

NATURE·STUDY
AND·LIFE



HODGE

NATURE STUDY AND LIFE

BY

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TO
NELSON WELLINGTON HODGE

MY FATHER,
WHO GAVE ME MY FIRST
ANIMALS AND PETS, MY FIRST GARDEN
PLOT AND LITTLE FARM, WHO LEFT THE
BIG OAK UNCUT
FOR ITS BEAUTY
AND THE WILD PRAIRIE UNFLOWED
FOR ITS WILD FLOWERS, WHO SET
THE ELM TREE BY THE
PORCH AND THE
RED MOSS
ROSE
IN THE OLD HOME
GARDEN

PREFACE

THE field which this book essays to enter has ever spread out before me like an enchanted country. The possibilities and resources of life, dissolving in changes forever fresh and new, the infinite variety of mechanism, device, and story, the display of beauty on every side that baffles expression by pen or brush, have always seemed to me the natural matrix for the highest development of the child's mind and soul. We are beginning to use fruitfully in our education the legends and myths of the past, but the fundamental conceptions of these lie in the life and nature about us. All this is the work of the Infinite Enchanter of the Universe, and forms a realm of real magic, of which human myth and fairy tale are after all but the passing shadow. This was the world of keenest interests, delights, and sufferings of my boyhood, the common ground out of which my interests in special problems of science have grown, the world to which I instinctively turn from the fatigue and technicality of special work for rejuvenation and refreshment and find that its delights do not grow old.

The more I study the problem, the more it seems to me that this side of nature is the sheet anchor of elementary education, all the more necessary as modern life tends to drift away from nature into artificialities of every sort. Recent developments of the sciences have completely dazzled our modern education with their bewildering array

of newly discovered facts, and the temptation has proved irresistible to introduce their technicalities into the elementary curriculum. But the childhood of the race was very long, and we should not wish to force its period, brief at best, in the life of the individual. The weathering of rock and the formation of soil afford interesting lessons in modern geology; but men dug and planted, and established fruitful relations with Mother Earth thousands of years before geology was even dreamed of. So with combustion and the various forms of water: why not let children wonder about them for a few years, and then come with interest keen and fresh to their study in the chemistry and physics of the high school or the college? By leaving out everything else, however, I do not wish to insinuate that the study of living things is all of nature study. But other sides of nature are so fully represented in plans for nature-study courses now before the public, — I am tempted to say so much too fully represented — that my conscience is perfectly clear in leaving them to shift for themselves.

Many recent books presenting courses of nature study have divided the lessons according to the seasons and terms of the school year. This form is doubtless of service to some teachers. I have not been able to adopt it, however, for two reasons: Nature's changes were not arranged according to our school courses, and the predominant importance of subject-matter precludes such cramped and formal treatment; my purpose is to bring nature into relation to child life rather than to school life, to make it a continuous source of delight, profit, and highest education rather than a formal school task. I

have sought to obviate this difficulty in arrangement by a somewhat detailed grade plan in which topics are suggested for the grade best adapted for their pursuit. A full cross-reference index will also assist in a similar way.

The illustrations have been selected to express the relation of man, especially the relation of the child, to nature; and since spontaneous activity is fundamental to my plan of nature study, the majority of them are intended to suggest ways and means of doing something. To those who have contributed pictures, notably Charles Irving Rice, J. Chauncey Lyford, Myron W. Stickney, Charles L. Goodrich, The National Cash Register Company, Henry Lincoln Clapp, M. V. Slingerland, Miss Katherine E. Dolbear, and Miss Jessie G. Whiting, I wish to express my sincere thanks. Acknowledgment usually accompanies the illustration, but the picture of a deer in the velvet (p. 15) should be accredited to Mr. Rice. The photograph of the mosquitoes (p. 89) and the portrait of a young wood thrush (p. 345) are by Mr. Stickney. Figs. 121, 123, 125, 131, and 135, together with most of the data from which the bird-food chart (p. 323) was constructed, are contributed by Miss Helen A. Ball. The other line drawings, with exception of 20 *d*, 22, 25, 35 *b*, 71, 160, 161, 178, 193, 194, 195, were made under my direction by Mrs. Helen Davis Burgess. The photographs not otherwise accredited are by the author.

This book could never have been written, in anything like its present form at least, until its various suggestions had been given the test of actual school work. Miss Mary C. Henry, principal of the Upsala Street School of Worcester, Mass., has not only done this, but in addition

has contributed many and valuable suggestions, notably with reference to the grade plan, to the school garden, and to the problem of cleanliness of the schoolroom. Thus to Miss Henry and the teachers in the Upsala Street School the book owes much of its definite character. To Professor Brooks, of the Johns Hopkins University, I am also under obligations for counsel as to the general plan of the work. For help in final revision of the text and proofs and preparation of the illustrations I am under great obligations to Mr. Lyford, and for assistance with the proof I wish to express my indebtedness to Miss Henry, Miss Dolbear, and Mr. Stickney.

Finally, I acknowledge my debt to Clark University for opportunity, and to Dr. G. Stanley Hall for suggestions which called my attention to nature study. The further I went, the more it seemed to me that the sources from which must flow the future development of science in this country all lie in the quality of the work done in the public schools. In freshness, in lively interest, in originality, nothing equals a child; and it has long been conceded that at no time is progress in learning so rapid as during the first three or four years of life. The secret of this, it has seemed to me, lies in the fact that touch with nature at first hand, original research, if you please, is the very breath of mental life. How may this splendid growth process of infancy be prolonged through life? The best answer to the question that I am at present able to offer is the book itself.

C. F. HODGE.

CLARK UNIVERSITY, WORCESTER, MASS.,
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INTRODUCTION

FOR this book I have no hesitation in predicting a most wholesome, widespread, and immediate influence upon primary and grammar school grades of education in this country. No one has gone so far toward solving the burning question of nature teaching, and to every instructor in these subjects this volume will be not only instructive but inspiring.

Unlike the authors of most of the many nature-study manuals now current, Professor Hodge has been for some years the head of a University Department, is a specialist in two or more of the fields of biology, and has made original contributions of value to the sum of human knowledge. His mind thus moves with independence, authority, and unusual command of the resources in the field here treated.

New as his method essentially is, it is now made public only after years of careful trial in the public school grades in Worcester, until its success and effective working in detail is well assured. Thus it has passed the stage of experiment and is so matured and approved that, with slight local adjustments, it can be applied almost anywhere for children of from six or seven to thirteen or fourteen years of age.

I have also observed the growing appreciation with which this matter and method have been received by the representative teachers from nearly every state in the

Union in the successive sessions of our Summer School, in which approval has grown to deep interest and hearty enthusiasm.

Although the author has striven to secure the best results sought by other nature books, this differs not only in all respects from some, but in some respects from all, and chiefly as follows :

It contains a richer and more varied subject-matter. Instead of elaborate methods applied to a few species, it presents the essential and salient points about many and thus avoids the current fault of over-elaborate and over-methodic treatment, prolonged till interest turns to ennui.

Another principle solidly established and here utilized, is that interest in life forms precedes that in inanimate nature for children of the age here in view. Rock forms, crystals, stars, weather, and seasons are all interesting, but have their nascent period later, and at this stage pale before the deep, instinctive love of pets and the fauna and flora of the immediate environment.

Again, the principle of utility is here often invoked in a new field, and in a way calculated to advance one of the chief objects of modern pedagogic endeavor — an increasing unity and solidarity between the school and the home. The new use of this motive is distinctly national and sure to appeal to the practical spirit of this country.

The author is a born naturalist, and his love of nature and children, which is infectious, is not less but more because he does not forget nature's uses to man. Believing profoundly, as I do, in the poetic, sentimental, and religious appeal which nature makes to the soul, it is plain that for some years preceding adolescence the

normal child can be appealed to on the practical, unsentimental, and utilitarian side of his nature.

Once more, this work is opportune because it stimulates spontaneous, out-of-door interests. It is with abundant reason that we find now on every hand a growing fear of the effects of excessive confinement, sedentary attitudes, and institutionalizing influences in the school. Such work as is here described must tend to salutary progress in the direction of health.

Lastly, many modern nature books suffer from what might be called effeminization. This is a book written by a man and appeals to boys and girls equally.

The time has now happily passed when it is necessary to urge the importance of the love and study of nature, or to show how from it have sprung love of art, science, and religion, or how in the ideal school it will have a central place, slowly subordinating most other branches of study as formal and accessory, while it remains substantial. To know nature and man is the sum of earthly knowledge.

G. STANLEY HALL.

WORCESTER, MASS., Dec. 3, 1901.

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NATURE STUDY AND LIFE

CHAPTER I

THE POINT OF VIEW

And God blessed them, and said unto them, be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.

And God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat.

And the Lord God took the man, and put him in the garden of Eden to dress it and to keep it.

Aims and Purposes of a Nature-Study Course. — The heart of education, as of life itself, is purpose. Through the maze of infinite variety in form and structure and action that nature presents to the student on every side, the only thing that can hold him to definite lines with patience, persistence, and continuity enough to make his work amount to something is *purpose*. Hence, in order to select intelligently the materials for a successful course, we need at every step to have the purpose of nature study clearly before us.

This may be expressed in a brief formula, as: *Learning those things in nature that are best worth knowing, to the end of doing those things that make life most worth living.*

What things are *best worth knowing* is indicated in a fundamental way by the relations toward nature that the human race has found necessary and valuable to develop; and nowhere in literature are these relations expressed with such force, beauty, and high authority as in the words at the heading of this chapter. The fundamental relations to nature of the race, the individual, and the child have been more fully discussed elsewhere,¹ and it is necessary only to summarize them here briefly as follows:

Of first importance is the fact that man's primitive relations to nature are mainly biological—relations to animal and plant life.

Subjugation of Animals. — Development of these relations followed the order of logical necessity. Subjection must come first if man is to live in safety on the earth. This great process of subjugation, this hand-to-hand fight against nature, must have constituted the main lines of human nature study for thousands, probably for tens of thousands of years before language took form and written history began, and it has formed a large part of the work ever since. And how far have vermin, weeds, insects, and microbes been brought under subjection even now? To what extent this phase of struggle and warfare should enter into a course of nature study must remain largely a matter for individual parents and teachers to decide, but that it has played an important and fundamental rôle in development of civilization and formation of human character there can be no doubt. And it remains as true as ever that character

¹ "Foundations of Nature Study," *The Pedagogical Seminary*, vol. vi, No. 4, pp. 536-553; and vol. vii, No. 1, pp. 95-110, No. 2, pp. 208-228.

can only be developed by struggle, by active, intelligent, patient overcoming of difficulties, the elements that achieved success throughout the ancient travail of the race. It is still "To him that overcometh"; and nothing can take the place of the hard task in education. But there need be no reversion to barbarism. In fact, the



FIG. 1. PRIMITIVE GERMAN HOME AND ITS OCCUPATIONS
(From a painting by Joh. Gehrts)

work should all be planned to exert the strongest possible uplift toward civilization instead.

Dominion over Animals.—The step from abject savagery, by which a new relation between mankind and nature was opened up, was *domestication of animals*. Hitherto life had been a struggle against all nature, against friends and foes alike. At this point man first developed intelligence

enough to distinguish between friends and enemies and to discover companions and helpers among the animals about him. The first animal tamed was the dog, which is still the idol of the child's heart. Although taming of the dog antedates all historic records, it is quite probable that this great advance was made by the plastic fancy of a child, — that *the first animal domesticated* was the playfellow of some savage boy or girl.

Then follows, also before the dawn of authentic history, domestication of the horse, sheep, goat, horned cattle, and most of our domesticated birds, and it is self-evident that the family or tribe first to develop the patience and intelligence to tame and thus utilize animal helpers must have rapidly outstripped all rivals in the race for life.

Human races, in fact, may be divided into those that have and those that have not tamed the horse. In long struggles small margins of strength are often decisive, but one "horse power" equals that of five men, from which we see what an enormous advantage accrued from domestication of this one animal. Who first tamed and rode a colt no one will ever know, but it must have been some boy, lithe, strong, and daring. Certainly the twelve-year-old Alexander succeeded better with Bucephalus than the royal grooms of his father Philip.

The important interest for nature study is the process of domestication, the gaining of "dominion" expressed in the command, the establishment of helpful relations, rather than anything connected with the animal itself. Thus we miss the substance for the shadow when we attempt to give this kind of education by pictures of animals; and we also lose the humanizing and educational