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ART OF NEW GUINEA PAGE 1

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ART OF NEW GUINEA

BY DOUGLAS NEWTON

With the kind permission of The Museum of Primitive Art and its Curator, Douglas Newton, an exhibit of the Art of New Guinea will be on display in the Caspary Gallery through June. In the accompanying article, Mr. Newton touches on similarities of cult objects found in areas of New Guinea separated by natural barriers. His hypothesis that this may be explained by early migrations is strengthened by the work of Professor Alexander G. Bearn and Dr. F. David Kitchin at The Rockefeller from 1961 to 1966. They have studied a genetically determined serum globulin — termed the group-specific component — a mutant of which occurs with great frequency in New Guinea. Apparently, it was moved across the then-existing land mass to Australia sometime in the distant past, as it is now found in aborigines of northern and west-coast Australia.

AT FIRST GLANCE, New Guinea art is bewildering. However inured one may become with time and familiarity, something of this particular kind of shock is liable to recur at the sight of a new style or a new object. In fact, this is one of the strangest of the world's arts, particularly among those we call the "primitive arts." Others are not so alien. Much African art, for instance, has for many years gained a ready acceptance, partly, as we all know, because for a little while during the early years of the century a



MEMORIAL POLE

number of European artists found its means and its presence congenial. This has often been considered a revolutionary expansion of our Western esthetic sensibility; but one is tempted to ask if the discovery of African art and its continuing popularity are the result of a greater degree of coincidence between African art and Western forms than might be expected. In other words, the recognition was mutual. But as far as New Guinea art is concerned, such recognition has not yet taken place. Nor is this altogether surprising, because it often confronts us with objects that seem to have no connection with anything we can imagine. Unquestionably they are works of art; they are designed and composed; line and volume have been important to their makers; but why are they like that at all? To find answers, one must appeal to the land itself and its people.

The island of New Guinea, lying north of Australia, is at its closest point separated from the continent only by the seventy-mile-wide Torres Strait. It is enormous — one of the largest islands in the world, second only to Greenland — and stretches 1,500 miles on its long west-to-east axis, greater in extent than Texas and Louisiana together. Physiographically, it presents sharp contrasts. The central spine of the island is a cordillera of steep-sided mountains with peaks up to 16,000 feet, snow-capped even in this equatorial location. The lesser ranges are split by deep valleys through which run great rivers; at the mountains' feet, rivers traverse the skirts of the foothills, crawling across endless swamps and alluvial plains which flood extensively during the wet seasons, for they are only a few feet above sea level. In these areas the climate is both torrid and humid. The vegetation consists largely of high evergreen forest, except in those areas where it has been burned over for cultivation or during hunting drives. There, coarse grass takes over and inhibits new growth. Coconuts and sago palms abound. The commonest animals are pigs, marsupials, and phalangers; the only native carnivore is a small, mongoose-like creature. Among the birds, the birds of paradise, cockatoos, and hornbills are best known. The rivers swarm with fish — including sawfish and sharks — and, until recently, crocodiles.

With all this tropical abundance, fewer than three million people live in New Guinea. There are indications that in the past the number was smaller, even

considerably smaller. In any case, the island was probably populated fairly recently. Because New Guinea is the end of a mountain chain that rises in the Himalayas and runs through Malaysia and Indonesia, the origins of its people are to be looked for in south-east Asia. It is presumed that they moved into New Guinea from that direction in a series of migrations.

Until recently, it has been taken for granted that although New Guinea was a magnificent field for anthropological research, it had nothing to offer in the way of archeology. This may well be true of much of the lowland areas, with their floods and high humidity, so well-calculated to break down organic materials quickly. However, the few excavations that have been carried out recently in the highlands by R. and S. Bulmer and J. Peter White have been rewarding. They have pushed back the date of the first human habitation of the island to 10,000 years

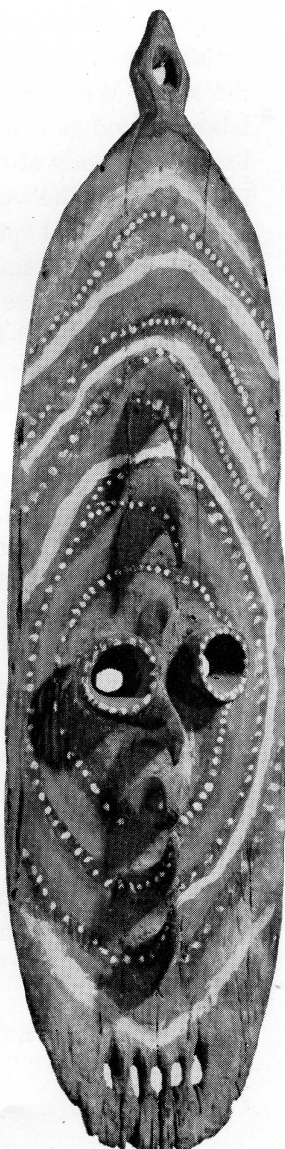
ago, and provide hints of various cultural phases. These remain to be linked up with earlier presumptions — made on the grounds of languages, physical characteristics, and material culture traits — that the earliest important migratory group was the Papuans, non-Melanesians, or pre-Austronesians. These dark people used a round-sided type of stone adz blade, and arrived in the period between 3500 and 2000 B.C. Subsequently, it is thought, there were arrivals of people — the so-called Melanesians, or Austronesians — who were lighter in color, spoke languages akin to those of Polynesia and Indonesia, and used a quadrangular adz blade. From about 1500 to 700 B.C., these Melanesians settled enclaves along the north coast, notably at the eastern end of New Guinea and the offshore islands. The mingling of the two groups added to the richness and variety of the cultures.

The constants in New Guinea cultures, apart from

SHIELD



HOOK-FACE



OPENWORK BOARD



some tools and foods, are few indeed. The number of distinct languages, for instance, is estimated as at least 700; custom is almost as varied.

Hardly less puzzling than the discernible varieties are the congruities in art styles and the thematic aspect of mythology and religion among widely separated areas. To name only three, there are marked parallels among the rituals and some types of masks of the Sepik District, the Asmat area, and the Papuan Gulf — each of which is some hundreds of miles from the other two. They do not exist in isolation from surrounding cultures, but it is notable that great highland regions, with completely different religious and cultural patterns, lie between the Sepik and the other

DEBATING STOOL



areas. Such congruences have been explained in terms of the results of large culture-bearing migrations from north to south across the mountains.

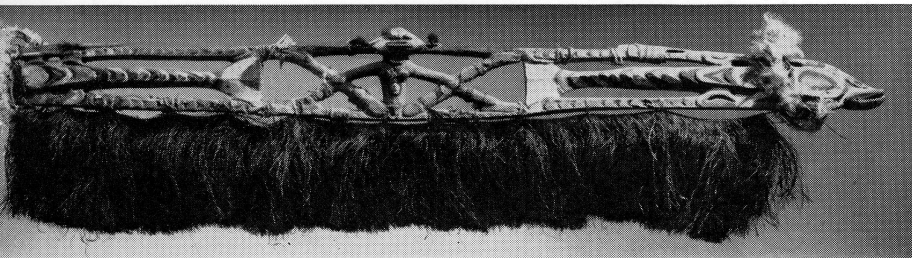
It is conceivable that the highlands were populated both from west and east, and that the great, and less attractive, lowland swamps and river areas were settled by groups crowded out of the mountain areas. A proximate cause for such movement is suggested by J. B. Watson's recent theory of an agricultural revolution in the highlands, brought about by the introduction of sweet potato cultivation to a hunting-gathering economy, followed by a population explosion. He tentatively dates this at 350 years ago. This does not rule out the possibility of many small movements inland from the coast; these certainly seem to have taken place in parts of the Sepik District, with attendant linguistic, cultural, and artistic consequences.

The major factor all the visual art of New Guinea has in common is its motivation; and this, in the last analysis, may be broadly called religious. Most New Guinea societies show a marked dichotomy between the sexes. While both men and women share the labor of food-gathering and some crafts, only men have the custody of sacred objects and can perform ritual actions. The women's part in religion is seen in terms of temporal episodes, so to speak: in the past, because it is often stated that women discovered the holy secrets and gave them to the men; in the future, because most ritual is so planned and deliberately staged that women can be the appreciative audience of its culminatory, spectacular side. It is the religious continuum itself in which they cannot share.

The essence of New Guinea religion is still not very well understood, partly because here again the variations — even among those so far recorded — are numerous. Singly or in combinations, we can find a creative god or gods; gods who intervene in human affairs and those who are indifferent; malevolent spirits and the ancestral dead. There is a strong belief in the spirit world existing side by side with the real world, and the possibility of manipulating it through magic. Much ritual is, in fact, devoted to this, and the most important end in view is usually the fertility of plants, animals, and men. Without an abundance of plants and animals mankind cannot survive from day to day. Without human fertility, so that it becomes strong in numbers, the human community cannot



WOMAN AND BIRDS



WOMAN AND CATFISH

long survive, for it will suffer from natural depletion and will fall prey to the headhunting raids of its neighbors. In southeast Asia, headhunting was connected directly with fertility: the captured head, as the seat of the soul, was buried in fields to disseminate its power. It has been suggested that in New Guinea headhunting (and cannibalism, which was by no means universal) were re-enactments of the mythological killing of a cannibalistic monster from whose dismembered body sprang the world's food plants.

Initiation to the great cults of adult life was a first social obligation of all boys and, occasionally, an especially forceful woman. Often this took the form of a symbolic devouring of the initiate by a monster—cassowary, fish, or crocodile—after which he was reborn to human society. Introduction to adult responsibilities followed. Among some groups, the rebirth was taken so literally that the initiate was ceremonially reintroduced to every food, natural element, and human artifact as though he had just come to life. Initiation often was accompanied by ceremonial ordeals involving bloodletting. The most lasting of

these was extensive scarification of the back and chest, intended to eliminate from the boy's body the female blood inherited from his mother. Part of this process included a first introduction to the cult and its sacred objects. This was not complete, and had to be followed by further revelations in later years.

Some cults involved large-scale ceremonial spectacles, which in certain areas were fairly direct enactments of important movements in the world-creating feats of gods and heroes. At such times the performers might also personify the spirits, and enact symbolically the beneficial deeds the community hoped the spirits would carry out. At other times all that was represented, in parades and dances, was the visiting presence of the supernaturals. This presence also could be magically invoked for help and advice, and the spirits delivered oracles through the mouths of shamans.

This bald and incomplete outline can give little idea of the wealth of New Guinea religious thought and action, with its complex, interlocking systems of symbolism—systems which, it will be remem-

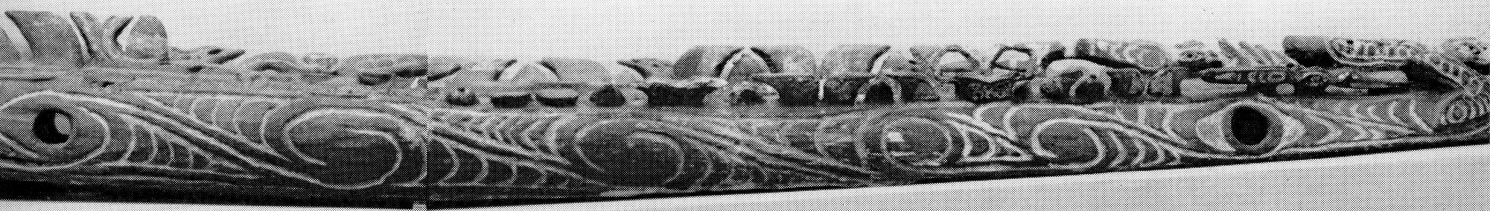


bered, varied radically from group to group in spite of certain underlying similarities of imagery or practice. To give one instance alone: among the head-hunting Asmat cannibals, almost all representation harked back to the great theme of fertility through killing. In Asmat thought (and in New Guinea thought in general), all death is due to black magic if it is not violent. Therefore the dead must be placated by headhunting in revenge. The victims themselves can be adopted as ancestors, since the more ancestors the group has, the greater its potency, and thus the greater the food yield of its sago trees. The human body is intimately linked with the idea of the tree; the Asmat believe themselves to be descended from wooden figures carved by an ancestor. The cutting of a sago tree, and the splitting of it to obtain the internal pith, are equivalent to the dismembering of an enemy body for food. The trees felled for MEMORIAL POLES *page 2* are attacked as though they were enemies, and they are carved into simulacra of war canoes with enormously enlarged prows. Such prows are always a mass of named ancestral figures and headhunting symbols. These symbols include the praying mantid, which is itself a cannibal; the cockatoo, which eats the fruit, or "heads," of the sago tree; the tails of opossums (also fruit-eaters), which resemble the shell nose-ornaments worn by headhunters; and so on. To express this body of concepts as a sequence is probably inaccurate, although inevitable. In the native mind, it may be more akin to a polyhedral figure in which the center is connected to all the vertices, which are themselves accessible from each other.

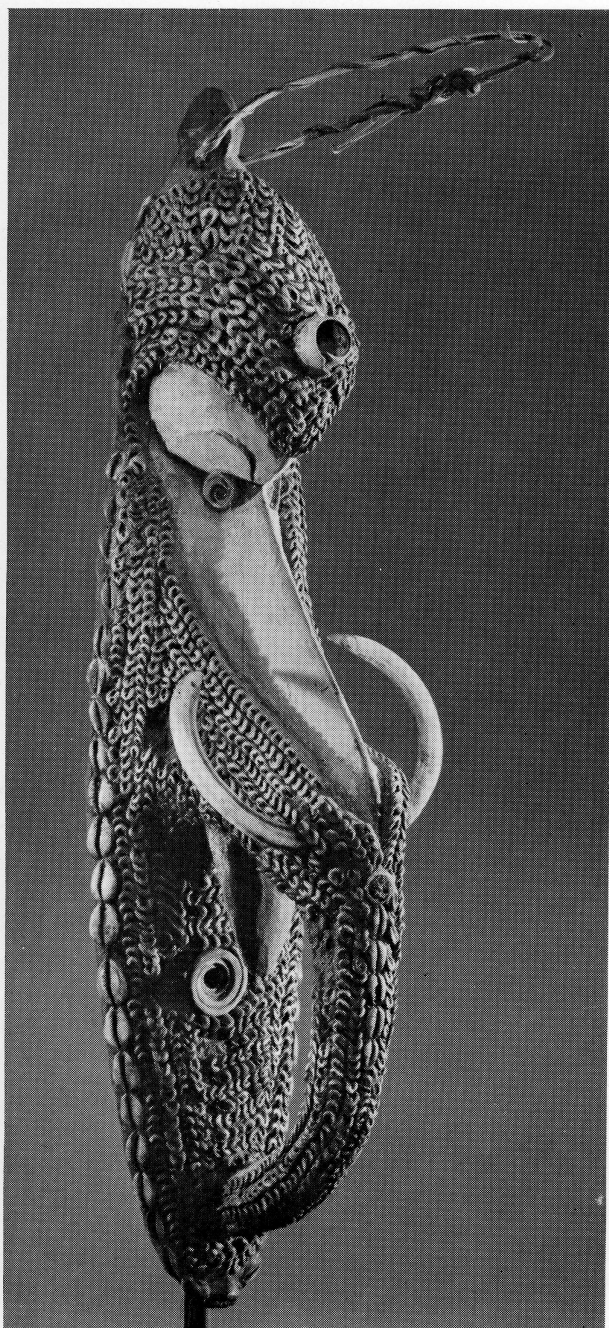
In spite of this wealth of other imagery, the main subject of New Guinea art is, except for a few marginal instances, humanity. This is understandable in terms of the ancestor-cults, and also in terms of the people's villages, hemmed in as they are by miles of

monotonous, natural features of swamp and forest. The people had no grasp of landscape as such. Predators upon, rather than collaborators with, their environment, they turned away from it and toward each other. Thus the human body, treated naturalistically or with extreme stylization, dominated their painting and sculpture. At the furthest extreme of stylization are paintings, SHIELDS *page 3*, and doors from some still barely explored mountain areas, in which native informants declare the figure is shown, although it is almost untraceable. More elaborate works are equally mysterious. Examples are the big OPENWORK BOARDS *page 3* of the Sawos tribe, which are among the masterpieces of primitive sculpture. Even their function is obscure. On one hand, they are said to represent novices who died during initiatory ordeals; on the other, merely to be items made for gift exchanges. Various totemic symbols are recognizable — a pig, birds, fish, a man's head; the large face at the top is said to be that of a weevil. What do the openwork elements mean? Why are there prongs at the bottom, similar to those used to keep bags of valuables away from vermin, yet useless here? Clearly, symbolism is involved, and not an arbitrary assemblage on an unconscious level. The artists of the surrealist movement, who first took an interest in Oceanic art, were enchanted by precisely the sense of mystery that arose from those uncomprehended conjunctions. But almost certainly the carving represents a human figure, that of an ancestor, and derives from a prototype with hooks on which offerings could be hung.

It may belong to the same thematic group as the strange hook-figures from the Karawari River, far to the south of the Sawos, the main religious carvings of an area about 200 square miles in extent. They occur in many forms. In some of them the group of hooks (which in this example constitutes the mid-



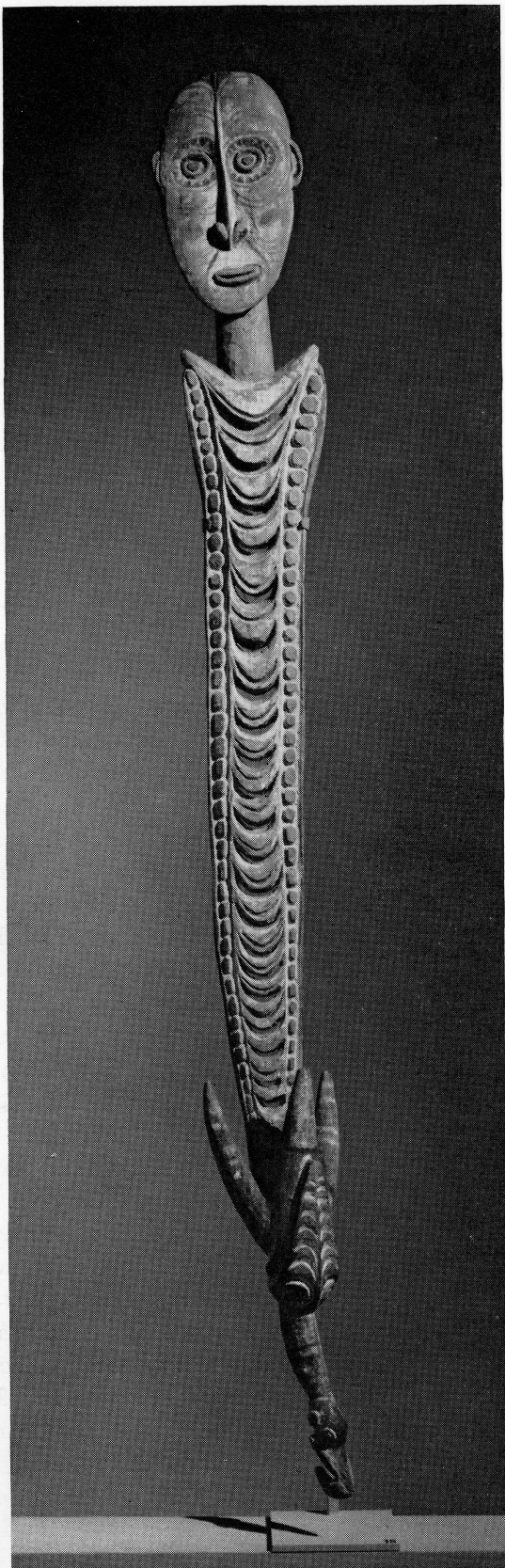
CROCODILE CULT OBJECT



MASK (MWA1)

dle of the body) is an independent unit representing a human face. An interesting transformation of meaning has taken place in one type of these objects. Whereas in those from one area the *HOOK-FACE* *page 3* is perfectly clear, in those of another the stylization is complete and the hooks are explained as representing a "CROCODILE" *page 1*. Perhaps in the early part of this century, a *CULT OF CROCODILES* *above* was introduced, thus leading to a reascription of the old symbols.

In areas where art is actually more naturalistic, a single object may allude only to a limited range of symbols. Take, for instance, the ancestors shown on the so-called *DEBATING STOOLS* *page 4* of the Iatmul living on the Sepik River, the whole point of which is that they are not functional stools at all. These objects were beaten with leaves to mark points made in debates; otherwise they were not touched. One can only speculate on this conjunction of stool and figure. The table may correspond to the stool owned by the ancestor represented. Going further afield, the combination of man and stool recalls the New Guinea funerary ceremonial of exposing the body on a special chair. That this is not performed in the Sepik, and in any case occurs in areas far distant from each other, indicates some of the fascinations and perils of speculations about New Guinea art. Carvings with definite general resemblances to each other may actually be completely unrelated. Several from the Sepik River show a *WOMAN AND BIRDS* *page 5* or *WOMAN AND CATFISH* *page 5*. This is not, as one might think, a case of different symbolic inflections of the same theme — because they appear to refer to two different legends: the one with birds to the origin of the Sepik River, that with catfish to the origin of a ceremonial house. Probably both were carried in dances to validate by display the crucial episodes of cosmic myths. Another instance consists of the carv-



ings perched as finials on the spires of ceremonial houses. They show human beings — sometimes men, sometimes women — grasped by TOTEMIC EAGLES cover. The men are stated to be victims of the village's headhunting raids, but the female figures refer to a legend of a great ancestor who was carried through the air by two eagles, her sons. Other carvings, masks in particular, not especially differentiated from each other, celebrate individual ancestors after whom they are named. Most of them are world-creators or beings who were present at the creation. The most spectacular are those of the Sepik River, which represent 'ancestors wearing the long nose ornaments of headhunters and covered with a wealth of valuable shells. They are always made in honor of ancestors on the mother's side, who are impersonated by the dancers wearing them — MASK page 7.

Besides, within a culture imagery has a certain fluidity, especially in terms of use. A perfectly ordinary utilitarian object, such as a HOOK at left to keep food baskets beyond the reach of vermin, could on occasion be bedecked and given offerings as the focus of an ancestral cult. Other such hooks might take the same forms as important cult figures normally kept in the secrecy of the ceremonial house.

But their sanctity fluctuated. It increased with age, until the objects were too dangerous to be touched. Then came the inevitable end. They were eaten by insects, or began to rot. Virtue had gone out of them, and they were thrown out to decay.

Their ignominious fate is a metaphor for that of all native art in New Guinea today. Of a vast wealth of carvings and paintings, little now remains there. The bulk has been sold to traders, missionaries, and museum expeditions and dispersed throughout the museums and private collections of the world. The people of New Guinea are now mainly concerned with adjusting themselves to the Western world, which their old art does not reflect, and the images of which they have not yet assimilated. Probably they never will. We can only wait and see whether the old impetus will revive, and if so, what new forms it will take.

HOOK

THE CONCEPT OF UNITY IN MECHANISMS OF DISEASE

BY ROBERT W. LEADER

EVEN BEFORE he emerged from caves, man's curiosity about his environment led him to many observations of the appearance and behavior of animals, as shown by the drawings he left behind. However, modern concepts of the biological sciences did not begin to take shape until the fourth century B.C. in Greece.

In addition to the scientists and philosophers, rulers of that age also showed interest in such matters. Alexander the Great was later described by Pliny: "Fired by the desire to learn the natures of animals, he trusted the prosecution of this design to Aristotle. For this end he placed at his disposal some thousands of men in every part of Asia and Greece, among them hunters, scholars, fishers, park keepers, herdsmen, bee wards as well as keepers of fish ponds and aviaries in order that no creature might escape his notice."

Aristotle was a grantsman of the Greek "Great Society," and has probably not yet been excelled in our own. Eight hundred talents (six hundred thousand dollars) were given him by Alexander to support his research. This must cause one to reassess the picture of Aristotle, who is widely regarded as a bandy-legged, contemplative little man wrapped in a toga. He must also have had a very large travel budget to allow him to cover the wide geographical



scope of his research interests. Certainly he set an amazing record for volume of publications.

In spite of these early beginnings in medicine and other sporadic observations of the natural diseases of animals by some of the great men of biology and medicine, such as Hunter, Pasteur, Koch, and the University's own Carl TenBroeck and Richard Shope, there has been a consistent and inexplicable neglect in translating knowledge of diseases that affect animals into their possible relationships to man. We retain a pre-Darwinian vestige of the belief that man stands alone in his Olympian relationship to that part of the environment that involves disease processes, although we can translate normal functions and structures analogously. This is patently fallacious in terms of phylogeny, because man is one of many animals; and while he may have the most complex nervous system, he certainly is less graceful than the cat, less agile than the gibbon, and less aquatic than the dolphin.

Near the end of the eighteenth century, Cuvier opened the entire science of comparative anatomy. He so brilliantly pursued structural similarities and worked them into patterns among species that he could demonstrate previously unsuspected relationships among widely divergent animals, from mollusks to mammals. He developed such a reputation that many believed him able to build a body from a few bones by mere inference. In his appreciation of the continuity of structure and function, he eclipsed all previous concepts, and gave birth to the science of paleontology, which has filled our museums with reconstructed fossils of mammoths, saber-toothed tigers, and pterodactyls.

One Ripple in the Stream

Following the inspiration of Cuvier, Darwin, and others, there have been exhaustive studies of phylogenetic relationships by anatomists, zoologists, and physiologists. Analogies among species have been the cornerstone of their work. Somehow, medicine has strayed from this broad concept of unity in the study of disease and has segmented itself into various compartments, the principal of which are veterinary medicine and human medicine. These are artificial divisions, and the sooner the borderlines are obliterated, the sooner we will harvest the benefits of the study of diseases of all animals and apply



Cuvier's concept of species similarities inspired many studies like this early nineteenth century wood engraving.

these to advancement of human welfare.

Most university libraries contain hundreds of books on comparative studies, yet often comparative pathology and comparative medicine do not even appear in the subject catalogues. This is partly because most students of disease have been physicians with an inclination to regard experimental animals principally as tools or test-tubes in which diseases could be produced and the results applied by extrapolation to reach solutions to human ailments. This idea was advanced by the immense successes of Pasteur, Koch, and others in diagnosing diseases and preparing vaccines. Such experiments with artificial "models" have been highly productive, for they have lightened the burden of sufferers from diabetes, malnutrition, heart defects, and many other ailments. We have now

reached a state of complexity in medicine that resists such direct assault, for arteriosclerosis, rheumatoid arthritis, multiple sclerosis, and cystic fibrosis are not easily related to straightforward, simple causes.

It is my thesis that we must open our minds and our eyes to the potential of comparative studies of organic and psychic diseases in all species of animals. For this purpose, man must cease to regard himself as unique and accept his status as one ripple in the stream of biology. Dr. Dubos has said, "If we look carefully enough we will eventually find an animal model for every human disease."

Gain in Bacon, Loss in Time

An excellent example of myopia in this context is the belated observation within the past few years that aged swine have a high incidence of arteriosclerosis of a type very similar to that in man. Lord Florey, among others, has pointed out that we have overlooked this because we do not allow pigs to grow old. They are usually slaughtered and eaten when they are young, so that little is known even about their normal life span, let alone the details of diseases which might occur during their dotage. As a result, we have gained in bacon but have lost valuable time in making progress toward the solution of arteriosclerosis.

There has, however, been a surge of interest in the comparative aspects of cardiovascular diseases of swine and other animal species. Scientists at the University of Pennsylvania, University of Oxford, Iowa State University, and several other laboratories are carefully observing the aging process in swine. Several geriatric centers have been established where not only arteriosclerosis but other diseases of old swine may be studied in depth.

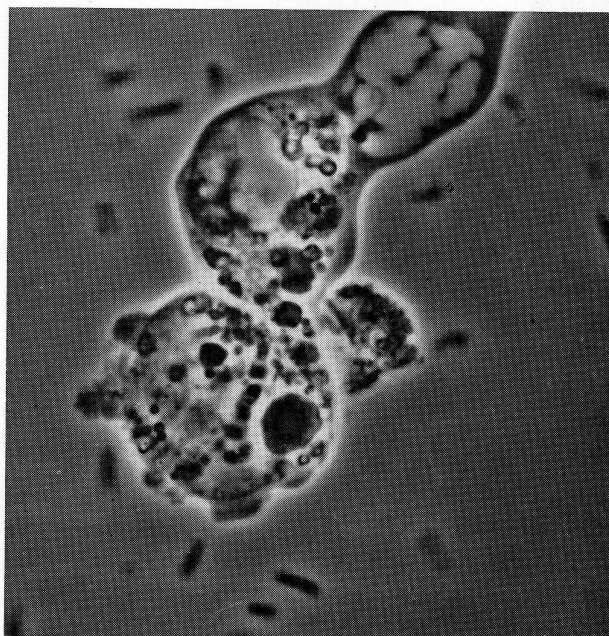
Other species of animals also can be of value. For instance, certain breeds of pigeons have a high incidence of spontaneous arteriosclerosis. Biochemical, pathologic, and genetic studies of these birds have provided some of the most valuable information recently obtained about the mechanisms of the development of atherosclerosis. There has been a rising incidence of vascular disease in the animals of the Philadelphia Zoo, which may be partly attributable to the stress of living in an urban environment.

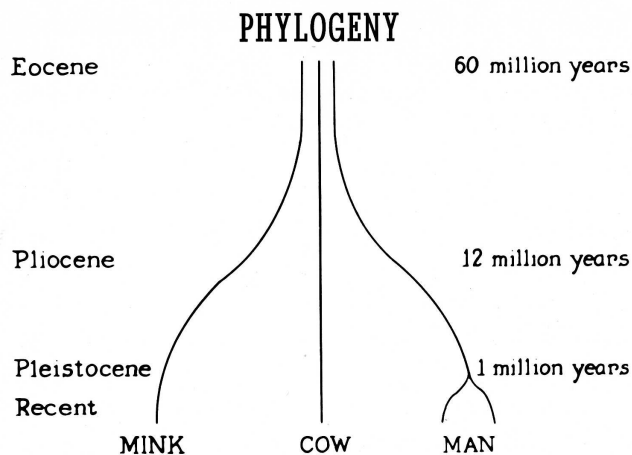
Our neglect of comparative cardiovascular studies may have cost us dearly in our progress toward the

eventual solution of the disease that is civilized man's greatest nemesis. Let us hope that our alertness and objectivity have been sharpened sufficiently to give us the benefits that will derive from more sophisticated comparative studies. As a stimulus to greater effort, a conference on comparative atherosclerosis was held in Los Angeles, California, in 1964. This meeting, which was attended by scientists from all over the world, devoted itself to intensive discussions of rats, rabbits, whales, hippopotamuses, pigs, man, and many other species. Out of the interchange have come many unanswered questions newly framed and, equally important, an increased appreciation of the continuity of disease patterns among species.

Perhaps this is the appropriate time to mention another untapped source of animal material that relates to chronic disease as a problem of the environment. One of the most dire emergencies in urban life today is air pollution. Many millions of dollars are being spent yearly in studies of its effect on human beings and in attempts to control the level of toxic and irritating materials. An obvious animal model that has not been thoroughly studied is the New York City police horse. A large number of them have lived their entire lives in the metropolitan area. This would be an ideal group in which to study the effect of

Phase contrast photomicrograph of leukocyte shows abnormally large, malfunctioning lysosomes.





Chediak Higashi syndrome—if an evolutionary trait—may have begun in these species some 60 million years ago.

exposure to this environment on cardiovascular, pulmonary, renal, and other organ systems. One would scarcely attempt to predict the nature of the abnormalities that could be found, but certainly a non-smoking population of mammals should be worthy of detailed study. Under the present system, most of these horses are retired to a rural setting to live out their years. It seems wasteful that advantage should not be taken of these circumstances. In the same vein, it would seem most appropriate to establish some form of thorough geriatrics studies of the thousands of dogs that share diet, air, and abode with their masters.

Next, because it presents conundrums in evolution, genetics, and basic cellular biology, I would like to discuss the hereditary abnormality of lysosomes known as the Chediak Higashi syndrome. This disease, known in children for some twenty-five years, has recently been shown to have a counterpart in two quite different species—the mink and the cow. As a result of work over the past three years, it is now known that this anomaly, which is inherited as a non-sex-linked Mendelian recessive, influences in a deleterious fashion the ability of its victims to produce normally functioning lysosomes. This is most obviously manifested as a dilution of the melanin pigment, which results in pale coloration and poorly functioning blood leukocytes. The condition makes the affected individuals extremely susceptible to bacterial infections. Studies under way in our laboratory indicate that this functional defect in the leukocytes

is related to reduced ability of the cell to discharge lysosome enzymes when they are needed in the cellular defense mechanism.

If one considers this an evolutionary trait, inherited by these three species at the time of their original separation in the mammalian tree, it would be necessary for the disease to have been carried in the animal population of the three species for a period of at least 60 million years, or since the Eocene epoch. While this is possible, it seems much more likely that the animals have been subjected to repeated mutations of this genetic locus throughout their history. This presents us with several intriguing questions. Is this gene locus unusually susceptible to disturbance? Is there some specific environmental influence responsible for the mutation? Could experiments be designed to produce this mutation on demand?

Above all, however, this condition illustrates the truth that there is indeed unity among species of animals, including man, in the fundamental nature of spontaneous diseases.

Of course, infectious diseases have long been the most well-worked area of comparative medicine. The contributions resulting from the studies of Rous on chicken sarcoma are well known, as are the classic discoveries of the rabbit papilloma and fibroma, made by the late Dr. Richard Shope. Dr. Shope also demonstrated the natural history of swine influenza virus, which develops via a complex cycle through two invertebrate species, the earthworm and the lungworm, and through a masked or inactive stage in its definitive mammalian host. This work formed the basis for much of the most important knowledge about human influenza gained during the last decade.

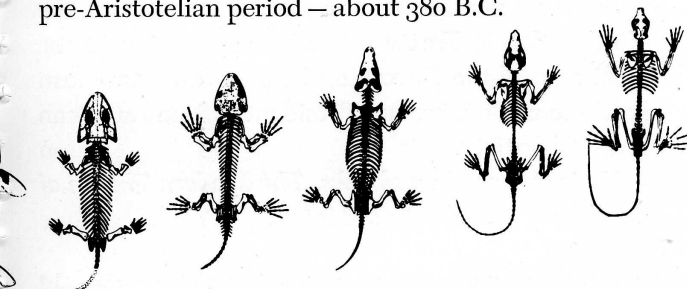
This leads naturally to a discussion of scrapie, an interesting chronic viral disease of sheep. This affliction, which may have an incubation period as long as two to three years, eventually results in the death of animals because of degeneration of the brain and spinal cord. The disease has been under study by workers in veterinary medicine for many years. In some of its manifestations it resembles multiple sclerosis, and in others it is closely akin to kuru, a disease of man, which causes devastating death losses in the Okapa region of New Guinea. There the children and young adults of some families have a high incidence of a slow brain degeneration. The microscope

reveals marked similarities between this disease and scrapie. Working from this clue, a group headed by Dr. Carlton Gajdusek at the U.S. National Institutes of Health inoculated several species of animals with brain tissue from patients who had died of kuru. After a period of two or three years, chimpanzees so inoculated developed a very similar disease. No experimental animal except the chimpanzee has thus far shown any abnormality. The point relevant to this discussion is that careful studies of the sheep disease, when analyzed perceptively and intelligently, led scientists to experiments that may help solve the mystery of kuru and give tantalizing new leads to the study of multiple sclerosis. This is a long geographic, as well as phylogenetic, stretch.

Thus far, little concerted effort to study the diseases of zoo animals has been carried out. Some such programs are beginning in the United States, but the most advanced one is that being developed at the Nuffield Institute for Comparative Medicine at the London Zoological Park. This recently created laboratory in Regent's Park is a modern research institute, whose objective is to learn as much as possible from observing and studying the diseases that occur in the animals of the zoo. Several projects, under the leadership of Dr. L. G. Goodwin, are rapidly making contributions to our knowledge of blood diseases, metabolic bone afflictions, and several others. The foresight exhibited in the planning of that laboratory is a model for the rest of the world to contemplate.

Thus, by looking about us we can see that for the objective observer, nature's own experiments wait in the form of naturally occurring animal diseases. There, for the watchful, exist the complex interplay and overlapping spectra of afflictions of many species. If we are sufficiently alert to synthesize these relationships and bring them into proper focus, they will resolve in a consistent, logical pattern — a sort of periodic table of diseases.

In conclusion, I would like to call attention to a quotation taken from an anonymous Greek in the pre-Aristotelian period — about 380 B.C.



Take twenty or more eggs and let them be incubated by two or more hens.

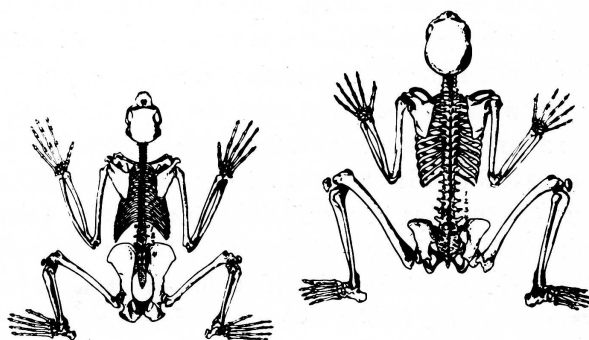
Then each day from the second to that of hatching remove an egg, break it and examine it.

You will find exactly as I say, for the nature of the bird can be likened to that of man.

This incisive bit of philosophy anticipated by nearly 2300 years Darwin's theory of evolution and Haeckel's law of biogenetic recapitulation. Yet we have not fully heeded its implication of unity in the world of disease. The next period of development in biomedical research should be a broad approach to studies of disease that will include all animals in addition to man.

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- Dr. Leader — who is Associate Professor in The Rockefeller University — gave this lecture in a slightly different form in Caspary Auditorium in February.*



Relationships among widely divergent animals remain a challenge to today's disease hunters.

NEW TRUSTEES



GEORGE F. BENNETT

GEORGE F. BENNETT and FREDERICK SEITZ have been elected Trustees of The Rockefeller University, President Bronk announced in February.

Mr. Bennett is Treasurer of Harvard University. Born in Quincy, Massachusetts and a graduate of Harvard, Mr. Bennett very early resolved to devote his career to investment management, and it has remained a dominant interest in his life ever since. Following his graduation, he was with the First Boston Corporation, then for six years with Newton, Abbe & Company, and since 1943 with the State Street Research and Management Company and President of the State Street Investment Corporation. His numerous directorships in corporations include the Commonwealth Oil Refining Company, Niagara Mohawk Power Corporation, and Middle South Utilities, Incorporated. He is also President of Federal Street Fund, Inc., Chairman of the Executive Committee of Mid-America Pipeline Company, and a Trustee of Wheaton College.



FREDERICK SEITZ

Dr. Seitz is President of the National Academy of Sciences, a post he has held for five years. Formerly Professor of Physics at the University of Illinois and Dean of the Graduate College and Vice President for Research of that University, Dr. Seitz has been concerned all his life with the relationships among science, education, and world affairs. He is also a pioneer and authority in the field of solid state physics. After receiving the Ph.D. degree from Princeton in 1934, Dr. Seitz was a member of the research staff of the General Electric Company for several years, and served on the faculties of Rochester, Pennsylvania, and Carnegie Institute of Technology. Among his many activities he was Science Advisor to the North Atlantic Treaty Organization for two years, Chairman of the Governing Board of the American Institute of Physics, and President of The American Physical Society.

He is author of two books, *The Modern Theory of Solids* and *The Physics of Metals*.

NEW FACULTY



HAO WANG

A NEW APPOINTMENT to the faculty in the field of logic and philosophy has been announced by President Bronk. Dr. Hao Wang — Gordon McKay Professor of Mathematical Logic and Applied Mathematics in Harvard University, and Visiting Professor this year at Rockefeller — has accepted permanent appointment as Professor effective July 1. Dr. Wang, a mathematical logician, received the M.A. degree from Tsing Hua University in his native China in 1945, and the Ph.D. degree from Harvard University in 1948. After three years as a Junior Fellow, he became Assistant Professor of Philosophy at Harvard. In 1954, at the invitation of the University of Oxford, Dr. Wang went to England as John Locke Lecturer in Philosophy, and stayed on as Reader in the Philosophy of Mathematics until 1961, when he was recalled to Harvard to accept the Gordon McKay chair in Mathematical Logic and Applied Mathematics. Dr. Wang recalls that as a Junior Fellow his interests were in the foundations of mathematics and in phil-

osophy in general — interests which have continued to this day. Then, before leaving for Oxford, he turned to the theoretical study of computers. Recently the focus of his research has generally shifted to technical logic as a strictly mathematical discipline, and to philosophy which is closely related to exact human knowledge. He is author of the book, *A Survey of Mathematical Logic*.

THE ROCKEFELLER UNIVERSITY NEWS

■ President Bronk delivered the commencement address at the Midyear Convocation of the State University of New York at Buffalo. Also in February, he gave the address at a Convocation of the Governor and General Assembly of North Carolina for the dedication of the North Carolina Science and Technology Research Center.

■ Professor Mark Kac delivered the Josiah Willard Gibbs Lecture in January at the Annual Meeting of the American Mathematical Society in Houston. The subject of his address was "Some Mathematical Problems in the Theory of Phase Transitions." Previous honorary lecturers in the series include Doctors George E. Uhlenbeck of Rockefeller University, Albert Einstein, and Vannevar Bush.

■ Among the visiting scholars in residence at the University during January and February were Professor Morton Bogdonoff of the Department of Medicine, Duke University; Sir Lawrence Bragg, Secretary of the Royal Institution and former Director of the Cavendish Laboratories, Cambridge University — and Lady Bragg; Doctor C. E. Dolman, Professor at the University of British Columbia, and biographer of Theobald Smith; Professor Dagfinn Føllesdal of the Department of Philosophy, University of Oslo; and Professor I. Arthur Mirsky, Chairman of the De-

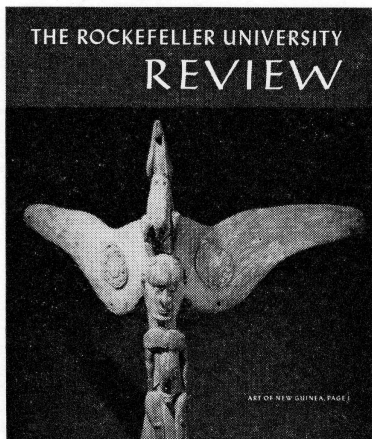
partment of Clinical Science, University of Pittsburgh School of Medicine — and Mrs. Mirsky.

■ Professor René J. Dubos received the sixth annual Phi Beta Kappa Science Award for his book, *Man Adapting*. The 1963 award was also conferred on Dr. Dubos, for his *The Unseen World* published by The Rockefeller University Press. "Dubos has written many informative and iconoclastic books," *Nature* comments on *Man Adapting*, and "This is the best. It is compulsive reading. . . ." Professor Donald R. Griffin received the honor in 1965 for his book, *Bird Migration*.

■ A special dinner meeting of the Mayor's Science and Technology Advisory Council was held in Welch Hall in January. University presidents and business leaders heard of the Council's interest in creating a more favorable environment to attract scientifically based industry to New York City. Speakers included Mayor Lindsay and Gaylord Harnwell, President of the University of Pennsylvania.

■ Organizations to which the University has been host in recent months include the American Psychiatric Association, New York District Branch; the Carnegie Commission on Educational Television; the Courant Institute of Mathematical Sciences; the Health Research Council of New York City, Executive Committee; the Mayor's Science and Technology Advisory Council; the Institute of Electrical and Electronics Engineers, Group on Engineering in Medicine and Biology; and the National Institutes of Health, sections on Cell Biology and Study (Division of Research Grants), Behavioral Sciences and Genetic Study.

■ The Madison Square Boys' Club conferred its American Medallion Award on Professor Reginald M. Archibald at the Club's annual meeting in February. The honor was presented by Philip Kuther, 13 years old, for the 6,000 members of the Madison Square organization, in recognition of Dr. Archibald's 26 years as a volunteer worker and "A Wonderful Human Being."



THE COVER shows the finial for a ceremonial house in Chawos, New Guinea. Carved in wood, this totemic eagle grasping a man is one of the pieces of New Guinea art on exhibit in Caspary Gallery through June. Photograph by Charles Uht.

ACKNOWLEDGMENTS: PAGES 1-8 photographs courtesy of The Museum of Primitive Art. PAGES 9, 10, and 13 illustrations courtesy of The American Museum of Natural History. PAGES 11 and 12 micrograph and diagram courtesy of Dr. Leader. PAGE 14 *left* photograph courtesy of Harvard University; *right* photograph courtesy of the National Academy of Sciences. PAGE 15 photograph by The Rockefeller University Illustration Service.