SCIENCE

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THE VALUE AND SERVICE OF ZOOLOGICAL SCIENCE[1]

ESTHETICAL AND RECREATIONAL VALUES

WE are met together in a world convulsed by strife, resounding with the measured tramp of armies, with the clash of arms, and into the vortex of this world-wide conflict our own nation has been drawn. Back of the rising smoke of battle towers the gaunt figure of materialism. It is greed of material gain, it is lust of dominion, wherewith to reap this gain, that has precipitated this mighty struggle.

All nations have allowed themselves to fall in more or less degree under the sway of this materialism, and we ourselves are not without guilt in this respect, though not so guilty as our critics would fain have us believe. It was not to be wondered at that under these conditions many at first saw in this war only the rivalry of sordid interests, that they hesitated to take sides in a struggle in which they conceived the end not as the triumph of noble principles but as the supremacy of commercial advantage, that our critics charged us with seeking to serve only our own selfish interests and taxed us with hypocrisy when on entering the conflict we renounced material gain and raised the banner of truth and justice.

But exposed to the heat of this conflagration and in the crucible of suffering men's ambitions have been refined, the metal has been freed from the dross. As the struggle has progressed, another figure—the figure of idealism—has become defined, ris-

[1] Symposium before the American Society of Zoologists, Minneapolis, December 29, 1917.

ing youthful, strong and virile, and the meaning of the conflict stands plainly revealed. It is the age-long struggle between the multitude and the privileged few, between the rights of the people and the divine right of kings, between the conception of government which makes the state the servant of the people who have created it and that which reduces them to slaves and places not only their possessions but their lives, at the disposal of the divinely appointed rulers of the state, and even demands that their consciences be subservient to the will of the sovereign. Gradually as the issue has defined itself more and more clearly, the logic of events has forced nations whose entrance into the struggle may have been in a degree dictated by other and less noble motives to commit themselves definitely and unmistakably with respect to these fundamental principles and the sympathy of the individual must be bestowed for or against the democracy in which we who are truly Americans all believe.

But so confused and so clouded have been the issues, so bitter the struggle, waged both with the pen and the sword, that some have doubted the value of art, of literature, of science, of religion, and even of civilization itself. Ingenious logic has lent itself to so interpret and apply the principles of our *own* science as to justify the theory that might makes right, that the weak have no rights which the powerful can be bound to respect, that the strong nation is justified in taking possession of and administering the heritage of its weaker neighbors even though it be necessary to exterminate the weaker in so doing.

The conflict has been severe. The forces of might, better prepared, better organized, more effectively administered, and profiting also by advantages of strategic position, have seemed to be on the high road to success. The issue still hangs in the balance, and victory for the right is not yet assured. Therefore, there are those who, faint-hearted, have despaired and, blinded by the apparent success of might, have lost faith in right and have recanted, laying the blame upon the idealists for having led them astray. They now profess admiration for the strength of materialism and decry the weakness of an idealism which breeds a race of cowards and weaklings. But are they justified? While it is true that idealism, uncontrolled by reason, may build a house of cards which in time of stress collapses and buries both its followers and those associated with them, can this be affirmed of that idealism through which shines the clear light of reason? Though the believer in truth, justice and right hesitates to draw the sword, is he not the stronger, relatively, if when he does so, he enters the conflict with clear conscience and high resolve? One looks in vain through the history of the ages for a case where freemen have been lacking in the courage to uphold their convictions, even in the face of the most oppressive opposition, or to defend them, if necessary, by force of arms.

It is this spirit of idealism which led our nation at first to give generously and individuals to sacrifice much that the sufferings of war might be mitigated, and which, though we were long forbearing, led us, when reason had shown clearly the necessity of so doing, to enter the conflict, actuated by motives more altruistic than those which have impelled any nation in the previous history of this world. It is idealism that is leading our young men willingly into a crusade which takes them far across the sea, to endure privations, suffering and death itself, while their loved ones, who have bid them "God-speed" with tears in their eyes but with the pride of sacrifice in their hearts, pray for their success, and

hope for their return. Materialism is strong, but idealism, stronger still, is the most powerful force in the world to-day. We can not doubt the outcome of the struggle, with our tremendous resources added to those of the nations with whom we are associated, and with the consciousness of high moral purpose to animate our armies.

Not only is idealism a force to be reckoned with now but from it we draw our faith in the future. When the nations come around the conference table to adjust terms of peace, the promise of the future will rest in the degree to which idealism is able to sway the council. Should materialism, perchance, assert itself, only a truce is possible. The evolution of justice as between man and man can be slowed and even stayed for a time, but can not be long arrested.

If then so much depends upon this force, if in it rests our faith in the present and our hope in the future, we should do well to investigate fully its nature and to determine as precisely as possible the factors that contribute to its development. Such a pursuit, however, does not lie within the limits of this discussion; it is appropriate only to raise the question whether a love for the beautiful and the cultivation of it—that is, esthetics and esthetic training—are not among such factors.

Idealism in last analysis rests upon a keen perception of truth, right and justice, and this involves that which is esthetic as well as that which is ethical. A recent writer on esthetics[2] says that

> esthetic and moral judgments are to be classed together in contrast to judgments intellectual. . . . Esthetic judgments are mainly positive, that is, perceptions of good, moral judgments are mainly and fundamentally negative, or perceptions of evil. . . . Esthetics deals with values which are immediate, moral values are always remote. . . . Not only are the various satisfactions which morals are meant to secure esthetic in the last analysis, but when the conscience is formed and right principles acquire an immediate authority, our attitude to these principles becomes esthetic also. Honor, truthfulness and cleanliness are obvious examples.

Esthetic perception should not be confused with artistic production, although esthetic desire is back of and tinges all art. Thus interpreted art is subjective, esthetics objective. The study of animal life has been a source of inspiration to artists of all time and apparently the earliest beginnings of decorative art consisted in the crude drawings of men and animals traced by cave men on the walls of the caverns which sheltered them. Many conventional designs when traced back through the successive steps which mark their evolution lead to representation of animals which because of some peculiarity of form excited the imaginations of aboriginal man. But we are not concerned directly with the value of animal study or the services of such study to art, great as they have been. It is the appeal which the study of animal forms makes to our sense of the beautiful that interests us here.

In order to appreciate beauty, esthetics tell us, we must put ourselves in the place of that which excites the sensation, in a certain sense project ourselves into it. And as we do so "our motor activities rehearse the tensions, pressures, thrusts, resistances, efforts, the volition, in fact the life, with its accompanying emotions, which we project into the form and attribute to it."[3] Thus the sensation of beauty is a motor as well as a sensory phenomenon. If this sensation is one of pleasure we ascribe to the object the possession of beauty, if the opposite, of ugliness. But all sensations of

[2] Santayana, "The Sense of Beauty" (1910), pp. 23*et seq.*

[3] Lee and Anstruther-Thompson, "Beauty and Ugliness" (1912), p. 28.

pleasure are not accompanied by the perception of beauty. Pleasant as our recollections of a certain dinner may be we would hardly refer to it as beautiful, even to compliment the most gracious hostess. The frequent repetition of esthetic experience gradually develops in the individual a greater susceptibility to such stimulation, in which regard esthetic pleasure differs from other pleasures the frequent indulgence in which leads to satiety and even repulsion.

This ability to project ourselves, which with respect to other creatures, leads to that we call sympathy, is a most valuable acquirement. It needs no argument to prove that it tends to develop unselfishness, humanitarianism, and ultimately a love of truth, right and justice, which is idealism. The cultivation of esthetics, therefore, is clearly not only *one* factor in the production of idealism, but perhaps the most important factor of all.

If one compare his impression with regard to a beautiful object with that of others he soon learns that the impression of each person is different, depending on previous experience, training and point of view, and that perceptions of beauty are always individualistic. The perceptions of two individuals may approximate one another if the basis of the one approximate that of the other, but as each has his own personality so each has his own perceptions of beauty. If one be honest with himself and others this tends to develop a respect for others' opinions and his sense of fellowship with the rest of mankind.

To quote again from a text referred to above:[4]

> It would be an error to suppose that esthetic principles apply only to our judgments of works of art or of those natural objects which we attend to chiefly on account of their beauty. . . . In the leading political and moral idea of our time, in the idea of democracy, I think there is a strong esthetic ingredient, and the power of the idea of democracy over the imagination is an illustration of the effect of multiplicity in uniformity. . . . Of course, nothing could be more absurd than to suggest that the French Revolution . . . had an esthetic preference for its basis; it sprang, as we know, from the hatred of oppression, the rivalry of classes, and the aspiration after a freer social and strictly moral organization. But when these moral forces were suggesting and partly realizing the democratic idea, this idea was necessarily vividly present to men's thoughts; the picture of human life which it presented was becoming familiar, and was being made the sanction and goal of constant endeavor. . . . The consequence was that democracy, prized at first as a means to happiness and as an instrument of good government, was acquiring an intrinsic value; it was beginning to seem good in itself, in fact the only intrinsically right and perfect arrangement. A utilitarian scheme was receiving an esthetic consecration. The practical value of the arrangement on which, of course, it is entirely dependent for its origin and authority, was forgotten, and men were ready to sacrifice their welfare to their sense of propriety; that is they allowed an esthetic good to outweigh a practical one.

It was becoming an ideal.

> Esthetic love of uniformity, however, is usually disguised under some moral label; we call it the love of justice, perhaps because we have not considered that the value of justice also, in so far as it is not derivative and utilitarian, must be intrinsic, or what is practically the same thing, esthetic.

The same author emphasizes the idea that beauty is a species of value and the philosophy of beauty a theory of values. If this be true then another value of esthetic training is that it educates the judgment. One is inevitably led to compare beautiful objects one with another not only to determine degrees of beauty, but also to discover the new beauty which such comparison may disclose.

The pursuit of beauty, furthermore, involves continued attention; a certain object may attract us at first glance because it exerts a powerful stimulus and commands

[4] Santayana, *l. c.*, p. 110.

our attention, but no casual glance will reveal beauty in it, and to appreciate that beauty to the utmost we must become absorbed in contemplation, must, as we often say, "enter fully into the spirit of the thing." This is another value attached to the study of esthetics, that it develops the power of concentrated observation.

It thus appears that the cultivation of esthetics not only tends to develop sympathy and from that as a starting-point, becomes a prominent factor in the development of idealism, but also develops judgment, power of concentrated observation, and respect for the opinions of others, being thus also a factor in the production and spread of democratic ideals. The multiplication of objects of beauty in our cities —parks, with all that usually goes with them, fine buildings, and works of art—is not extravagance, nor is it of little consequence that we seek to secure beauty in all the details of our surroundings. The effect of these things, acting gradually and exerted unconsciously upon the citizens, produces in time results which no one can measure but of the value of which there can be not the slightest doubt.

In this connection we should be reminded of the fact that esthetics is but rarely taught as such, and indeed, the daily contact with beautiful things, working silently but none the less surely, is more effective than conscious efforts to secure results, which too often defeat themselves by the opposition of the persons whom it is desired to affect. Esthetic training may be secured from the study of literature, of science, or of the arts, if care be used to take advantage of the opportunities constantly offered.

The study of animal life is peculiarly suited to form the basis of esthetic training, and, indeed, no one can acquire even a rudimentary knowledge of zoology without being influenced esthetically. There is in the case of the animal, not only the beauty of form and of color which belongs to so many natural objects, but also the beauty of motion, in the case of birds the beauty of song, and in all higher animals even greater esthetic possibilities are revealed in the degree to which their natures are akin to that of man. Animal nature-study develops sympathy, judgment and the power of observation, and always excites the closest attention, thus possessing exactly the esthetical values referred to above. It is clearly opposed to all that is dogmatic, and properly presented or acquired contributes to liberality of thought and respect for the points of view of others.

In another way animal nature study is supreme among the subjects which may form the basis of training in esthetics. Just as the earliest artistic efforts of primitive man seem to show that of all the objects about him animals appear to have most attracted his attention and stimulated first his imagination, so in childhood we today are first most strongly impressed by the living animals about us. While children may be to a degree interested in trees, and flowers, and the inanimate things around them, the most effective approach to nature study in the case of younger children is through the study of animals and this is the logical beginning of esthetic training.

It thus appears, if the points which have been referred to are well taken, that the cultivation of esthetics is highly valuable to us as individuals, to the communities in which we live, to the nation of which we are a part, and to mankind as a whole, and since the study of animal life is preeminently fitted to serve as the beginning of such cultivation and is peculiarly appropriate as material for its continued prosecu-

tion, no further argument is necessary to show the esthetical value of zoology.

In inviting your attention to the other aspect of the topic assigned to me, the recreational value of zoology, it should first be noted that this does not involve entrance upon a new field. The play instinct, which is exhibited by many animals in varying degree, and which with his more complex nervous system, reaches its highest and most varied manifestations in man, is essentially an esthetic instinct.

This is most evident in the play of children. They impersonate various characters, and little girls, "playing lady" reproduce practically all the activities of their mothers—they keep house, they have and direct imaginary servants, they order by telephone articles needed in the household, they make calls, go to parties, become ill and call physicians or nurse members of the families who are sick, they go visiting, write, send and receive letters, imagine themselves afflicted by the various trials that beset married life, exchanging sympathy with one another over these troubles, and if they be not yet subject to these trials, they have lovers and enjoy the consequent notes, flowers, bonbons, invitations to the theater, and other attentions that attend such a blissful state of existence. Boys in like manner impersonate their fathers, or conceive of themselves as animals the habits of which they imitate, and even pose as inanimate objects and endeavor to reproduce the qualities they ascribe to such objects. Have none of you a memory of having played animal and a recollection of the disappointment you felt as an elephant when your more sagacious companions, who were monkeys, climbed the tree after apples and insisted on your remaining on the ground?

Thus the child puts himself in the place of the object which he sees in his imagination, and derives pleasure from the activities that that involves. That he secures from it a sensation of beauty may be questioned in many cases, but it should be remembered that children reproduce more or less perfectly such activities as seem to them attractive, such as flying and swimming, or personal qualities which they admire, that they aim to arrive at consistency in their play, and that a sense of rhythm is frequently strongly evident. Many games are accompanied by singing, and a careful study of the whole matter has led to a general recognition among estheticians of the esthetical nature of play as it is carried on by children.

In adults this is less clear. But the essence of play in adults is in the laying aside of one's ordinary character and activities and the assumption of a different character with the different activities this involves. To a greater degree than in the case of children do adults seek to realize the fullest consistency in the playing of the part and to a greater degree do these activities involve that which is really beautiful. It is interesting to note also the tendency of adults at play to break into song.

Play activities must, if they be in the fullest sense of the word play, have nothing in common with our ordinary vocations. Hunting is recreation to the business man but business to the professional hunter and guide. A hunter would enjoy less of the pleasure of the hunt if he did not wear the regulation hunting clothes and carry the paraphernalia which is appropriate to such an expedition. The charm in hunting lies in the constant stimulation of the imagination. The hunter is alert to the possibility that any moment the game may come into view and demand instant action if it be secured. Any grass-clump, any thicket, any piece of woodland, any depression, or any turn in his course may disclose

the quarry. A hunting excursion is really a constant succession of play-reactions. The killing is not pleasure, but the getting of the game gives satisfaction because it is the culmination and realization of a pursuit which has been in the fullest sense of the word, esthetic.

Not only must play activities be different from ordinary activities but the object sought must be non-utilitarian. A man who goes hunting or fishing with the sole idea of killing and bringing home all the booty he can, and, it may be, whose game is driven up to him, does not derive the recreation he might from his quest.

It is unnecessary to say that recreation must afford pleasure to him who seeks it. This element introduces the possibility of infinite variety in play, and again emphasizes its resemblance to other esthetic activities, which we have seen are individualistic in character. Two persons will find equal enjoyment in very different types of recreation, what is play to one might be the hardest of work to another, and the ways in which different individuals will pursue the same type of recreation are almost as many in number as are the individuals themselves.

The aim of play is primarily rest. We endeavor to select recreation of such a character as to demand the use of muscles ordinarily not called into activity, thus relieving those that are exhausted with the daily toil. We seek enjoyment in directions that carry us outside our ordinary field of thought and in that way afford the opportunity to tired nerve cells to recuperate their energies. We demand in our play freedom from worry and responsibility. A quality in play much emphasized by some students of the subject is that its activities are assumed voluntarily and may at any moment be suspended. How much it adds to the enjoyment of a trip if we feel that it makes no difference when we get home! Play should involve both muscular and nervous activity and should be capable of fully absorbing the attention of the player.

Finally it may be pointed out that recreation should be taken away from the familiar surroundings, is most profitable when taken in the open air, and most satisfying to a person of taste and culture, if sought amid scenes which stimulate our sense of beauty.

The ultimate aim of recreation is, as was that of esthetics, the development of a more effective individual to the ends that he may become a more worthy citizen. As each develops sympathy, the power of judgment, and of concentrated attention, they both do contribute definitely to this end. And both assist in this development in another manner which has not been mentioned. Nervous balance, the ability of an individual to maintain a clear mental vision, an active imagination, the possession of strong emotions always held in check by reason, are necessary if a man is going to be consistently a safe and progressive citizen. Both esthetics and nature study not only tend to develop this balance and these qualities, but both also offer relief from strain when one's burdens become heavy and the weight of responsibility presses hard. One person finds relief in the beauty of art, another in the beauty of literature, but many and perhaps the majority seek it in the beauty of nature in one form or another or in the relaxation and recuperation which are afforded by recreation.

That the study of animals, particularly in their natural environment, affords opportunities for recreation is so evident as to make proof unnecessary. But emphasis is given to the statement if attention is called to the fact that all the essential conditions of play are present, that it takes one away from ordinary scenes and activi-

ties, leads him into the open air, brings him in contact with interesting and beautiful objects, demands physical and mental activity, and if he be susceptible to the attraction of such objects at all, absorbs his attention, and thus relieves him from worry and responsibility.

Thus zoology has a very considerable recreational value, but it is clear from what has been said that this is to be secured in greatest degree from the study of field zoology, or as it is usually called, nature study. There is much esthetic value in the study of animals in the laboratory and museum and there is some recreational value as well, but both are realized in far greater degree if animals be studied living, in their natural surroundings, and displaying their characteristic activities.

Hunting is attractive to many men and to some women, but opportunities for such recreation are rapidly growing less and less, and over the larger part of our country are now secured only at a considerable sacrifice of time and money. Fishing is still within the reach of a larger number, but opportunities for this enjoyment are constantly diminishing. Under these conditions many sportsmen have taken to the camera and find close at hand in the pursuit and photography of animals too small to serve as game all the pleasures that they formerly found in hunting or fishing.

One feature of nature study which adds greatly to its recreational value so far as the great number of our people is concerned is that it may be pursued close at hand. The out-of-doors is all around us, but most of us see little of it. Let one take up the pursuit of nature study and everything about him takes on a different aspect. Where before he saw only earth and sky and woods and fields, now he sees a myriad of beautiful and interesting forms. His eyes are opened to objects and activities before undreamed of and not only does the thicket and weed-patch, pond and stream, become scenes of marvelous activity, but the air is vibrant with tones before unheeded. The activities of the animals here as in the case of esthetics give to animal nature study a peculiar value as compared with the study of plants or inanimate nature.

And as the study is pursued the surroundings become pregnant with more and more of interest and beauty. Every walk becomes an adventure and every area to which one devotes his attention a field of discovery. It has been said that to secure the greatest value from recreation one must seek new scenes and such as afford opportunities for the contemplation of the beauties of nature. To the student of nature study the most familiar scenes take on a new aspect, and as his knowledge increases he not only learns how to find new and beautiful objects, but he acquires also that which enables him to project himself into features of his surroundings which before seemed commonplace and uninteresting. These now appear beautiful and to opportunities for healthy recreation are added means of esthetic enjoyment which can be but slightly appreciated by those who have never experienced them. Nay more—as nature is infinite, and as he is capable of continued development, a lifetime of ever-widening opportunity unfolds itself as he proceeds.

It may seem a far cry from the tumult of battle to the calm and peace of the roadside, the meadow and the woods; from the broad principles for which nations are contending to the simple facts of nature study; from a field of struggle which involves the whole world to the area limited by one's horizon. But a little consideration shows

that it is not so far, after all. From the highways and byways from one end of this country to the other are coming the men who are to fight the battle for freedom; in last analysis the idealism for which this nation stands is rooted in the minds of its people; and the extent to which the government can prosecute the war, it may be even victory itself, depends upon the strength of that idealism in the minds of even the most humble and least traveled of our citizens.

But after the war will come peace, when we will resume to a large degree our former daily habits of life and thought, when the communities in which we live will once more take up the tasks of civic and industrial development, when our nation will turn again to those problems of government and society upon the successful solution of which its future prosperity, if not its existence, depends. Then will be needed more than now the idealism which a crisis like the present calls forth in such strength, but which slumbers in time of peace; then will we need to consider most seriously the means by which that idealism may be developed and kept active. Then will democracy even more than at the present time need to be fostered and will we need to make use of every agency which will educate people to a broader view of their responsibilities and increase sympathy, the love of truth, right and justice, regard for the welfare of others, and a feeling of kinship with all mankind. And if the study of animal life can contribute even in a small degree to the effectiveness of our people and to the development of that idealism upon which the future of democracy depends, then is it worthy of consideration and the value of zoological science has one more claim to recognition.

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SCIENTIFIC EVENTS

TIN IN VIRGINIA

THE United States is almost entirely dependent on foreign countries for its supply of tin. As this metal is a war-time necessity, and as a domestic source of supply is urgently needed, all known deposits of tin ore (cassiterite) in the United States have recently been examined by geologists of the United States Geological Survey, Department of the Interior. One of the most promising of these deposits is in the Irish Creek district, in the eastern part of Rockbridge County, Va., near the summit of the Blue Ridge. This deposit was recently examined by H. G. Ferguson, of the United States Geological Survey, which in this research is acting in cooperation with the Virginia Geological Survey. The existence of tin ore in the Irish Creek district has been known for many years, and between 1883 and 1893 the deposit there was actively mined. The mining company, however, became involved in litigation as to land titles and abandoned work in 1893. Work on the deposit was never resumed, and the old workings are now caved and heavily overgrown with brush, so that a thorough examination of them is difficult, but what Mr. Ferguson saw in the field and the information he derived from old reports led him to conclude that the deposits along the Blue Ridge in this vicinity offer some promise as a source of tin, both through the systematic working of the known veins and the possible discovery of other deposits. The cassiterite occurs in quartz veins that cut a granitic rock of peculiar appearance known as a hypersthene granodiorite. The veins do not continue for long distances and their content of tin is probably very irregular from place to place. Some high-grade ore was found, however, and some tungsten ore occurs with the cassiterite. It is believed that the district is worthy of further investigation. A copy of the report may be secured on application to Dr. Thomas Leonard Watson, director, Virginia Geological Survey, Charlottesville, Va.

INTERNATIONAL SCIENTIFIC NOMENCLATURE[1]

IN the *Comptes rendus* of the Paris Acad-

[1] From *Nature*.