was a temporary improvement, alarming symptoms reappeared and his death occurred on May 21, 1928. Dr. William A. Young, the British pathologist at the Accra station who undertook to look after Noguchi's incomplete experiments, himself fell a victim to yellow fever, from which he died on May 29. Stokes, Noguchi, Young gave their lives in the pioneer work of establishing the nature of African yellow fever which had hitherto been one of the baffling problems of tropical pathology.

Noguchi was an international figure much beloved. His sudden death, therefore, came as a shock to the whole world. In virtue of the world-wide scale on which he carried out his fruitful investigations, he had become known as a leader and pathfinder in bacteriology. Messages of sympathy and admiration were sent from far and near, and the circumstances of his courageous and tragic death became the theme of writers in innumerable lay and technical journals.

As is often observed among men of his race, Noguchi was of small stature and slender build, but his physical movements were extraordinarily alert and precise. He carried his well-shaped head surmounted by a heavy growth of black hair erect on strong shoulders, and his well-moulded features were dominated and lit up by eyes of unusual eagerness and quickness of glance. His expression was genial and almost never severe, although Mr. Konenkov has caught the latter mood in the portrait bust for which Noguchi sat during the last days before sailing for Africa. There was striking disproportion between the slight body and the dynamic energy which characterized Noguchi's years of devotion to the main passion of his life—science.

During Noguchi's eventful life, learned societies and governments may almost be said to have vied with one another in doing him honor. The emperor of his own country decorated him twice; in 1915, on his only return to his native country, when he was hailed as one of the most famous Japanese of all time; and again after his death, in special recognition of his eminence and meritorious service to the cause of science, the Order of the Rising Sun of the highest class was conferred upon him posthumously. Noguchi's simple origin and inauspicious beginnings as well as his amazing career in science have been seized upon and held up to his countrymen as worthy of admiration and emulation. His example of filial piety to his family and his teacher, and the story of his visit to his home in 1915, which became virtually a triumphant tour through the country, are being woven into a legend of singular beauty so precious to the heart of the East.

The birthplace of Noguchi has been acquired and will be saved to posterity. As a shrine in which personal effects, mementoes and records of his scientific work will be deposited and preserved, it will become an object of pilgrimage and veneration for the intellectually devout from far and near. The spirit of science will surely hover over this shrine, and in accordance with the genius of his countrymen, it will attract worshipers to whom the name of Hideyo Noguchi will be a sacred emblem of love of his fellow man.

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THE IMPORTANCE OF NATURAL AREAS TO FORESTRY OFFICIALLY RECOGNIZED

SEVEN years ago a foresighted American forester, W. W. Ashe, made a well-grounded proposal in a paper entitled "Reserved Areas of Principal Forest Types as a Guide in Developing American Silviculture,"[1] the scope of which is evident from the title. Since that time the indispensability of natural areas for forestry and for all kinds of ecological study has become increasingly recognized the world over. In this country the Ecological Society of America has made the establishment of carefully chosen natural areas a point on its program, and has accomplished the great and justly deserving task of making a rough inventory of the nature types of the Americas[2]—a perfectly logical first step towards a solution of the difficult question of how to preserve representative natural conditions to a sufficient extent with a reasonable economic effort.

Few people realize the full gravity of this question, which can not be said to have reached a perfect solution thus far in any country, but which certainly should be solved by the present generation, if it is to come near to a satisfactory solution. A great responsibility rests upon this generation as to just what shall remain to the future of the few remnants of virgin nature still left. This should not be left to chance. All that is wasted is lost for ever. Many natural units—forest types, plants, animals, etc.—are already exterminated. Others will be in the near future, unless preserved. And every unit lost means an irreparable loss to science and may, in many cases, directly check or hamper some line of general progress. To take a salient example: if the larger whales

[1] *Journal of Forestry*, 20: 276–283. 1922. *Cf.* also G. A. Pearson, "Preservation of Natural Areas in the National Forests," *Ecology*, 3: 284. 1922.

[2] "Naturalist's Guide to the Americas," Baltimore. 1926. Here Mr. Ashe has again stressed the value to silviculture of reserved areas of natural forest types (pp. 10–11).

should be exterminated from the oceans—as seems likely, unless the present destructive policies are discontinued—it will be a heavy loss not only to science,[3] but as well to human economy. There is no probability of a direct, industrial use of the fat in the oceanic plankton, but it is extremely useful in the concentrated form as it occurs in the body of the whale.

Forestry is perhaps the one economically important activity which would suffer most from being deprived of certain natural units in their original state. Rational forestry is applied forest ecology. A knowledge of the slowly reached natural equilibria, to be found only in virgin stands, is essential, not only for its progressive development, but even to warrant its reasonable success. This truth has not always been fully realized, and rather artificial schemes have been applied as, for instance, in Germany. Fatal consequences have not failed to appear.

It is true that German forestry has long been the recognized model and has been also highly successful, generally speaking. But German foresters are worrying to-day over one serious failure, which is due to their applying a Prussian order contrary to nature. Extensive areas of state forests in Saxony, pure spruce forests raised and managed perfectly in accordance with the rigid ideals of old German forestry, are declining in growth to an extent approaching catastrophy. At the same time methods imitating nature's own have proved a great success, and there is at present among German foresters a marked change in opinions and methods, a general tendency of "back to nature" which would appeal to a Jean Jacques Rousseau. The virgin forest, representing a reliable natural equilibrium, is often taken as a model when discussing possible silvicultural schemes.

Briefly, the recent development in forestry has convincingly proven the soundness of the idea of natural areas as a guide in developing silviculture. It might be objected that, with increasing fundamental knowledge, forestry will be less dependent upon the imitating of nature. This may be true to a certain extent, but still does not imply that forestry can do without natural areas. The study of virgin conditions is necessary not only as a starting-point but also as a permanent reference for almost any research work from which fundamental knowledge promoting forestry can be expected. So, even for its possible successful emancipation from nature imitation, forestry depends on virgin nature.

Every distinct natural forest type represents a different equilibrium, and it follows that the last remnants of any important forest type are invaluable.

[3] The balaenides, in fact, are ecological marvels: imagine a ship crossing the Atlantic without any fuel other than the almost microscopic planktonic organisms she can catch on the way.

Fortunately enough, the importance of natural areas seems to-day to be quite generally recognized, not only among ecologists, but also by the Forest Service. A number of areas on the national forests have been reserved, or proposed for reservation,[4] for different reasons, and "several of the districts have developed, or are in process of developing, programs of wilderness areas or natural areas." The quotation is from a Forest Service letter, dated March 11 of this year, which was sent to each of the district foresters in order to encourage the developing of such plans. To quote again, the letter suggested to the district foresters: "that steps be taken by you to develop such a program as rapidly as other demands upon the time of your organization will permit." The programs are to include both "natural" areas for research and "primitive" (*i.e.*, more or less wilderness areas) for recreation, etc.

The accomplishments and activities mentioned evidence the keen interest taken to-day by the Forest Service in the preservation of natural areas. A recent event furnishes strong proof that this program is backed by the National Forests Reservation Commission. This event is the Heart's Content purchase, whereby a last remnant of one of the most remarkable natural forest types of this country was saved, by a considerable economic effort on the government's part. This purchase is from several points of view of such importance that an account of its history and bearing merits common interest.

It is well known that the natural mixed white pine forest which once covered about half of the area in the state of Pennsylvania and the southern part of New York state has been practically exterminated. There is a small grove of old white pines within the Cook forest at Cooksburg, Pennsylvania, which has fortunately been preserved from cutting by a coordinated action of public-spirited men, but a real climax type representing the natural white pine forest of the New York-Pennsylvania plateau is believed not to exist to-day outside of the small stand at Heart's Content, sixteen miles south of Warren, Pennsylvania.

To begin with, twenty acres of this stand were donated as a memorial by the owners, the Wheeler and Dusenbury Company, Endeavor, Pennsylvania, to the Allegheny National Forest—an example for other owners of priceless natural treasures to follow. This area, however, although representing a considerable sum from an economic point of view, was recognized to be too small to warrant the preserving of a representative sample of the type, and so, in cooperation with the Forest Service, a larger area was staked out,

[4] C. F. Korstian, "The Preservation of Natural Conditions in the National Forests," "Naturalist's Guide to the Americas." Baltimore. 1926. p. 17.

including some additional hundred acres surrounding the twenty-acre plot. All lumbering operations on the hundred acres were postponed until the Forest Service could have time to consider the matter and present the area for purchase to the National Forests Reservation Commission.

In the meantime research men became interested in the area, and a survey by the Allegheny Forest Experiment Station and by a Cornell graduate student, under the writer's directions, was started immediately, so there would be at least some records to supplement the data obtained on the twenty-acre plot, if the decision of the Reservation Commission was unfavorable. The research men joined the Forest Service in advocating the purchase.

The Reservation Commission realized the importance of Heart's Content as a "laboratory" for research promoting silviculture, and the area was included in the last purchase for the Allegheny National Forest, although its acquirement entailed a considerable sum because of the high commercial value of the heavy timber with its large proportion of white pine.[5] The value of the hundred acres averages not less than $650 an acre.

The importance of the Heart's Content purchase lies, of course, first in the preserving of a sample showing the climax development of a natural forest type of outstanding economical importance naturally belonging to millions of acres of potential white pine land in the region. It is hoped, however, that it will be of importance, also, as a precedent. With the present purchase, the importance of natural areas to forestry has the stamp of official recognition. It can now be hoped that it will be possible, too, in the future to rely upon the government for the preservation of indispensable vestigial areas of important forest types; also in cases where they can not be found within the national forests, but must be specially acquired. The high cost per acre of the Heart's Content tract will not be a precedent. It is believed that no other forest type in the east, even in its fullest development and with the best situation with respect to market conditions, could ever, with the present prices, reach more than one fifth or one fourth of the value per acre represented by the Heart's Content tract.

First of all, of course, the full possibilities of the national forests should be made use of. The activities of the Forest Service for the preservation of natural areas promises well to this end. It could only be questioned whether a still more systematized effort, under the leadership of a botanically trained expert on forest types, would not be necessary or, in any event, desirable.

Since the full range of natural variations as to forest types is, most probably, not represented within the limits of the national forests, it is evident, however, that a satisfactory solution of the whole question requires a wider outlook. A general survey of existent natural areas, representing the different natural forest types of this country, should be made, and a sufficient number of reasonable sized tracts chosen in order to represent as fully as possible the whole range of natural variation. Then the chosen tracts should be effectively preserved, whether they be located on national forests or not. This, of course, is a big program requiring considerable systematic effort and competent central leadership.

The time and money expended on such an enterprise would, in the writer's opinion, be a good investment. The key to a rational solution of any question relating to nature preservation is careful choice made in time and based upon sufficient knowledge. Only by a judicious choice of areas can a really satisfactory result be expected, at least from moderate economic effort. In the absence of a general survey, the most impressive and costly wilderness plan will hardly assure the good representation of all existent forest types.

It would seem logical to the writer, considering the unquestionable importance for forestry of the preservation of a carefully chosen set of natural areas, that the task outlined be assumed by the Forest Service. If this is not deemed practicable, it might be assigned to the Society of American Foresters, or to the Ecological Society of America, whose above-mentioned activities would seem particularly to fit it to assume the work, provided sufficient monetary support were given.

It is a question whether there are sufficient means, with the present regulations, of safely protecting preserved natural areas. This is certainly not the case—with areas preserved as national parks and national monuments, although it is universally recognized that the purpose of setting these aside is to leave them intact to future generations. It is neither possible nor is it intended to keep the public out of such areas. On the contrary, the present usage implies and entails advertisement attracting the attention of the public and resulting in an invasion of the area by people which would otherwise not take place. It seems almost that the worst thing—next to destruction by industrial use—which can happen to an area representing a sensitive nature type is to be made a national or state park or a national monument.

The serious effect of trampling in some California redwood parks is well known, and it has called forth

[5] A few summary data on the Heart's Content tract will appear in a note by the writer in the *Journal of Forestry*.

special investigation to find a remedy for it.[6] The fitness of natural areas for scientific purposes can evidently be jeopardized by a much slighter degree of trampling, etc., than is required to kill a redwood tree. Such areas, in fact, should be kept absolutely intact to serve their purpose. In the future, it will be necessary to make some distinction between public "wilderness" playgrounds and areas reserved for scientific research, and to prohibit public access to the latter except by special permit. It would be poor economy to spend, for instance, $65,000 as for the hundred acres in Heart's Content, in order to save a unique, natural document, and then later jeopardize the authenticity of the document by encouraging its use as a picnic ground.

This, of course, is a purely technical, administrative question which will be readily solved as soon as its importance has, more generally, become as clear as it is already to the Forest Service.[7] The most urgent thing is to have the areas selected before it is too late to make a good choice.

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SCIENTIFIC EVENTS

FISH CULTURE IN THE NATIONAL PARKS

A COOPERATIVE arrangement has been effected between the Department of the Interior and the Department of Commerce whereby a fish culturist of the latter department will supervise fish culture operations in the national parks and national monuments. The arrangement is expected to become effective next July 1, when the funds for the 1930 fiscal year become available. The full text of the statement follows:

Under the plan of cooperation the fish culturist, to be carried on the pay-roll of the Bureau of Fisheries of the Department of Commerce, will devote his time during the summer to piscatorial problems in the national parks. During the winter months he will direct fish-cultural operations at hatcheries of the Bureau of Fisheries located at points outside the parks.

The work of the fish culturist so far as it relates to the national parks will include the general supervision of fish cultural studies and operations, including detailed studies of park waters to determine suitability for fish, a study of native or related fish species suitable for stocking or restocking, and the preparation of permanent management plans for all park waters. Next summer the fisheries expert will study conditions in Yellowstone and Glacier National Parks.

At the present time the Bureau of Fisheries maintains federal hatcheries in Yellowstone and Glacier National Parks. The Fish and Game Commission of California maintains a state hatchery at Yosemite Park, and state cooperation is given in other national parks through furnishing fish for planting in park waters.

Planting is now done by the individual park organization, but up to the present time it has been impracticable to make scientific studies to determine suitability of fish for planting, and no data have been available on park waters as to the abundance or lack of fish food. Under the new plan it is expected that these fundamental facts will be determined and studies made of the life histories of native species and the desirability of their propagation, as well as of exotic fish species adapted for propagation in park waters.

This cooperative arrangement will be similar to one in force with the Public Health Service of the Treasury Department, whereby a sanitary engineer of that service acts as chief sanitary officer for the National Park Service, having full responsibility in matters of sanitation.

AERIAL PHOTOGRAPHY

TRUSTEES of The Daniel Guggenheim Fund for the Promotion of Aeronautics announce the authorization of a grant of $30,000 to Syracuse University to assist in the establishment of an aerial photographic surveying and mapping center at that institution for the purpose of offering a course of study in this work. The grant provides the necessary equipment and instruments for a study of this kind and is made with the understanding that Syracuse University will provide the proper instructional staff for the conduct of the course.

Syracuse University was a pioneer in teaching photographic surveying. The first courses were introduced in the college of applied science about the same time that the Wright brothers made their initial flying experiments twenty-five years ago.

The program will consist of eight courses, ranging from map-making and aerial navigation to the economics of aerial mapping. General courses in photo aerial surveying will be given to all students in civil engineering as a part of the regular curriculum, with advanced courses for those specializing in this work.

It is believed that this comprehensive program for instruction and research will bring significant results in the application of aviation to an important field

[6] E. P. Meinecke, "A Report upon the Effect of Excessive Tourist Travel on the California Redwood Parks," State of California, Department of Natural Resources, division of parks. California State Printing Office, Sacramento. 1928.

[7] The question is touched upon in the letter of March 11 mentioned above.