Medical Research

Certain medical problems are peculiar to New Guinea; others are of greater importance in New Guinea than elsewhere. Still other problems do not occur more frequently in New Guinea than in other underdeveloped parts of the world, but they are possibly more easily studied in New Guinea.

The work which has been undertaken on kuru in the eastern Central Highlands of New Guinea is an example of developments which may arise from research on what at the time appeared to be a matter of purely local significance. Kuru, a fatal organic disease of the central nervous system, occurs in a relatively small area of the Central Highlands of New Guinea. It affects people of the Fore linguistic group, of whom there are some 10,000 to 15,000 individuals. Between 100 and 200 of these people die of the disease each year. To the Fore people, kuru is the most important disease that occurs, and it is a dominant factor in their culture. To the world kuru is unimportant, a few people dying in a small unknown tribe, a rare disease mentioned in small print or as a footnote in most textbooks. There has already been extensive clinical, epidemiological, genetic, anthropological, and experimental research on kuru by Australians and Americans. The most decisive discovery (made by Gajdusek and his collaborators) was that the disorder could be transmitted from patient to ape by intracerebral inoculation of autopsy material and that the disease is in fact the action of a transmittable agent with a long incubation period. This discovery has established a new horizon in the study of so-called degenerative or system diseases of the nervous system.

Arteriosclerosis, hypertension, and gout, common in Western society, remain rarities in Melanesia, and observations on the relation of these ailments to increasing Westernization may assist in understanding the etiology of these disorders.

When fully established, the Institute of Human Biology expects to be involved in a balanced program in which work leading to an understanding of the biology of man will be conducted along with medical investigations which may be of more immediate importance to the welfare of individual people. Inquiries are invited from workers who may wish to undertake research in human biology among people undergoing rapid socioeconomic changes.

Summary

A new research institute has been established in New Guinea. The Institute will initiate research into a wide range of problems relating to the biology of man in a country well placed for such investigations. The influence of a changing culture on the incidence and forms of disease as well as medical problems of peculiar importance to New Guinea are also to receive attention. Inquiries from interested workers are invited.

NEWS AND COMMENT

Japan (II): University Turmoil Is Reflected in Research

Japanese universities are facing the most serious problems of any sector of the Japanese scientific establishment. An extraordinarily virulent outbreak of student unrest has struck most of the nation's leading universities over the past couple of years, thus disrupting the orderly progress of scientific research. And the campus turbulence has served to highlight a number of organizational and social rigidities that seem to be hampering the academic research effort. As one American science planner who recently returned from Japan expressed it: "The system is lousy. It's remarkable how well the Japanese have done considering the handicaps built into their system."

The Japanese universities have unquestionably made great strides over the past two decades. Harry C. Kelly, provost at North Carolina State University, who was the top science adviser to General Douglas MacArthur during the American occupation and who cochaired the U.S.-Japan Committee on Scientific Cooperation for many years, told *Science*: "The conditions now are pretty good. The scientists still need a lot of material help, but I compare the situation today with 1946 and it's a new world over there."

Similarly, an American science administrator who spends most of his time squiring visiting American specialists around Japan reports that their general reaction is: "Golly, 3 years ago I'd have guessed they were 15 years behind in my field. Now I'd guess they're only 3 years behind." In some fields, the Japanese may even be ahead. Harold R. Mighton, manager of technical liaison for the DuPont Company in the Far East, told me that the polymer department at Kyoto University, which has more than a dozen full professors, "would make any of ours look sick."

But the entire Japanese university system is currently in a state of crisis and there is considerable debate about the health of academic research. On a recent month-long reporting trip to Japan I discovered a curious difference of opinion about the strength of academic science. Most of the Japanese I interviewed expressed a belief that the universities are the strongest part of the nation's research system, while almost every Westerner I encountered viewed industrial research as the chief glory of Japanese science. But proponents of both views agreed that the universities are facing critical problems that must be resolved if Japan is to continue its phenomenally rapid rise to world power status.

In the first article in this series I discussed Japan's initial ventures into the areas of "big science." This article will focus on university science, and a subsequent article will focus on industrial research. I have already mentioned some of the difficulties of coping with Japan, but it may be salutary to caution the reader again. Even specialists who visit Japan have difficulty assessing the quality and significance of Jap-

anese research. One American pollution expert who visited Japan in 1968 for the explicit purpose of assessing water-pollution-control efforts, for example, concluded rather lamely in his official report that "work done by research institutes is either extremely basic or very primitive—I could not determine which in the time I had to look at their programs."

There are similar problems in assessing the strengths and weaknesses of Japanese institutions. To cite just one example, the city of Tokyo, the world's largest city with more than 11 million inhabitants, operates to a large degree without using the street address system that most Westerners would regard as indispensable. Few Tokyo streets have names, and while a new numbering system was adopted a few years ago, few taxi drivers use the numbers to find a building. To reach a particular destination you have to know where it is located with reference to a major intersection or a well-known landmark. Once when I tried to reach a famous rock garden by taxi, I was dropped at a children's playground several blocks away. Another time I tried to reach a downtown office, only to be dropped at a Sapporo Beer Hall several blocks away. In each case I had the address written out in Japanese, but the taxi driver simply didn't know the location of the particular building I wanted. How a major city can operate effectively without relying on street numbers is baffling to a Westerner. But Tokyo does manage to function, of course, and it thus provides a healthy reminder that Western organizational patterns are not the only ones. Thus the reader is warned that much of the following discussion of Japanese universities is based on Western viewpoints, and while the Japanese themselves agree with many of the criticisms of their university organization, there may well be sources of institutional strength too subtle for Western eyes to detect.

Japan has three major types of universities. As of 1967, there were 74 national universities, which are supported by the central government; 39 public universities, which are supported by other governmental entities; and 256 private universities, which are heavily supported by student fees.

As is true in this country, the bulk of the fundamental research in Japan is performed in the universities and their attached research institutes, while the bulk of the applied and developmental work is performed by industry. Unlike the situation here, Japan has few, if any, "think tanks" on the model of the Rand Corporation or Stanford Research Institute—a lack which several Japanese scientists told me impedes the application of basic research findings to national needs.

Mass higher education only came to Japan after World War II, but the Japanese have been quick to seize the opportunities offered them. About one of every five 20-year-olds in Japan is reportedly enrolled in either a 4-year university or a 2-year junior college, a figure which ranks somewhat behind the United States, which has about 33 percent enrolled. The great bulk of the 1.5 million students, more than 75 percent by various recent counts, are in the private schools, which are considered strongest in the humanities and social sciences and relatively weak in the natural sciences.

The most important scientific work, according to officials at the Ministry of Education, is concentrated in the national universities, particularly the seven former Imperial universities, and in some four or five private universities. But university research in Japan is woefully underfinanced by American standards. The government allocated more than half of its total R&D budget for the fiscal year ending 31 March 1970 to university research—but the amount was still only about $320 million, which is less than the combined federal support for academic science at just six leading American universities.

The Japanese university system is elitist in the sense that graduation from one of the top schools is often a prerequisite to gaining the leadership posi-

POINT OF VIEW

Morris Fishbein, who edited the Journal of the American Medical Association *for 26 years and who is currently the editor of* Medical World News, *a news magazine for physicians, recently took issue with efforts by medical journals to restrict dissemination of medical information in the press. Because his remarks are applicable to the scientific community in general, the following excerpts are reprinted from Fishbein's editorial in the 28 November 1969 issue of* Medical World News.

For years, many a medical journal has insisted that articles accepted for consideration be submitted for publication solely to it. The obvious question is, What constitutes publication? The interpretation most widely accepted is that publication implies the use of the author's complete manuscript, including photographs, charts, tabular material, bibliographic references, and the other concomitants of the usual scientific contribution. Such publication differs greatly from the condensed report common in the medical news media, or the abstract that may appear in the program of a scientific meeting, or the publicity release circulated by the organization holding a meeting.

In the interest of more complete presentation, the medical news publications often do use one or more of a researcher's illustrations or tables of data. But seldom if ever do they publish the complete scientific contribution as presented by the author. On the other hand, the news media may enhance the value of a contribution by including in their report comments from the public discussion of the manuscript, or interviews with other scientists concerned with the subject.

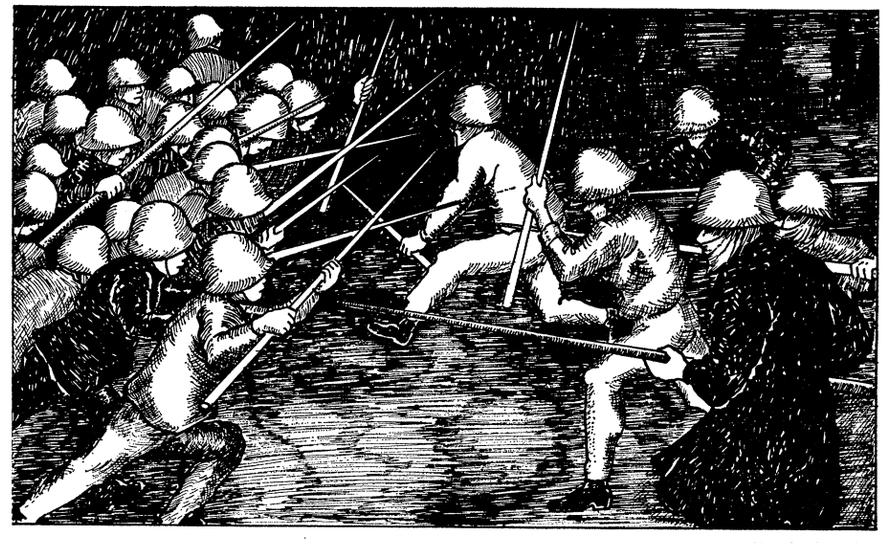
The times have changed. But the editors who have attacked the current system apparently would like to revert to the strictures, if not monopolies, on information that prevailed more than two-score years ago. Like King Canute, who could not forbid the inroads of the rushing waters, they may be crying with voices that are not likely to be heard. . . .

The distinguished editors of the clinical journals would do a disservice to the medical profession by demanding that medical investigators withhold information about their observations and conclusions until sufficient time has passed to allow the medical journals of record to present their work in its totality. Nor should they expect investigators to heed such directives.

tions in government, industry, and the academic world. There seems to be an almost universally recognized "pecking order" among Japanese universities, with Tokyo and Kyoto universities heading the list and a handful of other national and private universities close behind. Graduates of second-rank universities must generally content themselves with minor jobs after graduation, while graduates of the prestige institutions have an inordinately easy time reaching positions of leadership. By one recent count, alumni of Tokyo University comprise roughly 20 percent of the national Diet, 30 percent of the heads of large corporations, and 30 percent of all university professors.

Not surprisingly, the pressure to get into the "right" university is intense, and the university entrance examinations, which are administered separately by each university, become a make-or-break point in a student's life. The entire Japanese system of elementary and secondary education has been likened to a vast cramming course designed to prepare students for the university entrance exams. Students who fail to get into the university of their choice after going through the "examination hell" occasionally commit suicide; others try again and again at the same school rather than accept a lesser college and limit their future possibilities. There are reportedly hundreds of thousands of "ronin" (schoolless students) who are marking time, frustrated, waiting to get into the universities. Once they get in, however, they often find that the pressure is off, the work is easy and unrewarding, and the university is a disappointment. Thus the rhythm of Japanese education is the inverse of our own system, which tends to be easy and undemanding on the lower levels and increasingly competitive at the higher levels.

The Japanese national universities, in their formative stages, were patterned largely on the 19th-century German model, and while American influences have become increasingly important in the postwar period, some of the rigid, bureaucratic structure of the last century remains. In one sense the Japanese universities are much more democratic than their American counterparts, for the faculty generally elects the president and other key administrators. But in another sense, the Japanese universities are much more hierarchical in structure than are those in America. The universities, including their research institutes and medical schools,



Marshall Kathan

are organized according to a chair system which gives senior professors extraordinary authority. A typical chair in an experimental science might include a titular professor, an assistant professor, two assistants, and some postgraduate students. The senior professor is said to have enormous influence over the research directions his subordinates can explore, and even over their future employment and promotion prospects. Daizo Ushiba, dean of the medical school at Keio University, a leading private institution, for example, told me that senior medical professors often dictate where their students will go for postgraduate training, a situation which does not usually please those young doctors assigned to duty in a boondocks hospital.

Some Western scientists believe the chair system forces junior scientists to show undue reverence for their seniors and thus inhibits the free-wheeling discussions common in the West. "The system is dreadful," one American physicist with long experience in Japan told me. "A great deal of the university work is mediocre because it's badly supported and it's dominated by men of antiquated thoughts who suppress the initiative of younger men. The system is almost guaranteed to keep university research in a stupid, dull routine."

Funds from the Ministry of Education to the national universities are distributed, for the most part, by chair. Each professor gets essentially the same fixed sum, with minor adjustments depending on whether he is engaged in theoretical or experimental or clinical work. American scientists who regard our own competitive project grant system as a major strength of American science tend to view the Japanese system as "simplistic" in that it ignores both merit and need (except for a small fund that is awarded competitively to projects of particular merit).

The chair system has come under increasing attack in recent years. Radical students and young faculty members at Tokyo University's medical school, for example, have demanded complete dissolution of the system. And the dominant opinion at the October 1968 general meeting of the Japan Science Council, according to press reports, was that the root cause of campus turmoil in Japan is the "19th century university system of the German type centering around the chair system" which is "no longer in tune with the times."

The most serious problem currently confronting the universities is the same one that is currently plaguing American institutions of higher learning—student unrest. But if the American public is upset over the disruption that has occurred at Berkeley, Columbia, and other U.S. campuses, it would be utterly appalled at the extent of disruption in Japan. By one informed count, there were major disputes at well over 100 campuses in Japan during the 1968–69 academic year, and more than a dozen universities, including some of the most prestigious in the nation, were wholly shut down for periods that sometimes extended into months.

At various points during the past year some 27,700 newly enrolled students at 22 national and private universities were unable to start classes; some 17,000 students had their scholarship loans suspended by the Japan Scholarship Association on the grounds that there were no reports of their achieve-

ments; thousands of students were unable to take final examinations, thus losing a year of academic progress; and at least eight national universities were simultaneously without a president.

The Japanese student movement has long had a reputation for ritualistic playacting, with great masses of students and police performing their roles with remarkably little damage to property or persons, but in the last year or so the level of violence seems to have escalated. There have been several deaths resulting from student clashes, as well as several suicides attributed to university unrest, and the number of wounded is reportedly well up into the thousands. Student factions have fought with each other, with university authorities, with the faculty, and with the police, and the faculty has occasionally fought back. At Yamagata University, for instance, a platoon of 150 "hawk" professors reportedly overran student barricades, beat the radical students with sticks, and handed the leaders over to the police.

Campus Issues

The chief issues involved in the campus disputes have differed from campus to campus and have ranged from international politics to local campus conditions. Students have protested against the Vietnam war; against Japan's military alliance with the United States; in favor of the return of Okinawa to Japanese control; against U.S. bases in Japan; and against various other policies of the incumbent government of Premier Eisaku Sato or of the United States. They have also rebelled against remote and fossilized professors, poor academic facilities, unstimulating courses, mammoth enrollments, increases in tuition at the private schools, impersonal mass education, lack of student participation in university governance, middle-class values, the dehumanizing aspects of society and the university, and the rigidity with which their futures are decided. A banner seen at a 1968 demonstration in the Ginza, Tokyo's main shopping and entertainment area, illustrated some of the divergent themes. It simply said, in translation: "Anti-war —A student who failed to pass the entrance examination."

The campus disturbances have clearly had an impact on scientific research, but the effect has been uneven. Some laboratories have been closed down for months; others have continued to operate even while their governing university was officially closed down. There is no question that many individual researchers have had their work destroyed. Take the case of Kenji Uraguchi, a sprightly, elderly toxicologist who is currently at the East-West Center in Honolulu. Uraguchi had been conducting long-term feeding experiments on some 2000 mice in a laboratory at the University of Tokyo as part of a cancer research project. Last December, however, student radicals seized the building and refused to let the scientists in. Uraguchi finally talked them into letting him remove his mice; he put them on a truck and drove through the city, seeking a new home for his experiment; but he finally had to settle for separating the mice among three separate laboratories. Since the experiment required strict temperature and humidity controls, however, the work was essentially ruined. When I talked to him in Honolulu this fall, Uraguchi had cancelled the research project and disposed of some 1500 mice. He had also just heard that the place where he was keeping the remaining 500 mice had just been occupied.

How many similar cases exist is anybody's guess. Officials at the Ministry of Education told me they had heard estimates from prominent scientists that Japanese research has been set back 3 to 5 years by the campus disturbances, but other government and university officials told me they thought the disruption had been surprisingly light. No one seems to have made a systematic survey of the problem. The chief immediate impact of the disturbances has been to close some laboratories and, perhaps more significant, to involve the professors in endless meetings and confrontations, thus sapping them of the time and energy to do research. The chief long-range impact may well result from the disruption of the education of tens of thousands of students. *Nihon Keizai*, a daily economic newspaper, deemed the situation serious enough to warn in an editorial in October that "paralysis of research functions at universities due to campus disturbances and blockade will bring about a long-term stagnation of Japanese research and development."

American scientists intending to go to Japan will no doubt be interested in knowing what effect the campus problem might have on their own work. The answer seems to be that it is possible to work effectively in Japan, but you have to be careful to pick your spot. Violence against American scientists seems to be practically nonexistent. But there have been a few cases where work has been disrupted or prevented. In one instance, John Westley, a University of Chicago biochemist, was scheduled to work at Osaka University's medical faculty this year under the U.S.–Japan Cooperative Science Program, but his visit was cancelled after student radicals warned the host professor that Westley's presence might spark trouble. In another case, also at Osaka University, an American scientist was unable to use his lab for the last 3 months of his stay, but he had completed his data collection in the first 9 months of his stay, so he was able to spend the remaining time writing up his results. These cases are said to be "isolated instances" and most Americans working in Japan are said to have carried out their research relatively unaffected.

American granting agencies, however, have clearly been affected by the campus turmoil. Both the United States military agencies and the National Institutes of Health have sharply cut back their support of Japanese scientists for reasons that stem partly from academic opposition, and the Ford Foundation last fall had to cut off its subsidy to Kyoto University's Southeast Asia Research Center after students charged that the research supported American "aggression" in Vietnam.

Getting Tough

The tide of student disruption seems to have ebbed in recent months. University authorities have been increasingly willing to call in the police, and some universities, such as Kyoto, have mobilized nonradical students and faculty in an effort to suppress disruption. A tough new law has also been put into effect. It gives the Education Minister wide powers over the universities, including the right to shut down schools where disputes can't be handled by the university administration. The law has aroused great opposition in academic circles, not only for its provisions, but also for the way it was steamrolled through the Diet, but its mere existence is said to have stiffened the backbones of embattled school administrators.

The police have also beefed up their riot squads. I happened to be in Tokyo at the time of Premier Eisaku Sato's departure for the United States to conclude an agreement on Okinawa. The police were everywhere—armed with

body-length aluminum shields, helmets and visors, hand and shin protectors, and backed up by armored trucks, high-pressure water hoses, and other equipment. The radical students had threatened to disrupt Sato's departure, but they never got close to the well-guarded airport. When they attacked a nearby train station, they were clobbered in what the press interpreted as a "lop-sided" battle.

Japan's educational system is clearly in a state of transition—beset by enormous strains and trying to find a path toward reform. Already some universities have announced radical innovations. Tokyo Institute of Technology, for example, announced a plan last June whereby all faculty members would submit to periodic "aptitude examinations" by a committee of their peers to help determine whether they should be promoted or asked to resign. Other universities have been trying to increase student participation in campus decision-making. And virtually every major university and government agency concerned with education has a committee studying the need for reform.

Japan is probably suffering from a more serious "generation gap" problem than any other country in the world. Japanese society has traditionally been based on reverence for one's elders and on submersion of individual desires into the collective will. Now the Japanese youth are demanding a share in institutional power and are asserting that they have individual needs which must be met. Whether the forces now at work in Japanese society will ultimately strengthen the nation, by ridding it of past rigidities, or weaken it, by lessening Japan's ability to harness its energies single-mindedly on a collective goal (such as war or economic growth) remains to be seen. But, to the extent that national power depends on a strong scientific research establishment and a first-rate university system, there seems little doubt that Japan's future progress will hinge on its ability to solve the current academic crisis.

—PHILIP M. BOFFEY

Endangered Species: Congress Curbs International Trade in Rare Animals

The Himalayan giant panda and the Nubian wild ass were granted a reprieve early in December when the President signed into law a bill (PL 91-935) to eradicate U.S. trade in endangered species of wildlife. Instead of relying on game wardens here and abroad to halt poachers at the production end of the rare animal trade, the law would eliminate the market for such rare animals as the Asiatic cheetah, woolly spider monkey, bush baby, and snow leopard.

Conservationists have long stressed the importance of preserving individual species of wildlife, both for possible genetic, behavioral, or medical research and for esthetic reasons. "The prospective picture of man, living alone on his planet except for domesticated food animals or pets, seems a rather dreary one," observed one Congressional subcommittee.

But with human expansion into former wildlife habitat, many wild animal populations have been reduced to the point where hunting pressure or climatic quirks could push them over the brink. Since the turn of the century, an average of one species a year has quietly made its exit somewhere in the world, and one endangered species list currently popular in government circles includes 275 mammals and over 300 species of birds. The U.S. Department of the Interior fears that some North American animals, including the Southern bald eagle, the whooping crane, and the peregrine falcon might soon follow the passenger pigeon and Carolina parakeet to extinction if no action were taken to save them.

Over the last few years, a three-point federal welfare policy has emerged for endangered species, regardless of their economic worth:

- Since 1966, the Bureau of Sports Fisheries and Wildlife has maintained a captive propagation program at its Patuxent Research Refuge in Maryland. The Bureau is experimenting with breeding stocks of the Hawaiian nene goose, the Aleutian Canada goose, the Southern bald eagle, the whooping crane, and the masked bobwhite. The National Zoological Park and other zoos in the United States are emphasizing captive propagation rather than further collection of endangered foreign species.
- Rare animals have been traditionally protected by regulating hunting and by including critical habitat types in the 28-million-acre National Wildlife Refuge System. The bill authorizes an extra $1.75 million for land acquisition in the endangered species program, plus $1 million annually for fiscal 1970–1972 for purchase of privately owned lands within the boundaries of areas administered by the Interior Secretary to preserve or protect endangered species.
- Under the new legislation, the pet and fur market for both native and foreign endangered species will be outlawed in the United States. The Secretary of the Interior will maintain a list of fish and wildlife threatened with worldwide extinction. Federal inspectors at ports of entry, warehouses, or retail stores could confiscate imported live specimens or any imported skins, coats, or manufactured items made from a species on the list. Federal law now prohibits the interstate commerce of birds, fish, or mammals poached in any state, whether or not they are rare. The new law extends this protection to reptiles, amphibians, mollusks, and crustaceans taken in violation of federal, state, or foreign laws, and to fish taken illegally in a foreign country.

The law provides an exception to the prohibition on importation of endangered species for zoological, educational, scientific, or propagation purposes.

In the past, the idea of preserving a species indirectly by restricting the consumption end of the trade has worked well with some native animals. In the early 1900's, the Audubon Society found that its game wardens were fighting a losing battle to save the American egret, a bird, common in the South, whose large white feathers were prized for ladies' hats. But once the federal government exercised its