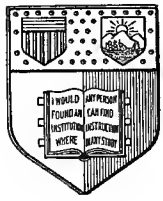

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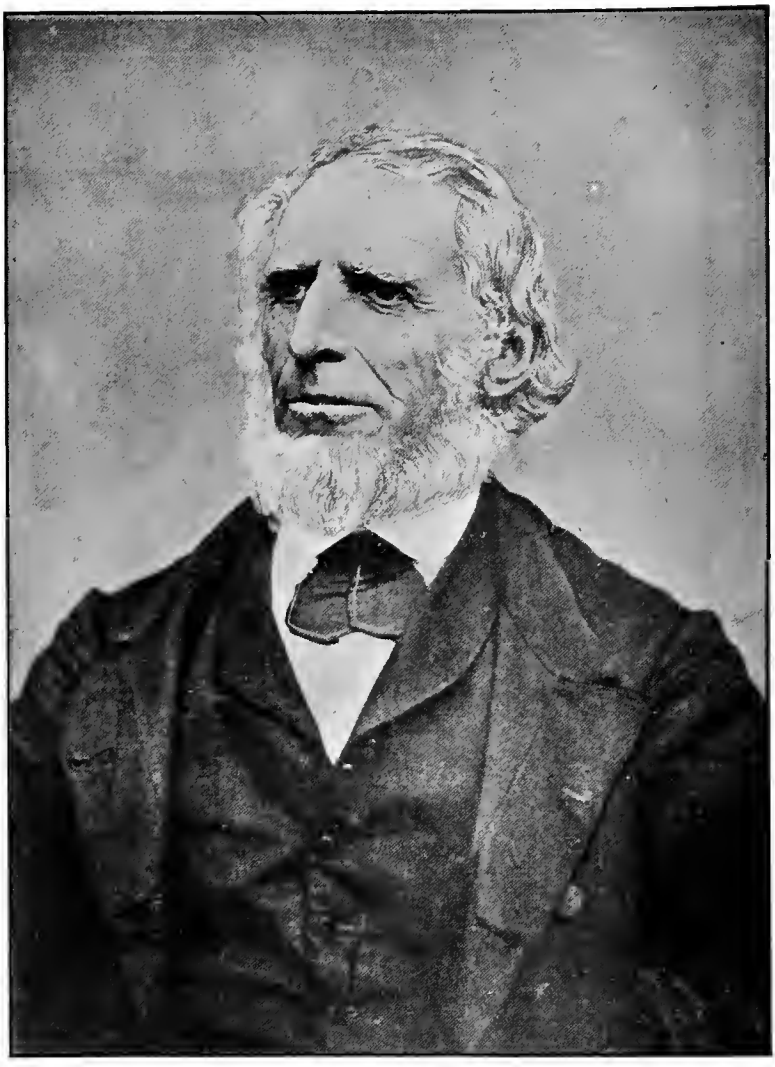

EZEKIEL HOLMES,

FIRST SECRETARY OF THE MAINE BOARD OF AGRICULTURE;

AT THE AGE OF SIXTY-FOUR YEARS.

AGRICULTURAL BIBLIOGRAPHY

OF MAINE

BIOGRAPHICAL SKETCHES OF MAINE WRITERS ON AGRICULTURE,
WITH A CATALOGUE OF THEIR WORKS; AND AN INDEX
TO THE VOLUMES ON THE AGRICULTURE
OF MAINE, FROM 1850 TO 1892

By SAMUEL L. BOARDMAN

AUGUSTA:
PRINTED FOR THE AUTHOR
1893

EDITION OF TWO HUNDRED COPIES ON LARGE PAPER.

TO THE MEMORY OF

EZEKIEL HOLMES,

TEACHER, EDITOR, SCIENTIST, PHILANTHROPIST:

THE FATHER OF

AGRICULTURAL LITERATURE IN MAINE.

CONTENTS.

ILLUSTRATIONS.

PREFACE.

The present work has been prepared as a contribution to the World's Columbian Exposition, Department A, group, 15, class 83,—"agricultural literature and statistics."

The biographical sketches embraced in the following pages are those of the leading writers upon agriculture, native or residents of Maine. It has been the aim of the author to present the name of every contributor to agricultural literature whose writings have taken considerable rank in agricultural annals, and if any have been omitted it has been from want of knowledge or information regarding them. It has been matter for regret that in some cases the replies to repeated letters of inquiry have been very meagre; so much so that it is feared the sketches will appear inadequate to the persons whom they most concern. In other cases no replies whatever have been received, and it is consequently feared that some names should appear here which do not occur at all. It can only be said in these cases that the writer has faithfully endeavored to do equal and exact justice to all.

It has been found difficult also, to draw the line between the admission of a name to the Bibliography, which would entitle it to the distinction of a biographical sketch; or to place it in the general index in connection with authors and subjects. Much study was given to this point and it is believed the results have been such as will meet the approval of all interested. In cases of deceased authors estimates of their character and works have been carefully admitted; and in a few instances the recognition of important and original work by living authors, has been noticed by experts qualified to judge, as something altogether fitting and in commendable taste. Many native Maine authors on agriculture have won wide distinction for their elaborate works, while all have performed an honorable part in the agricultural literature of the country and age. Writers on the sciences relating to agriculture, as geology, entomology, botany, forestry, in their economic applications, have been included in this list.

A word may be said as to the illustrations. The frontispiece is enlarged from a card photograph, the negative of which was made by Sawyer, a Bangor artist, at Augusta, in the winter of 1865, only a few weeks before Dr. Holmes' death. The portrait by Meisel—a lithographic plate—which appears in the Report of the Board of Agriculture for 1865, was a composite one, and never quite satisfactory to those who knew Dr. Holmes only in his later years. The old title-pages are exact reproductions of the earliest works issued in Maine on agricultural subjects; that of the Northern Shepherd being the work published by the Kennebec Agricultural Society in 1835. These three plates have been made especially for this work; the views of the State College and Experiment Station have before appeared, and the plates are kindly loaned for use here.

The want of complete references to volume and page, in some cases, is due to the fact that the author did not have the opportunity of consulting original sources of information, and was obliged to depend upon notes furnished by individual writers.

AUGUSTA, MAINE, June 1, 1893.

INTRODUCTION.

It is an interesting fact, especially to all intelligent Maine farmers, that while Arthur Young and Sir John Sinclair were engaged in their eminent services for the improvement of the agriculture of Great Britain, and leading citizens of Pennsylvania had established and were carrying on "The Philadelphia Society for Promoting Agriculture," (the first association of its kind formed in the United States), leading citizens in the then District of Maine had organized an agricultural society, the third in all North America at the time. So that the great "light stations" first established in this country for the improvement of agriculture and the diffusion of agricultural literature, were: Philadelphia, Pa., 1785; Charleston, S. C., 1785; Hallowell, Maine, 1787. It was not till five years after this, viz: March 7, 1792, that the "Massachusetts Society for Promoting Agriculture" was incorporated at Boston. The broad-minded men interested in the establishment of these societies, were convinced of the necessity and of the assistance which such associations would afford to the interests of agriculture. Their objects were at first confined to the diffusion of knowledge pertaining to rural economy through the publication of "Memoirs" or "Papers;" the offering of premiums for the elucidation of subjects upon which information was desired; the adoption of approved systems and methods of European culture suited to the conditions of this country, as well as for the improvement of certain articles of domestic manufacture. The holding of fairs or "cattle shows" was no part of the objects of these early societies, this feature not having been introduced till Oct. 1, 1810, when the Berkshire Agricultural Society, under the direction of Mr. Elkanah Watson, held a cattle show at Pittsfield, Mass., the first that ever took place in the United States.

The Kennebec Agricultural Society was established through the efforts of Dr. Benjamin Vaughan, and his brother, Mr. Charles Vaughan. Dr. Benjamin Vaughan was born in England, April 30, 1751, studied at Cambridge and received his medical degree at

Edinburgh. During the American Revolution Dr. Vaughan was a member of Parliament, but on account of his friendship for the American Colonies he was obliged to leave his country for France where he resided for several years. In Paris he formed an intimate acquaintance with Dr. Benjamin Franklin; and greatly admired the character of Washington. After the establishment of peace with England Dr. Vaughan came to the District of Maine and settled in Hallowell, "on the banks of the beautiful Kennebec." Charles Vaughan, who was born in London, June 30, 1759, soon followed his brother to this country, both settling upon a family property derived from their maternal grandfather, Benjamin Hallowell—a tract of land which extended along the Kennebec river for one mile, and westward to Cobbosseecontee lake—a distance of five miles. This land they improved and kept in a high state of cultivation, employing a large number of workmen upon it throughout the year. They had extensive gardens, established nurseries, planted orchards, imported stock, seeds, plants, cuttings and implements from England, and carried on model farming upon a large scale. They built miles of faced and bank wall upon their farms, laid out and built roads for the public use, and while they sold trees and plants from their nurseries, often to the value of a thousand dollars in a single year, they also freely gave to all who were unable to buy; sent stock, plants and seeds to leading farmers in the several new towns for them to propagate or test, and carried on correspondence with prominent farmers. The apple was not then so highly esteemed for fruit as it is now, but cider was made in large quantities. The Vaughans built the largest and most perfect cider mill and press in New England, employing a skilled mechanic from England to set up the machinery. In their gardens and orchards were apples, pears, peaches, cherries, and many kinds of nut-bearing trees. Doctor Vaughan was a distinguished student, a celebrated physician and an extensive writer upon agricultural subjects, passing a great part of his time in studies and scientific investigations. He carried on an extensive correspondence with learned men and savants both in America and abroad. Among his correspondents in this country were Washington, Franklin, and the elder Adams; in France Lafayette and Michaux the naturalist; in England, Sir John Sinclair, Arthur Young, Sir Humphrey Davy and many distinguished statesmen. Charles Vaughan had the immediate care of their large estates and the carrying out of their experiments and farming oper-

THE

RURAL SOCRATES;

OR

AN ACCOUNT OF A CELEBRATED

PHILOSOPHICAL FARMER,

LATELY LIVING IN *SWITZERLAND,*

AND

KNOWN BY THE NAME OF

K L I Y O G G.

Seeſt thou a man diligent in buſineſs, he ſhall ſtand before kings.
Proverbs xxii. 29.

——— Spiritus unus
Per cunctas habitat partes. *Manilii Aſtronomicon.* l. II.

HALLOWELL (DISTRICT OF MAINE)
Printed by PETER EDES; and *ſold* by the bookſellers in the principal towns of the United States.

A. D. 1800.

TITLE-PAGE OF FIRST BOOK RELATING TO AGRICULTURE PRINTED IN MAINE.

ations. These were very extensive, were performed at great cost of care and money, and had for their object the improvement of the agriculture of the state as much as they did the business of their owners. No breed of stock or variety of fruit, vegetable or seed was disseminated until it had been thoroughly tested and found to be valuable and well adapted to this country.

Dr. Vaughan had an extensive library and received from England the works on agriculture printed by Arthur Young, the "Communications to the English Board of Agriculture" and works of other writers, some of which are now to be found in the Hallowell public library. In 1800 he published an edition of "The Rural Socrates," which was printed at Hallowell by Peter Edes. There is nothing in the book to indicate that it was published under Dr. Vaughan's direction, but I had this fact many years ago from the late Mr. John Hesketh, a son of Mr. John Hesketh who came over from England with Dr. Vaughan as his head gardener, and the venerable Hallowell printer, Col. D P. Livermore. Arthur Young had published an edition of this work in London, in 1770, under the title of: "Rural Economy; or Essays on the practical parts of Husbandry; to which is added The Rural Socrates, being memoirs of a [Swiss] Country Philosopher [M. Hirzel]." This work had been reprinted in Philadelphia in 1775, probably under the encouragement of the Philadelphia Society, and it is an interesting fact that the second American edition of this early treatise on agriculture should have been printed in the District of Maine. Hence it may be safely said that the interest in agricultural literature was as great at the commencement of the present century, in this new and wilderness state, as at any place in the United States. The Rural Socrates is an 8vo. volume of xiv, 203, xiii pages, the matter of which is divided into three sections and an appendix. It contains an account of a philosophical farmer known as Kliyogg, living in Switzerland, his farm methods, mode of life, and particulars as to his character and sentiments This book is exceedingly rare. I do not know of but two copies, one of which is in the library of the State College at Orono, the other in the collection of the writer.

Dr Vaughan's first contribution to the "Papers on Agriculture, consisting of Communications made to the Massachusetts Society for Promoting Agriculture," appears in the part for 1803, and is entitled: "On the Benefit of Stripping the Bark from the Trunks of Trees, etc. By a member of the Kennebec Agricultural Society."

It occupies pages 5–23, and is designed "to show the benefit of stripping the bark from the trunk of certain diseased or feeble orchard trees; confirmed by accounts respecting the periodical disbarking of the Spanish cork-trees; and of certain other operations which may be performed with advantage on the bark of fruit trees." The article is dated, "Kennebec, January, 1802."

His second contribution is published in the same number and is entitled: "Means for increasing the Strength, &c., of Timber. By a member of the Kennebec Agricultural Society." It occupies pages 23–43, and treats "of several cheap and brief operations which have been proposed for increasing the strength and durability of certain species of timber, and for giving an immense increase of the dimensions, to be employed while the timber is growing."

The third essay is contained in the "Papers on Agriculture" for 1804. It is: "Particulars respecting the history and the use of the species of Gypsum, called Plaster of Paris; especially as it concerns Agriculture. By a member of the Kennebec Agricultural Society." This occupies pages 11–24, and is dated, "Kennebec, April, 1804."

The fourth essay from his pen appears in the same part, pages 47–103, and is entitled: "Fruit Trees. A Letter to Judge Dwight Foster, respecting the methods in use for forming Dwarf Fruit Trees, with some detailed particulars respecting Fruit Trees in General; and Observations on the Supposed decline and extinction of Certain Fruits. By a member of the Kennebec Agricultural Society." This is dated, "Kennebec, April 28, 1804." This is one of the most ingenious and interesting of Dr. Vaughan's essays and its numerous references and quotations indicate the wide range of his reading and his close and accurate observation.

In the "Papers on Agriculture" for 1809, pages 9–14, appears an "Address of the Kennebec Agricultural Society," which is signed by John Merrick, and is prefaced with this note: "The following communication appeared in the Kennebec Gazette for June 19 and 26, 1807, which you will do a favor to the farmers of Massachusetts by publishing in your Agricultural Papers. Yours, B. V. November, 1807."

Dr. Benjamin Vaughan died in Hallowell, December 8, 1835. Charles Vaughan died in Hallowell, May 15, 1839. It is almost impossible to over-estimate the value of the efforts of these pioneers

in the agricultural development of the State and country, and they should ever be held in grateful remembrance by the farmers of Maine for what they did in improving and perfecting the many branches of our agricultural operations. Their good influence is realized even to the present day.

One of the earliest writers on the physical resources of Maine, who did much to attract attention to the wealth of timber, manufacturing advantages and agricultural characteristics of the District and State, was Moses Greenleaf, who was the author of two important statistical and general works, and an atlas of maps of the State. Mr. Greenleaf was born at Newburyport, Mass., October 17, 1777, and came to New Gloucester with his father's family. Becoming of age and desiring to go into business he settled in Bangor and went into trade. In a brief sketch of Mr. Greenleaf, from the papers of the late William D. Williamson, published in the Bangor Historical Magazine, Vol. 4, 1888-'9, p. 75, Mr. Williamson who knew Mr. Greeuleaf well, says: "Unable through misfortunes or changes in the times to sustain himself in mercantile business, about the year 1806 or 1807, he resigned his property into the hands of his creditors, and afterwards removing into the township where he died, prepared, in the midst of the wilderness, a habitation for himself and family. His mind was energetic and elastic. His education, which was acquired at the common schools, was greatly improved by reading and reflectiou, by business, and by the literary pursuits to which his mind and tastes so much inclined. Being a magistrate, a land-surveyor, and a ready writer, he was one of the most useful men among the settlers of a new country. At one time he was a Justice of the Court of Sessions. In 1816 he published a map and a 'Statistical View of Maine,' and in January of that year the Legislature of Massachusetts authorized a subscription of one thousand copies, at $3 for each map and 75 cents for each copy of the work. Encouraged by this patronage he revised and enlarged both and in 1829 published them at great expense. The new edition was called 'Survey of Maine,' and the maps were several. On application to the Legislature of Maine for aid, a resolve passed March 10, 1830, gave him $500, and a subscription on the part of the Government for four hundred copies of the maps and 'Survey' at $16 per set. These last works acquired him considerable credit, but they were too heavy to find a ready and extensive sale, and hence the remuneration for his labor was not adequate to his deserts, he never was fitly compensated for his

time. Mr. Greenleaf was quick in thought, composition, action and speech. His stature was more than middling for height, and well proportioned; his complexion rather light; his manners easy, and himself always frank and accessible. He died at Williamsburg, March 20, 1834 "

Mr. Greenleaf's first work has this title: "A Statistical View of the District of Maine; more especially with reference to the Value and Importance of its Interior. Addressed to the Consideration of the Legislators of Massachusetts. By Moses Greenleaf, Esq. *Salus publica mea merces.* Boston: Published by Cummings and Hilliard, at the Boston Bookstore, No. 1, Cornhill, 1816." It is an 8vo volume of 154 pages Chapters in this work relating to its conditions for agriculture are on Climate, Soil and Products, Value of Land, Sales and Grants of Land, and General View of the Interior Vacant Territory. Regarding climate, Mr. Greenleaf thinks its greater coldness when compared with that of other countries under the same parallel of latitude, is the prevalence of its immense forests which cover the land, but he says: "As the population of Maine increases, the forests are cleared, and the soil becomes more fully exposed to the genial influence of the sun, the climate will continue to ameliorate until it shall arrive to the happy temperature of other countries similarly situated. We may, with a considerable degree of certainty, calculate on the time when the inhabitants of Maine will enjoy all that mild temperature of climate and rich variety of the bounties of nature, which are now in possession of the most favored countries under the sun." In his chapter on agriculture Mr. Greenleaf says that "to each 1000 acres in the settled part of Maine, there are, on an average, 838 acres of improvable land, 102 acres of waste land, 47 acres covered with water and used for roads." He says, further: "There are 48 persons to every ten acres, or four and eight tenths to every acre, annually employed in raising corn, grain and pulse; and there are 36 persons to every ten acres, or three and six tenths to every acre employed in tillage of all kinds." The following interesting statistics of agricultural products are given:

Counties.	Bushels of wheat raised annually.	Bushels of corn raised annually.	Aver. bushels of wheat per acre.
York	12,350	122,307	14
Oxford	14,508	42,346	18
Cumberland ...	16,993	93,887	15
Lincoln	20,188	82,564	18
Kennebec	29,003	73,559	19
Somerset.....	9,822	21,842	18

At that time there were only nine counties in the District of Maine, no returns being given from Hancock, Penobscot and Washington counties. Interesting facts and remarks are given in each of the above named chapters specially relating to agriculture, and in the last Mr. Greenleaf observes: "On the whole there is no vacant territory in the United States which affords so many advantages of communication with different markets already established and flourishing as are to be found in the unsettled part of Maine; and it may be considered as rich in point of soil, and containing as little waste land as any part of New England of equal extent. At its first settlement, its products for exportation will consist principally of lumber, potash and wheat. As it proceeds in improvement, flour, pork, beef, wool, flax, &c., will become its staple articles."

Mr. Greenleaf's second work is entitled: "A Survey of the State of Maine, in Reference to its Geographical Features, Statistics and Political Economy. Illustrated by Maps. Portland: Published by Shirley and Hyde, 1829." 8vo. pp. 470. This work may be regarded as a rewritten, enlarged and elaborated edition of his "Statistical View." There are chapters on Climate, Natural Products and Agriculture which are especially interesting. They are each more extended, more carefully written and more abundantly illustrated by references and statistics than those in his first work. Of our climate he says: "The staple productions which are found to succeed in the climate of Maine are Indian corn, wheat, rye, barley, oats, millet, pulse of various kinds, flax, hemp, grass and most of the plants of northern climates. It is not known that the most, if not all, of these do not succeed as well, and in general yield as great crops with the same cultivation, as in any part of New England. * * * The character of the summers of Maine is well adapted to all the necessary purposes of agriculture, and is favorable for the cultivation of all those plants in the production of which consists the true wealth and independence of a people." In the chapter on agriculture Mr. Greenleaf says: "The fertility of the soil in the State is, in general, equal to that of any part of the northern states, in proportion to its extent. That of the northern part of the State, on the Aroostook and St. John, is considered as far superior, unless it may be some portions of comparatively small extent." Regarding the yield of crops Mr. Greenleaf says: "The crops of Indian corn in different parts of the State, and different

seasons, have varied from 30 to 50 bushels per acre; in some instances 80 bushels; wheat from 15 to 40; rye rather more; hay from 1 1-2 to 3 tons—other products in proportion." Several quite elaborate tables of agricultural statistics are presented in this chapter. The first gives the amount of agricultural capital and products in the several towns as exhibited in the returns made by order of the Legislature in the year 1820. These returns comprehend, 1. "Fixed capital," including acres of tillage, of upland, fresh meadow and salt marsh mowing; acres of pasturage, and number of barns. 2. "Active capital"—all kinds of farm stock. 3. "Annual products," including all crops and the number of cows the pasturage will keep. As these statistics are based on returns ordered by the Legislature in the first year that Maine was a State, when the authorities desired to know just what wealth the State possessed in this direction, they are without doubt correct. Returns are given from every town in the then ten counties of Maine a summary of which will be of interest as being the first agricultural census of Maine ever taken:

Tillage	78,964	acres.
Upland mowing	269,346	"
Fresh meadow	28,189	"
Salt marsh	8,859	"
Pasturage	272,717	"
Number of barns	31,019	
" " horses	17,849	
" " oxen	48,224	
" " cows	95,091	
" " swine	66,639	
Indian corn	508,143	bushels.
Wheat	202,161	"
Rye	45,679	"
Oats	102,605	"
Barley	74,972	"
Peas and beans	34,443	"
Hops	17,913	pounds.
Upland hay	215,805	tons.
Fresh meadow	18,476	"
Salt marsh	6,457	"
Number of cows the pasturage will keep	101,803	

From these statistics Mr. Greenleaf constructs a table of proportions from which he determines that there was a total of 15 9 acres of improved land to each person engaged in agriculture; that the average yield of hay was 0.79 per acre; that it required 2.6 acres of land to pasture one cow; that there was 2.7 horses, 7.3 oxen, 14.5 cows and steers under three years old, and 10.2 swine to each one hundred acres of improved land, and that to each one hundred persons engaged in agriculture there were 32 horses, 88 oxen, 173 cows and steers under three years old, and 121 swine. The total value of the fixed and active agricultural capital was $30,737,255. Commenting upon these tables Mr. Greenleaf makes many observations worthy of note. "It is miserable husbandry," he says "that does not produce at least one ton of hay to the acre on the average." Regarding agricultural exports he says: "The agriculture of the western and older counties of the State, including those of Kennebec river, produces not only a sufficiency for their own consumption, but a considerable quantity for foreign exportation, and also some for exportation coast-wise to other parts of the United States. In 1826, the exports of agricultural products from Maine to *foreign* ports—including beef, butter, cheese, pork, bacon, lard, flour, corn, candles, beans, potatoes and live stock, amounted to $409 561. An interesting feature of the agriculture of the State in 1827 was the number of cattle and sheep driven to the markets at Boston, Brighton, Salem and other points in New England. An account was kept at Haverhill bridge in that year, of all Maine cattle and sheep crossing it to western markets, and a careful estimate—in the absence of an exact account—was made at Piscataqua bridge. The former figures were 3766 horned cattle, and 1368 sheep; the latter were 1000 horned cattle and 2000 sheep. Taking those passing by other avenues. crossing the river at Newington and Exeter, it was estimated that a total of 10,000 neat cattle and 7000 sheep went annually from Maine to the western market. Cattle were averaged at $20 per head, and sheep at $1.50, bringing the value to $250,000, which added to the foreign exports made the total value of agricultural exports about half a million dollars annually.

The map accompanying Mr. Greenleaf's "Statistical View" of Maine, and the atlas of maps accompanying the "Survey," were, says the writer in Appleton's American Biographical Cyclopedia, "the best made to that date." The atlas embraced seven maps and charts, including a map of the State, a map showing the

original grants of land, chart showing vertical projections of elevations from the sea to Canada, meteorological diagrams, etc. The engraving is finely executed and the artistic work highly creditable. A set of the maps is in the State Library, Augusta.

Mr. Greenleaf's writings rank very high as original and trustworthy sources of information regarding the physical resources of the State previous to and immediately following its formation. He was not an agriculturist, but he had a mind trained to a broad grasp of every question affecting the material prosperity of the State, and his views and observations upon our early agriculture and farm methods must ever be regarded as those of a trained and unbiased publicist, containing sound reflections, accurate statements and a wise forecast of the future importance of the agriculture of our State, which were long ago found to be correct.

The copy of Dr. Samuel Deane's New England Farmer—the first work of its kind published on this side of the Atlantic—which is before me, is that of the third edition published in 1822. As Dr. Deane was pastor of the First Parish church in Portland from October, 1764, to November, 1814, it is reasonable that this work must have had a considerable circulation in Maine and influenced to a large extent the character of our agriculture. The first edition was published at Worcester, Mass., in 1790, with no name of author upon the title page, but instead the words: "By a Fellow of the American Academy of Arts and Sciences." The second edition was issued in 1797, and the third in 1822. It has this title: "The New England Farmer; or Georgical Dictionary. Containing a Comprehensive account of the Ways and Methods in which the Important Art of Husbandry, in all its various branches, is, or may be, Practiced, to the Greatest Advantage in this Country. By Samuel Deane, D. D., Vice President of Bowdoin College, and Fellow of the American Academy of Arts of Sciences. Third edition: corrected, improved, greatly enlarged and adapted to the present state of the science of agriculture. Boston: Wells and Lilly, Court Street, 1822, 8 vo. pp. 532." Dr. Deane was born at Dedham, Mass., July 10, 1733; graduated at Harvard College in 1760, and died at Portland, November 12, 1814, aged 82 years. In the introduction to his edition of "Smith and Deane's Journals," Portland, 1849, the late Hon. William Willis, said: "In agriculture Dr. Deane pursued his labors zealously and scientifically, and was consequently more successful than any other person in this

region of country. The results of his experiments and his experience, he embodied in that work, which was the first of the kind published on this side of the Atlantic, and was universally consulted by agriculturists."

The introduction to the History of Maine, by William D. Williamson, published at Hallowell in 1832, in two volumes, was devoted to the geography and natural history of the State, and had sections relating to the atmosphere, climate and seasons; natural productions, vegetables, trees, shrubs, plants, roots and vines—occupying pages 9–182 of the first volume. The information contained under these headings has a direct bearing upon the characteristics of Maine as an agricultural State, and must have had great influence in making still wider known, at the time of its publication, the physical basis of our agriculture. Mr. Williamson was born at Canterbury, Conn., July 31, 1779, and died at Bangor, October 10, 1822. His history of the State is a splendid monument to his rare scholarship and fine qualities as an accurate, impartial and able historian.

In February, 1834, an act was passed by the Legislature establishing a "Board of Internal Improvements," which was made up of three commissioners appointed by the Governor. Their duty was "to explore and examine the great water courses of the State, and also different parts of the State where it may be supposed that canals, roads, railroads or other important internal improvements may be made for the benefit of the State." It was under authority of this Board that Dr. E. Holmes made a survey of the then little known "Aroostook territory" in 1838. His report of this survey is entitled: "Report of an Exploration and Survey of the Territory of the Aroostook River, during the spring and autumn of 1838." It was printed in 1839 in a pamphlet of eighty pages, and is one of the scarcest of the earlier publications relating to the agriculture of the State. It is divided into two parts—part first embracing the results of a reconnoisance of the rivers and lakes in the territory; and part second, devoted to the situation and extent of the valley of the Aroostook, its climate, soil, natural growth, agricultural products, roads and geological formations. It is the very first account ever published on the physical characteristics of this now well known section of Maine, the "garden" of the State, and is of great value as coming from a man of such trained habits of observation as Dr. Holmes possessed, and moreover who was a thorough

scientist and one having always before him the practical agricultural features of any section visited and studied.

Regarding the agricultural products of the territory Dr. Holmes says: "Wheat is and ever must be the great staple of the country. In 1837, on the farm of Fish and Wiggins in Township No. 4, on the Aroostook road, (now the town of Patten), was raised 1,250 bushels of wheat on fifty acres of burnt land, or 25 bushels per acre. The total number of bushels of wheat raised in that township in 1837 was 6,000, or an average of 300 bushels to each family, worth then $1.75 per bushel. Of potatoes he says: "They are equal in quantity and quality to any whatever—the climate and soil both seem particularly congenial to this root. Many assert that they have obtained 300 bushels per acre with common management. Nothing is wanting but greater facilities for getting them to market to make their culture one of the most profitable branches of agricultural operations that can be pursued here" Indian corn is not grown on account of frost, but when the climate is "ameliorated by the absence of forests," he thinks it will be raised. Rye is little cultivated. Oats are "extensively raised" Barley is little raised but always produces well. "Buckwheat," Dr. Holmes says, "takes the place of Indian corn in the older sections of the State." He records instances of fifty bushels being raised from one bushel sowing and in one case twenty-five bushels from a peck and a half of seed. "It shells out badly in harvesting, and the people put rugs and cloths on the bottom and sides of the carts when harvesting it to save that which scatters out." Beans and all garden vegetables do well. "Flax," says Dr. Holmes, "does better than further south, and most of the settlers have a small patch for the purpose of affording them thread." Of fruits he says: "Apple trees grow well at Houlton, but people must wait till the forests are cut away before they can be well grown and the fruit matured." The grasses he says are "the best in New England, and all the cultivated grasses flourish in great perfection. The average yield is one and one-fourth tons per acre worth $12 per ton on an average for loose hay, and $14 for screwed hay." The objections to the territory Dr. Holmes states to be: "lack of mills; early frosts; want of schools and religious privileges; want of roads."

Dr. Holmes recommended that a "State Experimental Farm" be established in the territory because an abundance of the best land could be had for such a purpose, and at a low price. "While such

farms are almost unknown here, they are common in European countries." He states the object of such a farm to be: "To introduce the various breeds of cattle, sheep, hogs and other stock; to cultivate the various crops which it is desired to acclimate, and the properties of which it is wished to test in this latitude; to introduce the various fruits which would probably grow, and thus form a source whence the settler could look for a supply to commence his operations or to renovate his stock and crops when degenerated or exhausted. Another advantage of this location would be: it is the most northern section of our State, and we might be pretty well assured that whatever came to maturity here, would also mature in any other part of New England."

In concluding his report Dr. Holmes uses these effective and forcible words: "Are you a young man just starting in life, but with no capital save a strong arm, good courage and a narrow axe? Go to the Aroostook; attend assiduously and carefully to your business; select a lot suitable for your purpose and with the common blessings of Providence you will, in a few years, find yourself an independent free-holder, with a farm of your own subduing and with a capital of your own creating." Well may Dr. Holmes be called the "father of Aroostook," for it was this report which gave to the people of the State their first real knowledge of the fertility of its soil, the marvelous production of crops of which it was capable, and the comparatively small cost at which they could there obtain a farm and home and become "independent free-holders." Fifty-four years ago Dr. Holmes saw clearly the great natural wealth and abundant agricultural possibilities of the Aroostook territory, which are even yet in their infancy of development and just ready to receive the impetus of a new life through the opening of the Aroostook Railroad, a half century after Dr. Holmes wrote that "greater facilities for getting their agricultural products to market" was the greatest obstacle to the development of the country.

In connection with the work of diffusing agricultural literature carried on by the agricultural societies of Maine, it is noticeable that the first agricultural and industrial college in North America was established in this State, the personal honor of which is due to the first Robert Hallowell Gardiner of Gardiner. In a petition to the Legislature the year after Maine became a state, viz.: 1821, asking for a grant of one thousand dollars for aid in establishing

an institution "to give mechanics and farmers such a scientific education as would enable them to become skilled in their professions," this distinguished and far-seeing philanthropist said: "It is an object of very great importance to any state, but especially one possessing fine views and a fertile soil, numerous mill seats and a coast indented with many and capacious harbors—to a state rapidly increasing in commerce, agriculture and manufactures, that its artisans should possess an education adapted to make them skilful and able to improve the advantages which nature has so lavishly bestowed upon them. The State of Maine is in possession of these numerous privileges yet while she has liberally fostered her colleges for educating young men for the learned professions, and possesses numerous academies for preparing youth to enter these colleges, and for making useful schoolmasters, she has hitherto omitted to make provisions for giving instruction to her seamen, her mechanics and her farmers upon whom the wealth and prosperity of the State mainly depends. The recent improvements in chemistry which give the knowledge of the nature of fertile and barren soils and the best mode of improving them, render the importance of a scientific education to her farmers much greater than at any other period." This, copied from the petition written by Mr. Gardiner, shows the idea which he had of the class of college or school so much needed in his time for giving a "liberal" education to farmers. It foreshadows exactly the colleges of agriculture and the mechanic arts now existing in all the states, under the endowment of the Morrill Land Grant bill of 1862; and Mr. Gardiner in pleading with the state to establish such a school, was actually a whole generation in advance of his time, as it was not till more than forty years later that these colleges were established under the patronage of the general government.

Mr. Gardiner succeeded in obtaining a yearly grant of $1,000 from the state, and the "Gardiner Lyceum" was incorporated in 1821. A stone building for its use was erected in 1822, and on January 1, 1823, the Lyceum was formally opened to pupils, Rev. Benjamin Hale, born in Newbury, Mass., November 23, 1797, and once a tutor in Bowdoin College, being president of the Lyceum from 1823 to 1827. After leaving Gardiner, Mr. Hale was professor of chemistry in Dartmouth College from 1827 to 1835, and from 1836 to 1858 president of Geneva College, New York. He died July 15, 1863. The course of study at the Lyceum was

arranged for two years, and there were twenty students the first year. The courses may be generally described as a chemical, and a mechanical one. The former comprised lectures on the principles of chemical science, on agricultural chemistry, on dying, bleaching, pottery, porcelain, cements and tanning. The latter course embraced lectures on mechanical principles, dynamics, hydrostatics, hydraulics and carpentry. Later a course in minerology was included In 1824 Dr. Ezekiel Holmes was engaged as "permanent professor in agriculture," and in connection with this professorship the trustees undertook the management of a practical farm in connection with the Lyceum, where experiments in agriculture were tried, where the students were allowed to work to diminish the expense of board, and "to give the future agriculturalist the knowledge of those principles of science upon which his future success depends, and an opportunity to see them reduced to practice." In order to accommodate those students whose business during the summer months made it impossible for them to join the regular classes, winter classes were established in surveying, navigation, chemistry, carpentry and civil architecture. These "winter classes" corresponded to the "short courses" in special branches now given at many of our agricultural colleges.

This outline shows the general scope and character of the institution. After Mr Hale's resignation of the office of president the Lyceum was severally in charge of Edmund L Cushing, Dr. Ezekiel Holmes, Mr. Whitman and Jason Winnett, as pr siden's or principles. Its classes were well kept up for many years, at one time the scholars numbering fifty-three. The Lyceum had a good library and creditable collections, and the students were encouraged to make collections of specimens illustrating the geology and flora of the section, which were deposited in the museum. Finally the state withdrew its yearly appropriations, and for two or three years subsequently it was maintained almost entirely at the expense of Mr. Gardiner himself. The property of the Lyceum, after having remained unused in the hands of the trustees for several years, was sold to the city of Gardiner in 1857, and the building occupied as a high school. The proceeds were divided *pro rata* among the original stockholders, and the first agricultural and industrial college in the United States ceased to exist.

But few of the publications of the Lyceum have been preserved. Among those to which the writer has had access are: the "Inaugural

Address, delivered at Gardiner, Me., Jan. 1, 1823, by Benjamin Hale, principal of the Gardiner Lyceum and Lecturer on Natural Philosophy," a pamphlet of 16 pages printed by S. K Gilman, Hallowell; and a pamphlet of 24 pages, the title page of which is wanting, but containing the "Laws of Gardiner Lyceum, and Regulations for the Government of the Lyceum." In his inaugural address Mr. Hale gave the key-note in the design of the institution in these words: "It will not be said that the founders of this institution have assisted in unnecessarily multiplying seminaries of education for it is new in character, and it is designed to supply the wants of a large portion of the community, for which no provision had hitherto been made. Nor will it be said that these wants are not real. The education of the advocate or divine is scarcely more necessary to his success than that of the mechanic or the farmer. If the professions of the former are themselves branches of science, those of the latter are founded in science. And as we expect empiricism from those who enter the learned professions without a suitable preparatory education, so we can expect nothing but deficiency of skill in mechanics who have been taught only the manual exercise of their arts. There surely can be no reason why mechanics and agriculturists should not be instructed in that science which will enable them to follow their pursuits, not blindly, but from rational views. Those who have not this education, may indeed copy faithfully the practices of their fathers, but we cannot expect from them improvements which shall enrich their country and benefit the world." The government of the Lyceum was vested in the students.

As progress was made in our agricultural operations and the semi-occasional or yearly publications of the "papers" and "memoirs" of the agricultural societies became inadequate to the intellectual needs of farmers, agricultural journals took the place of these official publications. Thus the New England Farmer grew out of the "Papers on Agriculture" published by the Massachusetts Society for Promoting Agriculture; and it was at the annual dinner of the Kennebec Agricultural Society in 1831, that Samuel Wood, Esq., read a proposition from Dr. Holmes in regard to the establishment of the Kennebec Farmer, "which proposition was received with much enthusiasm." Previous to this, however, "The New England Farmers' and Mechanics' Journal" had been published for one year, 1828, at Gardiner, "conducted by E. Holmes, M. D., Professor of

Chemistry, Natural History and Agriculture in Gardiner Lyceum." It was a monthly journal published by Parker Sheldon, each number containing a lithographed plate, the magazine being very creditable in typographical appearance and containing useful articles relating to agriculture and mechanics. The first number of the "Kennebec Farmer and Journal of the Useful Arts," was issued January 21, 1833, but the title was changed to "Maine Farmer" with the number for March 18, of that year. In making this change, the editor, Dr. Holmes, said: "This is our first and last change,"—and the paper is still published under this title although in the course of its history many changes in proprietorship and editors have been made. "The Yankee Farmer" was established at Cornish in 1835, by S. W. Cole, was removed to Portland at the close of its first year, and subsequently removed to Boston where it was merged in the New England Farmer. "Drew's Rural Intelligencer" was first published at Augusta, January 6, 1855, was removed to Gardiner in 1857 and discontinued in 1859. The publisher and editor, Rev. William A. Drew, was born in Kingston, Mass., December 11, 1798, and died in Augusta, December 2, 1879. He was a true lover of nature, had great fondness for all agricultural and horticultural pursuits, and his writings upon these subjects were not only picturesque and interesting but thoroughly practical. The "Dirigo Rural" a weekly agricutlural journal was first issued at Bangor, July 4, 1874, and was published till August 6, 1887, when it was discontinued. Its proprietor and editor throughout the entire course of its publication was Daniel M. Hall, who was born in Hermon, September 17, 1836. Mr. Hall was Secretary of the Maine State Grange from 1881 to 1885, inclusive. He now holds an important position in connection with the Department of Agriculture, Washington, D. C. "The Home Farm" was published at Augusta from 1880 to 1887, when it was removed to Waterville and its name changed to "The Eastern Farmer." It was discontinued in April 1888. Its editor during this entire period was Samuel L. Boardman. These comprise the leading agricultural journals that have been published in Maine, although a few others devoted to general farming, stock breeding and bee-keeping have from time to time appeared in different places and been published for short intervals. Although somewhat ephemeral in their nature, the influence of agricultural papers for the wide diffusion of agricultural knowledge has been immense, and this

brief recognition of their service and value, at least, ought to find a place in any survey of the agricultural literature of the State. Aside from the above named distinctively agricultural journals, many of the state and local papers maintain departments of farming and grange intelligence and information, demanded by their readers, which furnish a great aid to intelligent agriculture.

The Board of State Assessors, established by act of the Legislature in 1891 publishes an annual report which contains many statistics of interest relating to the movable capital of our farms. In the report for 1892 the following statistics and values of live stock are given: number of horses in the state, 117,332; number of three year old colts, 9,600; number of two year old colts, 8,645; number of one year old colts, 9,125; number of oxen, 26.609; number of three year old steers, 26,304; number of two year old steers. 40,867; number of yearling steers, 44,821; number of cows, 138.994; number of sheep, 370,602; number of swine, 33.445; total values as returned, $15,747,468.

This survey of the agricultural literature of Maine, embraces a glance at all that has been published, either privately or officially, with the exception of the various reports and transactions of our Board of Agriculture, State Pomological Society, State College and Experiment Station, which are fully described and indexed in the following pages.

BIBLIOGRAPHY.

ABBOTT, LYMAN F. Born in Wilton, October 12, 1830. Agricultural editor of Lewiston Journal since 1882. A leading writer for many agricultural journals. Address: Lewiston.

1. Small Fruits and their Culture. Transactions Maine State Pomological Society, 1875, page 83–93.
2. Culture of the Gooseberry for Market. Transactions Maine State Pomological Society, 1876, page 123–127.
3. The Future of Orcharding in Maine. Transactions Maine State Pomological Society, 1885, page 118–124.
4. Fruit Growing in Maine compared with other Agricultural Industries. Transactions Maine State Pomological Society, 1891, page 95–104.

ABBOTT, THEOPHILUS CAPEN. Born in Vassalboro in 1826, and graduated from Waterville College, now Colby University, in the class of 1845. Immediately upon leaving college, Mr. Abbott engaged in teaching for many years, going first to Vermont where he taught two years at Townshend. He then returned to Maine and was principal of the school in Augusta in 1847. In 1848 he was principal of the school in Thomaston; at Bath in 1849; Portland in 1849-50, and Houlton in 1851. During 1852 and 1853 he was an instructor at Waterville College. In 1854 he went to Michigan, and for one year taught an academy at Berrien, in that state, and in 1856 and 1857 was an assistant professor at Ann Arbor In 1857 he was ordained to the ministry of the Congregational church but did not preach as he liked teaching better. The Michigan Agricultural College was established in 1855, in accordance with a provision in the State constitution which said that "The Legislature shall, as soon as practicable, provide for the establishment of an agricultural school"—this being the first agricultural school or college, established by constitutional provision in any state in the United States. In this college, which was opened to students in May, 1857, Dr. Abbott was appointed to the chair of English Literature, and held the position from 1858 to 1862; and on December 4, 1862, he was chosen president continuing in this

office till July 1, 1885, his voluntary resignation having been placed before the trustees November 24, 1884. On retiring from the presidency of the college, after a service of twenty-two years, the trustees induced him to accept the chair of Mental Philosophy and Logic, which position he held till his death. In 1862 and 1863 he was acting secretary of the State Board of Agriculture of Michigan. In 1871 the University of Michigan conferred upon Dr. Abbott the degree of LL D. Upon his resignation of the presidency of the Agricultural College the trustees in a vote of thanks said: "Dr. Abbott's labors have been largely instrumental in bringing this college to its present high position among institutions of its kind in this country." He died at Lansing, Michigan, November, 1892. [Portrait: Report Michigan Board of Agriculture, 1884, p. 255.]

1. Agricultural Education and Agricultural Colleges. Report Maine Board of Agriculture, 1869, page 383–392.
2. Agricultural Education. Address before the Michigan Legislature, March 4, 1875. Lansing, Mich., 1875, 8 vo., pp. 24. [Also Report Michigan Boad of Agriculture, 1874, page 64–83.]
3. Student Labor at Agricultural Colleges. Report Michigan Board of Agriculture, 1874, page 98–105.
4. Prejudice Against Agricultural Schools. Report Michigan Board of Agriculture, 1875, page 212–222.
5. Manual Labor at Michigan Agricultural College. Report Michigan Board of Agriculture, 1879, page 182–188.
6. Social Rank of Farmers. Michigan Board of Agriculture, 1880, page 258–265.
7. Early History of Michigan State Agricultural College. Report Michigan Board of Agriculture, 1881, page 358–379.
8. Michigan Agricultural College and State Board of Agriculture. Report Michigan Board of Agriculture, 1884, page 255–260.
9. Reports as President of the Michigan Agricultural College. 1862–1885.

"A modest, mild-mannered, noble man, cultured and broad in mind, genial in social intercourse, beloved by all. In all the time of Dr. Abbott's presidency of the Michigan college, he enjoyed the most abundant confidence of the legislators and people of that state. Earnest, straightforward, sincere and conscientious in the discharge of his duties, he never appealed to the Legislature in behalf of its agricultural college, in vain. Indeed it was said of him at this time that the successive Legislatures of that state had so high an opinion of his character and such unbounded confidence in his plans and his ability to carry them out, that they would give him any amount of money he asked for any purpose whatsoever; and that is why the agricultural college of Michigan is so noble an institution today; why Dr. Abbott will always live in it, and why the people of Maine and of the country should never forget him. His memory and fame are secure in the splendid institution of which he was the real father."—Kennebec Journal, November, 16, 1892.

"Dr. Abbott's death has reminded every alumnus of the Michigan Agricultural College, of the kind, fatherly man whom every student loved and respected; the man who was ever thoughtfully attentive to every interest of the college, and who always found time to exercise a personal care for each and every student. He came to the college as a professor at an early day, and while still a young man was appointed president. In this capacity he skilfully conducted the institution through its darkest days and finally saw it firmly established in a successful and popular career. A man of studious habits and not very robust physique, he was, nevertheless, an indefatigable worker. When, some years ago, he became unable to continue the duties of president, from the results of a serious injury, he was continued as professor of mental philosophy and logic, and when his injuries rendered him unable to perform further active duty at the college, he was honorably retired with the title of Emeritus Professor. He well deserved the name given him by the graduates—'The Father of the College.'"—New York Tribune, March 6, 1893.

AGRICULTURE OF MAINE. A complete set of the volumes under this general title comprises thirty-nine volumes, from 1850, to and including 1891. The volume for 1850–'52, is entitled "Transactions of the Agricultural Societies in the State of Maine," and contains 862 pages. This volume was "arranged from official returns" by E. Holmes, Secretary of the Board of Agriculture. It comprises many able addresses, historical notes, essays on agricultural subjects and fruit lists for different parts of the State. The volume for 1853 contains 421 pages, "arranged from official returns" by E. Holmes, Secretary of the Board of Agriculture. It embraces addresses, description of fruits, statements of exhibitors in various classes at fairs and historical notes which make it a valuable work. The volume for 1854 contains 310 pages, and was printed in 1854. It was "arranged from official returns" by E. Holmes, Secretary of the Board of Agriculture. On the establishment of the Board of Agriculture in 1852 the duty of collecting and publishing the transactions of the several county agricultural societies devolved upon the secretary of the board. The Legislature made no provision for compiling the transactions for the year 1855. In 1855 it incorporated the Maine State Agricultural Society, which act of incorporation authorized the secretary to prepare and publish the doings of the several societies. Before all the returns from these county societies had been sent in a change was made in the law by which the duty of preparing these reports for the press devolved upon the secretary of the Board, Stephen L. Goodale, who commenced his services with the year 1856. The volume for 1855 is entitled: "Agriculture of Maine; Report of the Secretary of the Maine State Agricultural Society and Transactions of the several county Agricultural Societies." It was not printed till 1859, and comprises

240 pages. It embraces important historical data relative to the different breeds of horses, cattle and sheep that have been introduced into Maine, with the dates imported and by whom brought, from the pen of Dr. E. Holmes. The volume for 1856 is the "First Annual Report of the second Secretary of the Board of Agriculture, together with an abstract from the returns of the Agricultural Societies in the State. This is the first volume compiled by Stephen L. Goodale as secretary, who edited seventeen volumes, viz: 1856-72. The plan of publishing the yearly volume in two parts; part first the report of the secretary; part second, abstract of returns from the county agricultural societies with miscellaneous papers, was continued throughout Mr. Goodale's term of office. The volumes edited by Mr. Goodale are all lettered, "Second Series," with the exception of the first report, 1856, which was not bound in cloth. Two editions of this report were published, the only instance in which a second edition of this work was issued. The volumes for the years 1861 and 1862 contain the reports on the scientific survey of the State, hence the agricultural portion of these volumes is limited. For 1861 it embraces 212 pages: for 1862, 223 pages. The six volumes for 1873-4 to 1878-9 were edited by Samuel L. Boardman, third secretary of the Board, the words "Second Series" having been omitted from the lettering of the volumes Upon the resignation of Mr Boardman in 1879, Mr. Goodale was re-appointed secretary and held the office for about six months. The volumes of the "Agriculture of Maine" from and including 1880 to 1890, were edited by Z. A. Gilbert, the fifth secretary. The publishing of the "Abstract," or second part of the annual volume, was discontinued with the year 1879. In the report for 1882 appeared the report of the State Board of Cattle Commissioners, Inspector of Fertilizers, Report of Experiments at the State College and Transactions of the State Pomological Society; and these reports together with those of the Fertilizer Control Station, and the Agricultural Experiment Station of the State College have since been published in the annual agricultural volume. Since 1891 the volumes have been edited by B. Walker McKeen, Secretary of the Board of Agriculture; that for 1891 embracing also a compilation of the laws of Maine relating to agriculture.

Allen, Charles F. Born in Norridgewock, January 28, 1816. Graduated at Bowdoin College, class of 1839. President of the

Maine State College of Agriculture and the Mechanic Arts. 1871-'79; member Maine Board of Agriculture, 1871-'79. Received the degree of D. D., from Bowdoin College, and also from Wesleyan University, Middletown, Conn., 1872. An eminent clergyman of the Methodist church; an eloquent speaker; a profound scholar. Address: Kennebunk.

1. The Aims and Methods of the Maine State College of Agriculture and the Mechanic Arts. Report Maine Board of Agriculture, 1872, page 18–37.
2. Science in Agriculture. Report Maine Board of Agriculture, 1873, page 375–384.
3. Agricultural Education. Report Maine Board of Agriculture, 1875, page 94–105.
4. The Education of Farmers and Mechanics. Report Maine Board of Agriculture, 1877, page 221–235.
5. Best Methods of Retaining the Fertility of the Virgin Soil. Report Maine Board of Agriculture, 1878, page 113–128.
6. Reports as President of the Maine State College of Agriculture and the Mechanic Arts, 1871–79.

ATKINS, CHARLES GRANDISON. Born in Augusta, January 19, 1841. Graduated at Bowdoin College, 1861. United States Fish Commissioner, Bucksport.

1. The Menhaden and Herring Fisheries of Maine as Sources of Fertilization. Augusta, 1875, 8vo. pp. 67. [With one plate.]

Quoted as an authority by the United States Commissioner of Fish and Fisheries, in Report for 1877, as "containing very valuable contributions to the knowledge of the menhaden."

2. Studies on the Codling Moth. Transactions Maine State Pomological Society, 1883, page 54–61.
3. The Round-Headed Apple-Tree Borer. Transactions Maine State Pomological Society, 1884, page 63–67.
4. The Mulching of Orchards. Transactions Maine State Pomological Society, 1885, page 91–95.

BALENTINE, WALTER. Born in Waterville. Graduated at the Maine State College in 1874. Was a post graduate student at Wesleyan University, Middletown, Conn., and an assistant in chemistry in the Connecticut Agricultural Experiment Station, Middletown, Conn., for two years. Was employed four months in teaching chemistry at Lawrence University, Lawrence, Kansas. Studied one year at the University of Greifswald, Germany, and one year at the University of Halla, Germany, in which place was also employed as assistant in the Agricultural Experiment Station. In the summer

and fall of 1880 chemist in the Department of Agriculture, Washington, D. C. In 1881 was elected to the chair of Agriculture in the Maine State College. Acting Director Maine Experiment Station, April-July, 1885. From 1881 to 1892, member of the Maine Board of Agriculture. Has contributed largely to the agricultural and scientific press of this country and Germany. Address: Orono.

1. Improving the Fertility of the Soil. Report Maine Board of Agriculture, 1881, page 193–199.
2. Experimental Work in Agriculture. Report Maine Board of Agriculture, 1892, page 114–129.
3. Soil Exhaustion. Report Maine Board of Agriculture, 1883, page 47–60.
4. Milk and its Secretion. Report Maine Board of Agriculture, 1884. 48–64. [With two plates.]
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6. Chemistry of the Potato. Report Maine Board of Agriculture, 1886, page 133–144.
7. Experiments with Potatoes, Oats, Barley and Peas. Report Maine Experiment Station, 1888, page 123–134; 1889, page 145–147; 1890, page 102–103.
8. Experiments with Fertilizers. Report Maine Experiment Station, 1889, page 135–144; 1890, page 79–101; 1891, page 123–153.
9. On the Comparative Agricultural Value of Soluble, Reverted or Citrate Soluble, and Insoluble Phosphoric Acid. Report Maine Board of Agriculture, 1890, page 90–95.
10. The Dairy School at the State College. Report Maine Board of Agriculture, 1890, page 156–158.

BARKER, NOAH.

1. Report of the Commissioner on the Variations of the Magnetic Needle. Augusta, 1868, 8 vo., pp. 83.

BARTLETT, JAMES M. Born in Litchfield, September 25, 1854. Graduated at Maine State College with degree of B S., 1880 Chemist to Fertilizer Control Station at Pennsylvania State College, 1882–'84; Chemist to the Maine Experiment Station, 1885–'92. Received the degree of M. S., from Maine State College in 1883. Address: Orono.

1. The Artificial Digestion and Estimation of Protein Compounds by Stutzer's Methods. Report Maine State College, 1883, page 23–28.
2. On Fertilizers, Milk, and Sugar and Starch in Coarse Fodders. Report Maine Experiment Station, 1888, page 204–209.
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[Also published as Bulletin No. 3, Second Series, Maine Experiment Station, September, 1891, 8vo. pp. 8.]

The greater part of the analytical work of Mr. Bartlett at the Station has been published in the several annual reports of the Director.

BARNES, PHINEHAS. Born in Orland, January 26, 1811. Fitted for college at Phillips Academy, Andover, Mass., having as a seat mate Oliver Wendell Holmes. Graduated at Bowdoin College, at the age of 18, at the head of his class in 1829. In early life he was engaged in teaching and editorial work, having been editor of a paper in Bangor in 1833; and from 1836 to 1839, professor of Latin and Greek in Waterville College In 1841 he assumed editorial charge of the Portland Advertiser, remaining in that position for many years. During this time he became greatly interested in railroads and had much to do in devising and constructing the early railway system of the State. After this he entered the profession of the law to which his whole future life was devoted. He always had a great love for botanical studies and for the practical working of the land, and made a close study of agricultural science and practice for the pure love which he had for it. He always had a fine garden the care of which was a constant delight. At a meeting of the trustees of the State College of Agriculture and the Mechanic Arts held January 22, 1867, he was elected first president of that Institution. He died in Portland, August 25, 1871.

1. The Colleges for the Industrial Classes, contemplated by the Act of Congress of 1862. Augusta, 1866. page 39.

One of the clearest and best presentations of the correct idea of an agricultural college, ever written at that date.

2. On Drainage and Flowage. Report Maine Board of Agriculture, 1858, page 208–220.
3. On Plowing and Manuring in Autumn. Report Maine Board of Agriculture, 1866, page 99–119.

BATCHELDER, T. P. Secretary West Penobscot Agricultural Society. Has published since 1867 an annual report of this society, with list of premiums and members, occasional addresses, and interesting notes and reports on premium crops. Address: Kenduskeag.

BAILEY, GEORGE HENRY. Born in Portland, December 25, 1832. Served as Lieutenant Co. D., First Maine Regiment throughout full

term of enlistment, mustered in May 3, 1861. Graduated at the American Veterinary College, New York, 1879. State Veterinary Surgeon 1884-'92. Represented the State at the National Convention of Cattle Commissioners at Springfield, Ill., in 1889. Address: Westbrook Junction, Deering.

1. Report of the Commissioners on the Contagious Diseases of Animals for 1887, Augusta, 1888, pp. 16.
2. Second Report, 1889, pp. 27.
3. Third Report, 1890, pp. 55.
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6. Sixth Report, 1893, pp. 36.

BAYLEY, W. S., Ph. D., and King, F. P.

1. Catalogue of the Maine Geological Collection, with a Brief Outline History of the Two Surveys of the State. Waterville, 1890, 8 vo. pp. 32.

A Catalogue of the collections made by the two State Geological Surveys of Maine, now in the custody of Colby University, Waterville.

BLAKE, JOSEPH Born in Otisfield, Jan. 21, 1814. He graduated at Bowdoin College in the class of 1835, and from the Bangor Theological Seminary in 1840. In 1872 he received the degree of D. D. from Bowdoin College. He contributed to various periodicals during his life and published a few sermons. He was ordained pastor of the Congregational church in the town of Cumberland in 1841, and remained there eighteen years. A year or more after graduating from college, November, 1836, he went to Natchez, Miss., remaining as a teacher till May, 1838. His botanical studies began at that time and were continued to the very close of his life; he being a most enthusiastic collector of plants. During the eighteen years of his preaching at Cumberland, he made several trips through the State, for the purpose of obtaining plants. In June and July, 1856 he went to Mt. Ktaadn where he collected some alpine plants, mosses and lichens. Perhaps the larger part of his Maine plants were obtained in Harrison and Wells, where he passed his summers for a number of years. He made one or more journeys to the very northern part of the State collecting some plants along the St. John river. In May, 1860 he moved to Gilmanton, N. H., and was installed pastor of the Congregational church at that place. During the eighteen years of his pastorate in New Hampshire he collected in the vicinity of his home and in the White Moun-

tains, keeping up his collecting in Maine during the summers. In December, 1878, he moved to Andover, Mass., where he remained for a period of ten years. He preached there occasionally, and still continued his botanizing. During all these years he exchanged plants with nearly all the prominent botanists in the United States, including Dr. Asa Gray, William Booth, M. S. Bebb, Spencer F. Baird, A. P. Chute, W. M Canby, J. W. Chickering, M. A. Curtis, Geo. L. Goodale, E. Hall, Thos. C Porter, Chas. J. Sprague, H. P. Sortwell, F. Scammon, John Torrey, Geo. Vasey, A. E. Verrill, J. M. Holtzroger, C. S. Sheldon, I. Macoun, L. M. Underwood, M. E. Jones, C. G. Pringle, H. N. Patterson, L. C. Cleveland, S. B. Mead, C. H. Peck, Dr. Dewey, J. A. Paine, J. C. Martindale, A. P. Garba, Judge Clinton, C. F. Parker, J. Fowler, A. H. Curtis and E Durand. His correspondence is preserved in the herbarium of the State College, Orono. Mr. Blake was a member of the Portland Society of Natural History, the Buffalo Society of Natural History and the American Academy of Natural Sciences, Philadelphia. A valuable herbarium collected by Mr. Blake enriches the collections of Bowdoin College. The "Blake Herbarium" in the State College of Agriculture and the Mechanic Arts, Orono, contains between three and four thousand species of Phenogams collected in the United States, and four or five thousand duplicates. About two thousand species of foreign plants, with numerous duplicates, from Switzerland, Germany, England, Hungary and South Africa. A considerable part of the mosses, lichens, fungi and other cryptogams of North America, amounting with duplicates to several thousand. He died at Andover, Mass., May 26, 1888

1. The Portland Catalogue of Maine Plants. Adapted for Marking Desiderata in exchange of Specimens. Portland, 1868, 8vo., pp. 12.

Mr. Blake was led to the study of botany by his great love of Nature and the refreshment he found in out of door life. To study the works of the Creator he held to be the noble and eternal joy of man. He took great pleasure in interesting others in the Natural Sciences and especially in his later years was able to give much assistance to younger botanists. The purity, sincerity, and modesty of his character impressed all who knew him. He was delicately honorable in all the conduct of life, accurate in speech, careful in judgment, loyal in friendship, of strong and tender feelings, with refined and scholarly tastes, and, above all, a profound sense of the beauty of Holiness as manifested in the character of God.

Boardman, Samuel Lane. Born in Bloomfield, (now Skowhegan), March 30, 1836. Assistant editor Country Gentleman, Albany, N. Y., 1859; editor Maine Farmer, Augusta, 1861 to 1878;

editor American Cultivater, Boston, 1878; editor and publisher The Home Farm, Augusta, 1880–'88; agricultural editor Kennebec Journal, 1889–'92; Secretary Maine State Agricultural Society, 1855–'74; Member of Maine Board of Agricul ure, 1872–'74; Secretary Maine Board of Agriculture and Trustee Maine State College of Agriculture and the Mechanic Arts, 1874–'79; Secretary Maine State Pomological Society, 1885–'86; Member Board of Managers Maine Experiment Station, 1885–'87; Member of various agricultural, historical and scientific societies.

1. Agricultural Survey of Somerset County, Maine. Augusta, 1860, 8vo., pp. 75.
2. The Agriculture and Industry of Kennebec County, Maine. With notes upon its History and Natural History. Augusta, 1867, 8vo., pp. 200.

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3. Maine State Agricultural Society: Report of the Exhibition at Portland, Oct. 6-9, 1868. Augusta, 1869, 8vo., pp. 16.
   Contains history of the Society from 1855 to 1868.
4. Power and Influenee of the Agricultural Press. A Lecture before the Maine Board of Agriculture at Skowhegau, Oct. 9, 1872. Augusta, 1873, 8vo., pp. 15.
5. Something about Foods. A Lecture before the Board of Agriculture at Etna, Dec. 29, 1874. Augusta, 1875, 8vo., pp. 19.
6. Maine Cattle. Some Materials towards a History of the Cattle of Maine; with Facts Concerning Early Breeders, and Notices of the Thoroughbred Herds at Present kept in the State. Augusta, 1875, 8vo., pp. 48.
7. The Menhaden and Herring Fisheries of Maine as Sources of Fertilization. Augusta, 1875, 8vo., pp. 67. [With one plate.]
   Mr. G. Brown Goode, in his "Natural and Economical History of the American Menhaden," published in the Report of the United States Commissioner of Fish and Fisheries for 1877, says: "From Mr. Boardman's work I have derived much information and quoted freely. * * The account of the agricultural uses of fish is the most complete which has yet been published."
8. A General Index to the Principal Articles and Leading Subjects in the Volumes on the Agriculture of Maine, from 1850 to 1875. Augusta, 1876, 8vo., pp. 24.
9. Some Notes on the History, Varieties and Statistics of Indian Corn. Augusta, 1877, 8vo., pp. 23. [With one plate.]
10. The Laws of Maine relating to Agriculture, or of Special Interest to Farmers. [Editor of.] Augusta, 1878, 8vo., pp. 78.
11. The Development of our Agriculture as a means for The Improvement of Business. A Lecture before the Farmers' Convention at Warren, Feb. 19, 1878. Augusta, 1878, 8vo., pp. 21.

12. The Climate, Soil, Physical Resources and Agricultural Capabilities of the State of Maine; with Special Reference to the Occupation of Its New Lands. Washington, D. C., 1884, 8vo., pp. 60. [Miscellaneous Reports of the Department of Agriculture, No. 4.]
13. The Agriculture of Maine. Introduction to the Atlas of the State of Maine, Houlton, 1884. [The equivalent of twelve 8vo. pages.]
14. The Tidal Lands and Diked Marshes of Nova Scotia and New Brunswick. Washington, D. C., 1885. 8 vo., pp. 31, Illustrated.
    Forming, chapter vii, pages 33-61, of "Tide Marshes of the United States." Being Miscellaneous Reports of the Department of Agriculture, No. 7.
15. History of the Agriculture of Kennebec County, Maine. New York, 1892. Large octavo, pp. 40. [With one plate.]
    Being a reprint of chapter viii of the "Illustrated History of Kennebec County."
16. Editor of Agriculture of Maine, 1873-79, 6 vols.
17. Editor of Pomolgy of Maine, 1885-86, 2 vols.
18. Some outlines of the Agriculture of Maine. Report of the Commissioner of Agriculture, Washington, D. C., 1862, page 39-59.
19. The Horse at Agricultural Exhibitions. Report Maine Board of Agriculture, 1876, page 120-132.
20. Historical Sketch of the State College. Report Maine Board of Agriculture, 1876, page 208-220.
21. An Apple: How to Pick It and What to Do with It. Transactions Maine State Pomological Society, 1885, page 105-115.
22. Memoir of Hon. Robert Hallowell, Gardiner. Transactions Maine State Pomological Society, 1886, page 27-34. [With portrait.]
23. Trees and their Uses in Rural Embelishment. Transactions Maine State Pomological Society, 1887, page 51-59.

BRACKETT, GEORGE E. Born in Belfast, January 28, 1838. Member of the State Board of Agriculture from 1869 to 1879, and from 1881 to 1883; register of deeds, Waldo county, five years; assistant secretary, Maine senate, 1880; secretary Grand Lodge of Maine Good Templars for a period of twenty years; secretary of Waldo County Trotting Horse Breeders' Association, 1890-1891; trustee State Agricultural Society; assistant editor of Maine Farmer, 1860. Address, Belfast.

1. Farm Talk: A Series of Articles in the Colloquieal Style, illustrating various common Farm Topics. Boston, 1868, 16 mo., pp. 130.
2. Farm Talk: A Series of Papers Written in Colloquial Style, illustrating various Farming Subjects. [With portrait of the author.] Belfast, 1881, 16 mo., pp. 144.
3. Practical Entomology. Report Maine Board of Agriculture, 1860, Abstract, page 151-167. [With one plate.]

4. Parasitic Insects Injurious to Farm Stock. Report Maine Board of Agriculture, 1871, page 116-123.
5. On the Keeping of Fruit. Transactions Maine State Pomological Society, 1873, page 117-119.
6. Associated Dairying in Maine. Report Maine Board of Agriculture 1874, page 37-43.
7. Associated Dairying in Maine. Report Maine Board of Agriculture, 1875, page 84-93.
8. Commercial Failures—and After. Report Maine Board of Agriculture, 1875, page 158-160.
9. Beet Sugar. Report Maine Board of Agriculture, 1876, page 80-84.
10. Muck, Its Value and Use. Report Maine Board of Agriculture, 1878, page 129-133.

COLE, SAMUEL W. Born in Cornish, in 1796. When about twenty years of age he left Maine and taught school for two years in New Jersey and Pennsylvania. Soon after his return he published the "Columbian Spelling Book," and a collection of poems entitled "The Muse." On January 5, 1835, he published at Cornish the first number of the Yankee Farmer, an eight page paper, "Devoted to Farming and Gardening, Rural and Domestic Economy, Arts, Trades &c." The size of the page was 8x9 1-2 inches, three columns to the page. It was issued semi-weekly. The building in which this paper was printed, and in which was also Mr. Cole's book-bindery, is now standing—or was a few years since—on the farm of the late Gowen Wilson Guptill, some two and a half or three miles from Cornish village. Here Mr. Cole had his seed gardens and experimental orchard. At the end of its first volume the paper was moved to Portland, and published in connection with a seed store and agricultural warehouse. Its publication was discontinued in 1838. In 1839 Mr. Cole moved to Boston and was connected editorially with different papers. He appears to have begun his editorial work on the New England Farmer, Saturday, December 9, 1848, with the first number of a "new series," which is called, Vol. 1, No. 1. In his opening editorial Mr. Cole says: "We recently offered a valedictory in another journal, and we are now happy in greeting the agricultural community under circumstances so auspicious, in a new and more acceptable manner." Mr. Cole continued editor of the New England Farmer till his death which occured at his home in Chelsea, Mass., December 3, 1851. I regret that so little is known regarding the personality of this noble man, and his good work as an agricultural editor and writer. But repeated letters written for the purpose of obtaining facts of

this kind, fail to reach their destination or to receive attention. Mr. A. W. Cheever, editor of the New England Farmer, writes me under date of Nov. 23, 1892: "Mr. Cole was a devoted admirer of Nature and among his last words were these: 'Lay me in some quiet nook, under some shrub or tree and I shall repose in peace.' I find the above in the December 20, 1851, number of the New England Farmer."

1. The American Veterinarian, or Diseases of Domestic Animals, showing the Causes, Symptoms and Remedies; and Rules for Restoring and Preserving Health by Good Management; with Directions for Training and Breeding, Boston, 1847, 16 mo, pp. 288.

Upon the title page of this volume the author is said to be: "Editor Agricultural Department Boston Cultivater, formerly editor Yankee Farmer and Farmer's Journal." Many editions of this work have been published—how many I cannot say. The preface to the edition dated: "New England Farmer Office, Quincy Hall, Boston, 1850," says "Fourteenth Edition or Thirtieth Thousand." It is a work that now finds a large yearly sale.

2. The American Fruit-Book: containing Directions for Raising, Propagating and Managing Fruit Trees, Shrubs and Plants, with a Description of the Best Varieties of Fruit, including New and Valuable Kinds, Embellished and Illustrated with numerous engravings of Fruits, Trees, Insects, Grafting, Budding, Training, &c., &c. Boston, 1849, 16 mo., pp. 288.

Upon the title page of this volume the author is said to be: "Editor of the New England Farmer, late editor of the Boston Cultivator, author of the American Veterinarian, and formerly editor of the Yankee Farmer. and Farmer's Journal." Acknowledgements are made by the author for aid received in its preparation from Stephen L. Goodale, Saco; Dr. E. Holmes, Winthrop; Henry Little, Bangor, and D. Taber, Vassalboro. Many editions of this work have been published.

Mr. Cole was one of the founders of our agricultural literature, and deserves to be held in honorable and grateful recognition for his intelligent labors in promoting early agricultural journalism in Maine—that great agency for the education of farmers.

Emerson, George B. Born at Wells, September 12, 1797. A teacher for forty years, and one of the foremost lecturers in the sciences which our country has produced. Said to have been

more familiar with the agricultural and botanical products of New England than any other man. Harvard University conferred upon him the degree of LL.D., in 1859. Died, March 4, 1881. [Portrait: Maine Historical and Geneological Recorder, October, 1889; Vol. vi, No. 4.]

1. A Report on the Trees and Shrubs growing Naturally in the Forests of Massachusetts. Originally published agreeably to an order of the Legislature by the Commissioners on the Zoological and Botanical Survey of the State. Second Edition. In two volumes. Boston, 1875, 8 vo. pp. 624. [With one hundred and fifty-three plates.]

The first edition of the above work was published by the State of Massachusetts in 1846.

"One of the last labors of Mr. Emerson's life was to carefully revise the whole work, sparing no expense to have its information complete down to that time, and its illustrations such as should reflect honor upon his country. These volumes, for exactness of knowledge, thoroughness of detail, artistic skill and consummate genius in the illustrative drawings, with a perfect adaptation to the purpose for which the work was prepared, render it a fitting monument to the memory of the writer." Memoir by R. C. Watterson.

EMERY, FRANK EDWIN. Born in Fairfield, May 31, 1855, and graduated at Maine State College, class of 1883. Assistant in Experimental Department, Houghton Farm, Mountainville, N. Y., 1884–'86; Superintendent Houghton Farm, 1886; Superintendent Maplecroft Stock Farm, Powling, N. Y., 1887; Farm Superintendent New York State Experiment Station, Geneva, 1888–'90; Agriculturist to North Carolina Experiment Station, since 1890. Address: Raleigh, N. C.

1. Report as Farm Superintendent. New York Agricultural Experiment Station, 1888, page 316-403. [With two plates.]

Contains: Soil and rotation of crops; forage crops; silos and silage; fertilizer experiments on grass; grass experiments on small plats; fertilizer experiments on grass; fertilizer experiments on corn.

2. Report of Farm Superintendent. New York Agricultural Experiment Station, 1889, page 215-297. [With two plates.]

Contains: Grass plats and forage crops; potato experiments; experiments with corn; nitrogen test plats; warming water for milch cows.

3. Report of Farm Superintendent. New York Agricultural Experiment Station, 1890, page 352-471.

Contains: Experiments with grasses and forage crops; on wheat; report on lysimeters; food of dairy animals; meteorology.

4. Silos and Ensilage. Bulletin North Carolina Experiment Station, No. 80.
5. Cotton Seed Hulls and Meal for Production of Beef. Bulletin North Carolina Experiment Station, No. 81.

6. Comparative Field Tests for 1891 and 1892. Bulletin North Carolina Experiment Station, No. 89.
7. Experiments with oats, corn, potatoes, sorghum and grass. Bulletin New York Agricultural Experiment Station, New Series, No. 13, September, 1888, 8vo. page 59-73.
8. Comparative Test of Cows; Loss in Keeping Manure. Bulletin New York Agricultural Experiment Station, New Series, No. 23, September, 1890, 8vo., pp. 297-325.

Mr. Emery is also author of the following articles as "Press Bulletins of the North Carolina Experiment Station," viz: No. 12, cost of feeding working teams; No. 14, rear calves only from the best cows; No. 21, peavine manuring for wheat; No. 22, tile-draining farm lands; No. 25, will stock fatten faster loose or tied up; No. 26, cost of feed in working farm teams; No. 29, a test of cows in one dairy; No. 32, cheese-making; No. 38, marketing stock for beef; special co-operative creameries. In addition to the above, twelve other "press bulletins" upon more general subjects are from Prof. Emery's hand. In connection with Prof. Kilgore, assistant chemist to the North Carolina station, Prof. Emery has prepared Technical Bulletins of the station, Nos. 80c, and 87d; has delivered many addresses at farmers' conventions in New York and North Carolina, and contributed largely to American agricultural journals.

FERNALD, MERRITT C. Born in South Levant, May 26, 1838; and graduated at Bowdoin College, 1861. Principal of Gould's Academy, 1863-'4; Houlton Academy, 1865-'6; Foxcroft Academy, 1866-'8. Professor of Mathematics and Physics, Maine State College, 1868-'79; acting President Maine State College, 1868-'71; President Maine State College from March, 1879. During his college presidency Dr. Fernald held the chair of Physics and Mental and Moral Philosophy, 1879 to 1891, and since 1891 that of Mental and Moral Philosophy. Received from Bowdoin College in 1861 the degree of A. B.; in 1864 that of A. M. and in 1881 that of Ph. D. Address: Orono.

1. Table of Azimuths for the Latitude of Maine, from 1868 to 1900 [See Barker's Report on the Variation of the Magnetic Needle, 1868.]
2. Register of Meteorological Observations, taken at Orono, Lat. 44 degrees, 53 minutes, 10 seconds; Long. 8 degrees, 24 minutes, 3 seconds E of Washington, Elevation above the Sea 134 feet. From 1869 to 1892. [See Reports of Maine State College.]
3. Meteorological Reports of Maine Experiment Station, 1889-'92.
4. The Distribution of Rains. Agriculture of Maine, 1870, page 126-142.
5. On Plant Growth. Agriculture of Maine, 1871, page 40-56.
6. Protection from Lightning. Agriculture of Maine, 1872, page 38-58.
7. Agriculture compared with other Industries. Agriculture of Maine, 1873, page 331-351.

8. Education and Labor. Agriculture of Maine, 1875, page 72-84.
9. Taxation. Agriculture of Maine, 1876, page 48-70.
10. The Margin of Profit in Farming and Farm Crops. Agriculture of Maine, 1877, page 114-131.
11. Lightning and the Means of Averting Its Destructive effects. Report Maine Board of Agriculture, 1872, page 38-57

FERNALD, CHARLES H. Born in Mt. Desert, March 16, 1838. Fitted for college at Maine Wesleyan Seminary, but entered the Navy in August, 1862, where he remained till the close of the Rebellion having reached the rank of Ensign, when he resigned and came to Maine, July, 1865. Principal of Litchfield Academy; of Houlton Academy 1866–'71; professor of Natural History, Maine State College, 1871–'86. Was with the United States Fish Commission at Eastport in the summer of 1872; at the Agassiz School at Penekese, summer of 1873, and at Museum of Comparative Zoology, Cambridge, Mass., during several summer vacations. Travelled in Europe and studied in the Continental Museums in the winter of 1878–'9 and summer of 1890. Since 1887 professor of Zoology, Massachusetts Agricultural College; and from August 1891 to January, 1892, acting President of the same. Entomological Adviser to the Massachusetts Gypsy Moth Commission. Received degree of A. M., from Bowdoin College, 1865, and Ph. D. from Maine State College, 1885. In addition to his works enumerated below, Prof. Fernald has written a large number of articles upon entomological subjects which have been published in the North American Entomologist; Canadian Entomologist; Psyche; American Naturalist; Bulletin of the Brooklyn Entomological Club; Papilio; Entomologica Americana; Transactions of the American Entomological Society, Philadelphia; Entomologist, London; Entomologist's Monthly Magazine, London; Transactions of the Entomological Society, London and other publications. In recognition of his contributions to science, Prof. Fernald had a genus of insects named for him, *Fernaldia*, by Prof. A. R. Grote, *F. anatomella*; one of the small moths, *Agrotis fernaldi* by Morrison; *Conchylis fernaldana* by Lord Walsingham; *Setiostoma fernaldella* by Prof. Riley; *Nephopteryx fernaldi* by Mons. Ragonot of Paris; *Melitara fernadalis* by Dr. Hulst; *Acallis fernaldi* by Mons. Ragonot; *Teras fernaldi* by Prof. Butler of the British Museum. Several other insects have also been named for Prof. Fernald. Address: Amherst, Mass.

1. Tuberculosis. Hatch Experiment Station, Massachusetts Agricultural College, Bulletin No 3, 1889, 8 vo., pp. 20.
2. A Dangerous Insect Pest in Medford. Hatch Experiment Station, Massachusetts Agricultural College, Special Bulletin, November, 1889, 8 vo. pp. 8.
   First description of the Gypsy Moth in this country.
3. Report on Insects. Hatch Experiment Station, Massachusetts Agricultural College, Bulletin No. 19, May, 1892. [With one colored plate, one map and four full page plates.]
   Describes gypsy moth; Paris green on tent caterpillars; cranberry insects; vine worm; fruit worm.
4. Tuberculosis, with Special Reference to the Disease as seen in Cattle and other Domesticated Animals. Report Massachusetts Agricultural College, 1892, page 81-100.
5. Report on Insects. Hatch Experiment Station, Massachusetts Agricultural College, Bulletin No. 20, pp. 16.
   Describes Canker worms; Apple-tree tent caterpillars; Fall Web-worm; Tussock moths.
6. The Grasses of Maine. Designed for the Use of Students of the Maine State College and the Farmers of the State. Augusta, 1885, 8 vo., pp. 70. [With forty-two full page plates.]
   Also, Maine Board of Agriculture, 1884, page 194.
7. The Butterflies of Maine. Described for the Use of Students of the Maine State College, and the Farmers of the State. Augusta, 1884, 8 vo., pp. 104. Illustrated.
8. On Some of our Injurious Insects. Augusta, 1877, 8 vo., pp. 14. One plate. [Also Maine Board of Agriculture, 1877, p. 56-69.]
   Describes the Wheat midge and Oyster-shell bark louse.
9. A Synonymical Catalogue of the Described Tortricidæ of North America north of Mexico. Philadelphia, 1882, 8vo., pp. 72.
   Reprinted from Transactions of American Entomological Society, May, 1882.
10. The Sphingidæ of New England. Augusta, 1886, 8vo., pp. 87. [With six full page plates.]
11. Moths. [Heterocera.] In Standard Natural History, Boston, 1884. Vol. II, page 435-469. [With one full page plate and thirty-nine illustrations.]
12. Natural History of the Potato-Rot Fungus. Maine Board of Agriculture, 1882, p. 210-213. [With one plate.]
13. Destructive Insects—Their Habits and the Means of Preventing their Depredations. Transactions Maine State Pomological Society, 1875, p. 17-31.
14. The Orthoptera of New England. Designed for the Use of the Students in the Massachusetts Agricultural College and the Farmers of the State. Boston, 1888, 8vo., pp. 61. Illustrated.

FERNALD, MERRITT LYNDON. Born in Orono, October 5, 1873. Assistant in the Herbarium and Botanical Laboratory of Harvard University, 1892. Address: Cambridge, Mass.

1. Plants of Special Interest Collected at Orono, Maine. Bulletin of the Torrey Botanical Club. New York, 1891.
2. The Portland Catalogue of Maine Plants. Second Edition. Portland, 1892, 8 vo., pp. 40–72.

GETCHELL, IRA E.

1. Tables showing the Magnetic Declination in the State of Maine from 1609 to 1880. With notes on the Variation of the Compass, the Secular, the Annual and the Diurnal Change. North Vassalboro, 1880, 12 mo, pp. 13.

GILBERT, Z. A. Born in Greene, November 4, 1832. Member of Maine Board of Agriculture, 1869--'77; President Maine State Pomological Society, 1874--'78; Trustee State College of Agriculture and the Mechanic Arts, 1880--'88; President Maine State Jersey Cattle Association, 1886--'92; State Inspector of Fertilizers, 1883--'84; President Board of Managers Maine Fertilizer Control and Agricultural Experiment Station, 1885–'87; Chairman of Council Maine State College Agricultural Experiment Station, 1888; President Board Commissioners on Contagious Diseases of Cattle, 1882 -'6; Secretary Maine Board of Agriculture, 1880--'91; Agricultural Editor Maine Farmer. Address: North Greene.

1. Editor, Agriculture of Maine, 1880-'90, 10 vols.
2. The Culture of the Potato. Report Maine Board of Agriculture, 1869, p. 425-433.
3. Plows and Plowing. Report Maine Board of Agriculture, 1870, p. 275-293.
4. The Cooking of Food for Farm Stock. Report Maine Board of Agriculture, 1871, p. 245-263.
5. Changes in Our Farming. Report Maine Board of Agriculture, 1873, p. 6-29.
6. Special Farming. Report Maine Board of Agriculture, 1873, p. 393-402.
7. Planting an Orchard. Report Maine Board of Agriculture, 1875, p. 65-71.
8. Fences and Fencing. Report Maine Board of Agriculture, 1876, p. 1-7.
9. The Compost Heap. Report Maine Board of Agriculture, 1877, p. 193-202.
10. Silos and Ensilage, Report Maine Board of Agriculture, 1880, p. 12-25.

11. Co-operative Butter Making. Report Maine Board of Agriculture, 1881, p. 8-21.
12. Principles of Fertility. Report Maine Board of Agriculture, 1882, p. 131-140.
13. Associated Dairying. Report Maine Board of Agriculture, 1883, p. 71-86.
14. The Grass Crop and What to Do with It. Report Maine Board of Agriculture, 1883, p. 13-23.
15. Machinery in Corn Growing. Report Maine Board of Agriculture, 1883, p. 115-127.
16. Comparative Profits of Butter Making and Selling Milk. Report Maine Board of Agriculture, 1883, p. 177-187.
17. The Red Russet. Transactions Maine Pomological Society, 1887, p. 89-93.
18. Practices in Private Dairying. Report Maine Board of Agriculture, 1888, p. 50-72.
19. Work of the Cream Separator. Report Maine Board of Agriculture, 1890, p. 148-153.
20. Products of the Dairy and How to Secure Them. Report Maine Board of Agriculture, 1890, p. 172-181.
21. Shrinkage in Value of Farm Real Estate. Lecture before Maine Board of Agriculture at Augusta, January 15, 1890, Augusta, 1890, 8 vo., pp. 6.

GOODALE, STEPHEN L. Born in South Berwick, August 14, 1815. Was educated in the public schools and at Thornton Academy, Saco. Elected Secretary of the Maine Board of Agriculture in 1856, and continued in that position till 1872. Trustee Maine State College of Agriculture and the Mechanic Arts, 1870-'73. For many years general manager and chemist of the Cumberland Bone Company. Trustee of the Saco and Biddeford Savings Institution, 1847-'57; Vice President, 1857-'67; President, 1867-'87. One of the most eminent agricultural chemists in the country. Address: Saco.

1. Editor, Agriculture of Maine, 1856-'72, 17 vols.
2. The Principles of Breeding; or, Glimpses at the Physiological Laws involved in the Reproduction and Improvement of Domestic Animals. Boston, 1861, 12 mo., pp. 164.

One of the earliest treatises published on this subject, which has received high praise from the agriculturists of the whole country and is today regarded as a standard work.

3. Dairy Husbandry. Report Maine Board of Agriculture, 1858, p. 57-124.
4. The Grasses of Maine. Report Maine Board of Agriculture, 1859, p. 61-152.

5. Principles of Breeding Domestic Animals. Report Maine Board of Agriculture, 1860, p. 57-142.
6. On the Manufacture of Cheese as an article of Export, by means of Associated Dairies. 1863, p. 111-132.
7. Fruit Culture. Report Maine Board of Agriculture, 1863, p. 133-267. [The Apple and Pear.]

A careful and elaborate general treatise on this subject, and one of permaneut value.

8. Fruit Culture. Report Maine Board of Agriculture, 1864, p. 136-167. [The Plum, Cherry, Grape and Currant.]
9. On the Beet Root as a Source of Sugar. Report Maine Board of Agriculture, 1864, p. 168-171.
10. Influence of the Forest on Climate. Report Maine Board of Agriculture, 1868, p. 71-103.
11. The Rinderpest or Cattle Plague. Report Maine Board of Agriculture, 1868, p. 104-119.
12. On the Cultivation of the Hop. Report Maine Board of Agriculture, 1866, p. 54-80.
13. Structure, Functions and Diseases of the Udder of the Cow. Report Maine Board of Agriculture, 1866, p. 184-198.
14. On the Chemistry of Manures. Report Maine Board of Agriculture, 1867, p. 83-113.
15. Wheat Culture in Maine. Report Maine Board of Agriculture, 1868, p. 121-159.
16. On Some Points in Potato Culture. Report Maine Board of Agriculture, 1868, p. 160-180.
17. Rinderpest. Report Maine Board of Agriculture, 1868, page 181-235.
18. Valuation of Manures. Report Maine Board of Agriculture, 1869, p. 360-381.
19. Foot and Mouth Disease in Cattle. Report Maine Board of Agriculture, 1870, p. 431-440.
20. The Changes in Farming which have taken place, and which should be made. Report Maine Board of Agriculture. 1872, p. 334-354.
21. Shall the State of Maine grow her own Fruit Trees, or buy them from Other States. Transactions Maine State Pomological Society, 1873, p. 49-56.

Goodale, George Lincoln. Born in Saco, August 3, 1839. During his preparation for college, he served as apprentice in an apothecary store, his grandfather's business, and acquired a good knowledge of the pharmacy of that day. He entered Amherst College in 1856, and graduated in 1860 in the class with Prof. Estey and President Francis A. Walker. After graduation, he remained for a year connected with the college as assistant in chemistry and botany. His teacher in the latter department was the late Prof. Tuckerman. In Tuckerman's Catalogue of the Plants of

Amherst and Vicinity the author refers to the excursions made with Mr. Goodale during the years from 1856 to 1861. Among the other teachers then in Amherst College who exerted a marked influence upon the tastes and work of Mr. Goodale should be mentioned the late President Edward Hitchcock and his son Charles, now of Dartmouth, Prof. C. U. Shepard, the mineralogist, President Seelye, and the venerable Prof. William S. Tyler. Being a rapid short-hand writer, he was at one period in his college course amanuensis to the late President William A. Stearns, with whom to the very last he maintained close relations. In his senior year he began the study of medicine with the well-known and beloved physician, Dr. A. Smith, of Amherst, but toward the end of 1861 joined the Portland School for Medical Instruction as a pupil, attending courses of medical lectures in the Medical School of Maine and at Harvard. He received his medical degree at Harvard University in 1863, reading at graduation, a thesis on *Anthrax maligna*. Later in the same year he was given the same degree by Bowdoin College. From this date until 1865 he practiced medicine in Portland, served as City Physician, and gave lectures in the medical school on anatomy, and afterward on surgery and materia medica. During the winter of that year he attended as private pupil, in New York, the special classes of Dr. Frank Hamilton, Austin Flint the elder, and Dr. Shrady; but in February of 1865 his health was so much impaired that he relinquished practice and study, and went by the way of Panama to California. After having executed certain commissions in the inspection of mining property, he visited the principal points of botanical interest in the State, ascending Mount Shasta with a party in August. In the following year Dr. Goodale visited Europe with his life-long friend, Prof. Brackett, formerly of Bowdoin College, and now of Princeton University. He accepted, in 1868, an instructorship in Bowdoin College and the Medical School of Maine. His connection with those two institutions lasted until 1871, during which period he held the chair of Materia Medica in the Medical School, and of Applied Chemistry and Natural Science in the college. At the invitation of Prof. Asa Gray, he became assistant in botany in the Summer School of 1871, and later in that year was appointed university lecturer in Harvard. In 1872 he was promoted to the Assistant Professorship of Vegetable Physiology, and in 1877 to the Professorship of Botany. On the death of his teacher, the late Asa Gray, he was appointed

to the vacant Fisher Professorship of Natural History. Many of his vacations have been passed in Europe in the study of economic and physiological botany, the vacation year of 1881-1882 in the laboratory of Pfeffer, in Tübingen, and in Paris. In addition to the degrees already mentioned, Prof. Goodale has received that of Master of Arts from Bowdoin and from Amherst; from the latter also that of Doctor of Laws. Among the societies to which he belongs may be mentioned: Phi Beta Kappa, of Amherst; American Society of Naturalists (of which he has been president;) American Physiological Society; Society of American Anatomists; the German Botanical Society; the Academies of Philadelphia and of New York; the American Academy of Arts and Sciences; and the National Academy, Washington. He was President of the American Association for the Advancement of Science in 1891. Prof. Goodale's contributions to science have been chiefly physiological and botanical. In addition to these publications, reference may be made to his work as associate editor of the American Journal of Science, and to his three series of lectures before the Lowell Institute in Boston. One of these courses, that on forest trees and forestry, is especially valuable to all having the care of woodlands or forest trees, and to farmers generally. Reference is made to a few of his published treatises of more direct economic value to farmers. [Portrait: Popular Science Monthly, September, 1891.] Address: Cambridge, Mass.

1. Prize Essay on Underdraining and Deep Tillage. Report Maine Board of Agriculture, 1860. Part II, p. 122-138.
2. Botanical Report on Maine Plants. Preliminary Report upon the Natural History and Geology of Maine. Report Maine Board of Agriculture, 1861, p. 125-129.
3. Botanical Notes on the New Lands of Maine. Report Maine Board of Agriculture, 1861, p. 361-372.
4. Mineral Waters of Maine. Report Maine Board of Agriculture, 1861. p. 443-456.
5. The Vegetation of Aroostook County. Report Maine Board of Agriculture, 1862, p. 120-128. [With a map.]
6. On the diseases of Plants. Report Maine Board of Agriculture, 1869, p. 129-149.
7. Some of the Conditions of Successful Experimenting. Report Maine Board of Agriculture, 1869, p. 310-325.
8. Analytical Researches on the Food of Cows. Report Maine Board of Agriculture, 1871, p. 96-104.
9. American Wild Flowers. Fifty-one beautiful colored plates. Boston, Mass., 1892, 4 to.

10. Several editions of the works of Dr. Asa Gray, on American botany, with revisions and additions.

HAMLIN, CHARLES EDWARD. Born in Augusta February 4, 1825. He graduated at Waterville College (now Colby University) class of 1847, and received the degree of A. M. in 1850. The University of Lewisburg in 1873, conferred the degree of LL. D. He was Professor of Chemistry and Natural History at Colby University, 1853--1873; Member of the Maine Board of Agriculture in 1870--'71; was elected a Member of the Board of Trustees of Colby University in 1880; Fellow of the American Academy, 1876; Curator of Conchology and Palæontology, Museum Comparative Zoology, from 1873, and Instructor in Geography and Geology, Harvard University, 1875--1877. He died at Cambridge, Mass., January 3, 1886.

1. Birds of Kennebec County. Report Maine Board of Agriculture, 1865, p. 168-173.
2. Observations upon the Physical Geography and Geology of Mount Ktaadn and the Adjacent District. Bulletin of the Museum of Comparative Zoology of Harvard College, No. v of vol. vii, pp. 189-223. [With one folded heliotype, and one map.]

In this work Prof. Hamlin describes the geological features of the surrounding region, the lakes in the vicinity, a Kame at Gordon's Landing, the granite area, reaching the conclusion that the country south of Ktaadn is part of the great region of stratified rocks which surround it on all sides. Incidentally mentions the geological features of Kennebec valley.

Prof. Hamlin's beautiful character and worthy life find fitting eulogy in the Memorial discourse delivered in the chapel of Colby University, July 5, 1887, by Rev. Francis W. Bakeman, D. D. [Portland, 1887, 8 vo. pp. 32.] "Sincere, modest, kind; pure in thought and expression; charitable in judgment, loyal to his convictions, yet human and reasonable; full of most generous sentiment and winning in his friendliness, he was as near the perfect Christian gentleman as we may hope to see in an imperfect world."

HARVEY, FRANCIS LEROY. Born April 22nd, 1850, near Ithaca, Thompkins Co., New York. Early education in public schools of Ithaca. Moved with parents to Iowa in 1865. Taught fourteen terms in the public schools of Iowa between 1867 and 1874. Entered the Iowa Agricultural College in 1868. Graduated in 1872, degree B. S. Student Assistant in Chemistry for two and a half years. Curator in Entomology for Natural History Society of Alma Mater three years, and President two years. Took post-graduate in Botany at Alma Mater 1874, Harvard Summer Course in Mineralogy and Geology 1877. Principal Graded Schools in Iowa 1873. Chair of Natural Sciences, Humboldt College, Iowa, 1874. From 1875-'81

Chair of Theoretical and Applied Chemistry in the Arkansas Industrial University. From 1881–'5 Chair Biology, Mineralogy and Geology, same institution. In 1886 in charge of Dr. A. E. Foote's Natural History and Mineral Establishment in Philadelphia, Pa. From 1887 to date chair Natural History, Maine State College. From 1888 to date, also Botanist and Entomologist to the Maine Agricultural Experiment Station. Received the degree of Ph. D. in 1890 from Arkansas Industrial University. Thesis for degree "The Apple Maggot—*Trypeta pomonella*, Walsh" Corresponding member Academy Natural Sciences, Philadelphia, Pa.; Corresponding member Portland Society Natural History; Corresponding member Torrey Botanical Club, New York; Corresponding member Washington Entomological Society, and active member American Association of Economic Botanists and Entomologists. Address: Orono.

1. First Report as Botanist and Entomologist to the Maine Experiment Station. Report Maine Experiment Station, 1888, p. 136-195.
2. Second Report, 1889. Report Maine Experiment Station, 188, p. 148-254. Contains: Life History of the Apple Maggot, p. 190-237. [With three plates.]
3. Third Report, 1890. Report Maine Experiment Station, 1890, p. 105-139. Fourth Report, 1891. Report Maine Experiment Station, 1891, p. 175-207.
4. Preservation of Our Forests. A Paper read at the Maine Forestry Convention at Bangor, December 18, 1888. 12mo. pp. 8. [See also First Annual Report of Maine Forest Commissioner. Augusta, 1891, p. 29-41.]
5. Some Fungous Diseases of Fruits. Transactions Maine State Pomological Society, 1889, p. 88-107. [With one plate.]
6. What and How Much Science Teaching in Common Schools. Thirty-Fourth Report State Superintendent of Common Schools of Maine, 1887, p. 145-153.

Has contributed many agricultural, botanical and zoological articles to public journals and periodicals.

"One of the best pieces of work which has been done by the experiment station entomologists in the past year has been performed by Prof. Harvey in his studies upon the apple maggot. He has outlined a careful investigation and carried it through successfully, and has presented his results in a straightforward, scientific and readable way. He gives for the first time accurate observations upon the eggs, careful studies of the reproductive system, observations upon the act of oviposition, and a list of sixty-six varieties of apples infested by the maggot, with comparative statements as to damage. His summary of the life history is very careful, and his consideration of the remedies includes an account of the useless methods, the preventive measures, and the direct methods. He follows with some critical remarks upon the anatomy of Trypete, and a summary of the previous writings upon this insect, correcting the numerous errors which have occurred in print. He rightly claims for himself the credit of recording for the first time, *a*, the discovery and history of the eggs; *b*, that the larva becomes full

grown in from four to six weeks; *c*, that the flies are on the wing larger than before recorded, that the later races of flies affect the later fruit."—Prof. C. V. Riley, in Insect Life, Vol. III, p. 253-254; March, 1891.

HAYES, JOHN LORD. Born in South Berwick, April 13, 1812. Graduated at Dartmouth College, 1831. From 1865 to his death, a period of twenty-two years, Secretary of the National Association of Wool Manufacturers; Judge at the Centennial Exhibition, 1876, on Wool and woolen fabrics, and Silk and silk fabrics; received the degree of LL. D. from Dartmouth College in 1878; appointed President of the Tariff Commission by President Arthur in 1882 Died at his home in Cambridge, Mass., April 18, 1887. Mr. Hayes was a voluminous writer on subjects pertaining to the wool industry and related questions. He edited eighteen annual volumes of the quarterly "Bulletin," published by the Wool Manufacturers' Association, which is an authority, the world over, on matters pertaining to sheep husbandry, the wool industry and legislation affecting it. A memoir of Mr. Hayes, and tributes to his memory and character appear in the "Bulletin," Vol. 17, p. 98–115, which contains a portrait of Mr. Hayes as a frontispiece. A bibliography of his writings will be found in the "Bulletin," Vol. 17, p. 101–104, extending to fifty-eight titles. A few of the more important of these are given below:

1. The Angora Goat. Its Origin, Culture and Products, Boston, 1868, 8vo., pp. 38.
2. Address before the National Association of Wool Manufacturers, at the First Annual Meeting in Philadelphia, September 6, 1865. Cambridge, 1865, 8vo., pp. 80.
3. Report upon Wool and Manufactures of Wool at the Paris Universal Exposition, 1867, Washington, 1868, 8vo., pp. 143.
4. The Wool Industry in our National Economy. Report Maine Board of Agriculture, 1876, p. 179-207.
5. The Awards and Claims of Exhibitors at the International Exhibition at Philadelphia, 1876, in the Departments of Textile Materials, Fabrics and Machinery, Boston, 1877, 8vo., pp. 631.

This volume contains Mr. Hayes' remarkable reports on wool and woolen fabrics, and on silk and silk fabrics, p. 277-458.

6. Wool Production and Sheep Husbandry. Report Maine Board of Agriculture, 1877, p. 132-156.

An address delivered before the Maine Board of Agriculture at Newport, February 22, 1877; full of interesting personal and auto-biographical reminiscences, and equally so of the most valuable and important matters on sheep husbandry for Maine farmers to consider. They are as applicable to our conditions now as when first spoken.

7. Sheep Husbandry in the South. Boston, 1878, 8vo., pp. 108.
8. The Resources of the United States for Sheep Husbandry and the Wool Manufacture. Boston, 1878, 8vo., pp. 43.

"In his paper on sheep culture, on wool as an article of commerce, and on its manufacture, he has manifested not only his thorough knowledge of the business and his accuracy in statistics and details, but, equally, a literary taste and ability, a purity of style and an elegance of diction, which, employed on themes of a less technical and limited interest, would have won for him commanding reputation as a master of English composition."—Dr. Andrew P. Peabody, Wool Manufacturers' Bulletin, Vol. 17, p. 96.

"But John L. Hayes' great work in life, that for which his memory will for many years be most honored, is his able, consistent, intense and thoroughly patriotic advocacy of the policy of protection to home industry. In the earnestness and zeal with which he advocated this policy, he had no superiors; in the fulness of his knowledge of his subject, he had few equals. The wool tariff of 1877, which gave such general satisfaction, and assisted so greatly to develop both our wool growing and wool manufacturing industries, was chiefly the work of his skilful hand, and its enactment into a law was chiefly due to his personal influence with leading members of both branches of Congress."—James M. Swank, Editor Bulletin of the Iron and Steel Manufacturers' Association, April 20, 1877.

"In all the relations of domestic and social life, Mr. Hayes has been true, faithful and kind, loving and tenderly beloved, incapable of enmity or ill-will, deeming it his happiness to make others happy, and filling a large and unspeakably dear place in the affection of very many beyond the inner circle of family and kindred."—Dr. Andrew P. Peabody.

HOLMES, EZEKIEL. Born in Kingston, Mass., August 24, 1801. Graduated from Brown University in 1821, and from the Maine Medical School in 1824. His health being inadequate to the hard service of a country physician's life, he became a teacher for the next five years in the Gardiner Lyceum. In 1828 he edited for a single year the New England Farmers' and Mechanics' Journal. He was professor of natural science in Waterville College from 1833 to 1837. From its establishment, in 1833, Doctor Holmes ably edited the Maine Farmer until his death—a period of thirty-two years. Before 1840 he advocated the establishment of a Board of Agriculture, which was finally done in 1852, he being its first secretary and holding that position for three years. A State Agricultural Society was also incorporated by the legislature in 1855, largely through the efforts of Doctor Holmes, who drafted its constitution and was its secretery until his death. In 1838 he made a survey of Aroostook county for the State Board of Internal Improvement; and in 1861--2 was chief and naturalist of the scientific survey of Maine, authorized by the Legislature. These leading dates in the active and useful life of Doctor Holmes give but a very imperfect idea of the great work he accomplished for the agriculture of Maine—the influence of which is still potent and fruitful. As editor of the Maine Farmer for more than thirty years, the work of Doctor Holmes was such that had he done nothing more for Maine agriculture his memory would forever be held in grateful remembrance. Doctor Holmes

THE

NORTHERN SHEPHERD,

BEING

A REPORT OF A COMMITTEE

OF THE

KENNEBEC COUNTY AGRICULTURAL SOCIETY,

UPON THE

DISEASES AND MANAGEMENT OF SHEEP.

——— To rear the tender flock,
A labor this. ————————
Virgil.

WINTHROP,
William Noyes—Printer.
1835.

TITLE-PAGE OF FIRST ORIGINAL TREATISE ON MAINE AGRICULTURE.

was the first person in Maine to introduce Shorthorns into the state; the first Southdown and Cotswold sheep, and the first of the Jersey breed of cattle. The last public act of his life was that of securing from the Legislature in February, 1865—but a week before his death—an act which established the State College of Agriculture and the Mechanic Arts as a separate and independent institution. The natural history cabinet in this college is named the "Holmes Museum" in his honor. He died at his home in Winthrop, February 9, 1865. [Portrait: Frontispiece to Agriculture of Maine, 1865.]

1. Culture of Hemp. Report of a Committee of the Legislature. Maine Documents, [Council], 1829, p. 479-486.
2. Annual Report of the Corresponding Secretary of the Kennebec County Agricultural Society, for 1834, pp. 11. [Maine Documents, 1835.]
3. Editor of Transactions of the Agricultural Societies of Maine, 1850-55, 4 vols.
4. The Northern Shepherd, being a Report of a Committee of the Kennebec County Agricultural Society upon the Diseases and Management of Sheep. Winthrop, 1835, 12mo, pp. 132.

The first distinctively original treatise on agriculture printed in Maine. A rare volume.

5. Report of an Exploration and Survey of the Territory of the Aroostook River, during the Spring and Autumn of 1838. Augusta, 1839, 8vo, pp. 80.
6. Birds Injurious to Agriculture. Agricultural Report of the Commissioner of Patents. Washington, 1857, p. 110-160. [With thirty-two plates.]
7. Introductory Report as Naturalist to the Scientific Survey of Maine. Preliminary Report upon the Natural History and Geology of Maine. Report Maine Board of Agriculture, 1861, p. 97-124. [Contains notes on the physical geography of Maine, and List of Birds of Maine.]
8. On the Fishes of Maine, including some of the Elementary Principles of Ichthyology. Report Maine Board of Agriculture, 1862, p. 9-117.
9. Notes on the Geology of a Portion of Aroostook County. Report Maine Board of Agriculture, 1862, p. 359-376.
10. Aquæculture. Report Maine Board of Agriculture, 1864, p. 99-135.
11. Numerous agricultural, scientific and literary addresses and lectures published in pamphlet form from 1830 to 1865.

For biographical sketch of Doctor Holmes see Agriculture of Maine, 1865, p. 205-226.

"Dr. Holmes was unwearied in his efforts to promote the public interests of the State. Everything pertaining to its natural resources—from the humblest plant to the giant tree of the forest, from the soil to the mountain, from the bottom of the small stream to that of the neighboring ocean—bore testimony to his zeal and

knowledge. Nothing escaped his eye that might render service to the wants of his fellow man. His influence in promoting emigration to the Aroostook was of a far greater value in erecting a barrier against foreign encroachments, than a line of forts in an unbroken forest from Canada to the Atlantic."—Dr. N. T. True Agriculture of Maine, 1865, p. 215.

"He was the true conservator of the industrial and domestic interests of Maine, and watched their progress and development with all the solicitude and care of one whose vital concerns were at stake. To the farmers whom he so often met in the midst of his labors, he was emphatically a father, and in the many homes in his own and other states lived a numerous family. When he went forth he moved as a patriarch of old among his children, their herds and their flocks; all were ready to bid him welcome, and thousands rose up to do him reverance. His sympathies were emphatically with the masses. Man was his brother, and in whatever state or condition he met him he was ever ready to extend the right hand of friendship to his equals and comrades in life, or relieve the wants of the mendicant that sought his charity."—Eulogy delivered in Representatives' Hall, State House, Jan. 29, 1866, by Hon. E. R. French, Agriculture of Maine, 1866, p. 46-47.

HITCHCOCK, CHARLES HENRY. Born in Amherst, Mass., August 23, 1836. Graduated from Amherst College, 1856; Andover Seminary, 1861. Assistant State Geologist, Vermont, 1857; Geologist to Natural History Survey of Maine 1861–'62; Geologist New Hampshire, 1868--'72. In 1869 received degree of Ph. D. from Lafayette College, Indiana. Has published important reports on geological surveys of Vermont, Maine and New Hampshire; several geological maps of authority; treatise on geology in Report of Ninth Census; Elementary Geology, 1860; Mount Washington in Winter, 1871, and has made more than one hundred and fifty contributions to scientific literature. Has in late years made extensive explorations in Florida and the Windward Carribee islands, the last trip in the interest of the Cumberland Bone Company, Portland. Discovered that the phosphate of Redonda was of mineral origin. Was one of the principal geologists connected in the formation of the Geological Society of America, 1888. Has recently presented extensive geological collections to Dartmouth College. Professor of Geology, Dartmouth College. Address: Hanover, N. H.

1. General Report upon the Geology of Maine. Preliminary Report upon the Natural History and Geology of the State of Maine. Report Maine Board of Agriculture, 1861, p. 146-328.
2. Geology of the Wild Lands. Report Board of Agriculture, 1861, p. 377-442. [With a geological map of Northern Maine.]
3. Geology of Maine. Report Maine Board of Agriculture, 1862, p. 221-430. [With a map.]

HOSKINS, THOMAS H. Born in Gardiner, May 14, 1828. Graduated from Medical Department of the University of Louisville, Ky., 1860. From 1849 to 1854 in the wholesale drug business in Louis-

ville. Editor Vermont Farmer, 1872; Agricultural Editor Vermont Watchman and State Journal; Member Vermont Board of Agriculture. Since 1865 has resided at Newport, Vt., near the head of Lake Memphremagog. The extreme severity of the winter climate in this elevated locality led him into an ardent study of the "iron-clad" tree fruits, which he has now pursued for over twenty-five years. His orchard contains more than twelve hundred fruit trees, embracing every variety capable of enduring the climate, collected from our northern border, from Canada and from Russia; and Dr. Hoskins appears to have solved the problem of tree fruits—especially of apples, pears, cherries and plums—for all Northern New England and lower Canada. He is an enthusiastic gardener and hybridist, and has produced a considerable number of valuable new varieties of garden vegetables. His experimental gardens and grounds have become a sort of horticultural Mecca for those seeking an example of success in these specialties. Dr. Hoskins is one of the most distinguished and best known horticultural writers in the country and has contributed largely to the agricultural and horticultural journals and magazines, and the Agricultural reports and horticultural transactions of many states. Among the journals to which he has constantly and frequently contributed are the Maine Farmer, The Home Farm, New England Farmer, Massachusetts Ploughman, Rural New Yorker, The Gardener's Monthly, American Gardening and Garden and Forest. In addition to this Dr. Hoskins has prepared valuable reports on the fruits of Vermont which have appeared in the Transaction of the American Pomological Society, viz: 1881, p. 118; 1885, p. 108. The catalogue below comprises only some of his more important lectures and papers furnished to the reports and transactions named. Address: Newport, Vt.

1. Fruit Raising in Vermont. Vermont Board of Agriculture, 1872, p. 50-61.
2. Vermont as an Agricultural State. Vermont Board of Agriculture, 1872, p. 568-578.
3. Science and Practice of Manuring. Vermont Board of Agriculture, 1874, p. 158-176.
4. Why does Education Draw Young Men from the Farm. Vermont Board of Agriculture, 1875-'76, p. 489-504.
5. List of Fruits for Vermont. Vermont Board of Agriculture, 1878, p. 216-217. [Equally valuable as a guide to varieties for cultivation in Maine.]

6. Apples for Aroostook County. Maine Board of Agriculture, 1880, p. 105-115. [An exceedingly important contribution to Maine pomology.]
7. Small Fruits and Apples on the Farm. Vermont Board of Agriculture, 1881-'2, p. 169-174.
8. Hardy Winter Apples. Transactions Maine State Pomological Society, 1882, p. 29-34.
9. Nomenclature of Russets. Transactions Maine State Pomological Society, 1882, p. 86-38.
10. Setting out an Apple Orchard. Vermont Board of Agriculture, 1883-'4, p. 123-126.
11. The Iron-Clad Tree Fruits. Maine Board of Agriculture, 1885, p. 10-31. [Illustrated with thirteen outlines and portraits of fruits.]
12. Truck Farming. Vermont Board of Agriculture, 1885-'6, p. 103-116.
13. The Bleeding of Apple Trees. Transactions Maine State Pomological Society, 1886, p. 158-160.
14. Russian Fruits. Transactions Maine State Pomological Society, 1889, p. 126-128.

JACKSON, CHARLES THOMAS. Born in Plymouth, Mass., June 21, 1805; died in Somerville, Mass., August 28, 1880. Graduated at the Harvard Medical School in 1829; studied in Europe; discovered the magnetic telegraph in 1832, claiming priority over that of Samuel F. B. Morse; State Geologist of Maine 1837–'39; of Rhode Island, 1839; of New Hampshire 1841–'44; published Report on Mineral Lands of United States in Michigan, 1849; discovered the anæsthetic properties of ether, 1841–'2; received decorations, orders and honors on this discovery from many foreign nations and learned societies. Made numerous contributions to scientific transactions and journals.

1. First Report on the Geology of the State of Maine. August, 1837, 8vo., pp. 128. [Accompanied by an atlas of twenty-four plates and views.]
2. Second Report on the Geology of the State of Maine. Augusta, 1838, 8vo., pp. 168. [This contains a treatise on Agricultural Geology; embracing the geographical origin, distribution, chemical composition and capabilities of soils, p. 140-168.]
3. Third Report on the Geology of the State of Maine. Augusta, 1839, 8vo., pp. 276. [Contains: Catalogue of geographical specimens in the State Cabinet, Maine; collected in the years 1836, 1837 and 1838, p. i-lxiv; and a chapter on agricultural geology, p. 123-183.]
4. Dr. Jackson also issued two reports on the "Geology of the Public Lands" belonging to the states of Maine and Massachusetts, the matter in which was, in part, a duplicate of some portions of the reports of the geological survey. The second report, published in 1838, contained 100 pages, nine plates, and an appendix of xxxvii pages.

A copy of the atlas of plates, and also the portfolio of original sketches from which the plates were made is in the State Library, Augusta. In addition to the above works, Dr. Jackson published reports on the geology of Rhode Island and Vermont, besides other important scientific works.

JORDAN, WHITMAN H. Born in Raymond, October 27, 1851. Graduated from the Maine State College in 1875, with the degree of B. S. Principal Dennysville High School 1876–77. Post-graduate student at Cornell University in Chemistry and Physics in 1877–'8. Assistant in Experimental and Analytical Chemistry at Wesleyan University, Middletown, Conn., 1878–'9. During 1879–'80 instructor at the Maine State College. From 1881 to 1885 professor of Agriculture and Agricultural Chemistry, at the Pennsylvania State College; Chemist to Pennsylvania State Board of Agriculture, 1883–'5. Since April, 1885, Director Maine Agricultural Experiment Station. Address: Orono.

1. Value, Production and Use of Manures. Report Maine Board of Agriculture, 1880, p. 42-74.
2. Experiments and Investigations conducted at the Pennsylvania State College, 1881-'2. Harrisburg, Pa., 1892, 8vo., pp. 29.
3. Agricultural Experiment work. Annual Report, Pennsylvania State College, 1883, pp. 29.
4. Agricultural work for 1884. Report Pennsylvania State College, 1884; pp. 34.
5. On non-albuminoid nitrogen of Timothy at different stages of growth. Report Society for the Promotion of Agricultural Science, Vol. I, 1882, p. 68-71.
6. The changes that occur in the albuminoids of silage. Proceedings of the Society for the Promotion of Agricultural Science, Philadelphia, Pa., 1884, p. 39-42.
7. Annual Report Experiment Station. Report Pennsylvania Board of Agriculture, 1881.
8. Field Experiments with Fertilizers. Report Pennsylvania Board of Agriculture, 1881.
9. The Maintenance of Fertility. Report Pennsylvania Board of Agriculture, 1882.
10. Relations of Soils and Crops to Moisture. Report Pennsylvania Board of Agriculture, 1882.
11. Report as Chemist to the Board of Agriculture. Report Pennsylvania Board of Agriculture, 1883.
12. How can our Cereal Crops be most Economically Increased. Report Pennsylvania Board of Agriculture, 1884.
13. Fertility, Soil Exhaustion and Fertilizers. Report Pennsylvania Board of Agriculture, 1884.

14. Plant Food. Report Maine Board of Agriculture, 1885, p. 52-53.
15. The Chemistry of the Silo. Report Maine Board of Agriculture, 1885, p. 125-130.
16. Clover in Agriculture. Report Maine Board of Agriculture, 1887, p. 132-155.
17. The Determination of the Digestibility of Feeding Stuffs. Agricultural Science, Vol. I, 1887.
18. Further Remarks upon Foods and Feeding Problems. Agricultural Science, Vol. I, No. 12, 1887.
19. The Necessity of Caution in Agricultural Research. Agricultural Science, Vol. 2, No. 10, 1888.
20. The Composition and Digestibility of Certain Cattle Foods with some observations on the determination of the digestibility of protein and carbohydrates. [With J. M. Bartlett and L. H. Merrill]. Agricultural Science, Vol. 2, No. 11, 1888.
21. Annual Report of the Maine Fertilizer Control and Agricultural Experiment Station, 1885-'6; pp. 78.
22. Annual Report of the Maine Fertilizer Control and Agricultural Experiment Station, 1886-'7; pp. 136.
23. Annual Report of the Maine State College Experiment Station, 1888, pp. 1-134 and 195-203.
24. Annual Report Maine State College Experiment Station, 1890, pp. 1-78. Report of same for 1891.
25. Pennsylvania State College Bulletins, Nos. 1-6-8-11, 1882-1885.
26. Bulletins of the Maine Agricultural Experiment Station, Nos. 2-26; Second Series, No. 1, 1885-'90.
27. Feeding Value of Skim Milk. Report Maine Board of Agriculture, 1888, p. 102-111.

Miscellaneous articles in the Maine Farmer, Germantown Telegraph and Philadelphia Press. Numerous addresses at farmers' institutes in Maine and Pennsylvania, which are not fully reported in the published annals.

KNOWLTON, DAVID H. Born in Farmington, December 21, 1844. Graduated from Bowdoin College, 1869. Secretary Maine State Pomological Society, 1887–'92. Address: Farmington.

1. Editor Transactions Maine State Pomological Society, 1887-'92, 6 vols.
2. "What Man hath Done, Man may Do." Transactions Maine State Pomological Society, 1885, p. 83-85.
3. Essay on Pomology. Transactions Maine State Pomological Society, 1886, p. 61-72.
4. Arbor Day and Its Observance. Transactions Maine State Pomological Society, 1887, p. 59-70.
5. Field Work among the Fruits. Transactions Maine State Pomological Society, 1888, p. 36-43.
6. The Experiment Station and Its Work. Transactions Maine State Pomological Society, 1889. p. 108-115.

7. Fruit Culture—Its Possibilities in Maine. Transactions Maine State Pomological Society, 1890, p. 65-73.
8. Fruit Exhibitions. Transactions Maine State Pomological Society, 1891, p. 47-51.

LADD, EDWIN F. Born in Starks, December 13, 1859. Graduated from Maine State College, 1884, with degree of B. S. Assistant Chemist to New York Agricultural Experiment at Geneva, 1884–'88; Chief Chemist to New York Experiment Station, 1888–'90. Professor of Chemistry North Dakota Agricultural College, and Chemist to the North Dakota Experiment Station, 1890–'92. Secretary North Dakota State Dairymen's Association. Fellow of the American Association for the Advancement of Science; member of the Society for the Promotion of Agricultural Science; of the American Chemical Society; of the American Academy of Political and Social Science; of the Scientific Society of the Maine State College, and of the New York State Dairymen's Association. Address: Fargo, N. D.

1. Composition and Relative Digestibility of Feeding Stuffs. American Chemical Journal, Vol. 8, p. 1.
2. Pepsin vs. Animal Digestion. American Chemical Journal, Vol. 7, p. 6.
3. Sugars and Starch in Fodders and their Determination. American Chemical Journal, Vol. 10, p. 1.
4. The Influence of Food on the Composition of Butter. Agricultural Science, 1880, p. 251.
5. Cooked vs. Raw Food for Stock. Bulletin No. 5, (New Series), New York Agricultural Experiment Station, October, 1885, pp. 3.
6. Hay vs. Damaged Hay. Bulletin No. 6, (New Series.) New York Agricultural Experiment Station. November 5, 1885, pp. 2.
7. Influence of Fertilizers on the Chemical Composition of Plants; Analysis of Feeding Stuffs; Feeding and Digestion Experiments. Bulletin No. 10, (New Series). New York Agricultural Experiment Station, August, 1888, pp. 8.
8. Chemical Composition of Some Feeding Stuffs. Bulletin No. 14, (New Series). New York Agricultural Experiment Station, October, 1888, pp. 30. [With one plate.]
9. Cattle Foods and Feeding Rations. Bulletin No. 17, (New Series). New York Agricultural Experiment Station, October, 1889, pp. 28.
10. A Method for the Determination of Fat in Milk and Cream. Bulletin No. 19, (New Series). New York Agricultural Experiment Station, June, 1890, pp. 12. [With two plates, and two folding tables.]
11. The Relative Digestibility of Feeding Stuffs. Report New York Agricultural Experiment Station, 1885, p. 312-319.
12. Action of Phosphoric Acid in the Soil. Report New York Agricultural Experiment Station, 1885, p. 321-325.

13. Feeds—Raw and Cooked. Report New York Agricultural Experiment Station, 1885, p. 320-321.
14. An Examination of Feeding Stuffs. Report New York Agricultural Experiment Station, 1886, p. 358-366.
15. Albuminoid and Non-Albubuioid Nitrogen. Report New York Agricultural Experiment Station, 1886, p. 366-374.
16. Variations in the Composition of Grasses in Two Years. Report New York Agricultural Experiment Station, 1887, p. 406-411.
17. Early and Late Cut Timothy. Report New York Agricultural Experiment Station, 1887, p. 411-417.
18. Analysis of Hays from Different Localities. Report New York Agricultural Experiment Station, 1887, p. 417-419.

Samples of Timothy from Wisconsin and Maine; the latter from the farm of the State College, Orono.

19. Composition of Forage Plants. Report New York Agricultural Experiment Station, 1887, p. 419-431.

The cactus of the genus *Opuntia* known as "Prickly Pear," Prickly Comfrey, and various grasses.

20. Wheat and Its Products. Report New York Agricultural Experiment Station, 1887, p. 431-437.

Analysis of wheat straw, wheat bran, flour, middlings, shipstuff, bran.

21. Per cent. of Water in Some Farm Products. Report New York Agricultural Experiment Station, 1887, p. 437-440.

Amount of water in grasses when in full bloom; in hay; in fodder corn; in corn stover; in corn meal.

22. Influence of Fertilizers upon the composition of Timothy and Clover. Report New York Agricultural Experiment Station, 1887, p. 441-454.
23. Amount of Nitrogen, Phosphoric Acid and Potash removed from the soil by Farm Crops. Report New York Agricultural Experiment Station, 1887, p. 455-464.
24. Fodder Analyses. Report New York Agricultural Experiment Station, 1888, p. 235-244.
25. Amount of Fertility Removed from the Soil by Crops. Report New York Agricultural Experiment Station, 1888, p. 244-250.
26. Influence of Fertilizers upon the Chemical Composition of Grass. Report New York Agricultural Experiment Station, 1888, p. 250-262. [With two plates.]
27. Results of Special Fertilizers upon Oats. Report New York Agricultural Experiment Station, 1888, p. 262-264.
28. Changes in Maize as it Approaches Maturity. Report New York Agricultural Experiment Station, 1888, p. 264-265.
29. Analyses of Hays from Different Localities. Report New York Agricultural Experiment Station, 1888, p. 265-267.

Hays from Wisconsin, Maine (farm of Maine State College, Orono), New Hampshire and New York; the growth of 1885, 1886, 1887. "The variation in the composition of hays from different localities is quite marked for different years, and shows that often the meteoralogical

influences are a more potent factor in determining the quality, (not the quantity), of a hay crop than are the fertilizers."

30. Nitrogen-free Extract of Fodders. Report New York Agricultural Experiment Station, 1888, p. 267-270.

31. Feeding Experiments with Dairy Cows. Report New York Agricultural Experiment Station, 1888, p. 270-284.

Experiments with orchard grass, corn meal, Linseed meal and wheat bran; with the amount of nitrogen supplied and recovered, and the amount of dung and fertilizing matter contained in the same voided by the cows during the experiment.

32. Influence of Food on Milk and Butter. Report New York Agricultural Experiment Station, 1888, p. 284-292.

33. Feeding Experiments. Report New York Agricultural Experiment Station, 1888, p. 292-297.

34. Corn Fodder vs. Ensilage. Report New York Agricultural Experiment Station, 1888, p. 297-299.

35. Sheep Feeding Experiment for Fat and for Lean Meat. Report New York Agricultural Experiment Station, 1888, p. 300-302.

36. Artificial vs. Animal Digestion. Report New York Agricultural Experiment Station, 1888, p. 304-307.

37. Analyses of Fertilizers. Report New York Agricultural Experiment Station, 1888, p. 307-315.

38. Analyses of Foods. Report New York Agricultural Experiment Station, 1889, p. 73-79.

Nitrogen free extract of foods, its composition and digestibility.

39. A Study of the Maize Plant. New York Agricultural Experiment Station, 1889, p. 79-91.

The chemistry of the Maize plant through its periods of growth.

40. Cattle Foods and Feeding Rations. Report New York Agricultural Experiment Station, 1889, p. 91-153.

The nitrogenous and carbonaceous rations, digestibility of alfalfa hay, of hay-mixed grasses, of a compound ration, and influence of roots on the digestibility of a ration.

41. Influence of certain Grain Foods on the Chemical Composition of Milk. Report New York Agricultural Experiment Station, 1889, p. 153-205.

42. Dairy Notes. Report New York Agricultural Experiment Station, 1889, p. 206-214.

Sweet vs. ripened cream for butter; temperature for churning; ash constituents of milk and cream; pounds of cream for one pound of butter; influence of food on the butter; rations fed by New York dairy farmers.

43. Artificial vs. Animal Digestion. American Chemical Journal, Vol. xi, 1889, p. 169.

44. Estimation of Sugar, Starch and Ash constituents in Fodder. Journal Analytical Chemistry, Vol. ii, 1888, p. 145.

45. Some Changes in Timothy Grass as it approaches Maturity. Agricultural Science, Vol. i, 1887, p. 221.

46. Need for more thorough Meteorological and Climatic Studies. Agricultural Science, 1890, Vol. x, p. 36.
47. Silage vs. Dry Fodder. Society for the Promotion of Agricultural Science, 1890, p. 29.
48. Digestion Experiments. Society for the Promotion of Agricultural Science, 1888, p. 96.
49. Rational System of Stock Feeding. Report New York State Agricultural Society, 1888.
50. Investigations upon Maize. Journal of American Chemical Society Vol. 12, No. 8, 1890.
51. Sugar Beets. Bulletin No. 5, North Dakota Experiment Station, February 1892, pp. 50.
52. Wheat Growing and Dairying for North Dakota. Bulletin No. 8, North Dakota Experiment Station, December, 1892, pp. 14.

LANG, JOHN WILSON. Born in Brooks, September 23, 1840. Educated in common schools. Served in Ninth Maine Regiment 1864–'5, in Virginia and North Carolina. Agricultural editor Republican Journal, Belfast, 1869–'72; of Dirigo Rural, Bangor, 1875; of Eastern State, Dexter, 1383–'5, of American Sentinel, Bath, 1887–'89. One of the editors of Maine Journal of Education, Portland, 1873. Published the Farmers' Exchange, Brooks, for six months, 1873. Member of Maine Board of Agriculture, 1871–'74. Secretary Maine Dairymen's Association, 1874–'79. Address: Bowdoinham.

1. Survey of Waldo County: Historical, Physical, Agricultural. Augusta, 1873, 8vo., pp. 131.
2. Wants and Resources of Maine Agriculture. Report Maine Board of Agriculture, 1873, p. 62-74.
3. Dairy Interests of Maine. Report Maine Board of Agriculture, 1873, p. 354-361. Same, Part II, 1874, p. 169-'74. Same, Part II, 1875, p. 190-203.
4. Farming as a Profession. Report Maine Board of Agriculture, 1874, p. 94-103.
5. Adaptability of Maine to Dairying. Report Maine Board of Agriculture, 1876, Part II, p. 259-267.
6. Feeding Dairy Cows. Report Maine Board of Agriculture, 1877, Part II, p. 130-135.
7. Dairy Interests of Waldo County. Report Maine Board of Agriculture, 1882, p. 162-166.
8. Our Worn Lands. Report Maine Board of Agriculture, 1883, p. 199-207.
9. Fruit Culture in Maine. Transactions Maine State Pomological Society, 1884, p. 30-36.
10. Practical Co-operation. Report Maine Board of Agriculture, 1886, p. 81-94.

11. Fruit Culture in Sagadahoc County. Transactions Maine State Pomological Society, 1886, p. 119-121.
12. History and Culture of the Potato. Report New Hampshire Board of Agriculture, 1872, p. 303-323.
13. Value of Insect-Eating Birds. Report New Hampshire Board of Agriculture, 1873, p. 297-314.
14. Sheep, Wool and Mutton. Report New Hampshire Board of Agriculture, 1874, p. 179-192.

Edited First, Second, Third and Fourth Reports of Maine Dairymen's Association, published in Report of Maine Board of Agriculture for the years 1874, 1875 and 1877.

In addition to the above the agricultural reports of Maine contain many shorter articles from Mr. Lang's pen, while he has been a contributor to the leading agricultural journals of the State and country, for many years.

MATTHEWS, S. W. Born in Hampden, May 31, 1832. Graduated from Waterville College, (now Colby University), 1854. Assistant Assessor of Internal Revenue; Deputy Collector of Customs; editor of newspapers nine years; member of the House of Representatives in 1873; Commissioner of Maine Bureau of Industrial and Labor Statistics, 1885--'92. Address: Augusta.

1. Our Abandoned Farms. Report Bureau of Industrial and Labor Statistics, 1890, p. 93-135.
2. The Canning Industry of Maine. Report Bureau of Industrial and Labor Statistics, 1892, pp. 32-35.

More canned goods are packed in the State of Maine than in any other state of the Union. Corn, beans, squash, pumpkin, apple, berries, jellies, condensed milk, are among the products of the canning industry of the State. Returns from 64 corn packing factories in 1891 show that they packed the product of 9312 acres of sweet corn, and employed eight thousand persons. The total pack of these factories was 13,161,028 cans.

MATTOCKS, CHARLES P. Born in Danville, Vt., October 11, 1840, and has lived in Maine since he was ten years old. Graduated from Bowdoin College in 1862, and from the Harvard Law School, 1867. Immediately upon graduating from Bowdoin he entered the 17th Maine Regiment as First Lieutenant and participated in all the battles of the Army of the Potomac from the first battle of Fredericksburg until the surrender of Lee, with the exception of nine months spent in rebel prison. For gallantry brevetted through all grades to Brigadier General. County Attorney of Cumberland 1870-'73. Colonel of State Militia, 1879. Member of House of Representatives, 1883–'85. A lawyer having a large practice. Proprietor of

"Riverside Farm," East Baldwin, one of the most celebrated breeding farms of thoroughbred live stock, Jerseys, Cotswolds and Berkshires, in the State. President of Winslow Packing Company, operating in some years as many as fifteen corn packing factories. Executive Commissioner of Board of Columbian World's Fair Managers for Maine. Address: Portland.

1. Cotswold Sheep: Their History, Breeding and Management. Chicago, 1878. Large 4vo, pp. 9. Illustrated.

Indroductory essay to American Cotswold Record, Vol. I.

Regarded as an authority on the history and characteristics of this breed of sheep, by all American and Canadian breeders.

MAINE.

Present Condition of the State. Its Agricultural, Financial, Commercial and Manufacturing Development. Advantages of the State as a Summer Resort. Augusta, 1885, 8vo., pp. 40.

The chapter on agricultural condition, pages 7-11.

MAINE EXPERIMENT STATION. The Maine Fertilizer Control and Agricultural Experiment Station was established by act of the Legislature approved March 3, 1885. It contemplated two lines of work: First, in reference to the inspection and analysis of fertilizers; second, that of experiment and investigation. From the organization of the Station in April, till July 1st, 1885, Prof. Walter Balentine was acting Director. Prof. W. H Jordan was elected Director and assumed the duties in July, 1885, and has continued in that position to the present time. The Station existed as a State institution till the Hatch Bill, passed by Congress March 2, 1887, became a law, viz: October 1, 1887, when a state law went into effect repealing the law creating the Station. From that time it has existed as the "Maine State College Agricultural Experiment Station," under the provisions, and by virtue of the apptopriations, authorized by the Hatch Bill of 1887. As a State institution the Station published three reports, and twenty bulletins, the latter having been published only in the agricultural journals of the State.

1. Report of the Maine Fertilizer Control and Agricultural Experiment Station, 1885. Augusta, 1885, 8vo., pp. 23.

Contains: Analysis of Fertilizers for the months of April-June, 1885, and law establishing the station.

2. Annual Report, 1885-'6. Augusta, 1886, 8vo., pp. 87.

Contains: Report on Inspection and Valuation of Fertilizers, p. 9-41.
The Manure Residue of Corn Meal and of Cotton-Seed Meal, p. 42-46.
Composition of Cattle Foods, p. 47-53.

GENERAL OFFICES OF MAINE EXPERIMENT STATION.

Digestion Experiments, p. 53-64.

Digestibility of Timothy Hay and the Maize Kernel.

Feeding Cotton-Seed Meal for Milk and Butter Production, p. 65-72.

On Feeding Steers for Growth, p. 73-78.

3. Annual Report, 1886-'7. Augusta, 1887, 8vo., pp. 145.

Contains: History and Analyses of Samples of Fertilizers collected in 1887, p. 8-40.

Relative Manurial Value of Cotton-Seed Meal and Linseed Meal, p. 40-41.

Experiments with Fertilizers at the Station. Field experiments with fertilizers at the Station, showing the comparative production from different forms of phosphoric acid; the profitable quantity of commercial fertilizers to use, and results of field trials of fertilizers by farmers in different parts of the State, p. 41-64.

Analyses of Feeding Stuffs, Analyses of Timothy hay, clover hay, oat straw, potatoes, cottonseed meal, linseed meal, patent cotton food, beef scraps, pork scraps, dried blood, whole corn and meal, corn meal and corn-and-cob meal, rations for poultry raising, p. 64-100.

Dairy Products. The effect of the temperature at which the milk is set upon the volume of cream; upon quantities of cream; upon the composition of the cream; upon the amount of cream for a pound of butter; to the residue of fat left in the skimmed milk after different periods of setting, and comparative weights of night's and morning's milk, p. 107-119.

Analytical and Experimental Methods at the Station. p. 123-136.

4. Annual Report of the Maine State College Experiment Station, 1888. Augusta, 1889, 8vo., pp. 223. Contains:

Report on Inspection of Fertilizers offered for Sale in 1888, p. 27-60.

Analyses of Muck, p. 61-63.

Box Experiments with Fertilizers, p. 64-66.

Field Experiments with Fertilizers by Farmers, p. 67-81.

Foods, p. 81-90.

Digestion Experiments, p. 90-100.

Whole Corn vs. Corn Meal, p. 101.

The Compounding of Rations for the Different Classes of Farm Animals, p. 102-110.

Composition of American Feeding Stuffs, p. 111-122.

Experiments with Potatoes, Oats, Barley and Peas, p. 123-134.

Experiments in the Improvement of Plants by Seed-Selection, p. 135-147.

Potato Scab, p. 148-149.

The Apple Scab, p. 149-151.

Injurious Insects, p. 151-195.

Describes the round-headed apple tree borer; flat-headed apple tree borer; oyster-shell bark-louse; apple tree tent caterpillar; forest tent caterpillar; fall canker worm; eye-spotted bud-moth; apple tree aphis; codling moth; apple maggot; ash-gray pinion; pear tree slug; plum curculio; cherry tree plant louse; imported currant worm; white scale;

black swallow tail; eyed elator; hawthorn tingis; mourning cloak butterfly; meal worm; spraying trees. [With thirty-four figures.]

Protein Digestion, p. 195-203.

5. Annual Report of Maine State College Experiment Station for 1889. Bangor, 1890, 8vo., pp. 294. Contains:

Inspection of Fertilizers, p. 1-35.

Experiments with Cattle Foods, p. 37-68.

Feeding Experiments, p. 69-84.

Feeding Experiments with Swine, p. 85-105.

A study of Dairy Products, p. 106-134.

Being the results of tests with several different breeds of dairy cows.

Experiments with Fertilizers, p. 135-144.

Being the results of both pot experiments and field experiments by farmers in different parts of the State.

Germination Experiments, p. 149-160.

Experiments with Forage Plants, p. 161-169.

Injurious Plants, p. 170-187.

The potato rot; apple scab; false flax; rib-grass. [With two plates.]

The Apple Maggot. [With three plates, embracing twenty figures.] p. 190-241.

Insecticides, p. 242-254.

Fruit Tests, p. 255-256.

Report of Veterinarian, Dr. F. L. Russell, p. 257-266, contains:

Hog Cholera; parturient apoplexy.

6. Report for 1890. Bangor, 1891, 8 vo. pp. 162, contains:

Inspection of Fertilizers, p. 1-16.

Tests of Dairy Cows, p. 17-51.

Relates to cost of food; yield of milk solids; cost of milk; composition of milk; food value of waste products of the dairy; loss of fat in waste products; mechanical loss of butter fat; effect of a delay in setting milk; mineral ingredients of milk.

Relative Yield of Digestible Material in Early Cut and Late Cut Timothy Hay, p. 65-67.

Feeding Experiments with Colts, p. 68-70.

Feeding Experiments with Steers, p. 71-74.

Feeding Experiments with Different Breeds of Swine, p. 75-78.

Fertilizer Experiments, p. 71-106.

Relates to the effect of different forms and mixtures of fertilizers; systems of manuring, and field tests of fertilizers by farmers in different parts of the State.

Tests of Varieties of Beans, Sweet Corn, Peas, Beets, Squash and Pumpkins, p. 102-103.

Report of Botanist and Entomologist, Prof. F. L. Harvey, p. 105-139. [With two plates and twelve illustrations.]

Embraces germination experiments; experiments with corrosive sublimate; spraying for apple scob; Paris green for potato beetles; causes of potato scab; strawberries; rib grass, or English plaintain; fall dande-

lion; the cecropia emperor moth; the white-marked tussock-moth; fall webb-worm; eye-spotted bud moth; woolly-louse of the apple tree; red-humped apple tree caterpillar; fall canker-worm; forest caterpillar.

Fruit Tests, p. 140.

Report of Meteorologist, Dr. M. C. Fernald, p. 141-157.

7. Report for 1891. Bangor, 1892, 8vo., pp. 213. [With thirteen plates.] Contains:

Results of Inspection of Fertilizer, p. 1-20.

Description of the Station Equipment, p. 21-28.

Digestion experiments, p. 29-40. [Appendix, p. 3-9.]

Embraces the tests of digestibility of Hungarian grass; Hungarian hay; corn fodder; Timothy hay; various roots; gluten meal; wheat bran.

The production of Food Material by Various Fodder and Root Crops, p. 41-46.

Turnips as Food for Sheep, p. 47-52.

An Experiment in Producing Growth in Lambs, p. 53-57.

Feeding Experiment with Colts, p. 58-61.

Influence of Food upon the Quality of Butter, p. 62-69.

The Babcock Milk Test adapted to Cream, p. 71-80.

Report of the Horticulturist, Prof. W. M. Munson, p. 81-122.

Embraces notes on cabbages; on tomatoes; on egg-plants; fruit tests; spraying for codling moth; spraying for apple scab, [with three figures]; spraying apparatus; [formulas and modes of application.]

Fertilizer Experiments, p. 123-144.

Growing Mixed Grains compared with growing Grains Separately, p. 144-145.

Trials of Spring and Fall Manuring, p. 146.

Field Trials of Fertilizers by Farmers in different parts of the State, p. 146-153.

Report of Meteorologist, Dr. M. C. Fernald, p. 155-174.

Report of Botanist and Entomologist, Prof. F. L. Harvey, p. 175-207. [With one plate and thirteen figures.]

Embraces report on plants received for examination; hawk moths; cut-worms; goldsmith beetle; remedies for borers.

Bulletins Nos. 1 to 20 were published in the agricultural journals of the State from May 18, 1885, to May 13, 1887. Nos. 1 to 5, inclusive, of this series were reprinted in a pamphlet of 15 pages, 8vo. Nos. 6 to 20 inclusive were issued on slips.

Bulletin No. 21 is out of print.

Bulletin No. 22, March, 1888, [Organization of the Station], pp. 8.

Bulletin No. 23, April, 1888, [analysis and valuation of fertilizers], pp. 16.

Bulletin No. 24, May, 1888, [tests of potatoes, oats, barley and peas; and germination and purity of seed], pp. 10.

Bulletin No. 25, August, 1888, [analyses of commercial fertilizers], pp. 8.

Bulletin No. 26, October, 1888, [composition and digestibility of certain cattle foods], pp. 16.

Bulletin No. 1, Second Series, May, 1889, [analyses of fertilizers for 1889], pp. 4.

Bulletin No. 2, Second Series, [the apple maggot and potato rot, by Prof. F. L. Harvey], pp. 7.

Bulletin No. 3, Second Series, September, 1891, [the Babcock milk test adapted to testing cream], pp. 8. [With one plate.]

MAINE STATE GRANGE. The Maine State Grange, Patrons of Husbandry was organized at Lewiston, April 21–22, 1874. Its secretaries have been: J. M. Jackson, Lewiston, 1874–'80; Daniel M. Hall, Bangor, 1881–'85; Frederick A. Allen, Auburn Plains, 1886–'92.

1. Journal of Proceedings, First Annual Session, Lewiston, 1874; and Second Annual Session, Bangor, 1875. Lewiston, 1876, 8vo. pp. 51.
2. Third Annual Session, Waterville, 1876. Lewiston, 1877, 8vo. pp. 45.
3. Fourth Annual Session, Saco, 1877. Bangor, 1878, pp. 36.
4. Fifth Annual Session, Gardiner, 1878. Bangor, 1879, 8vo. pp. 40.
5. Sixth Annual Session, Portland, 1879. Bangor, 1880, 8vo. pp. 40.
6. Seventh Annual Session, Waterville, 1880. Bangor, 1881, 8vo. pp. 38.
7. Eighth Annual Session, Augusta, 1881. Bangor, 1882, 12 mo. pp. 52.
8. Ninth Annual Session, Lewiston, 1882. Bangor, 1883, 12 mo. pp. 44.
9. Tenth Annual Session, Bangor, 1883. Bangor, 1884, 12 mo. pp. 88.
10. Eleventh Annual Session, Houlton, 1884. Augusta, 1885, 12 mo. pp. 80.
11. Twelfth Annual Session. Augusta, 1885. Farmington, 1886. 12mo., pp. 72.
12. Thirteenth Annual Session. Augusta, 1886. Lewiston, 1887. 12mo., 74.
13. Fourteenth Annual Session. Skowhegan, 1887. Lewiston, 1888. 12mo., pp. 84,
14. Fifteenth Annual Session. Bangor, 1888. Lewiston, 1889. 12mo., pp. 72.
15. Sixteenth Annual Session. Belfast, 1889. Lewiston, 1890. 12mo., pp. 72.
16. Seventeenth Annual Session. Lewiston, 1890. Lewiston, 1891. 12mo., pp. 70.
17. Eighteenth Annual Session. Skowhegan, 1891. Lewiston, 1892. 12mo., pp. 72.
18. Nineteenth Annual Session. Lewiston, 1892. Lewiston, 1893. 12mo., pp. 82.

At the close of the year 1892, there were 214 subordinate granges in Maine having a membership of 16,330. There were also seven-

LABORATORY OF MAINE EXPERIMENT STATION.

teen County or Pomona Granges. The published Journal of Proceedings contain many important annual addresses by the State Masters, Nelson Ham, D. H. Thing, Frederick Robie, Rufus Prince, M. B. Hunt; and valuable reports on grange work, agricultural education, taxation, general agricultural work of the State and matters of domestic economy. The State Grange also publishes an annual Register of Granges with a list of officers, and has issued several circulars and reports relating to grange principles and work, for general circulation.

Maine State Pomological Society. The Maine State Pomological Society was incorported by the Legislature of Maine in 1873, its act of incorporation having been approved February 17, of that year. Its first annual report was published in 1874 and contained an important and interesting historical introduction from the pen of its first secretary, Hon. Geo. B. Sawyer of Wiscasset. This embraced a history of the fruits indigenous to Maine; history of orcharding in Maine; a fac simile of the first catalogue of nursery trees issued in this State, (by Ephriam Goodale of Buckstown now Orrington, as early as 1804), history of the old Maine Pomological and Horticultural Society organized in 1847, and of other associated efforts in behalf of pomology in this State. The six annual reports, 1873 to 1878, inclusive, are usually found bound up in one volume, although all were issued for separate years and a few copies of each were bound in cloth. For the years 1879, 1880 and 1881 no reports were published. The State having refused the publication of the reports for those years the society sought to procure the printing of the transactions by private means. Copy was furnished to a printer in Biddeford, and 128 pages of a volume embracing the above named three years' work of the society were printed; but the volume was never completed or distributed. This report so far as printed embraced the following lectures and papers:

The Apple Tree Borer. By John E. Bennoch of Orono, p. 30-39.

Orcharding in Washington County. By H. A. Sprague of Charlotte, p. 39-44.

Cranberry Culture. By Alfred Smith of Monmouth, p. 45-46.

Apples in their Commercial Aspect. By R. H. Gardiner of Gardiner, p. 46-48.

Orchard Management. By Joseph Taylor of Belgrade, p. 48-55.

The Codling Moth. By S. C. Harlow of Bangor, p. 55-60.

Tree Fruits for Northern Maine. By T. H. Hoskins, Newport, Vt., p. 60-64.

The Profits of Orcharding as Compared with General Farming. By W. P. Atherton of Hallowell, p. 69-77.

Varieties of Apples for Maine. By W. P. Atherton, p. 99-117.

In 1883 the publications of the society were again resumed as formerly, the title of the volume being changed from "Report" to "Transactions" which has since been uniformly followed. A yearly volume has been issued from 1882 to 1892. The Secretaries of the society have been as follows:

1873-'84: George B. Sawyer, Wiscasset.
1885-'86: Samuel L. Boardman, Augusta.
1887-'92: D. H. Knowlton, Farmington.

Below is given a list of the volumes with plates of Maine fruits and reference to the more important contents not catalogued in the general bibliography:

1873: pp. 127, contains:
Manure for Orchards. By Washington Gilbert, p. 69-91.
1874: pp. 146, Plate of the Goodale Pear, originated in Saco. Contains:
Catalogue of Fruits of the State of Maine, p. 108-138.
1875: pp. 176, contains:
Orcharding as a Business. By Alfred Smith, p. 40-54.
Cherries in Maine. By Granville Fernald, p. 64-93.
Maine Fruits at the Centennial Exposition, 1876, p. 104-116.
1876: pp. 165. Plates of residence and grounds of the late Dr. J. C. Weston, Bangor. Contains:
Fruit Growing in Monmouth. By G. H. Andrews, p. 89-92.
Fruit Growing in Connection with Geueral Farming. By Joseph Taylor, p. 92-104.
1877: pp. 112. Plate of the Starkey apple, originated in Vassalboro. Contains:
The Renovation of Old Orchards. By W. P. Atherton, p. 45-56.
Nurseries in Maine, p. 74-80.
1878: pp. 28.
1882: pp. 120. Contains:
Report on Russian Fruits. By Charles Gibb.
1883: pp. 112. Contains:
Experience in Orcharding and Its Lessons. By Rufus Prince, p. 32-38.
Orcharding in Franklin County. By S. R. Leland, p. 45-47.
Growing Apples for Profit. By D. J. Briggs, p. 48-52.
Fruit Growing in Piscataquis County. By H. L. Leland, p. 52-54.
1884: pp. 100. Contains:
The Nursery Business in Maine. By W. P. Atherton, p. 45-56.
Maine Fruits at the Cotton Centennial Exposition, New Orleans. p. 59-63.
1885: pp. 167. Contains:

The Climatic Line of Fruit Culture in Maine. By W. P. Atherton, p. 85-91.

Can the Codling Moth be Trapped? By S. C. Harlow, p. 97-100.

1886: pp. 186. Portrait of the Hon. Robert Hallowell Gardiner, formerly President of the Society; Portrait of Marshall P. Wilder; plate of the Boardman apple, originated in Farmington. Contains:

Experience in Orcharding and Marketing the Fruit. By P. Whittier, p. 35-40.

Twenty years' Experience and what I have Learned. By W. P. Atherton, p. 81-85.

Propagation and Culture of the Plum. By J. E. Bennoch, p. 128-130.

1887: pp. 164. Plate of Dudley's Winter Apple, originated in Castle Hill, Aroostook County. Contains:

Notes on Plum Culture. By D. P. True, p. 40-50.

Insects Injurious to Fruits. By Carl Braun, p. 77-87.

Small Fruits and their Culture. By P. M. Augur, p. 105-120.

1888: pp. 148. Plate of the Rolfe Apple, originated in Guilford. Contains:

Diseases attacking our Fruits. By S. T. Maynard, p. 48-59.

Money in Small Fruits. By J. H. Hale, p. 70-90.

Revised Fruit List for Maine, p. 113-126.

1889: pp. 172. Colored plate of the Russell apple, originated in Farmington. Portrait of Peter Henderson. Contains:

Pear Culture. By C. M. Weston, p. 48-51.

The Dietetics of Fruit. By C. D. Smith, M. D., p. 58-77.

Some Fungous Diseases of Fruits. By Prof. F. L. Harvey, p. 88-107. [With one plate]

Maine Fruit at the Bay State Fair, p. 129-130.

1890: pp. 152. Contains:

Results of Spraying. By S. C. Harlow, p. 58-63.

Fruit Raising in Aroostook County. By James Nutting, p. 73-74.

Strawberry and Small Fruit Culture. By S. H. Dawes, p. 81-90.

Varieties of Strawberries and Marketing. By Willis A. Luce, p. 91-92.

Horticultural work at the Maine Experiment Station. By Prof. W. M. Munson, p. 115-116.

1891: pp. 137. Contains.

Pear Culture. By S. H. Dawes, p. 64-70.

Experiments in Spraying. By Prof. W. M. Munson, p. 71-85.

Maine Apples in the English Market. By Edward Peake, p. 92-94.

McKeen, B. Walker. Born in Fryeburg, March 9, 1849. A teacher of experience and largely interested in educational progress. Agricultural editor of the Oxford Democrat from January 8, 1884 to March 9, 1886. Secretary of the West Oxford Agricultural Society from October 6, 1886 to December 8, 1892. Member of the Maine

Board of Agriculture, 1888 to 1892; president of the Board, 1891; elected Secretary of the Board, January, 1892. Address: Augusta.

1. Editor, Agriculture of Maine 1891-'92, 2 vols.
2. Sweet Corn Culture. Report Maine Board of Agriculture, 1887, p. 53-62.
3. Stock Feeding and Its Relations to the Fertility of the Farm. Report Maine Board of Agriculture, 1888, p. 169-178.
4. Importance of Specialties in Farming. Report Maine Board of Agriculture, 1889, p. 121-135.
5. Business Farming. Report Maine Board of Agriculture, 1890, p. 96-108.

MEMORIAL of the Maine State Agricultural Society for the adoption of Measures for the Settlement and Sale of the Public Lands of Maine. Augusta, 1858, 8vo., pp. 27.

MERRILL, LUCIUS H. Born in Auburn, October 11, 1857. Graduated at Maine State College, 1883. For two years assistant in the United States National Museum; since 1886 Chemist at Maine Experiment Station. Address: Orono.

1. Fodder analysis, artificial digestion, loss of nitrogen from nitrogenous Superphosphates, Method for Phosphoric Acid. Report Maine Experiment Station, 1888, p. 210-213.
2. Co-efficients of Digestibility for Protein. Report Maine Experiment Station, 1889, p. 282-285.
3. The Mineral Ingredients of Milk. Report Maine Experiment Station, 1890, p. 52-57.
4. The Fat Globules of Milk. Report Maine Experiment Station, 1890, p. 58.

The greater part of the work of Prof. Merrill performed at the Station, appears in the general report of the Director.

MERRITT, E. W. Has published at Houlton an annual "Guide to Fruit Culture," from 1876 to 1892. Later numbers contain lists of fruits adapted to Aroostook County and similar high latitudes, with much information specially useful to fruit growers in that section. The Massachusetts Horticultural Society regards this little annual guide and catalogue of so important a nature as to be preserved in a full set in its library.

MUNSON, WELTON MARKS, M. S. Graduated at Michigan Agricultural College in class of 1888. Assistant Horticulturist Experiment Station of Cornell University, 1888–'90; Professor of Horticulture, Maine State College, and Horticulturist to the Maine State College Experiment Station, since 1891. Address: Orono.

1. Horticultural Work at the Maine Experiment Station. Transactions Maine State Pomological Society, 1890, p. 115-116.
2. Experiments in Spraying. Transactions Maine State Pomological Society, 1891, p. 71-85.
   [See also, Report Maine State College Experiment Station, 1891, p. 99-121.]
3. Report as Horticulturist to Maine State College Experiment Station, 1891, p. 81-122. Contains: Equipment of the Station; Notes on Cabbages; Notes on Tomatoes, Notes on Egg Plants; Fruit Tests; Experiments in Spraying.
4. Preliminary Notes on the Secondary Effects of Pollination. Report Maine State College Experiment Station, 1892, p. 29-58. [With one plate and sixteen illustrations.]
5. Report as Horticulturist to Maine State College Experiment Station, 1892, p. 59-98. [With one plate and seventeen illustrations.]

Contains: Notes on Cabbages; Notes on Tomatoes; Notes on Egg Plants; Fruit Tests; Spraying Experiments.

PACKARD, CYRUS A. Born in Hebron, December 22, 1822. Graduated at Foxcroft Academy, 1840. Address: Blanchard.

1. Reports as Land Agent of Maine from 1880 to 1891, pp. 232.
2. First Annual Report of the Forest Commissioner of the State of Maine. Augusta, 1891, 8vo. pp. 78. Contains:

Act Creating Forest Commissioner of Maine for the Protection of Forests.

Importance of Protecting our Forests.

Returns of Selectmen, County Commissioners and Fire Wardens.

Preservation of our Forests. By Prof. F. L. Harvey, p. 29-41.

The Relation and Importance of our Forests to Summer Tourists and Sportsmen. By George F. Godfrey. p. 42-44.

Economical Cutting of our Forests. By Wilson Crosby. p. 45-50.

Forest Planting and Municipal Ownership of Forest Lands. By George F. Talbot. p. 51-60.

The Depreciation of our Forest Growth and its Effects upon our Various Industries. By John E. Hobbs. p. 61-78.

PACKARD, ALPHEUS SPRING. Born in Brunswick, February 19, 1839. Graduated at Bowdoin College, 1861. On leaving college he at once became a volunteer assistant in the Maine Geological Survey. Meanwhile his interest in entomology, which has since become his life work, had already manifested itself, and during August and September, 1861, he collected insects on the Penobscot and Alleguash rivers, a description of which he furnished to the "Report of the Maine Board of Agriculture." This and other writings, including one on "How to Observe and Collect Insects," must have attracted Agassiz's attention, for Packard was sent for,

and to Cambridge he went. For three years he studied natural history, and during 1863–4 he was Agassiz's private assistant. He also studied medicine, and in 1864 was graduated at the Maine Medical College, and in October went with the First Maine Veteran Volunteers to the front, and served with the Sixth Corps in Army of the Potomac until mustered out in July, 1865. Turning to science, he became acting custodian and librarian of the Boston Society of Natural History, which place he relinquished in 1867 to join Putnam, Hyatt, and Morse in Salem. There he was one of the founders of the Peabody Academy of Sciences, and one of its curators, also aiding in the establishment of the American Naturalist, of which he was editor-in-chief until 1886. He founded a summer school of biology in Salem, and was one of the instructors in Agassiz's Science School at Penekese in 1873–4. For eleven years he continued in Salem, but in 1878 he accepted the chair of zoology and geology in Brown University, Providence, where he has since remained. He had, however, previovsly lectured on entomology at the Massachusetts Agricultural College and at Bowdoin College, besides having had charge of the entomology of the United States Geological and Geographical Survey when under Dr. Ferdinand V. Hayden; and during 1871–3 he was State Entomologist of Massachusetts. Dr. Packard was a member of the United States Entomological Commission during its existence in 1877–82, and made for it in the earlier years extensive excursions in the Western and Pacific States and Territories, while in the latter years he contributed largely to the three volumes of its reports. As early as 1863 he proposed a new classification of insects, which has since been generally adopted both in Europe and America. He discovered the morphology and mode of development of the ovipositor and sting of insects, and has studied their external anatomy. His contributions to the natural history of the limulus, including the development and anatomy of the brain and nervous system of crustacea and insects, have received the highest praise. Like his associates, he became a prominent advocate of the evolution theory, accepting the views both of Lamarck and Darwin, but not to the exclusion of either. In the introduction to the Standard Natural History, in 1883, he proposed the term Neo-lamarckism to cover the views of those who, like himself, did not accept all of Darwin's ideas. In this expression he includes the more fundamental factors of organic evolution, as changes of circumstance, reaction against

external stimuli, the effects of use and disuse by which he accounts for the origin of variation, thus affording a foundation for natural selection to act on. In other words, "natural selection is not a *vera causa*, but rather expresses the effects of the co-operation of a number of factors in organic evolution." In this modified theory of evolution he has received the support of some of the best naturalists of Europe, and he has many followers in this country. His latest work is an extended memoir on Cave Animals of North America, which has been issued by the National Academy. He is a member of many scientific societies, both at home and abroad. In 1889 he was chosen one of the eight honorary presidents of the Zoological Congress held in Paris, and was made an honory president of the section of zoology of the French Association for the Advancement of Science; and also the British Association for the Advancement of Science announced his election in 1890 as a corresponding member of that body. In 1872 he was chosen to the National Academy of Sciences in this country. Dr. Packard received the degree of M. D. from the Maine Medical School in 1864; and Ph. D., from Bowdoin College. Entomological editor of Garden and Forest since its foundation. Professor of Zoology in Brown University. In 1887 a list of the entemological writings of Dr. Packard, compiled by Mr. Samuel Henshaw, was published by the Department of Agriculture as Bulletin No. 16 of the Division of Entomology. It embraced 339 titles, many of which were those of large volumes and elaborate treatises. Below are given only those titles which are of economic importance, or which refer in general to insects injurious or beneficial to crops, and are of special intesest to agriculturists. [Portrait: Harper's Weekly, November 29, 1890.] Address: Providence, R. I.

1. Entomological report on the Army-worm and Grain Aphis. Sixth Annual Report Maine Board of Agriculture, 1861, pp. 130-145.
2. Report on the Insects collected on the Penobscot and Alleguash rivers during August and September, 1861. Sixth Annual Report Maine Board of Agriculture, 1861, pp. 373-376.
3. How to observe and collect Insects. Second Annual Report Natural History and Geology of Maine, 1862, pp. 143-219, figures. Separate: Augusta, 1863, pp. 79; figures.
4. Increasing distribution of the Canker-worm. Proceedings Boston Society of Natural History, 1867, Vol xi, p. 88.
5. Are Bees Injurious to Fruit? American Naturalist, 1868, Vol. ii, p. 52.
6. Guide to the study of Insects, and a treatise on those injurious and beneficial to crops. Salem, 1869, pp. 8+702, pl. 1-11; illustrated.

a. 2nd edition, Salem, 1870.
b. 3d edition, Salem, 1872.
c. 4th edition, Salem, 1874.
d. 5th edition, New York, 1876.
e. 6th edition, New York, 1878.
f. 7th edition, New York, 1880.
g. 8th edition, New York, 1884, pp. 8+715, pl. 1+15; illustrated.

7. The borers of certain shade-trees. Amer. Nat., 1870, v. 4, pp. 588-594, figs.
8. New or little known injurious Insects. 17th Ann. Rept. Sec. Mass. Bd. Agric., 1870, pp. 235-263, pl. 1. figs. Separate: 1870, pp. 31, pl. 1, figs. See Amer. Nat., 1871, v. 4, pp. 684-687, pl. 6, figs.
9. Parthenogenesis in Bees. Ann. Bee Cult., 1872.
10. Injurious Insects in Essex County. Bull. Essex Inst., 1872, v. 4, pp. 5-9, figs.
11. Second annual report on the injurious and beneficial Insects of Massachusetts. 19th Ann. Rept. Sec. Mass. Bd. Agric., 1872, pp. 331-347, figs. Separate: Boston: 1872, pp. 19, figs. (See Amer. Nat., 1873, v. 7, p. 241-244, figs.)
12. Third annual report on the injurious and beneficial effects of Insects. 20th Ann. Rept. Sec. Mass. Bd. Agric., 1873, p. 237-265, figs. (Reprinted with corrections in Amer. Nat., 1873, v. 7, p. 524-548, figs.)
13. Life histories of animals, including man, or outlines of comparative embryology. New York, 1876, pp. 243, pl., figs.
14. The migrations of the destructive Locust of the West. Amer. Nat., 1877, v. 11, pp. 22-29.
15. The Hessian-fly, Joint-worm, and Wheat-midge. Ca. Ent., 1877, v. 9, p. 100.
16. Report on the Rocky Mountain Locust and other Insects now injuring or likely to injure field and garden crops in the western states and territories. Report United States Geological Survey for 1875, 1877, pp. 589-810, pls. 62-70, maps 1-5, figures.
17. Half-Hours with Insects. Boston: 1877, pp. 8+384, pl., figures.
18. Insects affecting the Cranberry, with remarks on other injurious Insects. Report United States Geological Survey for 1876, 1878, pp. 521-531, figures.
19. Insects of the West: An account of the Rocky Mountain Locust, the Colorado Potato-beetle, the Canker-worm, Currant Saw-fly, and other Insects which devastate the crops of the country. London, 1878.
20. Parthenogenesis of the Honey-bee. American Naturalist, 1879, Vol. xiii, p. 394.
21. Cotton-worm investigation. American Naturalist, 1879, Vol. xiii, p. 535.
22. The Rocky Mountain Locust in New Mexico. American Naturalist, 1879, Vol. xiii, p. 586.

23. The Hessian Fly, its ravages, habits, enemies, and means of preventing its increase. Bulletin, United States Entomological Commission, No. 4, 1880, pp. 43, pls. 1-2, map, figure. (See American Naturalist, 1880, Vol. xiv, pp. 586-587; American Entomologist, 1880, Vol. 3, pp. 118-121, 140-141, figures.)
24. Second Report of the United States Entomological Commission. Washington, 1880, pp. 18+322+80, pls. 1-17, maps, figures.
25. Insects injurious to Forest and Shade Trees. Bulletin United States Entomological Commission, No. 7, 1881, pp. 275, figures.
26. Note on Forest-tree Insects. Bulletin Div. Ent. United States Department of Agriculture, No. 3, 1883, pp. 24-30.
27. Decay of the Spruce in the Adirondacks and northern New England. Nation, New York, 1883, Vol. xxxvii, p. 525.
28. Report on the Causes of Destruction of Evergreen Forests in northern New England and New York. Report Department Agriculture for 1883 [part of Riley's report as Entomologist], 1883, pp. 138-151, pl. 9, figures.
29. Egg-laying Habits of the Egg Parasite of the Canker-worm. American Naturalist, 1884, Vol. xviii, pp. 292-293.
30. The Larch-worm. American Naturalist, 1884, Vol. v, 18, pp. 293-296, figures.
31. The Hemlock Gelechia. American Naturalist, 1884, Vol. v, 18 p. 296.
32. The Spruce-bud Tortrix. American Naturalist, 1884, Vol. xviii, pp. 424-426, figures.
33. Egg-laying Habits of the Maple-tree borer. American Naturalist, 1884, Vol. xviii, pp. 1151-1152.
34. Second Report on the Causes of the Destruction of the Evergreen and other Forest Trees in northern New England and New York. Report Department Agriculture for 1884, [part of Riley's Report as Entomologist,] 1885, pp. 374-383, figures. Separate: 1885, pp. 12, figures.
35. Third Report on the Causes of Destruction of the Evergreen and other Forest Trees in northern New England. Report Department Agriculture for 1885, [part of Riley's report as Entomologist,] 1886, pp. 319-333, figures.
36. Additions to the Third Report on the Causes of the Destruction of the Evergreen and other Forest Trees in northern New England. Bulletin Div. Ent. United States, Department Agriculture, No. 12, 1886, pp. 17-23.
37. Fourth Report on Insects injurious to Forest and Shade Trees. Bulletin Div. Ent. United States Department Agriculture, No. 13, 1887, pp. 21-32, figures.
38. Value of Honey-bees in Fruit Culture. Western Pomologist, 1871, Vol. ii, pp. 133-134.
39. The Colorado Potato-beetle and Army-worm. The Currant-worm. New England Farmer, 1875, Vol. liv, No. 35, p. 1.
40. The Canker-worm. Scientific Farmer, 1876.

41. Insects injurious to the Maple. Scientific Farmer, 1878.
42. Fifth Report of the United States Entomological Commission. Report on the Insects injurious to Forest and Shade Trees. Washington, 1890, 8v. pp. 1-955.
43. Certain Cone-eating Insects. Garden and Forest, April 25, 1888, p. 100-101.
44. The Red Mite on Verbenas. Garden and Forest, March 7, 1888.
45. Life-history of Calothysanis amaturaria Walk. A geometric moth. Insect Life, iv, August, 1892, pp. 382-384.
46. Occurrence of Bucculatrix canadensisella Chamb. on birches in Rhode Island. Insect Life, V, No. 1, September, 1892, pp. 14-16.

PIKE, N. R. Born in Fayette, December, 8, 1815. Secretary of the Maine State Jersey Cattle Association from its organization to the present time. Address: Winthrop.

1. Herd Book of the Maine State Pure Blood Jersey Cattle Association. Together with Extracts from the Constitution and By-Laws of the Association; also Some Practical Hints on Dairying, Dairy Stock, etc. Vol. I, Augusta, 1876, 8vo. pp. 80. Illustrated.
   Contain: Scale of Points for judging Jerseys adopted by the Royal Jersey Agricultural Society of the Jersey Islands.
2. Herd Book of the Maine State Jersey Cattle Association. Compiled from Official Entries, Vol. II, Portland, 1880, 8vo. pp. 75. Illustrated.
   Contain: History of Jersey Island Cattle.
3. [Same.] Vol. III, Portland, 1883, 8vo. pp. 96.
4. [Same.] Vol. IV, Portland, 1886, 8vo. pp. 137.
5. [Same.] Vol. V, Augusta, 1889, 8vo. pp. 139.
   Contain: Constitution, transfers and list of members.
6. [Same.] Vol. VI, Augusta, 1892, 8vo. pp. 127.

One of the most important sets of agricultural books ever published in Maine, and one of the earliest state or local herd books issued in this country. The "Winthrop Jersey Cattle Association" was organized as a town society March 7, 1870, and a local herd book was kept in manuscript for several years. The Association was incorporated by the Legislature in 1875. The six volumes record a total of 3335 animals—880 bulls, and 2455 cows and heifers. The Association has a membership of 267; the states of Maine, Nebraska, Iowa, Indiana and Vermont, and the Provinces of New Brunswick and Nova Scotia being represented. The Society has done a great work for the Jersey cattle interests of Maine, and the Association and its herd books are a monument to the fidelity and integrity of its veteran secretary.

POOR, JOHN A.

1. Maine as a Field for Immigration. A Memorial of the European and North American Railway Company, and for a State Policy favorable to Immigration and the Encouragement of Manufactures. Augusta, 1861, 8vo, pp. 52.

Contains important facts relating to Maine Agriculture.

PROCEEDINGS of the meeting of Stockholders of the Presumpscot Park Association, holden January 22, 1876. With the charter prefixed. Portland, 1876, 8vo., pp. 27.

REPORTS of the Secretary and Treasurer of the Maine State Agricultural Society for the year 1868, with the address of His Excellency, J. L. Chamberlain, Reports of Discussions, &c. Augusta, 1869, 8vo., pp. 47.

RUSSELL, FREMONT L, V. S. Graduated at Maine State College in class of 1885; Inspector of Live Stock, Vanceboro; Veterinarian to the Maine State College Experiment Station. Address: Orono.

1. Report as Veterinarian. Report Maine State College Experiment Station, 1889, p. 257–266. Contains: essays on hog cholera, and parturient apoplexy.
2. Report on Tuberculosis. Report Maine State College Experiment Station, 1890, p. 59–64.

SAWYER, GEORGE B. Secretary of the Maine State Pomological Society, 1873 to 1884, and editor of its volumes of Transactions for that period. Address: Wiscasset.

SCRIBNER, FRANK LAMSON. Born in Salem, Mass, in 1851. His father died when he was three years old and very soon after he was adopted by a family, whose name he bears, living near Augusta, Me. Living on a farm, where work was the order of the day, he had little time for intellectual pursuits, but, happily, the mother of his adoption encouraged and fostered his inclination to study, and to her christian guidance he claims to owe all that he has ever accomplished. At the age of fifteen he began to interest himself in botany, analysing his first flower—the trailing arbutus—April 19, 1866, and from that time until his connection with the Department of Agriculture, in 1885, the greater share of his leisure moments was devoted to this, his favorite pursuit. His first botanical collections, made in 1866–'7 were acquired by Bowdoin College. At the age of eighteen, while yet on the farm, he prepared a treatise on the "Weeds of Maine" an illustrated paper of 62 pages., written for the State Board of Agriculture and published separately in pamphlet form. In 1874 he prepared for the same report, a similar paper on the "Ornamental and Useful Plants of Maine," published separately, making a pamphlet of 85 pages. After spending a term at Hebron Academy, another at Kent's Hill

and two terms at the Waterville Classical Institution, he entered the State College of Agriculture and the Mechanic Arts, at Orono, in the spring of 1870, from which institution he graduated in 1873, receiving the degree of B. S. While at Orono he spent much time in collecting plants for the college. During vacations he taught schools to assist in defraying college expenses. After leaving college he continued to teach, and was for some time connected with the works of the Government Fish Commission, located at Bucksport and at Grand Lake stream. In the summer of 1876 he taught botany to private classes, chiefly teachers in the public schools in Bangor, Me. In the same year he conducted the classes in botany in the Bowdoin college Summer School of Science. In January, 1877, Mr. Scribner went to Girard college, Philadelphia, as an officer of discipline, where he remained eight years. Soon after coming to Philadelphia, he was elected a member of the Academy of Natural Sciences of Philadelphia and for a number of years served as recording secretary of the Botanical Section of the Society. Such time as he could now command, he began to devote to the study of grasses and soon became one of the recognized authorities in this difficult but important order of plants. One of his first published papers on this subject "A list of the Grasses collected by Mr. C. G. Pringle in Arizona and California," which appeared in the Bulletin of the Torrey Botanical Club, brought him prominently before the botanists of the country and indicated his ability in discriminating forms and care in looking up authorities. It also led to his recognition abroad and brought him into correspondence with foreign botanists. He has since been honored by having a new genus of grasses—Scribneria—dedicated to him by the celebrated Austrian botanist, Prof. E. Hackel. Since the publication of the paper just referred to, he has been a frequent contributor to our leading botanical journals and has published descriptions of many new species of plants which he has often illustrated with his own hands. "A Revision of the North American species of the genus Melicae" is the title of one of Mr. Scribner's more important scientific papers, which was communicated to the Academy of Natural Sciences of Philadelphia and published in their proceedings. His second, and only other published communication to this society was an illustrated paper entitled "Observations on the genus Cinna, with descriptions of a new Species." In the summer of 1883, he was connected with the

Northern Transcontinental Survey, in the department of Economic Botany, and spent several months in Central Montana, making general collections, but paying special attention to the forage plants in order to determine their general prevalence and the actual or probable values of the several species for pasturage or for hay. The result of these observations was given in an illustrated paper entitled "Agricultural Grasses of Central Montana," read before the society for the promotion of agricultural science, and published in their proceedings for 1883. Two years later, he presented to the same Society a similar paper on the Grasses of Arizona. In 1883-'4 he prepared two long chapters for the American Supplement to the Encycl. Brit. published in Philadelphia, one on "Cereals" under agriculture; the other under Forage Plants, on the "Grasses of the United States." He made "A Contribution to the Flora of Kansas—Gramineae" illustrated by three plates and published in the proceedings of the Kansas Academy of Sciences, for 1885. In May, 1885, Mr. Scribner was appointed Assistant Botanist in the United States Department of Agriculture, and in July, 1886, he was made special agent to have charge of the Mycological Section of the Botanical Division—a section devoted to the study of the diseases of plants, a new branch of work in the Department. A year later he was appointed Chief of the Section of Vegetable Pathology, in continuance of his former duties, but then officially recognized by Congress. As assistant botanist, Mr. Scribner made a report on the "Fungus Diseases of Plants," which was published in the annual report of the Department for 1885. In December, 1886, his report on the "Fungus Diseases of the Grape Vine" appeared as a Special Bulletin. His report as Mycologist, published in the Annual Report of the Department for 1886, embraced a discussion of a number of fungus diseases of plants and their remedies. A number of papers relating to subjects connected with his official duties have appeared from time to time in various scientific and horticultural publications. One on "Greeneria fuliginea, a new disease of the Grape," was published conjointly with M. P. Viala of the National School of Agriculture, at Montpelier, France, in "Comptes Rendus," September 12, 1887. Mr. Scribner is a member of the Academy of Natural Sciences of Philadelphia; American Association for the Advancement of Science; a Fellow of the American Association for the Advancement of Science; a corresponding member of the Buffalo Academy of Science; of the

Torrey Botanical Club; of the New Jersey State Horticultural Society, and the Pennsylvania State Horticultural Society. In January, 1889, the Croix de Chevalier du Merite Agricole, was conferred upon him by the French Minister of Agriculture for his services to the French Government in matters pertaining to viticulture and the diseases of the vine. Mr. Scribner is Director of the Agricultural Experiment Station of the University of Knoxville, Tennessee. His collection of grasses which numbers nearly five thousand specimens embracing nearly all the known North American specimens, is one of the largest private collections in the country. [Portrait: Frontspiece to his work on Fungous Diseases. Little Silver, N. J., 1890.]

1. The Weeds of Maine. Augusta, Me., 1869, 8vo, pp. 62. Illustrated.
2. The Ornamental and Useful Plants of Maine. Part I, Augusta, Me., 1874, 8vo, pp. 85. Illustrated. [Part II was never published.]
3. A List of Grasses Collected by Mr. C. G. Pringle in Arizona and California, during the summer of 1881, with descriptions of those species not already described in American publications. Bulletin Torrey Botanical Club, 1882-1883.
4. New North American Grasses. Bulletin Torrey Botanical Club, 1884.
5. Observations on the Genus Cinna, with description of a New Species. Illustrated. Proceedings Academy Natural Science. Philadelphia, 1884.
6. A List of the Grasses from Washington Territory. Bulletin Torrey Botanical Club, 1883. Illustrated.
7. Agricultural Grasses of Central Montana. Proc. Socy. Prom. Agri. Sci., 1883, 12 pp., illustrated.
8. Agricultural Grasses of Arizona. Proc. Soc. Prom. Agr. Sci., 1886, 5 pp.
9. A Revision of the North American Melicae. Proceedings Academy Natural Science, Philadelphia, 1885, 10 pp. [With one plate.]
10. A Contribution to the Flora of Kansas—Gramineæ. Proceedings Kansas Academy of Sciences, 1885, 5 pp., 3 plates.
11. Grasses of Yellowstone National Park, I. Botanical Gazette, 1886, 9 pp.
12. Notes on a Hybrid Grass. Botanical Gazette, 1884, 2 pp. [With [figures.
13. A New Erioehloa. By Vasey & Scribner. Botanical Gazette, 1884. [With one plate.]
14. Arizona Plants. Botanical Gazette, 1885.
15. Some Aretic Grasses. [With plate.] Botanical Gazette, 1886.
16. Notes on Andropogon. Botanical Gazette, Vol. XIII.
17. List of North American Andropogoneæ. Bulletin Torrey Botanical Club, Vol. XVI, 9 pp.

18. New or Little Known Grasses. I. (Four species described and figured.) Bulletin Torrey Botanical Club, 1888.
19. New or Little Known Grasses. II. Bulletin Torrey Botanical Club, Vol. XVII, 10 pp. [With four plates.]
20. The Grasses of Roane Mountain. Botanical Gazette, Vol. XIV. Illustrated.
21. Mexican Grasses. Proc. Acad. Nat. Sci. Phila. 1891, 18 pp. [With one plate.]
22. Grasses of Mountain Meadows and Deer Parks. Proc. Soc. Prom. Agr. Science, 1889. (Reprinted with illustrations in Bulletin Tennessee Agricultural Experiment Station.)
23. Index to Grass Names. Proc. Soc. Prom. Agr. Sci. pp. 18, 1890.
24. The Grasses of Tennessee. Part I. Bulletin Tennessee Agricultural Experiment Station, Vol. V, No. 2. Illustrated.
25. Mt. Kataadn and its Flora. Botanical Gazette, 1892, 8 pp.
26. Weeds of the Farm. Bulletin Tennessee Agricultural Experiment Station, Vol. I, No. 3.
27. The True Grasses. By E. Hackel, translated from *die Naturlichen Pflanzen familien*, by F. Lamson Scribner and Effie A. Southworth, 8vo. pp. 227. New York, 1890.
28. Fungous Diseases of the Grape and other Plants, and their Treatment. 12 mo. pp. 136. Illustrated. Little Silver, N. J., 1890.
29. Report on the Fungous Diseases of the Grape Vine. Bulletin No. 2, Botanical Division United States Department Agriculture 1886, pp. 136. [With seven plates.]
30. Black Rot. *Physalospora Bidwellii*. Proc. 7th Annual Meeting Socy. Prom. Agr. Sci. 1886, pp. 7.
31. Botanical Characters of Black-rot. *Physalospora Bidwellii* Sacc. Botanical Gazette, Vol. XI, pp. 5. [With one plate.]
32. New Observations on the Fungus of Black Rot of Grapes. Proc. 9th Ann. Meeting Soc'y Prom. Agr. Sci., 1888.
33. Successful Treatment of Black Rot. (The Same.)
34. Report on the Extent, Severity and Treatment of Black Rot and Brown-rot in Northern Ohio, in 1889. Bulletin No. 11, Botanical Division, United States Department Agriculture, 1890, pp. 76-83.
35. Black-Rot. Scribner and Viala. Bulletin 7, Botanical Division, United States Department Agriculture, 1888, pp. 29. [With one plate.]
36. Report on the Experiments made in 1887 in the Treatment of the Downy Mildew and Black-rot of the Grape-vine. Bulletin No. 5, Botanical Division, United States Department Agriculture, 1888, pp. 110. Illustrated.
37. Report on Experiments made in 1888 in the Treatment of the Downy Mildew and Black-rot of the Grape-vine. Bulletin No. 10 of the Botanical Division, United States Department of Agriculture, 1889, pp. 6.

38. On a New Fungus Disease of the Vine, *Greeneria fuliginea*. Scribner and Viala. Proceedings Eighth Annual Meeting Society Prom. Agricultural Science, 1887.
39. Fungicides. Circular No. 5 of the Section of Vegetable Pathology, United States Department of Agriculture, 1887.
40. Notes on Orange Leaf-scab. Bulletin Torrey Botanical Club, October, 1886.
41. Fungus Diseases of the Vine and their Remedies. Proceedings New Jersey State Horticultural Society, 1886.
42. Observations the Past Season on Grape-rot and Mildew. Proceedings New Jersey State Horticultural Society, 1887.
43. Fungous Diseases of Plants. An address delivered before the East Tennessee Farmers' Convention at the 16th annual meeting, 1891.
44. In Annual Reports of United States Department of Agriculture:

1885. Report as Assistant Botanist on the Fungous Diseases of Plants, 10 pp.

1886. Report as Special Agent in charge of the Mycological Section, 31 pp., 8 plates, 3 maps.

1887. Report as Chief of the Section of Vegetable Pathology, 74 pp., 17 plates.

In American Supplement to The Encyclopaedia Britannica:

1. Article on "Cereals."
2. Article on "Grasses."

In addition to the above, contributions to horticultural and agricultural papers may be noted; especially to Colman's Rural World, Maine Farmer, The Home Farm, and Orchard and Garden. In the last named paper appeared a series of illustrated articles on the fungous diseases of plants.

"In many departments of botany Prof. Scribner is one of the leading authorities, but his great specialty is the grasses and foreign plants, in which he easily stands foremost and of which his knowledge is greater than that of any other man in this country today. Collections are sent to him from botanists in all parts of the country for classification and name. Fungus diseases of plants have also received a great deal of attention and study from him, and he will be remembered as the first in this country to recommend and use the Bordeaux mixture and other sulphate of copper compounds in their treatment, especially his successful treatment of black rot with these preparations."—Orchard and Garden, August, 1890, p. 149.

SHALER, NATHANIEL SOUTHGATE.

1. The Geology of Mount Desert. Eighth Annual Report of the United States Geological Survey, Washington, 1889. Part Second. Quarto p. 987-1063. [With two geological maps in colors, eleven full page plates and twenty-three illustrations in the text.]

SPRINGER, JOHN S.

1. Forest Life and Forest Trees. Comprising Winter Camp-life among the Loggers, and Wild-wood Adventure, With Descriptions of Lumbering Operations on the Various Rivers of Maine and New Brunswick. Illustrated. New York: 1956, 12mo, pp. 259.

Many of the illustrations in this volume are the same as those used in Jackson's reports on the geology of Maine, and are from the same plates.

BETA CHAPTER HOUSE. WATER TOWER. WINGATE HALL. LABORATORY.
OAK HALL. COBURN HALL.

CAMPUS OF MAINE STATE COLLEGE: LOOKING NORTH FROM PRESIDENT'S HOUSE.

STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS. The annual reports of the trustees, officers and faculty of the Maine State College, form a series from 1886 to the present time, issued annually. The several numbers contain the usual reports of the President of the Board of Trustees, treasurer, and heads of the various departments of instruction. They also embrace a summary of the meteorological observations for each year and the annual catalogue, thus forming a complete history of the institution and marking its successive stages of growth and development. In the notes given below only the more important contents of the reports are referred to, and no reference whatever is made of the catalogues and scheme of the different courses of study which accompany each annual report. Located at Orono.

1866: [No title page.] pp. 31. Contains:

Report of the Architect, Fred Law Olmstead.

1867: [No title page.] pp. 12.

1868: [Title page used for first time.] pp. 20.

1869: pp. 32. Register of Meteorolgical Observations, with tables, first appears in this report.

1870: pp. 40.

1871: pp. 36.

1872. pp, 44

1873: pp. 60.

1874: pp. 68.

1875: pp. 60. This report contains the first frontispiece ever used. It gives a view of the campus, with the Dormitory, Boarding House, White Hall and Laboratory.

1876: pp. 76. Contains:

Report of Experiments in Feeding Cooked and Raw Food to Swine, p. 35–40.

1877: pp. 79. Contains:

Reports of pig-feeding experiments, p. 30–34.

1878: pp. 87. Contains:

Report of pig-feeding experiments, p. 39–43.

1879: pp. 103.

1880: pp. 96.

1881: pp. 100. Contains: Laws relating to the College, p. 49-56.

1882: pp. 143. Contains:

Microscopic examination and Determination of the Building Stones of Maine. By G. P. Merrill, M. S., p. 89-100.

Field experiments with Artificial Manures, p. 71-74.

Fish Scraps as Food for Domestic Animals, p. 75-78.

1883: pp. 208. Contains:

Artificial Digestion, and the Estimation of Protein Compounds by Stutzer's Method. By J. M. Bartlett, B. S., p. 25-29.

Experiments on the Feeding Values of Early and Late Cut Hay, p. 40-44.

The Butterflies of Maine By C. H. Fernald, A. M. [Appendix.] p. 1-106.

1884: pp. 140. Contains:

[Appendix.] Laws Pertaining to the College, p. 3-10.

Notes on the Character of the Rock Formations in the vicinity of Auburn, Maine. By G. P. Merrill, M. S., p. 11-13.

The Precipation of Casein. By H. L. Merrill, p. 14-15.

On the Volumetric Determination of Fixed Fatty Acids in Butter and Other Fats. By H. W. Powers, p. 16-17.

1885: pp. 175, contains:

Experiment in Beef Production, p. 31-36.

The Sphingidæ of New England. By C. H. Fernald, A. M., [Appendix.] pp. 89-175. [With six plates.]

1886: pp. 118. Has a new plate as a frontispiece, giving a view of Brick Hall and Boarding House; White Hall; Chemical Laboratory, and Work Shop. Contains a reference to the $100,000 endowment of the College from the late Ex-Governor Abner Coburn.

1887: pp. 98. Has new plate: View of Coburn Hall.

1888: pp. 126 Contains:

Dedication of Coburn Hall.

Bulletin of the Maine State College Laboratory of Natural History. Vol. I, No. 1.

A Catalogue of the Minerals and Rocks in the Museum.

1889: pp. 100.

1890: pp. 185. Has plate: "Design for Engineering Building." Contains:

The Land Mammals of New England. A Thesis for an Advanced Degree. By Alice A. Hicks, B. S., (Mrs. George F. Black,) '87. Portland. With five full page plates.

1891: pp. 107. Embraces eleven beautiful plates of views of the grounds, buildings, interiors, etc., and a map of college campus.

1892: pp. 155. With ten new plates of buildings, view of campus and interiors. Contains Law of Congress of 1890 relating to the more complete endowment and support of agricultural colleges.

Report of the Evidence and Conclusions of the Committee to Investigate the Sale of the Agricultural College Script. Made to the Fifty-Ffth Legislature. Augusta, 1876, 8vo, pp. 130.

Report of the Joint Special Committee to Investigate the Cause of the Outbreak of Disease among the Cattle at the State College Farm, the Loss and Disposal of Cattle Therefrom, and the Doings and Correspondence of the Commissioners on Contagious Diseases among Cattle in Relation to the Same. Together with the Testimony taken Before the Committee. Augusta, 1887, 8vo. pp. 257.

Dedication of Coburn Hall, June 26, 1888. Augusta, 1888, 8vo, pp. 71.

Contains Ode by Mrs. M. C. Fernald; Address of Welcome by President M. C. Fernald; Historical Address by Hon. Lyndon Oak; record of

all officers of the College and members of the Faculty; report of building committee, and speeches by Prof. F. L. Harvey, Hon. Samuel Libbey, Hon. Herbert M. Heath and Dr. John T. Cushing.

Bulletin of the Maine State College Laboratory of Natural History. Vol. I; No. 1. A Catalogue of the Minerals and Rocks in the Museum. Augusta, 1888, 8vo, pp. 28.

Circular of Information. Orono, 1892. Oblong, pp. 32. [With thirty plates and engravings.]

Annual Catalogues, 1868-1892.

Souvenir of the Twentieth Annual Commencement, June 20-26, 1891. By Edward H. Kelley, '90. Contains plates, views, Historical Reminiscences, Fraternity Directory, etc.

College journals have been the College Reporter, 1875, published for a few years; The Cadet, 1886 to 1892, and occasional annual numbers of The Pendulum.

STONE, GEORGE H., A. B., A. M. Born in Colamer, Onondaga County, N. Y., Nov. 22, 1841. Graduated at Wesleyan University, Middletown, Conn., 1868. Professor of Mathematics, Genesee Wesleyan Seminary, Lima, N. Y., 1869-'72. Professor of Natural Science, Maine Wesleyan Seminary and Female College, Kent's Hill, 1874-'81. Professor of Geology, Colorado College, Colorado Springs, Col., 1881-'89. Mining Expert, Colorado Springs, Col. In addition to the works enumerated below Prof. Stone has prepared a report on "The Glacial Gravels of Maine and their Associated Deposits," making eleven hundred large manuscript pages, accompanied with maps and engravings which is soon to be published by the United States Geological Survey. It is a general review of the glacial geology of Maine, the origin of its soils, etc. In a letter to the author under date of March 22, 1893, Prof. Stone says: "My studies in the mountains during the last four years have quite revolutionized my views as to matters of interpretation." Address: Colorado Springs, Colorado.

1. The Kames of Maine. [From Proceedings of the Boston Society of Natural History. Vol. XX, March 3, 1880, pp. 430-469.] 8vo, pp. 430-469. The pamphlet is published in separate form and paged continuously.
2. Geology and Paleontology. Note on the Androscoggin Glaciers. [From the American Naturalist, April 1880.] 8vo, pp. 244-262.
3. The Kames or Eskers of Maine. [From the Proceedings of the American Association for the Advancement of Science, Vol. 29. Boston Meeting, August, 1880.] 8vo pp. 510-514. [With a map.]

4. Lecture upon Glacial Deposits in Eastern North America. 1881. See Portland Natural Hist. Soc. Proc. Glacial Erosion in Maine. Portland Natural Hist. Soc. Proc., Nov. 21, 1881, pp. 11.
5. The Kame Rivers of Maine. From the Proceedings of the American Association for the Advancement of Science, Vol. 32. Minneapolis Meeting, August, 1883. Salem, Mass., 1884, 8vo, pp. 234-237.
6. Local Deflections of the Drift Scratches in Maine. American Journal of Science, 130-146. 1885.
7. Terminal Moraines in Maine. [From the American Journal of Science, Vol. 33, May, 1887. 8vo, pp. 378-385.]
8. Classification of the Glacial Sediments of Maine. American Journal of Science, 40-122. 1890.
9. The same. New Haven, 1890, 8vo, pp. (1), 122-124.

"Prof. Stone, by devoting the time of his vacation for three years to an examination of those peculiar formations of our surface geology known as 'horsebacks', which he mapped out for the Boston Society of Natural History, has done more for the interpretation of geological science in our State, than has been done by the work of both our State surveys put together."—The Home Farm, August 14,1884.

STURTEVANT, EDWARD LEWIS. Born in Boston, Mass., January 23, 1842. Moved to Maine, "on the old hill in Winthrop," in the "fifties." Entered Bowdoin College in the class of 1863. Enlisted in the Twenty-fourth Maine Regiment in 1862. Was with the 19th Army Corps, on the lower Mississippi and at the seige of Port Hudson. Was First Lieutenant and Captain, and also attached to the staff of Gen. Nickerson, 3d Brigade, 2d Division, with the rank of Captain. Received the degrees of B. A., and M. A., from Bowdoin College. Graduated at Harvard Medical School, 1866. Proprietor (with his brother) of Waushakum Farm, South Framingham, Mass.,—a farm famous for its herd of Ayrshires, seed-corn and experimental work—from 1860 to 1882. Editor of The Scientific Farmer, (in conjunction with E. H. Libby), from February, 1876, to April, 1878; and sole editor of the same journal from May, 1878, to October, 1879. Director New York Agricultural Experiment Station, Geneva, 1882–'87. Fellow of the American Association for the Advancement of Science. Formed one of the largest and finest private libraries on subjects pertaining to agriculture, horticulture and botany ever collected, which was presented to the Missouri Botanic Garden, St. Louis, Mo., in 1892. Author of an "Agricultural Bibliography," the manuscript of which was presented to the library of the Massachusetts Agricultural College, Amherst, Mass. Address: South Framingham, Mass.

1. The Dairy Cow. A Monograph on the Ayrshire Breed of Cattle. With an Appendix on Ayrshire, Jersey and Dutch Milks; Their Formation and Peculiarities. Boston, 1875, 12 mo., pp. 252. Illustrated.

The authorship of this work was in conjunction with his brother, Joseph N. Sturtevant.

2. Editor of Reports of the New York Agricultural Experiment Station, 1882-'87, 6 vols. Contents:

First Report, 1882. Organization of Station work; experiments with wheat, barley and oats; studies on Maize; experiments with Potatoes; Forage Crops.

Second Report, 1883. Botanical Notes; Studies on Maize; Station grown Seeds; Weight of Seeds; Relations of Feed to Milk; Experiments with Potatoes; Experiments with Corn; Experiments with Grasses.

Third Report, 1884. Feeding Experiments and Milk Analysis; Study of Milk; Experiments with Potatoes; Wheat Improvement; Experiments with Corn; Germinations of Seeds; Study of Maize, including Sweet, Pop and Dent Corn.

Fourth Report, 1885. Starch Waste as Cattle Foods; Ensilage and Forage Crops; Studies on Corn; Fertilizers on Potatoes; Tests on Germination of Maize and other Seeds; The Sweet Corns.

Fifth Report, 1886. Cattle Feeding Experiments; Temperature and Crops; Vitality of Seeds as Influenced by Age; Experiments with Cabbage; Studies of Indian Corn.

Sixth Report, 1887. Feeding for Beef; Experiments with Potatoes; Seed Germinations.

3. Physiological Considerations concerning Feeding for Butter and Cheese. Hartford, Conn., 1874, 8vo, pp. 67.
4. The Wild White Cattle of Scotland, or White Forest Breed. [Reprinted from American Naturalist, Vol. 8, 1874, pp. 135-145.] pp.11.
5. Milk: Its Typical Relations. A Lecture before the Vermont Dairymen's Association, January 21, 1874. South Framingham Mass., 1874, 8vo, pp. 20.
6. Chemical Corn Growing. [Reprinted from Transactions South Middlesex Agricultural Society.] Framingham, Mass., 1875, 8vo, pp. 32.
7. The Law of Inheritance; or The Philosophy of Breeding. Boston, 1875, 8vo, pp. 48.
8. Plant Food and Agriculture. Hartford, Conn., 1876, 8vo, pp. 14.
9. Intercultural Tillage. Hartford, Conn., 1877, 8vo, pp. 42.
10. Indian Corn. Albany, N. Y., 1880, 8vo, pp. 31.
11. Some Thoughts and Facts Concerning the Food of Man. [Reprinted from the Report of the Connecticut Board of Agriculture, 1880.] Pages 114-155.
12. Thoughts on Agricultural Education. Hartford, Conn., 1881, 8vo, pp. 19.

13. Agriculture of Massachusetts. A Report prepared for the Massachusetts State Commission to the Centennial Exposition, 1876. Boston, 1876.
14. The Growing of Corn. [From the 28th Annual Report of the Secretary of the State Board of Agriculture.] Boston, 1881, 8vo, pp. 77-130.
15. Maize. An Attempt at Classification. [Printed for private distribution only.] Rochester, N. Y., 1884, 8vo, pp. 9.
16. The Dairy Cow—What She Is, and whence She Came. Report Maine Board of Agriculture, 1875, p. 112-125.
17. American Agricultural Literature. Proceedings of Fifth Annual Session of National Agricultural Congress, Philadelphia, 1876.
18. Milk: Physiological and Miscellaneous. Trans. N. Y. State Agricultural Society. Vol. 32, Albany, N. Y., 1878, p. 91-124. [With three plates.]
19. Seed Breeding. Agriculture of Connecticut, 1878, p. 149-187. [Reprinted in Monthly Journal of Science, August, 1879.]
20. Seed Corn. Report Maine Board of Agriculture, 1878, p. 30-47.
21. Fertility. Journal of American Agricultural Association, Vol. I.
22. Seedless Fruits. Trans. Mass. Hort. Society, 1880, p. 133-161.
23. Relation between Seeding and Quality in Certain Vegetables and Fruits. Proceedings Society for the Promotion of Agricultural Science, Vol. I, 1883, p. 40-49.
24. Different Modes of Cutting Potatoes for Planting. Proceedings of Society for the Promotion of Agricultural Science, Vol. I, 1883, p. 77-78.
25. Dairying vs. Thoroughbred Bulls. Transactions Vermont Dairymen's Association, 1876, p. 60.
26. Philosophy of Dairying. Transactions American Dairymen's Association, 1876, p. 90.
27. Why the Ayrshire Cow Should be the Dairymen's Choice. Transactions Vermont Dairymen's Association, 1872, p. 150-159.
28. Fertilizer Laws. Agriculture of Pennsylvania, 1877, p. 108.
29. Cost of a Crop of Corn to the Massachusetts Farmer. Agriculture of Massachusetts, 1872-'3, part II, p. 80-89.
30. Ayrshire Points. Ohio Agricultural Report, 1872, p. 261-270

Reprinted in Mark Lane Express, London, England, February 3, 1873; in Farmer's Magazine, London, May, 1873, p. 230, and in North British Agriculturist, Edinburgh, Scotland, July 16, 1873.

31. Hungarian Grass. Trans. New York State Agricultural Society-Vol. 33, 1884, p. 208-220.
32. Experiment Stations. Trans. New York State Agricultural Society. Vol. 33, 1884, p. 235-243.
33. Experimental Observations on the Potato. Trans. New York State Agricultural Society. Vol. 33, 1884, p. 261-265.
34. Lysimeter Records. Proceedings American Association for the Advancement of Science, 1881.

35. The Need of a Better Seed Supply. Trans. New York State Agricultural Society, Vol. 33, 1884, p. 286-289.
36. Corn Culture at Waushakum Farm. Transactions New York State Agricultural Society, Vol. 32, 1878, p. 170-176.
37. The Claims of the Ayrshire Cow upon the Dairy Farmer. Transactions New York State Agricultural Society, Vol. 32, 1878, p. 266-279.
38. Ensilage Experiments in '884 and 1885 at the New York State Agricultural Experiment Station. Transactions New York State Agricultural Society, Vol. 34, 1889, p. 116-129.
39. Forage Crops: Maize and Sorghum. Transactions New York State Agricultural Society, Vol. 34, 1889, p. 135-143.
40. Agricultural Botany. Transactions New York State Agricultural Society, Vol. 34, 1889, p. 335-338.
41. Morphology of Milk. Agriculture of Massachusetts, 1872-'4, p. 374-388.
42. Deerfoot Farm Centrifugal Dairy. Report Department of Agriculture, Washington, D. C., 1880, p. 629-651. [With three plates.] Reprinted in Journal of the Royal Agricultural Society of England. Second Series, Vol. 18, 1882, p. 475-495.
43. Conditions Necessary to Success in Dairying. Report New York State Dairymen's Association, 1883.
44. The Feeding of Spoiled Brewers' Grains. Report New York State Dairymen's Association, 1884.
45. Agricultural Botany. Proceedings Society for Promotion of Agricultural Science, Vol. 2, 1885, p. 9-15.
46. Cultivated Food Plants. Proceedings Society for the Promotion of Agricultural Science, Vol. 2, 1835. p. 59-72.
47. An Observation of the Hybridization and Cross-breeding of Plants. Proceedings of American Association for the Advancement of Science. 1885.
48. Germination Studies. Proceedings of American Association for the Advancement of Science. 1885.
49. Influence of Insulation upon Vegetation. Proceedings of American Association for the Advancement of Science. 1884.
50. Horticultural Botany. Proceedings of Western New York Horticultural Society, 1886.
51. Indian Corn. Transactions New York State Agricultural Society, 1879, p. 37-74.
52. History of Indian Corn. Sibley's Grain and Farm Seeds Annual, 1883.
53. Notes on the History of the Strawberry. Transactions Massachusetts Horticultural Society, 1888, p. 191-204.
54. Edible Plants of the World. Agricultural Science, Vol. 3, No. 7.
55. The Tomato. Report Maryland Experiment Station, 1889, p. 18.
56. Concerning Some Names for Cucurbitæ. Bulletin Torrey Botanical Club, October 1891.

57. The Dandelion and the Lettuce. Proceedings Society for the Promotion of Agricultural Science, Vol. 3, 1886, p. 40-44.
58. A Study in Agricultural Botany. Proceedings Society for the Promotion of Agricultural Science, Vol. 4, 1886, p. 68-73.
59. Atavism the Result of Cross-breeding in Lettuce. Proceedings of Society for the Promotion of Agricultural Science, Vol. 4, 1886, p. 73-74.
60. History of the Currant. Proceedings Western New York Horticultural Society, 1887.
61. Capsicum pasciculatum. Bulletin Torrey Botanical Club, May, 1888.
62. Capsicum umbillicatum. Bulletin Torrey Botanical Club, April, 1888.
63. Seedless Fruits. Memoirs Torrey Botanical Club, Vol. I, part 4.
64. Huckleberries and Blueberries. Transactions Massachusetts Horticultural Society, 1890, p. 17-38.

What is the Ayrshire Cow. Country Gentleman, Albany, N. Y., Sept. 18, 1873; Live Stock Journal, Buffalo, N. Y., Oct., 1873.

Dairy Cattle. Country Gentleman, Oct. 30; Nov. 6; Nov. 13; Nov. 20, 1873.

Adulteration of Milk. An Address. Massachusetts Ploughman, Boston, March 7, 1874.

Adaptation in Farming. An Address. Massachusetts Ploughman, April 4, 1874.

The Points of Ayrshires. An Open Letter. Country Gentleman, Dec. 16, 1875.

Sex in Breeding. Scientific Farmer, Aug., Sept., Oct., 1876.

A New Theory of Tillage. Scientific Farmer, Jan. 1877.

Epizootic Abortion. Scientific Farmer, May, 1877.

Agricultural Plant Feeding. An Address. American Cultivator, October 5, 1878.

Fertilizers on Brains. Land and Home, Feb. 5, 1880.

Milk. National Live Stock Journal, July, August, September, October November, 1880.

Concerning Sex. National Live Stock Journal, February, March, 1881.

Thoroughbred Seed. Indiana Farmer, Dec. 25, 1880.

Thoughts on Breeding. National Live Stock Journal, April, June, 1881.

Lowest Germination of Maize. Botanical Gazette, April, 1885.

Glimpses of Old Herbals. American Garden, May, 1891.

Seed Germination. A Study. Agricultural Science, February, 1887.

Acid Food. National Live Stock Journal, January, 1889.

Sweet Corn. Rural New Yorker, July 12, 8881. Illustrated.

Evaporation. New England Farmer, May 20, 1882.

CONTRIBUTIONS TO AMERICAN NATURALIST. Agricultural Botany. Illustrated. Vol. 18, 1884, p. 573-577.

Indian Corn and the Indian. Vol. 19, 1885, p. 225-234.

Kitchen Garden Esculents of American Origin. Vol. 19, 1885, p. 444-457; 542-553; 658-669.

A Study of the Dandelion. Illustrated. Vol. 20, 1886, p. 5-9; A Study of Garden Lettuce, p. 230-233; History of Celery, p. 599-606.

History of Garden Vegetables. Vol. 21, p. 49-59; 125-133; 321-333; 433-444; 701-712; 826-833; 903-912; 975-985. Vol. 22, p. 420-433; 802-808; 979-987. Vol. 24, p. 30-48; 143-157; 629-646; 719-744.

An important series of articles on the history of our cultivated garden vegetables, arranged alphabetically, but unfortunately terminating at "Gourd." Remarkable for its careful descriptions, synonymy, and voluminous references to the old herbals and the entire range of gardening literature ancient and modern, American and foreign.

In his report on the presentation of Dr. Sturtevant's library to the Missouri Botanic Garden, Dr. William Trelease, Director of the Garden, in his Fourth Report, [1893, p. 14-15], says: "The library is undoubtedly the most complete and valuable American collection of pre-Linnæan botanical books, and represents the expenditure of a great amount of time and money on Dr. Sturtevant's part, since he has for many years been interested in bringing together the early literature of the science of botany, especially in its application to economic plants. * * * It will be kept in a separate alcove, to be known as the 'E. Lewis Sturtevant Library of pre-Linnæan Botany.' A catalogue of its contents will be published in order that students of botany may know where a collection of books of this character can be consulted."

THOMPSON, JOHN WALLACE. Born in Turner, February 4, 1844. Enlisted in band of Fifth Maine Regiment at 17 years of age in 1861, and was mustered out in 1862 by the law discharging regimental bands. Enlisted again in 32d Maine Regiment, in March, 1864, and served till close of the Rebellion. Address: Canton.

1. Sketches, Historical and Descriptive, of Noted Maine Horses, Past and Present, their Ancestors and Descendants. Portland, 1874, 12 mo. pp. 228. Illustrated.
2. Sketches of Noted Maine Horses. Vol. II. Canton, 1887, 12 mo. pp. 348. Illustrated.

   The most important works ever published on the horse breeding interests of Maine. Volume I contains historical sketches of the Messenger, Morgan, Drew, Eaton, Rising Sun, Flying Eaton, Brandywine, Knox, Black Hawk, Morrill, Hampton, Patchen, Cadmus, Annfield, Fearnaught and Hambletonian families of horses in Maine; and pedigrees of 1061 horses. Volume II contains historical sketches of the Brandywines; Drew Horse, 114; Eaton Horse, 122; Gen. Knox, 140; Rising Sun, 429; Winthrop Morrill, 373; biographical sketches of the drivers, Edwin D. Bither and James Dustin, and pedigrees of 1711 horses.
3. The Maine Horse Breeders' Monthly.

A full set of this valuable magazine comprises thirteen volumes and three numbers, it having been published from June, 1879, to March, 1892, when it was discontinued. It is a mine of information on the pedigrees, history and performances of Maine bred horses, but unfortunately the several volumes are without title pages or indexes. Volume I, embraces

ten numbers; volume 2, nine numbers, but all subsequent volumes, twelve numbers each, beginning with January of each year. Some one will do a service to Maine agricultural literature by preparing an index to this work.

THOREAU, HENRY D.

1. The Maine Woods. Boston, 1892, 12mo, pp. 328. [Many Editions.]

The sections of this work relate to Ktaadn, Chesuncook and the Allegash and East Branch. Appendix contains the following: 1. Trees. 2. Flowers and Shrubs. 3. List of Plants. 4. List of Birds. 5. Quadrupeds. 6. Outfit for an Excursion. 7. A List of Indian Words.

This work has long been, and will long continue to be, a classic of the Maine forests.

TRANSACTIONS of the Cumberland County Agricultural and Horticultural Society, for the year 1861. With an Address by Hon. Samuel F. Perley. Portland, 1861, 8vo, pp. 83.

TRANSACTIONS of the York County Agricultural Society for the years, 1847, '48, '49. Together with the by-laws and laws of the State relating to Agricultural Societies. Saco, 1850, 8vo, pp. 144.

Contains Address of Hon. Rufus McIntire of Parsonsfield; Address of Ralph R. Philips of Manchester, Conn.; Address of Dr. Ezekiel Holmes of Winthrop; Harvest Home and Farmer's Rest, two poems by Charles H. Granger, Saco; Remarks on the different breeds of Sheep that have been introduced into Maine, by E. Holmes; On the Cultivation of the Pear on the Quince, by S. L. Goodale, and a Select List of Fruits for Maine.

TRUE, NATHANIEL TUCKERMAN. Born in North Yarmouth, (now Pownal), March 15, 1812. After studying for two years at Bowdoin College he relinquished his college course and attended the Maine Medical School from which he graduated in 1846. He abandoned the practice of medicine for the profession of teaching which he made his life work, having been principal of Gould's Academy, Bethel, for a long term of years; also a professor in a normal school in western New York, and principal of schools and academies in Gorham and Milan, N. H., and Litchfield, Maine. Member of Maine Board of Agriculture, 1858-'61. Received the honorary degree of A. M., from Colby University, (Waterville College), in 1868, and Bowdoin College, in 1841. Founder of the Bethel Farmers' Club, one of the best known and most influential of the earlier farmers' clubs of Maine. Senior editor of the Maine Farmer from 1865 to 1869, for which he wrote two series of very

popular short articles, viz.: "Chemistry by the Fireside," and "Geology by the Fireside." President of the Maine Board of Education; member of Portland Society of Natural History; American Association for the Advancement of Science; Wisconsin Historical Society; Maine Historical Society. He died in Bethel, May 18, 1887. [For sketches of his life see History of Bethel, 1891, p. 144-147; Collections and Proceedings of the Maine Historical Society, 1892, p. 225-231. Portrait: History of Bethel, p. 144.]

1. Address. Transactions of Agricultural Societies of Maine, 1853, p. 8-23.
2. Address on the Soils of Oxford County. Report Maine Board of Agriculture, 1856, Abstract, p. 88-102.
3. Address. Report Maine Board of Agriculture, Abstract, 1857, p. 179-203.
4. Address on Progressive Farming. Report Maine Board of Agriculture, Abstract, 1858, 77-105.
5. Insects Injurious to Vegetation. Report Maine Board of Agriculture, 1858, p. 167-176.
6. Renovation of Orchards. Report Maine Board of Agriculture, 1859, p. 205-209.
7. Biographical Sketch of Ezekiel Holmes, M. D. Report Maine Board of Agriculture, 1865. p. 207-226.
8. The Soil and Its Preparation for an Orchard. Transactions Maine Maine State Pomological Society, 1876, p. 71-77.
9. Planting an Orchard. Transactions Maine State Pomological Society, 1877, p. 23-29.
10. Pear Culture. Transactions Maine State Pomological Society, 1883, p. 79-81.

"It was his delight to take his spring and summer classes in botany through the fields, pastures and woods, gathering and classifying the various wild flowers in their season; or his pupils interested in mineralogy and geology to the summit of Paradise Hill, and sometimes even to the tops of the surrounding mountains where he pointed out and described diluvial markings and other signs of glacial action, and gathered minerals of various kinds. Dr. True's studies embraced a very wide range, and he was able to impart instruction in almost every department of useful knowledge. They embraced languages, both ancient, including Latin, Greek and Hebrew, and modern, including French, Spanish, Italian and German, the natural sciences, practical surveying and engineering, scientific agriculture, navigation, astronomy and the higher mathematics."—Maine Historical Collections, 1892, p. 228-229.

"He was one of the most industrious of men, never losing any time, and ever an early riser. He was a kind-hearted, genial man and full of sympathy for those working for self-education with limited means. Of his writings but little was ever published in permanent form, and most of them will soon be forgotten unless gleaned from the various newspaper files and reprinted."—Lapham's History of Bethel, p. 147.

TWITCHELL, G. M. Born in Bethel, Sept. 17, 1847. Lecturer Maine State Grange, 1889-'91; Overseer Maine State Grange, 1891-'92; Secretary Maine State Agricultural Society, 1891-'92. Assistant Editor Maine Farmer. Address: Augusta.

1. How to Make Poultry Profitable. Report Maine Board of Agriculture, 1883, p. 127-136.
2. Poultry for Profit. Report Maine Board of Agriculture, 1884, p. 39-47.
3. On Poultry. Report Maine Board of Agriculture, 1885, p. 224-229.
4. The Necessities of Today. Report Maine Board of Agriculture, 1887, p. 123-131.
5. The Percheron Horse. Report Maine Board of Agriculture, 1888, p. 198-208.
6. Intensive Poultry Culture. Report Maine Board of Agriculture, 1889, p. 172-185.
7. Inexpensive Sources of Fertility for the Orchard—Poultry. Transactions Maine State Pomological Society, 1890, p. 53-56.
8. How to Make Poultry Keeping Profitable. Report Massachusetts Board of Agriculture, 1889, p. 238-268.
9. Some Conditions for Success in New England Agriculture. Report Massachusetts Board of Agriculture, 1890, p. 90-104.

In addition to the above list, Dr. Twitchell has delivered many lectures before farmers' institutes and agricultural conventions in New Hampshire, Vermont, Rhode Island, New Brunswick and Nova Scotia, which have been published in full or by abstract in the agricultural reports of the several states and provinces named.

WASSON, SAMUEL. Born in Brooksville, August 15, 1819. Member of the State Board of Agriculture, 1860-1879; President Maine State Agricultural Society, 1873-'74; Secretary State Agricultural Society, 1875; trustee State Agricultural Society, fourteen years; member of the Maine Senate, 1857-'58; member of the Maine House of Representatives, 1865-'70, also in 1874. Editor and publisher of Eastern Farmer, Ellsworth. For many years a prominent contributor to the agricultural press. Address: East Surry.

1. Transactions of the Maine State Agricultural Society; for the State Fair Year, 1875. Portland, 1875, 8vo, pp. 101. [All published.]
2. A Survey of Hancock County, Maine. Augusta, 1878, 8vo, pp. 91.
3. Marine Manures. Report Maine Board of Agriculture, 1859, p. 180-182.
4. Use of Artificial Fertilizers. Report Maine Board of Agriculture, 1867, p. 74-77.
5. The Ideal Farmer. Report Maine Board of Agriculture, 1868, p. 56-65.

6. History of the Potato. Report Maine Board of Agriculture, 1869, p. 90-100.
7. Water as an Agricultural Agent. Report Maine Board of Agriculture, 1870, p. 359-370.
8. Green Crops as a Ready and Available Means for Enriching the Soil. Report Maine Board of Agriculture, 1873, p. 134-150.
9. Conditions Requisite for the Elevation of Farming. Report Maine Board of Agriculture, 1874, p. 19-30.
10. "No Cattle, no Crops." Report Maine Board of Agriculture, 1874, p. 283-294.
11. Specialties in Farming.—Mutton Rather than Wool. Report Maine Board of Agriculture, 1875, p. 161-176.
12. Muscle Beds. Report Maine Board of Agriculture, 1877, p. 211-216.
13. The Grasses of Maine. Report Maine Board of Agriculture, 1878, p. 1-24.

WIGGIN, EDWARD. Born in Bangor, November 14, 1837. Educated in the public Schools. Enlisted in Sixth Maine Battery, December, 1861, of which he was First Lieutenant, and was for some time acting assistant adjutant general on staff of Second Brigade, Artillery Division, Army of the Potomac. President of North Aroostook Agricultural Society; member of Maine Board of Agriculture, 1883-'85; President of the Maine Board of Agriculture, 1885; member of of the Maine Senate 1893. A teacher of experience and writer of ability for the public press. Address: Maysville Centre.

1. Aroostook. Address delivered at Boothbay, December 14, 1885. Also opinions of others with reference to that county. Portland, 1887, 8vo, pp. 26.
2. A Series of Articles giving a history and description of each town in Aroostook county, with special reference to their agricultural features and capabilities. [Published in Weekly Kennebec Journal, Augusta, 1890-'91.]
3. The Agriculture of Aroostook County. [In Report of Industrial and Labor Statistics of Maine, 1890, p. 68-79.]
4. Soil Exhaustion and How to Prevent It. Report Maine Board of Agriculture, 1883, p. 37-47.
5. Advantages of Aroostook County. Report Maine Board of Agriculture, 1883, p. 137-158.
6. Intellectual and Social Culture among Farmers. Report Maine Board of Agriculture, 1884, p. 131-149.
7. Progress in Agriculture. Report Maine Board of Agriculture, 1885, p. 186-202.

Mr. Wiggin is also the author of "Maine: Its History, Development, Resources and Industries," to be published as a contribution to the liter-

ature of the Columbian World's Fair, one chapter of which is devoted to the agriculture of the State.

WILSON, NATHANIEL E. Born in Orono, October 15, 1867. Graduated from Maine State College, with degree of B. S. in 1888. Assistant Chemist Vermont Experiment Station; chemist Bergenport Chemical Company, Bayonne, N. J.; now Chemist to the Nevada State Experiment Station, Reno, Nevada.

1. Sugar Beet Experiments. Bulletin No. 13, Agricultural Experiment Station, University of Nevada, October, 1891, 8vo, pp. 40.
2. Potato Experiments. Bulletin No. 14, Agricultural Experiment Station, University of Nevada, December, 1891, 8vo., pp. 18.
3. The Creamery Industry. Bulletin No. 16, Agricultural Experiment Station, University of Nevada, April, 1892, 8vo., pp. 66.
4. Cheese and its Manufacture. Bulletin No. 18, Agricultural Experiment Station, University of Nevada, November, 1892, 8vo., pp. 27.

WINSLOW, ISAAC O. Born in Fairfield, January 30, 1856; graduated at Brown University, Providence, R. I., 1878; degree of Master of Arts conferred upon him by his alma mater, 1887. Master of a public school in Providence for six years; member of Council of Maine Experiment Station, 1889-'92; Lecturer of Maine State Grange, 1891-'2; member of Maine Senate, 1893. Has contributed largely to the agricultural press of the State. Address: St. Albans.

1. The Principles of Agriculture for Common Schools. New York, 1891, 12mo, pp. 152.
2. Market for Dairy Products. Report Maine Board of Agriculture, 1890, p. 138-145.
3. Home Grown Products for Dairy Cows. Report Maine Board of Agriculture, 1891, p. 108-117.
4. Education for Farmers. Report Maine Board of Agriculture, 1890, p. 55-66.

GENERAL INDEX.

A general index to the twenty-three volumes of the Agriculture of Maine, embracing the transactions and reports from 1850, to and including 1875, was published in 1876, the year of the Centennial Exposition at Philadelphia. In his introduction to that index the Secretary of the Board of Agriculture, said: "The twenty-three volumes on the agriculture of Maine here indexed present to the farmer a record of facts and observations which embody almost every varied duty of his vocation, and nearly every principle which governs those duties and assists in their accomplishment." Since that index was published, sixteen additional volumes have been added to this long set of reports, one of the most important series of volumes ever published relating to the material interests of the State. During this period remarkable advancement, improvement and discoveries have characterized all agricultural operations, and the results of such improvements have been fully recorded in those volumes. They contain so many valuable essays, papers and lectures, recording the experience and practices of the best farmers, in our own State and in other states and countries, in regard to methods and results; as well as the light which science has thrown upon agriculture, that it has been deemed fitting—now that the nations of the world are uniting with the United States in celebrating the four-hundredth anniversary of the discovery of this Continent, and contributions of all kinds are being made to the literature, science and art of the world—that this general index should be revised to date, in order that the wealth of information embraced in these volumes may be made available to all desiring to consult them. Hence, whenever the farmer, wishing to ascertain the best practice, or the student in pursuit of science connected with agriculture may desire to ascertain how far the volumes on the Agriculture of Maine may aid him in his investigation, a few moments devoted to the following index will point out its chief contents and the pages to be consulted. Generally only the more important subjects and papers have been indicated,

but it is believed they are sufficient to direct a clear and satisfactory examination of the complete series. Each contributor will find his name in the index, with the title of his work; while the index of subjects is so complete as to leave little to be desired. The volumes are numbered by years, and where a reference is given, as "1874, ab. 127,"the "Abstract," or second part of the volume is to be understood.

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