pated from the finding that the white pines on the natural area at Heart's Content, near Warren, Pennsylvania, were essentially even-aged, suggesting their origin from some blowdown before the coming of the white man.[2, 3] Certainly destructive hurricanes occurred in the past, and several other recent blowdowns have been observed, such as the one on the Olympic Peninsula in Washington in 1920. Tornado tracks of all ages can be traced in southern pine forests in Louisiana. Wide-spread windthrow of forests may thus logically be said to be natural phenomena, and such areas natural areas even during the periods when the dominant vegetation is prostrate and decaying. Viewed in this light there may seem no occasion for concern over the New England hurricane were it not for the fact that the scattered fragments of virgin timber now destroyed were frequently the only ones remaining in the region.

Climatic factors are not the only destructive agencies. Other illustrations of agencies causing profound alteration of natural forest types may be found in forest tree diseases such as chestnut blight (*Endothia parasitica* (Murr.) P. J. and H. W. And.), which has eliminated chestnut as a component of fully stocked forests in the Northeast. White pine blister rust (*Cronartium ribicola* Fischer) and Dutch elm disease (*Ceratostomella ulmi* Schwarz) have demonstrated their capacity to influence stand composition markedly, if allowed to spread unchecked. Insects are no less important. Most of the spruce in parts of eastern Canada has been killed by the European spruce sawfly (*Diprion polytomum* Hartig); the Eastern spruce bark beetle (*Dendroctonus piceaperda* Hopk.) periodically makes inroads in overmature virgin spruce in some of the very areas set aside as natural reserves, often as a successor to the spruce budworm, (*Cacoecia fumiferana* (Clem.)); and the gypsy moth (*Prothetria dispar* L.) has noticeably reduced the proportion of oak and other favored food plants in some sections where the insect has abounded for many years. Less destructive in general, some mammals may occasionally concentrate on just the areas selected for study. The writer has observed virtually complete destruction of trees on permanent sample plots by deer, porcupines and even beaver. Rabbits, gophers, squirrels and mice are a scourge to forestry experiments in many parts of the country. Yet they are an integral component of the forest community and as well as insects, fungi and other biota are part and parcel of the natural forest complex, to which they are bound by intricate and diverse interrelationships. To eliminate them as disturbing influences is to create at once an altered environment.

[2] H. J. Lutz, *Ecology*, 11: 1–29, 1930.

[3] H. J. Lutz and A. L. McComb, *Ecology*, 16: 252–256, 1935.

Man, of course, is the arch enemy of natural vegetation because of his greater ability to affect it in more indirect and direct ways than other mammals. Like other biotic factors, however, his direct influence is usually more acute the greater the population concentrated on an area. Lone hunters and woodsmen interrupted natural environment far less than the mass attack of CCC boys.

How, then, shall adequate examples of all the major types of vegetation be protected from the constantly increasing number of disturbing influences? Only by anticipation of future needs for such reserves and by as complete protection as is humanly possible of large and small areas, well distributed and replicated so that if one meet with disaster another may survive. The National Park Service and U. S. Forest Service have many such natural areas and reserves under their jurisdiction and they are establishing more all the time.[4] A periodic inventory should be made to enumerate what types of vegetation are now under preservation and what others need protection. The only comprehensive attempt along this line was the "Naturalists' Guide to the Americas."[5] Many changes have occurred in the last 14 years, and this survey should be brought up to date. The Committee on Preservation of Natural Conditions of the National Research Council might well undertake such a survey.* Until data are available on (*a*) what vegetation types (and animal communities) are at present adequately represented in protected areas and (*b*) what other types should be so protected, with the recommended priorities, we shall go on setting aside reserves in hit-or-miss fashion, duplicating some excessively and overlooking others until it is too late.

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LEADING NATIONS IN SCIENCE AND THE NOBEL PRIZE

IN SCIENCE Brill[1] has recently presented results of calculations applied to the Nobel Prize awards in science and has given tables comparing all winning nations on a basis of population and the number of winners for each. Four small countries of Europe, namely, Switzerland, Denmark, Holland and Sweden, had the largest ratio of winners to the population. This conclusion is simple and irrefutable. However,

[4] *Anon.*, SCIENCE, 92: 347–348, 1940.

[5] V. E. Shelford, editor, "Naturalists' Guide to the Americas." 761 pp. Baltimore, 1926.

* Since the preparation of this note the writer has been informed that the Committee on Preservation of Natural Conditions of the Ecological Society of America is compiling such an inventory.

[1] SCIENCE, 92: 2388, 310–311, 1940.

Professor Brill further says in his concluding paragraph, "The true leaders in the sciences now appear since the smaller countries are no longer handicapped by their small populations." A statement qualified by the remark that leadership in science is shown, as far as it can be determined on a basis of Nobel Prize winnings and population alone, would be acceptable. As it stands, the conclusion goes beyond the scope of the data. There is an implication of qualitative excellence in science for the small nations, which has not been demonstrated. A comparison of the qualitative excellence of small and large countries in scientific effort and "production" would necessitate consideration of so many factors that the problem would become similar to that of comparing the economy of a large and small nation, a well-near or completely impossible task.

The Nobel Prize covers only part of science. Some workers who are veritable architects of the structure are never considered because they are outside the field of experimental science. The great Linnaeus or even Darwin would not be eligible to-day, although the effect of the latter's doctrines probably transcends any other influence on human thought advanced since the beginning of Christianity. Sir John Murray, co-father of oceanography with Mathew Maury, would not have been eligible. Henry Fairfield Osborn once said of Cope that he probably had a greater grasp of vertebrate zoology than any man that ever lived. Nevertheless, Cope could not have won the Nobel Prize. It is not necessary to go to years before the prize for examples. The vast panoramic story of the genealogy of the elephants and other related animals, unfolded by Osborn, did not gain for him the Nobel Prize, though certainly he would have been a grace to any body of scholars. Johan Hjort, the Norwegian, was not eligible, notwithstanding the fact that he is often referred to as the founder of modern fisheries biology, a subject of vast economic importance. A great explorer is a scientist as much as any other in the field. Norway had Amundsen, but no Nobel Prizes. Geologists, explorers, engineers, oceanographers, meteorologists, many biologists, the social scientists and even pure mathematics are not considered by the Nobel Prize committee. It is not my purpose to even faintly insinuate that there is an injustice in this situation, for there is none. Nobel had every right to define the fields for his awards, and he was probably wise in separating and limiting them as he did.

Due to their size and area alone, large countries are prone to have proportionately more than small countries of exploring and field expeditions, geologists, foresters, students of conservation and a greater variety of students of the various greater variety of plant and animal groups, to mention a few. Such workers must all be considered in evaluating the leadership of a nation in science. The five greatest natural history museums in the world are in the United States, England and France. These matters, too, should bear weight in the judging of such leadership.

It is interesting that the top six nations in Professor Brill's Table I, including Germany and Britain, have not been ravaged by war at home, prior to 1940, since the time of Napoleon; whereas France and Belgium, lower on the list, but close neighbors of the winner nations, have been called the cockpits of Europe. The top four nations have not been at war, except for a slight altercation between Holland and the Sultan of Sumatra, since Germany fought Denmark over Schleswig-Holstein in 1864. Germany and Britain have supported large war machines during the time considered, 1901 to 1939, and Germany has suffered a great defeat. In spite of this handicap her rank is fairly high. Would Germany be the leader had she been at peace? War and peace certainly have something to do with the question under discussion, but these factors could legitimately be considered as partial causes for the superiority of the small nations and not merely handicaps of those affected adversely.

It is also interesting to note the clustering of the prize winners in northern, Teutonic or semi-Teutonic, Europe. Accepting these tables as partial indicators of leadership in science, it is clear that things have changed since the days when the "Noble Romans" of post-medieval Italy gave the renaissance of learning and art its initial push. At that time the "Aryans" to the north were busy with other matters, but eventually the influence spread to them and even to the "subhuman Slavs," in the person of Copernicus and others. It is clear in the long view that no claims for racial superiority are due, regardless of how well proven a momentary national superiority in science is.

In conclusion, the leadership or qualitative excellence of a nation in the field of science is dependent on many things, and it can not be determined solely by considering the relationship of Nobel Prizes to the population. Nobel Prizes are partial indicators of scientific leadership, but their use as a complete measure is unwarranted.

Professor Brill's tables brought out several interesting and significant facts not mentioned here. It has been my wish to clarify one question raised and not to detract from his worthy findings.

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FESTSCHRIFT OF PROFESSOR EMBRIK STRAND

AN outstanding contribution to zoological literature is the publication of a Festschrift by the University of Latvia in honor of Professor Dr. Embrik Strand