which flies had free access, but no visible form of life appeared within the meat in the closed flasks, although an occasional egg or maggot was deposited upon the paper that covered them. After a long digression Redi continues (p. 36):

I thought I had proved that the flesh of dead animals could not engender worms unless the semina of live ones were deposited therein, still, to remove all doubt, as the trial had been made with closed vessels into which the air could not penetrate or circulate, I wished to attempt a new experiment by putting meat and fish in a large vase closed only with a fine Naples veil, that allowed the air to enter.

Under these conditions he found the meat remaining free from maggots or other forms of life visible to the unaided eye. The results of these simple and homely experiments, together with the reasoning of Redi, served to change the belief in the occurrence of spontaneous generation of life. It is true that after the discovery of microscopic organisms the question had to be tested with especial reference to these minute forms of life, but the experiments of Redi stand as the first published ones to make a scientific onset against the ancient dogma. The book is of varied contents and, naturally, all parts of it are not of equal interest and significance. His long disquisition on the origin of bees is discursive and tiresome. His letter embraces observations and comments on the poison of scorpions, on spiders, cheese worms, fruit flies, frogs, grafting experiments, galls, silkworms, butterflies, lice, etc. In reference to galls, he concludes that nature produces the gall for the generation of the insect, and that the fly that proceeds from the gall arises not from an animal egg, but from the modified tissues of the plant. One rather amusing circumstance is his testing on a human being the effect of meat poisoned by the sting of a scorpion. He says (p. 61):

Having had frequent proof that animals killed by a snake's bite, or tobacco, which is a terrible poison, can be eaten with impunity, I gave these pigeons to a poor man, who was overjoyed, and ate them with great gusto, and they agreed with him very well.

The book is well translated and the Italian is rendered into the equivalents of modern science—as *tossico,* translated toxin (p. 48) and *uova,* translated variously egg and pupa, according to the context. The bibliographical references to Redi and his work are not especially well chosen. Even so brief a list might be improved by making a few substitutions. One misses especially reference to Guiart's article on Redi in the first volume of the *Archives de Parasitologie,* and to Huxley's analysis of Redi's "Esperienze" in his address before the British Association at Liverpool in 1870. These might be substituted for the references to Cuvier and to Pouchet. Guiart's article contains a very fine portrait of Redi. The fine edition of Redi's works in nine volumes, Milan, 1809–11, also contains a well-written life of Redi and an attractive portrait. In this edition the "Esperienze Intorno alla Generazione Degl' Insetti," although essentially the same, is somewhat fuller than in the edition of 1688. It should be noted, however, that in the edition of his complete works, the illustrations of the "Esperienze" are engraved on a smaller scale and do not in any sense equal the photographic reproductions in the present volume.

The growing interest in the historical phases of biological investigation makes the appearance of this volume timely and we predict for it a deservedly wide circulation.

WILLIAM A. LOCY

EDUCATION A NATIONAL FUNCTION[1]

THE condition of American education today is in many respects a national reproach. In no other nation claiming to be civilized is there at the present time so large a population in such educational degradation as the American negro. No other population, equally numerous, to be found within the limits of any civilized nation so deprived of educational facilities and opportunities.

If there is any situation in our present society, for which the nation as a whole is responsible, surely the condition of the Amer-

[1] Abstract of an address by Dr. Edmund J. James, president of the University of Illinois, before Minnesota Teachers' Association in St. Paul, Minnesota, November 3, 1910.

ican negro is such. The establishment of slavery was brought about by the cooperation of north and south alike. The continuance of slavery was recognized and supported by the constitution and the law, and upon the abolition of slavery the American negro was in reality, and should have been in fact, a national ward.

Further, in no other great civilized nation are there so many worthy members of the community in such a state of ignorance and provided with such meager educational advantages as the so-called "poor whites" of the mountainous districts of the south, and as the population of other districts occupied by people resembling the Georgia "crackers," and the inhabitants of other similar regions in which they may be found in the north as well as in the south.

Nay, further, in no other civilized country are the teachers in the rural districts of the nation, as a whole, and for that matter, in many villages and towns, so untrained and unskilled, with so little experience or fitness for the work, as is the case in the United States of America.

In no other civilized country does the nation, as a unit, concern itself so little about the vital educational interests of the people as a whole.

And yet of all modern nations the United States is more dependent for its prosperity in the long run upon universal education than any other.

In a republic, of all forms of government, the welfare of each section, and of the whole, is bound up with the educational condition of each section, district and locality. In a free government where every man counts in certain matters as much as any other man ignorance in any locality, or in any individual, is a menace to all localities and all individuals. Intelligence and education in any district are an asset for all districts and for the whole nation.

Of all republics the United States is most interested in maintaining a vital and efficient educational system. No other state is receiving so many ignorant people from so many different nations with such varying standards of religion, morals and conduct. No other state is finding the fundamental basis of national unity so persistently undermined by foreign currents of thought and feeling.

The fate of the nation is consequently bound up with the assimilation of these elements as soon as possible with their complete incorporation into our body politic and social, and above all with their continuous uplift toward an ever higher standard of economic and moral efficiency. And yet toward accomplishing all this the nation, as a unit, is doing almost absolutely nothing.

We are spending enormous sums of money upon the army and upon the navy. We pride ourselves upon being a peaceful nation and yet we are spending more, and always have spent more, upon military defense and offense, as a nation, than upon all other objects and for all other purposes whatsoever. We have spent money like water upon the improvement of our rivers and harbors. We are planning to spend still more and if it were wisely spent it would be well. We are upon the verge of adopting a policy of internal improvements which will cast far into the background all that we have thus far done.

Side by side with the conservation of our national resources we are considering even larger plans for the development of our national resources on an even larger scale.

And yet we are doing little as a nation to conserve the greatest of our national resources —the intellect and health of our people. And we are doing still less to develop what is, after all, the greatest asset of any nation—the brains of its people. We have doubtless wasted much of our heritage. Such a waste is a sin and bitterly we shall pay for it. But the saving which we may affect, after all, by a more reasonable policy in these matters represents but a small increment to our national wealth compared with what may be added by the intelligent development of national talent, such as brought about by a reasonable, comprehensive, well-supported educational system.

When the constitution was adopted, the

nation handed over to the federal government some of the most fruitful sources of revenue. It left with the states some of the heaviest burdens of expenditure. The time has come when a readjustment in this respect should be brought about. Education should be made in form, what it is in reality, a national function. It should be placed by the side of the army and the navy, and internal improvements and federal justice as one of the great and fundamental functions of the American people finding its expression in every department of our national life; from the rural district of our remotest states to the federal government at Washington.

Such a policy means federal appropriation on a large scale for the development of national education. It would naturally end in a secretary of education who, as a member of the cabinet, should represent in a concrete form the beginning of a new and larger policy calculated to bring about new and larger results in the educational field.

We have done much as a nation to help develop our material resources. We have done little to help develop our intellectual resources which, after all, underlie and determine the possible development of our material resources.

Our school system should reach every child in the nation with effective elementary teaching. It should offer elementary technical training for vocation to every child. It should offer the advantages of high school, *i. e.,* secondary, education to all children who may be able intellectually to profit by it. It should bring to all the youth of a country who desire it the chance to train themselves scientifically for their future vocations. The returns for such expenditure would exceed by far all returns thus far made upon investments in internal improvement of a material sort. If the nation would give its attention earnestly to the matter of establishing such a school system, as should in every section of the country find out the natural abilities of its children and then assist in developing them to the highest possible degree of trained efficiency, an era of national expansion, national development, national influence, of increase of national wealth, would dawn upon us such as the world has not thus far dreamed of.

SPECIAL ARTICLES

OCCURRENCE OF THE ÆCIDIAL STAGES OF WILLOW AND POPLAR RUSTS IN NATURE

THE writers have frequently collected the teulotosporic stages of the rusts, *Uredo* (*Melampsora*) *bigelowii* (Thüm) Arth., on species of *Salix* and *U.* (*Melampsora*) *medusæ* (Thüm) Arth., on species of *Populus,* in the vicinity of Ithaca, N. Y. Knowing that the æcidial stage should be found on species of *Larix,* frequent search has been made for this stage on the larch trees on the Cornell campus. One tree in particular, which grew in close proximity to a badly rusted willow tree, was watched through several seasons, but the æcidia were never found. On May 23, 1910, however, Mr. W. H. Rankin, a graduate student in the department, found a tree of *Larix decidua* on the campus, which appeared decidedly yellow from an extreme infection of the *Melampsora.* Recognizing the fungus, we went to the tree and found growing with interlocking branches, a tree of *Salix cordata.* Examination of the fallen willow leaves of the previous year showed an abundance of the teleutosporic crusts. During the past summer the tree has been largely defoliated by the extreme attack of the *Uredo* stage. Teleutospores have also developed again in abundance. A few days later, May 28, we were collecting in a swamp (Michigan Hollow) six miles south of Ithaca, and again found a larch tree (*L. laracina*) attacked by an æcidial stage of a rust. Search was at once made for willow trees and a clump located at some distance. Careful examination of fallen leaves failed to reveal the presence of teleutosporic crusts. We then turned our attention to some trees of *Populus deltoides* in the vicinity and here we found teleutosporic crusts on the fallen leaves.

Specimens of all of the collections were sent to Mr. F. D. Kern, Lafayette, Ind., who