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NATURE AND THE DOCTOR[1]

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EVERY good doctor is a naturalist, and there is none more whole-souled or with a larger task. It is no accident that so many medical students have ranged through the fields as boys for rocks or plants, or that John Hunter while at the zenith of his London practice took time to inquire into the structure and economy of whales. To be an ardent observer seems the best of qualifications for the study of medicine. That it is not, though it is the first.

The doctor has always deemed himself eager to listen to Nature and to carry out her commands. Her name has been as often on his lips as that of Liberty on those of the social philosophers. Always he has spoken of aiding her, of not offending her, of letting her take her course (as if she would not take it anyhow by hook or crook), and time and again he has invoked the *vis medicatrix naturae,* conceding that "Nature is the best physician," an admission not the less wise because the fact has so often been staringly evident. Yet with all said it remains true that his relations with Nature have not been continually happy. In the great Oxford Dictionary, under head four, subhead eleven, section C of the meanings given for the word "nature," one finds the following: "Nature—contrasted with medical skill or treatment in the cure of wounds or disease." When first read this seems an innocent and even an encouraging usage; for it stresses the surgeon's success in changing the natural course of events in acute appendicitis, and the physician's in diabetes or pernicious anemia. One becomes for the moment complacent. And then, reading on, one notes just below in the dictionary, under section D, a companion statement, "Nature—contrasted with art," and there come to mind certain recent forms of art which seem expressive of a lively disagreement with nature. Then one thinks of the history of the medical past—of the many centuries

[1] Convocation address at the Medical School of the University of Michigan, October 1, 1938.

during which the phenomena of disease were hid almost wholly away from the doctor, of his ignorance, opinionation and well-intentioned rashness during that time, of the reticence, obstinacy and conservatism which Nature still shows; and one becomes uncertain about the present. Can it be possible that in the statement, "Nature—as contrasted with medical skill or treatment," the doctor of to-day is not merely involved but in some degree reproached? How does his relationship with Nature really stand? Is he actually at odds with her on some points?

The three tasks set every human creature, to see, to know and to do, are notably difficult in the case of the physician: he has to perceive disease phenomena, to understand them, and to cure or at least make them tolerable, preventing future instances. The difficulty with this task has been that sick and well alike have forced the doctor to act before he could know, and to assume, for practical purposes, that he knew before it was possible for him to perceive. Furthermore, he has had to be infallible: error could have no place in the reckoning. A horrid fix this for any reasonable man, and none would have let himself in for it except for the dire situation of his fellows. Throughout countless years people all about the doctor have cried to him, "Why don't you do something?", and disease has cried even louder. He has had to do it, to do his ignorant and erring best. This is still his situation as concerns not a few ills. Each case of paralysis agitans, every inoperable cancer that he sees goads him toward action. He must still treat the insane without knowing why they are so. Yet now at last he has to a large extent worked things around into their proper order; and what is even more important, he sees where next to direct his energies and how to bring them to bear.

This happy state of affairs is essentially recent, and it is due far less to the age-long heaping up of knowledge than to the modern approach to the unknown. Who was it said that discovery results from chance and the prepared mind? The prepared mind of nowadays makes its own chances. It is not content with what comes its way but devises occasions, goes out to find worlds of which there may be no token. So it is that the doctor sets forth to discover. He has become a passionately enterprising observer. He invents instruments and technics with complete assurance that they will disclose things worth while, though he may not know what. Knowledge has come to him in the past mostly through experimentation—which began with the first dose ever given to a sick man: and now he is determined to make the experimental method yield everything that is in it. This decision is not peculiar to him: as you well know, a furor for experimentation has seized of late upon all thinking humanity. It has been applied even to the most delicate and lovely of human relationships, not within casualties at times, as one may remark in passing. But the sick man is not the worse because of the expansion of the doctor's inquiries; curiously enough, the patient is less experimented upon than ever before. When all was ignorance, all inevitably was random experimentation or rule of thumb in coping with disease. But in proportion as the doctor has got to know more and more of the human body he no longer makes shift in these ways but resorts to purposeful moves. Furthermore, as an experimenter he has found that the major laws which rule in the body of animals rule with a striking particularity in the human organism as well; and from the study of diseased lower creatures he has learned about man.

The sick have always had more signs and symptoms standing plain to view than the doctor was able to note, even when he had only the outside of the human creature to scrutinize. One might think that the ancient physicians, Greek, Arabic, those of medieval Europe, possessed of no instruments, other than their own senses, wherewith to perceive, would have covered the narrow field accessible to them, that they would have noted and described and categorized all that unaided man could see or hear or smell of common illness. There were those of course who thought that they did so; but we realize that they fell short and that not even now has this limited task been completed. For generations doctors have been schooled more earnestly in observation than any other large group of men. Circumstances teach it as a skill to poker-players, horse-traders and politicians; poets are born with it; but medical students are drilled in it, and innumerable occasions drill the physician. Nevertheless, as you and I know, an acute doctor can still discern new signs and symptoms in diseases long held wholly familiar. It was only yesterday in medical time that those little spots on the inside of the mouth were pointed out, which help so much in the recognition of measles. And when it comes to a comprehension of the workings of the normal mind how little do we apprehend of what any one with a good brain of his own might find out! It has always been to man's interest that he should realize not only what other people were thinking but what went on in his own head—that he should understand human nature as it is called. Time and again people have solemnly counselled one another, "Know thyself!" Yet of late it has become plain that even the doctor has perceived but a small part of the mental workings of healthy man, let alone those of the sick, and that there are reaches of thought far beyond its immediate spectrum. One might have supposed that some of those subtle individuals existing in all ages, to whom guile has been a pastime and thinking a diversion,

would have discovered these reaches and made them familiar. The opportunities were there and the technical means, namely sharp and capable mentalities. Nevertheless, the Greeks had no word for personality, much less for introvert.

Such examples stress the need for a frontal attack on the unknown. This now seems so inevitable that one wonders why it was not undertaken many centuries ago. The impediment lay in the second of the doctor's tasks, that of interpreting what he saw. Observing seems less necessary when all is sufficiently explained: and what one sees looks different in the light of explanations. The old doctor had to have these if he was to attempt cure in any rational way, and to be rational was his first need because the unknown loomed so huge. Only his reason could keep him from falling into confusion and fear. His situation was abominable. He had to try to understand for practical purposes what was happening in an organism whose feet swelled or whose arm pained when the trouble really lay in the heart, and who felt strange thrills in the heart when sexually attracted to the female. He did not know what all this meant, but he could think about it and think he did with every wit. He saw the same trains of events occurring again and again, with death or health or incapacity as their outcome; and he made up explanations which were so satisfying that they had to be true. He propounded "systems" of medicine (text-books still flaunt the term) which were so beautifully imagined that they made further search for the causes of disease an impertinence. The three humors explained all, or the four elements, or an Archaeus which sat in the stomach and issued orders to the other organs.

This effort to explain phenomena before they were fully perceived was not unique with the doctor, though his needs led him to push it to an extreme. It has been the bane of discovery in every field all along. While man is a curious animal the vice of his curiosity is the ease with which it can be satisfied. He can only feel comfortable when things have been reasoned out; and insisting upon an explanation he becomes its immediate victim. Samuel Butler asserted that man really does not wish to know, that all he desires is tranquility of mind, or, as Butler wickedly put it, to have "the peace that passeth understanding." Certainly explanations have always gone far to content doctor, patient and patient's friends. They went very far indeed when one could perceive nothing of what went on beneath the skin during life and seldom looked under it after death. There were not enough facts then to keep ideas in their place.

This is not an effort to disparage the past but to understand it, as bearing upon the present. It had its great medical discoverers, as modern in their point of view, as clear-sighted, as any of to-day. Their names are too many to tell over. But these men changed material situations far more than they did the general attitude as affecting discovery.

The old doctor, then, had not only to cope with the unknown but with his preconceptions concerning it. These acted to keep him from seeing straight, from hearing clear. How far they could mar his perceptions can be judged from a trivial incident of to-day. A man engaged for many years in medical research, and hence accustomed to observing, bought a player piano of the sort that gives out sound in proportion to how hard one works at pumping it. The salesman showed him a lever and told which way to push it for the music to swell loud or grow faint. For many months he thrust that lever in the wrong directions, toward loud when he wanted faint and *vice versa,* never discovering his error but at length informed of it by a tuner. True, he had managed to compensate for his mistake in some degree by pumping strongly for loud music and mildly for soft. But the worst of the whole thing was that, when finally told, he hated to have to readjust his method to the truth. He had become so accustomed to doing the wrong thing well that it satisfied him. One can see how an early American doctor, deft in the art of bleeding, making of it a technical as well as an intellectual rite, would have overlooked the damage it caused and have clung to its use.

If preconceptions hampered observation, they hamstrung inference. Now we try to be dissatisfied with explanations for phenomena not wholly understood: but are we always successful? Certainly to the medical student that text-book still seems most worth while which explains best. And he admires those instructors who appear bright and sure in their replies, detesting such as wander uncertainly through the laboratory, qualifying their answer to every question, and obviously oppressed with what they do not know. The student sees knowledge as exquisitely sharp and clear because his instructors have not had time to dwell upon its blurred outlines and nuances. Consequently, the questions sometimes asked in eager good faith by his own family, whether to wear a ring against rheumatism, or carry a horsechestnut in the pocket to ward off asthma, seem profane, almost obscene. They may provoke him to be frantically dogmatic and render him medically useless in his own home.

This confidence that knowledge is precise can not last more than a year or two; it is shaken out and away by the facts that buffet the young practitioner from every side. As he goes on with his life he sees the impossible prove real so often that he becomes a humble as well as an ardent observer. The discovery of the Roentgen rays may be said to have ushered in a medical era characterized by increasing surprise and

humility. It is difficult to realize that only a generation ago men deemed cod liver oil a household remedy perpetuated by superstition, and doubted whether sunlight had any virtue beyond the psychical. They then thought of foods wholly in terms of fats, carbohydrates and proteins, mentioning salts, condiments and spices merely for completeness sake, since there were no calories in them and calories were what counted. In that confident period the doctor had suddenly learned so much through his own efforts that he had become mind-proud. Now the empirical good has once again made its weight felt: and we are again prepared to take hints from the past experience of the race on how to maintain health, and to assume that there may be reason in them, though we know it not. The doctor looks eagerly and profitably into quaint notions, as for example that maggots may help in osteomyelitis by devouring the dead bone.

In those Dark Ages of medicine when thinking made things so, there were immense opportunities for the wrong sorts of men, those who were not naturalists, but who had the endowment of visionaries, oftentimes religious. The desire to do good is a magnificent reason for wishing to become a doctor, but unfortunately it is no sign of fitness. Certainly one would not care to have a great poet or artist as one's physician, no matter how much he knew. For what these see they transmute. A little poet, a minor artist, those who draw their main strength from the sensitive perception of realities, yes, they will do better than well in coping with disease: and there have been many such amongst good physicians. But the visionary is an unnaturalist: as a doctor he runs amuck. He becomes the most dangerous and effective of all quacks, limpidly sincere and often lovable as a person, carrying his fellow mystics along with him joyfully, and dominating ignorant folk through the vigor of his convictions. In the old days the honest mystic had every chance to do the harm of his beliefs. Now he stifles in the atmosphere of medicine, its facts harry him, and he seeks the wide air of occupations in which there are more unconsidered variables.

How has this come about? It has come through the demonstration that this disease and that, more and more of them with every year, are entities as real as so many pebbles; and that the happenings for which they are responsible within the body are not nearly so haphazard as the rolling of pebbles downhill in response to physical laws. No need to remark to this audience that when one looks into the dead the wonder is in many cases that they lived, so gross has been the damage to organs and so arrant the interference with function. The efforts of the organism to survive are writ just as plain. For the body does not bear injuries meekly; it has not renounced or been absolved from a single law because it can not keep its temperature normal or digest its food. Though men term it disordered, order still prevails in it, though of a different sort. It has recourse to every possible stratagem of functional readjustment and repair, compounds felonies, fights rearguard actions to the last; and the marks of old lesions often disclose unbelievable victories. Walt Whitman could have sung a grander hymn to the body if he had seen all this. The best of the matter from the doctor's standpoint is that what he now perceives of bodily recourses and reactions he realizes to be inherently understandable, though it may not as yet be understood. When at last he lays bare an ill it does not prove to be a morass of the unknowable. Nature's activities have not become more mysterious on close scrutiny: they have but become more vast.

Nevertheless, as you well know, misbegotten, *a priori* philosophies explaining all of disease and all its cure are still rife in civilized communities. But now doctors as a class go free of them. It is the laity amongst whom they make play. Yet a clever new thought affecting the interpretation or treatment of disease will always take strong hold on the doctor. Anybody who scans that microcosm, the *J.A.M.A.*, for the last 30 years can follow the rise and fall of many an alluring idea. It spreads swift as a contagion, is acclaimed, utilized everywhere, but at long last begins a lingering disappearance from the literature. Where are the opsonic index, the ninhydrin reaction of yester year? The clever idea spreads so fast not only because of the urgency of human need, though this is the prime reason, but because doctors are still school men in some degree, easily governed by ingenious thoughts, rising with enthusiasm to notions that are attractive, and loving to think and work and discuss in company. The ill-founded concept is relinquished slowly, not alone because there may be nothing wherewith to replace it, but because doctors are loathe to believe that such an excellent conceit should not be Nature's as well as their own.

Though the doctor can no longer be a metaphysician, much less a mystic, in his interpretation of disease processes, he yet must recognize the force of the mystical point of view. While mystics do not have a different sort of measles, yet asthma is no less real because provoked by the sight of an artificial rose. According to Mr. Dooley, who, as some will remember, held forth at the time when our soldiers were dying of typhoid by the thousand during the war with Spain, "The man who taught us to boil our drinking water did a dom sight more for us than the feller who said 'Hitch your wagon to a star.'" The worst of this beguiling philosophy is its pragmatic appeal, as no one sees more clearly than the doctor, who made the discovery that in those days drinking water had to be

boiled. He knows that the potential influence of the mind over the body has been no whit diminished by the discoveries which have reduced a large part of what used to be deemed spirit to rather deplorable flesh. It is even his ambition to make the mind influence the body more than it ever has, and in ways productive of good; indeed, he already does this in certain risky yet rewarding combinations of medicine with inspiration. He knows that the mystic has a place and a power in human affairs, that he constitutes a saving opposition to received ideas, leavens the human lump. Yet he realizes also that the mystic can not be a wise physician.

The third of the doctor's tasks, that of setting things right, is the only one that the laity really care about. Here is where in all ages there has been the physical devil to pay whenever idea has prevailed over fact. Too often the physician of the past has been unable to see that his triumph of mind over matter was an empty one. Just recall in this connection Hawthorne's story, "The Birthmark," written less than a century ago in commentary on his own times, which tells of the young doctor trying to remove the naevus from his wife's face, who watched it pale and disappear, never noting that as it did so his wife died. The efforts determined by philosophies of medicine were in many cases far worse than aimless: misdirected, they had back of them all the force of beliefs strongly held.

Such was the state of affairs for hundreds of years up shockingly close to the present. During this time the well-educated European doctor was often a St. Thomas Aquinas of the body. But you will recall that St. Thomas and the other school men, whose task it was to reconcile logic and theology, had to let logic go whenever there was conflict. The doctor was under no such compulsion. When his logic was contradicted by happenings within the patient, the latter often bore the brunt of the decision.

There was of course a fairer side to the picture. In every time there have been men, like Paré, who looked with clear, shrewd eyes upon illness, were adroit in doing the possible, and for the rest stayed their hands.

Even when the old doctor was not empowered by rationalization, when they had not made of him a doctrinaire, there yet existed a strong reason why he should persist in a way of treatment that appeared to do harm. This reason, well understood by him, was that no single patient could possibly serve as the touchstone of his methods, owing to the diversity of human illness and of man's constitution. Hence he wrote off bad consequences, disregarded demonstrations against him by the individual sick body. Facts may force people to their knees, but they get up again when they have an idea. Of no one has this been more true than of the doctor. Take Benjamin Rush, for example, a hard-headed, sensible man. He was at his wit's end to treat yellow fever in Philadelphia in 1793, when he found one night, while searching for what had been done previously, that a Scotch physician had thought violent purgation to be effective in the Virginia epidemic of 1743, and furthermore had advised against "an ill-timed scrupulousness about the weakness of the body." Thenceforth Rush purged and bled with all the energy of a courageous and devoted character. So doing he gave impetus to the American school of bleeders, and they continued to take toll until far into the next century. Like all pledged to "systems" of treatment or medical philosophies, they suffered much for conscience sake and led uneasy, contentious lives. Believing that they alone could be right they fiercely detested efforts of other sort at cure. Rush was not on speaking terms with Dr. Adam Kuhn, the grave German physician who alternated with him in the treatment of the Drinker family.

There was the more reason for the old doctor to hold fast to his ideas, because both his ignorance and the public forced upon him the rôle of seer. The sick have always thought of doctors not as they are but as they would wish them to be. They place trust, they are not prepared to excuse. For sickness becomes a double burden when the doctor seems as likely to make mistakes as all the other people that you and I know. He has accepted this reliance upon him as implicit in his situation, and the result has been, not an absurdity but a relationship fine in human values. The truth is that the doctor has had to be self-confident to gain best results. Emerson wrote in his journal in 1837: "The same complaint I have heard is made against the Boston Medical College as against the Cambridge Divinity School, that those who receive their education want faith, and so are not as successful as practitioners from the country schools who believe in the power of medicine." Yet this faith has not always worked for fresh discovery as concerns disease. The gold-headed cane of the eighteenth century doctor, his dignity, the ritual formality of his visits to the sick room, though aiding the patient's state of mind, often trapped him into thinking too well of his own abilities and fenced him in this way from nature. The parade of efficiency in the modern hospital, its cool and silent whiteness, its swiftness in action, the deference to the chief on "rounds," the whole arresting contrast with the outside world, mean more than a task undertaken with the ailing body, and release for the patient from responsibility for himself—they imply that things will actually be done with more understanding and more surely than in any other sphere of human effort. But while in this way they help the sick, to no negligible extent they bring risk to the doctor. Their effect on him

might be very damaging were it not warded off by the disclosures of the clinical laboratory, the x-ray department, the postmortem room, which keep him chastened and effective.

In the old days thought on how to undertake curing took the same two lines as to-day: One could either give natural processes their head and urge them on, or mix in and try to direct events. These alternatives were frequent in ancient story. The heroine, coming upon the hero wounded and alone in the forest, dressed his wound with simples and gave him cooling drinks. He got well. The other literary recourse was more complex. He did not get well, so the heroine had him transported by litter to a leech who administered a draught of such potency that sometimes he had a major convulsion, and in any event passed into a trance from which several days later he woke up cured, and often with a far more agreeable personality. What the doctor gave had shaken things at their foundations, had averted chaos.

There was reason in the leech's violence if not sound reason; and it was the outcome of earnest observation. To the ignorant watcher disease and death seemed to have little of that order which reigns in the healthy body. The doctor saw what appeared to be a falling away from standards, a dissolution in progress that was far along before the organism gasped its last. Nature seemed incapable, all was disordered. These words dissolution, disorder, clearly express what the doctor believed that he witnessed and they give his interpretation of it. Serious illness was often the more appalling because it seemed a muddle. What more reasonable then than to try to restore order by drastic means? Out of such thinking came the dogma that violent diseases demand strong remedies. And thence, in some part also, that perturbing contrast to be found in the dictionary of to-day between nature and medical skill or treatment.

Now we no longer see disease as disorder, though the term still holds place as a synonym. We perceive that no matter how abnormal a body state may be, it is still natural. To the scientist, even the iridescence of decay, the scum on the pool, are the expression of laws which might be termed wholesome if the word had any meaning in such connection. And with the extension of this view to the laity has come a vast relief. For sickness was indeed appalling when it seemed to come out of nowhere and to be obedient to nothing. The special horror of the pestilences was that they walked in darkness. This horror is felt still in relation to a few diseases, notably cancer, but even in these the doctor can perceive laws. To the public yellow fever is now only a virus disease transmitted by mosquitoes, and the plague a bacterial infection. Such knowledge would be fortifying, even if they came again. And understanding has brought with it a common-sense attitude. The campaign against the venereal diseases can be so free-spoken because their causes are matters of fact.

The doctor himself has become the complete realist that he has always wanted to be. Facts are his familiars and mould his thought. He perceives that while he can hurry Nature or impede her, humor her, help her or narrow her field of activities (as when the surgeon takes out an organ), he can not change her ways; much less flout them. Patiently achieved in the course of long time, they will not soon be let go. But he sees too that in many respects he is already wiser than the body, which works from precedent to age-old precedent, and when confronted with crises resorts to the same immemorial gambits. Frequently now he can go Nature one better in healing the sick through exploitation of the resources that she provides, as for example the hormones. He still cures in many ways that he does not understand, but now he begins to feel a slight humiliation when so doing. In his primary task of observation he is more than ever behind. Despite all his instruments he is still hampered by sheer inability to perceive, while furthermore the scope of the perceptible has broadened incredibly. It provides one of the greatest of present dangers to the doctor's relations with Nature. So much of detail there is for him to look upon and realize as to bring risk that at times he may not see the organism as a whole. Yet this is his culminating duty. The wisest physicians will always be general practitioners in the sense that they deal in thought with the whole case.

In the eighteenth century the activities of the doctor as a field naturalist sometimes brought great discovery. Withering was the very man to have been told that a "wise woman" in a nearby village cured dropsy with a decoction of herbs. There were more than twenty of them in the mixture, yet, as he remarked, the problem presented no difficulties "to one conversant in these subjects"; the fox-glove, the digitalis, was the essential ingredient. For Withering knew botany, and had already produced a compendium of British plants that was to be used for generations after him. Jenner did not have a casual chat with a milkmaid and then take a fling at vaccination. Living in the country and keen about animals of all sorts, his observations convinced him that cow-pox and the "grease" in horses represented smallpox in an innocuous form; and after his first successful inoculation he waited nine years, rejecting material after animal material, before he got one that seemed right in his experienced view. With it he made the test which justified publication.

Now as field naturalists we roam chiefly within the body. Bacteriology has supplanted botany: and the

habits of organs seem more important than those of animals. Cushny remarked as long ago as 1915 that all the great therapeutic discoveries of the preceding 50 years had stemmed from the laboratory. Nevertheless medical science now derives strength more than ever from the study of life in the lower forms. It is not merely that cows have tuberculosis and pigs influenza. There exists a physiological kinship amongst organisms of the most incongruous kinds. The realization that Nature does not conform with man's meager imaginings but far exceeds them has always been one of the chief delights of the investigator. Could common sense have prophesied that observations on certain cells wandering within the negligible body of a skipping little crustacean, a waterflea, would tell how bacteria can be met and destroyed when they invade the human being? To find out anything from tobacco plants that will apply to human virus diseases seems a wild thought. Yet one can and does. It has dawned upon us, somewhat more than dawned, that the happenings in animals and plants have far greater meaning for us than their forms would imply. These overemphasize the differences in a most deceptive way; for living creatures are joined by their functional principles into a sort of vertical union. The same insulin that works in the cod-fish will save a diabetic man. What takes place within animals and plants is our own vital concern; no natural science but is in some sense our province. And the further the doctor peers amongst organic phenomena the more twos and twos can he see ready to be added up into fours.

Nothing in medicine has bettered so much throughout the years as the doctor's relations with Nature. Now he is more of a naturalist than ever. It may be urged that the change has been quantitative, that Hippocrates would find himself on easy terms with the good physician of to-day. Granted. Yet there are alterations which, though intrinsically quantitative, are qualitative in effect: they make the world look different. And the world of the body looks different now to the doctor, though it is only himself that has changed.

OBITUARY

IN MEMORY OF OTTO HILGARD TITTMANN

AT a meeting of the Board of Trustees of the National Geographic Society held on October 27, the following resolution was adopted on the death of Dr. Otto Hilgard Tittmann, one of the founders of the society and its president from 1915 to 1920:

With profound sorrow, the Board of Trustees of the National Geographic Society records the death on August 21, 1938, of Dr. Otto Hilgard Tittmann, a founder member of The Society.

A member of the Board since 1888, and President of The Society from 1915 to 1920, Dr. Tittmann had an important part in building The Society from a small group of pioneers to the world-wide organization of to-day. His keen scientific mind, his administrative ability, and his loyalty to The Society are recognized by this Board as vital factors in The Society's fifty years of progress.

Dr. Tittmann was an outstanding geodesist of his day. At seventeen years of age, in 1867, he began his scientific career as a member of field parties of the Coast and Geodetic Survey studying the Atlantic and Gulf Coasts. His frequent elevation to higher posts of responsibility in the Survey and his excellent work on special scientific assignments by his Government in the fields of geodesy and astronomy finally won for him, in 1900, the appointment of Superintendent of the Coast and Geodetic Survey.

At the early age of twenty-four years, he was assigned as assistant astronomer of an expedition to Japan to observe the transit of Venus. On his return to this country he continued his field work on the Atlantic and Pacific Coasts, and in 1887 was appointed Chief of the Office of Standard Weights and Measures, then a part of the office of the Coast and Geodetic Survey.

Outstanding among his achievements was his work in connection with the marking of boundaries between the United States and Canada and Alaska and Canada which covered the period from 1893 to 1911, and his researches in the field of geodesy.

In recognition of the valuable contributions of Dr. Tittmann to the National Geographic Society, of his important scientific achievements, of his inspiring leadership, be it resolved that this expression be spread upon the minutes of The Society and that a copy be transmitted to his family.

RECENT DEATHS AND MEMORIALS

DR. EDWIN HERBERT HALL, professor emeritus of physics at Harvard University, died on November 20 at the age of eighty-three years.

DR. JOHN C. PHILLIPS, research curator of birds in the Museum of Comparative Zoology of Harvard University, member of the faculty of the Peabody Museum of Harvard College and president of the Peabody Museum at Salem, Mass., died suddenly while shooting in the woods of New Hampshire on November 14. He was sixty-two years old.

DR. HOWARD A. MCCORDOCK, professor of pathology at Washington University School of Medicine, known for his work on sleeping sickness, died on November 13 at the age of forty-three years.

DR. HIRAM MILLER SHOWALTER, professor of biology at King College, Bristol, Tenn., died on Novem-