECT. They were divided into 3 equal groups by random allocation. The drugs used were imipramine and phenelzine, and the 3 groups were treated as follows: (1) ECT plus phenelzine 15 mgs. t.i.d. (2) ECT plus imipramine 25 mgs. t.i.d. (3) ECT plus placebo 1 tablet t.i.d. Drug and ECT were started at the same time and ECT was given twice weekly. ECT was stopped as soon as two observers agreed that the patient had shown maximal improvement. Patients receiving the antidepressant drugs were advised to continue medication for 6 months after discharge from hospital. All 150 patients were re-assessed at the end of 6 months. This showed that there was no significant difference in the number of ECT given to the 3 groups. Analysis of ratings showed that changes were noted earlier in the patients on the antidepressant drugs though the end results were similar in all groups in so far as number of treatments required was concerned. There was a much higher relapse rate in those not continued on antidepressant, suggesting that antidepressants offered some insurance against relapse.

Dr. Felix von Mendelssohn (Washington) reported on a new drug, SKF 10,810 a xanthene derivative which has tranquilizing and antidepressant effects. In a pilot study at St. Elizabeth's hospital this drug was given to 7 men and 12 women with schizophrenic psychoses of the schizoaffective paranoid, catatonic, and undifferentiated type, involutional and affective depressive psy-

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choses. Rapid and consistent improvement occurred in those patients who manifested primarily signs and symptoms of depression and apathy. Along with improvement in mood and activity, there was a disappearance of delusions and hallucinations. There was no improvement in withdrawn, autistic and negativistic patients and in those who had no depressive symptoms. In two patients grand mal seizures occurred and in one there was notable improvement after the convulsion. Other side effects were tremors, drowsiness, dizziness, and dry mouth. Dr. von Mendelssohn expressed the opinion that "SKF 10,810 is of therapeutic value in patients with specified combinations of depressive and schizophrenic symptoms. Unlike most phenothiazine and antidepressive drugs, it is not restricted to one category of target symptoms, but two simultaneously."

Dr. H. Akimoto (Tokyo) and his associates treated 264 in- and out-patients suffering with endogenous depression with a large number of antidepressant drugs. They reported that all these drugs helped but that imipramine and amitrityline were the best. Dr. C. M. B. Pare (London) reported that intramuscular nialamide produced improvement in one-third of a group of 26 patients whose depression had not responded to any other treatment including oral nialamide. For three weeks they were given on alternate days 750 to 1000 mg. intramuscular and 150 mg. orally. Blood levels of nialamide were measured after oral and intramuscular administration. There was no difference in the blood levels of responders and non-responders on oral medication. Identical blood curves were found in responders and non-responders to I.M. medication. Likewise in a few patients with terminal illnesses I.M. or oral nialamide caused no differences in brain 5 hydroxytryptomine.

Throughout the meeting there was lively discussion about the mode of action of the psychopharmaceuticals. The only point on which all agreed was that although remarkable progress had been made in pharmacologic knowledge of these drugs, precisely how they work is still a mystery. Dr. A. Pletscher (Basle) emphasized that all four classes of psychoactive drugs—monoamine oxidase inhibitors, thymoleptics, rauwolfias, and phenothiazines and other major tranquilizers—effect the metabolism of the catechol amines in the central nervous system. For this reason he felt that the MAO's provide a rich and fertile area of research which should be actively pursued.

Frank J. Ayd, Jr., M.D.
Baltimore

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