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CONTENTS.

	Page.
A Paper on the Early Quarantine Arrangements of Salem. By Robert S. Rantoul,	1
Regular Meeting, Monday, January 16, 1882,	57
John H. Sears, The Forest Trees of northern New York, 57.	
Regular Meeting, Monday, February 6, 1882,	58
Winter Field Meeting, Saturday, February 11, 1882, at Chebacco Ponds,	58
The Excursion, 58.—Account of the Wenham Lake Ice Company, 58.—Remarks by the President, 62; Mr. Robert S. Rantoul 62; Rev. George H. Hosmer, 63; Mr. John H. Sears, Buds and the ramification of Branches, 63.	
Regular Meeting, Monday, February 20, 1882,	67
Remarks on the death of Rev. Samuel Johnson: Rev. E. B. Willson, 68; Mr. Wm. P. Andrews, 69.—Resolutions on the death of Rev. Samuel Johnson, 69.—Rev. C. F. Rice, Sketch of Trip to Europe, 70.	
Regular Meeting, Monday, March 20, 1882,	70
E. P. Robinson, Esq., What I know about Whaling, 70.	
Regular Meeting, Monday, April 3, 1882,	71
Prof. G. F. Wright, The Terminal Moraine in Pennsylvania, 71.—Discussion by Rev. R. Randall Hoes, John H. Sears. Prof. I. J. Osburn. 73.	
Regular Meeting, Monday, May 1, 1882,	74
Remarks by the President, on the observance of May-Day, 74.—Mr. John H. Sears, Early spring flowers, 74.	
Annual Meeting, Monday, May 15, 1882,	77
Officers elected, 78; retrospect of the year: members, 79; field meetings, 80; excursions, 82; lectures and concerts, 83; meetings, 84; publications, 85; library, 85; art exhibition, 96; horticultural, 99; museum, 102; financial, 103; extract from Secretary's report, 104.	
An Amendment to the Act of Incorporation,	104

Carcinological Notes; No. 5. By J. S. Kingsley,	105
Popular Errors regarding the Duration of Life. By Adoniram C. Orne,	133
The Flora of Oak Island. By Herbert A. Young,	144
Opening of a newly discovered shellheap at Ipswich. By John Robinson,	158
Remarks by Mr. F. W. Putnam, 161.	
Arrowmaker's Wigwam at Pine Grove. By John Robinson, .	163

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BULLETIN

OF THE

ESSEX INSTITUTE.

VOL. 14. SALEM: JAN., FEB., MARCH, 1882. Nos. 1, 2, 3.

A PAPER ON THE
EARLY QUARANTINE ARRANGEMENTS OF SALEM.

BY ROBERT S. RANTOUL.

TO JAMES L. CABELL, LL. D., OF VIRGINIA,
President of the National Board of Health, and
STEPHEN SMITH, M. D., OF NEW YORK,
Chairman of Committee of the same, on the Quarantine
Systems of the United States:

GENTLEMEN :

You ask me for some account of the precautions taken by the people of Salem, from time to time, to protect themselves against the importation of foreign disease. You will naturally expect that such an account will make rather a long story, but I must preface it by saying that, from the date of the settlement to a recent period, there have rarely been any special precautions taken here against imported contagion, aside from the ordinary preventive measures made necessary by epidemics, so that the account which I have to give will naturally include not only what you ask for but a good deal more. Now and then, as you will see, the cargo of an

infected vessel was discharged under orders from our selectmen, on one or another of the islands at the mouth of our harbor; now and then an infected ship's company has been forbidden to go at large and been lodged in some isolated house or barn impressed for the service, or, later, in one or another of the pest-houses or inoculation hospitals provided by the town. But there has been, until lately, no established quarantine system,—nothing in the treatment of foreign disease, essentially differing from that of disorders of indigenous growth. Until 1799, we had no Board of Health, and no permanent Quarantine Ordinances of our own, but only temporary regulations.

Nor was this state of things due at all to exemption from exposure. On the contrary, we have been a commercial people from the start, and wherever there is water-traffic there is exposure. Indeed, the very epidemic which depopulated this coast in 1612–17, and which, by weakening the native tribes, may be said to have rendered possible the precarious maintenance of the settlement of 1624–6,—for before its ravages the Pentucket tribes could muster three thousand braves, and afterwards some Sagamores had not a dozen men,—this deadly epidemic is thought to have been the small-pox, and to have been contracted by the natives from intercourse with the French fishermen who then frequented the Bay. And the first large European reinforcement which reached us, in 1629, came stricken on the voyage with this same distemper, which proved fatal at sea to the child of their chronicler, the Elder Higginson, among others, and which, introduced by their arrival into the infant colony of some two hundred souls, reduced its numbers about one-half in a single winter.

Salem was, from the first, a seafaring town. Possessed of one of the few good harbors between Portland

and New York,—settled in 1626 by a party of fishermen who deserted Cape Ann, and found this an eligible seat because the promontory on which we live has navigable water and anchorage on either side,—the colonists lost no time in establishing their familiar industry and making themselves masters of the riches of the sea. Europe was Catholic, and no less than one hundred and fifty-three fast days had been set apart in the year, on which it was lawful to eat fish only. As late as 1563 it was penal for an Englishman to eat flesh on Wednesdays and Saturdays without a government license. A century later, in a code for Massachusetts printed in London in 1655, and preserved by Hutchinson, it is provided “Because fish is the chief Staple commodity of the Country” that “fishermen, mariners and shipwrights shall be allowed, man for man, some or other of the labourers of the country to plant and reape for them” for seven years, such laborers to be appointed and paid by the treasurer of the Commonwealth. Another century finds the two-penny revenue stamp of 1755 inscribed with a codfish and the legend “Staple of the Massachusetts,” and as if in anticipation of all this, King James, when asking “what profit should arise” from these settlements which should justify the royal favor, was answered in the single word “Fishing.” To which the King replied: “So God have my soul, ’tis an honest trade,—’twas the apostles’ own calling.”

Thus, in the beginning, the colonists looked to fishing, first, for the food on their tables, and, following the practice of the natives, for a dressing for their gardens and fields, and, next, for a valuable article of export trade which brought them rich return cargoes from other colonies, from the West Indies, and from the ports of Europe.

Perhaps I can suggest in a few words the early magnitude and variety of our maritime interests, and thus jus-

tify, in a degree, the extent to which I must draw on your space and patience in this account.

No settlement was attempted at this point until 1626. A dozen families came here then from an abandoned fishing station at Cape Ann, four or five leagues away, where they had been established, with others, by the Dorchester Company in 1624. They were mostly fishermen from the west coast of England, and, being dissatisfied with their Cape Ann location, had abandoned it, some for England, some for Virginia, and a little remnant for this "pleasant and fruitful neck of land" now called Salem. Conant, Woodbury, Balch, Palfray and others, evincing a determination to maintain themselves here, they were reinforced, first, by a party under Endicott in 1628, then by another which came with Higginson in 1629, and finally by the great Suffolk Emigration of 1630, under Winthrop. How promptly after their establishment here they began to develop commercial relations will readily appear.

In the summer of 1629 seven or more shipwrights were at work here. Shallops for the fishing business were already on the stocks. A barque had already been built and was to go to the Banks and bring back the fishermen from English fishing vessels, which returned to England direct from the Banks with their fares of fish. A storehouse was ordered, April 17, for the shipwrights; another, May 28, for the fishermen; nine fishermen are sent over at the company's charges to remain and initiate others in the craft; fish is ordered for a return cargo; lots are assigned in the common lands to fishermen in severalty to build flakes or stages, for curing their fares.

In the year 1636-7, a town order prohibited the exportation of lumber, which "hath not onely bared our woods verie much of the best tymber trees, of all sorts, but bereaved also our inhabitants of such boards & clap-

boards whereof they stand in need;" two spots "by ye waters side" are assigned to master-builders for ship building; the Ship "Desire"¹ of 120 tons, built here in 1636, had made a voyage to New Providence & Tortuga; before a twelvemonth ended a Fast was observed "on account of prevailing fevers, small-pox & low state of religion;" the first importation of indigo and sugar seems to have been made in 1639, though cotton had arrived earlier; on "the 22th of the 3th m^o called May" of that year the General Court voted "for further incuragement of men to set vpon fishinge, * * that such ships & vessels & other stock, as shall bee properly imployed & adventured in takeing, makeing & transporting of fish, according to the course of fishing voyages & the fish itselfe, shall bee exempt for 7 years from hencefourth from all countrey charges," * * Fishermen & Ship-carpenters were exempt from "training" and so important to the colony had the export of dried fish become that "it is forbidden to all men, after the 20th of the next month, to imploy any codd or basse fish for manuring of ground," upon pain of losing "the privledg of exemption from publike charges;" "timber trees fitt for shippinge" are protected by vote of a general town meeting in 1640, and "none shall cleave such trees upp to clapbo[ards] or pipestaves;" in 1641, ship-building is to proceed under the eye of a sworn surveyor because "the countrey is nowe in hand wth the building of Ships, w^{ch} is a business of great importance for the comon good" and at the urgency of Rev. Hugh Peters of the First Church, a 300 ton ship is built here; the next year, 1642, "tymber within the towne lymitts" is still further protected, by vote of town meeting, and, in

¹Four years later, she made the passage from Salem to Gravesend in twenty-three days, — famous sailing for those times.

October, a vessel of 200 tons, built here during the summer and laden with pipe-staves and other merchandise, sailed for Fayal; in 1643, Salem was trading with the mother country, Bermuda, Virginia, Barbadoes, Tortuga, and the Leeward Islands; in 1645, a commercial agent for the town at Barbadoes had been proposed in the town meeting, and in March, 1647-8, appear the first Quarantine Regulations.

Of these, Gov. Winthrop in his journal says: "It pleased the Lord to open to us a trade with Barbados and other Islands in the West Indies, which as it proved gainful, so the commodities we had in exchange there for our cattle and provisions, as sugar, cotton, tobacco and indigo, were a good help to discharge our engagements in England. And this summer there was so great a drouth, as their potatoes and corn, etc., were burnt up; and divers London ships which rode there were so short of provisions as if our vessels had not supplied them, they could not have returned home; which was an observable providence, that whereas many of the London seamen were wont to despise New England, as a poor, barren country, should now be relieved by our plenty.

"After the great dearth of victuals in these islands followed presently a great mortality (whether it were the plague, or pestilent fever, it killed in three days) that in Barbadoes there died six thousand, and in Christopher's, of English and French near as many, and in other islands proportionable. The report of this coming to us by a vessel which came from Fayal, the court published an order that all vessels which should come from the West Indies, should stay at the castle, and not come on shore nor put any goods on shore, without license of three of the council, on pain of one hundred pounds. Nor any to go aboard &c except they continued there &c

on like penalty. The like order was sent to Salem & other haven towns."

It should be understood that the "Castle" was in the Harbor of Boston some leagues distant from Salem, and the order requiring inward bound vessels to stay there may have had no bearing on vessels bound to Salem, which would not necessarily come within hail of the Castle. Besides these precautionary measures a Fast was ordered by the Court, "being sencible of the great mortality of o^r country men in the West Indies" and for other causes.

The first colonial legislation, which I find, intended to regulate Ports of Entry, bears date 1668, and in all the twenty-seven sections of the act, there is no allusion to the public health, so far was this matter left in the hands of the local authorities. Indeed, in Salem, we only completed our harbor fortification by impressing men in 1669, so that it would not have been easy before that date to enforce an act like that of 1647. This act I insert entire. It was repealed about two years later, and with the exception of a similar act suggested by the London plague of 1665, and also of two years' duration, and limited to ships from England as that had been to ships from the West Indies, no colonial legislation touching our subject was attempted until the end of the century, when a general quarantine law of larger scope, passed in 1699, was disallowed the next year by the Privy Council, on the ground that it usurped powers of regulating trade properly belonging to the Royal Governor and Council. And it may have been due to this jealousy that the towns preferred to make their own quarantine arrangements rather than invite the exercise of the veto-power by legislative enactments. The act of 1647-8 is as follows:

"For asmuch as this Co^rte is credibly informed y^t y^e plague, or like greivos [in] fectious disease, hath lately ex-

ceed^{ly} raged in y^e Barbadoes, Christophers, & oth^r i[sl]-lands in y^e West Indies, to y^e great depopulat^s of those, it is therefore ord^red, y^t all [our own] or oth^r vessels come^s from any pts of y^e West Indies to Boston harbor shall stop [and come to an] anchor before they come at y^e Castle, und^r y^e poenalty of 100£, & that no pson comeing in any vessell from the West Indies shall go a shore in any towne, village, or farme, or come within foure rods of any oth^r pson, but such as belongs to the vessels company y^t hee or shee came in, or any wayes land or convey any goods brought in any such vessels to any towne, villag^e, or farme aforesaid, or any oth^r place wthin this iurisdiction, except it be upon some iland where no inhabitant resides, wthout licence from y^e councell, or some three of them, und^r y^e aforesaid poenalty of a hundred pound for ev^{ry} offence.

“That no inhabitant, seaman, or other pson whatsoever, reciding wthin this iurisdiction, shall go aboard any such shipp or vessell comeing from the West Indies aforesaid, or buy or otherwise take into his possession any goods or marchandize brought in any such vessell, wthout licence as aforesaid, und^r y^e poenalty of 100£, & to be otherwise confined or restrained, as the said councell, or some three of them, shall appoint; & to y^e end y^t all psons may have due information hereof, it is hereby agreed, y^t this ord^r shalbe forthwth published, & a cobby thereof sent to y^e captaine of y^e Castle, togeth^r wth comission to him to cause ev^{ry} shipp or other vessell, belonging to y^e country or any oth^r place, y^t shall come from any pt of the West Indies aforesaid, to stop & come to an anchor before they shall passe y^e Castle, & then send unto them a cobby of this order, & there cause them to remaine till furth^r order from y^e councell, or some three of them, whose counsell is to be taken therein; this ord^r to continue till this Co^rte or

the councell of y^e cōmonwealth shall see cause to repeale y^e same.

"It is furth^r ord^{red}, y^ta cōpy of this order shall be forth^wth sent to the sev^rall cunstable of ev^{ry} port towne in this iurisdiction, wth warrant to give notice thereof, wth all possible speed, to any vessell coming from y^e West Indies aforesaid, upon y^e first view thereof, & furth^r to see to y^e execution of this ord^r, according to y^e utmost of their ability, & y^t y^e councell, or some three of them, shall have pow^r to appoint some convenient place, upon some of y^e ilands or oth^r fit places, where such p^{ersons} & goods shal be sheltered for a time, & to do any thing of like nature y^t shall be necessary for their preservation, & welfare of y^e country."

The order was repealed, 2 May, 1649.

"The Courte doth thinke meete that the order concerning the stoping of West India ships at the Castle should hereby be repealed, seing it hath pleased God to stay the sicknes there."

The first action of the selectmen of Salem now on record, touching our subject, bears date 1678, and is in these words :

"Att a metting of the selectmen 2 Sep^t. 1678.

The prouidence of god so ordering that the distemper of the small pox still continuing at Boston, severall of the Selectmen being ferfull of that distemper & others of them being ancient & not able to travell the Selectmen aforesaid have requested the worship^l. Major W^m. Hathorne to deliver in to the Honored Court of assistance our answer to the resons of apeale of Nath^l & John Puttman and the rest concerned with y^m & to speake to that case as nede shall require in the behalfe of the towne of Salem."

Meeting of Selectmen 17 : 8 : 1678.

"It is ordered that Wm. Stacy who is sick of the small pox doth not presume to come abroad till three wekes after this date be expired & that he be very carfull y^t when y^t time be expired he shift his clothes & doe not frequent any company till he be wholly cler. of that infection."

Meeting of Selectmen 25 : 10 : 1678.

"The selectmen being informed y^t Will^m Lord Jun^r is visited wth the small pox at his father's house, the selectmen doe order y^t Wm. Lord Sen^r his wife & children y^t live wth him doe kepe within ther house, & y^t they doe not ofer to sayle any of ther ware, viz : bread, cakes, ginger bread & the like & that they sufer non to come to ther house but what nessesity requires upon the penalty of twenty shillings in money for each offence.

"And it is ordered y^t Tho. Stacy doth forbare grinding at the mill & y^t he be carfull he doth not infect others, on the penalty of twenty shillings."

In 1680 the Selectmen of Salem seem to have found it necessary to establish a quarantine of their own by the following action, which, though temporary in its nature, will be seen to cover a period of twenty years, in which no help was had from general legislation.

"At a meeting of the Commission^{es} & Selectmen of the towne, June, 1680.

"In consideration y^t it hath pleased God to visit the inhabitants of Barbados with the small pox which is an infexious distemper and severall vessells are expected from thence : And it being our duty y^t all due care may be taken to prevent itt^s being brought in amongsts us :

"Wee doe therefore order, that not any vessell which comes from the Isl. of Barbados, shall have libertye to land any cotten wooll or other goods from on Board their vessel,

nor any one of their Comē or passenger that shall come with them from thence shall have libertye or bee suffered to come on shore, before they are visseted or examined by James Poland or John Clifford one or Both of which wee doe heareby fulley impowre to goe on Board all such vessell or vessells and for that end to impress any boate or canoe & persons sutable to attend them therein, likewise to give notice to them y^t they suffer not any person or persons to come on Board, that neither the Companye or passengers come on shore nor any person or persons what soever goe on Board of them upon the uttermost perrill, untill a tru acc^o bee given to the Selectmen of their health & condition they are in by the sayd persons impowred, that soe an order from the Selectmen may bee given forth either to licence them to come on shoare, or further to prohibit & forbid according as the case may justly require.”

“At a meeting of William Browne & Bartholomew Gedney Esq^r together with the Selectmen who ordered a warrant to bee drawne as followeth, June 14th, 1680.

“To Constable Peter Chevers you are in his maj^e name heareby required to impress William Marston to cary over the man hee hath brought into the towne, (which man is visseted with the distemper of the small pox) in the same boate hee brought him unto the house of Abraham Read, on Royall Syde, which sayd house if the man bee not willing to reseave him into it & withdraw himselfe into some other place for a short tyme: you are then heareby to impress the house & enter into it & leave the distempered man there, & William Marston with him to tend him; & to provide for them all such things as are nessesary upon the townes acc^o & to cause Abraham Read to depart, or if hee bee not at home then to open the house as aforesayd, likewise to order William Marston to sink the boat in some

convenient place for her clensing & all & every part heare-
of you are to attend untill you shall reseave further order
& heareof you are not to fayle."

At a meeting of the Selectmen January 21th, 1680-1.

"Abraham Reads Rates are abated to Constable Jn^o
Batchelder upon consideration of his house being im-
proved to put a sick man in, viz: the man y^e was viseted
with the small pox."

"Att a metting of the Selectmen 19: 8: 1683.

"There being certaine information given to the Select-
men, (& by M^r. John Tawleys owne acknowligement) y^t
M^r. Jn^o Tawley who latley arived from Newfound land
has brought in the distemper of the small pox haveing
one man on board sick of the same & considering the
great danger of the spreading of such a distemper amongst
us he haveing brought home many passengers whome he
has landed & they are scatered a broad —

"This following warrant was given to ye Constables.

"You & every of you are herby required in his majes-
ties [name,] forthwith to send ffrances Eliot on board M^r
Jn^o Tawleys Katch & ther to tend ye sick man & forth
with to send & cary downe to the house y^t Sarj^a Jn^o Cli-
ford lived in all the passengers & seamen y^t came in M^r
Jn^o Tawleys from Newfound land & can be found in this
towne & there to confine them till further order be taken
and y^t M^r. Jn^o Tawley be confined to his house & y^t his
boy be either sent on board ye Katch or downe to the
aforesaid house."

"At a meeting of the Select men 8th 7. 85.

"The Select men being informed that the small pox doth
greatly rage upon the Island of Burbados, doe therefore
order that all cotten wool that is now or hereafter shall be
imported from said Island into this harbor of Salem shall
be landed at Bakers Island & there to remaine untel the

Select men shall give order for the removall of the same."

[Baker's Island is four or five miles from Salem.]

"Att a meeting of the Selectmen y^e 16th of Aprell 1686.

"Itt is Ordrd that by reson of the prevailing of the small pox in the Iland of Barbados y^t all cotten wooll now imported into this harbor or shall bee here after dureing the tyme of that siknes there shall bee landed att Winter Iland in the warehous y^t was Cap^t Jn^o Corwins & not to take it thence till order from the Selectmen."

[Winter Island is just at the mouth of the Harbor, and was the site of the Fort.]

At a meeting of the Select men 18th May 1691.

"Ordered that noe pson whatsoever within the bounds of this towne that hath lately had the small pox, presume to come abroad into company or goe to meeting without p^ticular liberty & lycence first had & obtained from the Selectmen for the tyme being on penalty of twenty shillings for every such offence & that no pson whatsoever shall air or hang abroad any lining, bedding or cloathing out of any house where the distemper is or hath been lately, near any dwelling house or nigh the Mayn street on the penalty aforesaid."

"At a towne meeting held June 16, 1701.

"Voted that a pest house be builded, not exceeding 50^{lb} in money & s^d 50^{lb} be raised and pay^d in to y^e T. Treas^r at or before y^e last day of Decemb^r next come twelve month, & y^t y^e Selectmen consider of a convenient place, & make report thereof to y^e next town meeting & also y^t y^e Selectmen are impowred & desired to agree wth some sutable persons for to performe y^e same & to indeavour to procure some person to advance money on y^e credit of this town vote for y^e performance thereof, as soon as may be."

"At a meeting of y^e Selectmen Octob^r 16th, 1702.

"Ord^d y^t if any dy of y^e small pox they shall be buried about 3 of y^e clock in y^e afternoon.

"Ord^d y^t Constable Jn^o Williams doth attend y^e funeralls of any y^t dy of y^e small pox & walk before y^e corps to give notice to any y^t may be in danger of y^e infection."

Before the action last recorded a Provincial Act, dated June 25, 1701, had gone into effect (we will examine this act presently); it differed in scope and character from the temporary orders formerly issued by the General Court, and was kept alive, with few additions and modifications, for a century. But it is a surprising fact that, from the settlement of this colony to the year 1701, the matter of providing by law against the importation of contagious distempers should have received so little attention among a people devoted to navigation, frequently scourged with unmanageable epidemics and prone to legislate on all sorts of subjects whether profane or sacred. With the exception of these three enactments, neither of which remained in force more than two years,—two of which were carefully limited in their territorial scope,—the local authorities got no aid from the General Court before 1700, in protecting their populations against foreign disease, and even the local authorities themselves were very sparing of their efforts in this behalf. Possibly some explanation of this omission may be found in the obvious fact that the leading men of these seaboard towns, upon whom would devolve the making and enforcing of local regulations, were at the same time the ship-owners and ship-masters who could, by a tacit understanding among themselves, observe such regulations and thus render needless all appeal to legal authority. The men who controlled the commerce of the infant colony were beyond all others

the men who had its home interests at heart and they may have established, by mutual consent, a system for the protection of the town, without spreading it on the records or having recourse to penalties. It is proper to say that frequent days of public fasting, humiliation and prayer were resorted to by the law-making powers, colonial and provincial, as among the preventive measures of the day. The very frequent recurrence of these observances, which were intended to "avert the frowns of Providence" as discovered in "Fevers," "Small-pox," "Plagues" and "Unwonted disease," as well as in "the low state of religion," "sins," "blastings," "grasshoppers," and the "palmer-worm," would, if the long list of dates were enumerated, show what a terrible scourge these diseases were, especially the small-pox before the introduction of inoculation.²

² Inoculation was introduced into America in 1720 by Dr. Zabdiel Boylston of Boston who for some years, alone and under great discouragements of hostile legislation as well as personal peril, persisted in the practice. It seems to have prevailed earlier and more generally here than in Europe. See "Diseases of America," a letter dated "New York, December, 1780," from the pen of Dr. Johann David Schoepff, Surgeon of the Anspach-Bayreuth Troops in America. Also, for the connection of Dr. Increase Mather with the subject, see Collections Mass. Historical Society, 1st Series, Vol. IX, pp. 275-80. Dr. Benjamin Waterhouse of Cambridge, who, with Dr. James Jackson of Boston in 1796, introduced vaccination into America, wrote as follows in 1787 to his friend Dr. Holyoke of Salem.

Cambridge Octob^r 23^d 1787.

Sir

I herewith send you a Book entitled "an Inquiry how to prevent the Small-Pox," written by Dr. Haygarth of the City of Chester in England. This learned and benevolent Physician intends to publish a *Proposal for exterminating the S. Pox from Great Britain*, and as he thinks the communications I made him (as expressed in p. 138) of no small consequence to his plan, and requests more information, I feel heartily disposed to give all the assistance in my power, which is indeed no more than collecting the best information our Country affords.—With this view I send the publication for your perusal.—

I suspect that we in N. England know more of the S. Pox than they do in G. Britain, and that there are more and better materials for forming an accurate history of that Disease, with us, than with them?—Even their Physicians seem to have forgotten, that an Inhabitant of Boston was the first who put in practice the obscure hints given by Timonius of Constantinople, and transferring it to England, thence diffused this salutary practice among every polished nation in the world.—There appears an heroism in Dr. Boylston that is worth recording.—

I remain,

very respected Sir,

Dr. Ed. Aug. Holyoke M. D.
Salem, Mass.

your humble servant
B. Waterhouse.

About the year 1700, a general system of regulation began to develop itself, resulting in a law differing only from the vetoed act of 1699, in that it enjoined every justice of the peace to intervene in executing it, and the selectmen to take care of the sick at the cost of the persons or of towns, save in the case of paupers without settlement, they to be provided for at the cost of the Province. This act of the last year of William III was the basis of our quarantine system. It was passed during a period of disquiet. The charters were in danger. Massachusetts was asserting rights and exercising powers denied to her by the advisers of the Crown; and in the midst of the confusion incident to the retirement of Earl Bellomont from the Executive Chair of the Province and the resumption of that coveted seat by the once expatriated Dudley, and while it was temporarily filled a second time, for a few months, by the aged and decrepit Stoughton, then Lieutenant Governor, this fortunate law seems to have slipped through the prescribed forms of enactment. These are its terms.

AN ACT PROVIDING IN CASE OF SICKNESS.

Be it enacted by the Lieutenant-Governour, Council and Representatives in General Court assembled, and by the authority of the same,

[Sect. 1.] That, for the better preventing the spreading of infection, when it shall happen any person or persons coming from abroad or belonging to any town or place within this province to be visited, or that late before have been visited with the plague, small pox, pestilential or malignant fever, or other contagious sickness, the infection whereof may probably be communicated to others, the selectmen of such town be and hereby are impowred to take care and make effectual provision, in the best manner they can, for the preservation of the inhabitants, by removing and place-

ing such sick or infected person or persons to and in a separate house or houses, and by providing of nurses, tendance and other assistance and necessaries for them, at the charge of the partyes themselves, their parents or masters (if able), or otherwise at the charge of the town or place whereto they belong.

[Sect. 2.] And in case it happen any person or persons to be visited with sickness in any other town or place than that whereto they belong, and thereby occasion a charge to such town, the selectmen shall lay the accompt thereof before the justices in court of general sessions of the peace, within the county where the town lyes whereto such person or persons belong; and the justices, having adjusted the accompt of such charge, and allowed so much thereof as they judge reasonable, shall order payment thereof to be made by the treasurer of such town, when the persons themselves, their parents or masters, are unable to pay the same. And when it shall happen such indigent persons, not to be inhabitants, or belonging to any town or place within this province, and the proper charge thereof in case they need reliefe, then the charge of their sickness shall be defreyed out of the publick treasury of the province, by warrant from the governour, with the advice and consent of the council.

And be it further enacted by the authority aforesaid,

[Sect. 3.] That, if need so require, any two justices of the peace may make out a warrant, directed to the sheriffe of the county or his deputy, or constables of the town or place where any such sick person or persons shall be, requiring them, or any of them, in his majesty's name, with the advice and direction of the selectmen of the same, to impress and take up convenient housing, lodging, nurses, tendance and other necessaries, for the accommodation, safety and relief of the sick.

And be it further enacted by the authority aforesaid,
 [Sect. 4.] That if any person or persons, seamen or passengers, belonging to or transported in any ship or vessel arriving to any port or harbour within this province, happen to be visited with the plague, small pox, pestilential or malignant fever, during the voyage, or to come from any place where such sickness prevails and is common, any justice or justices of the peace within the county, to whom the notice or information thereof shall be given, shall forthwith take care to prevent and restrain all persons belonging to or transported in such ship or other vessel from coming on shore, and if any be before on shore to send them on board again, as also to restrain persons from going on board such ship or vessel; and to that end may make out a warrant, directed to the sheriffe of the county or his deputy, or constables of the same town, who are accordingly impowred and required to execute the same. And such justice or justices are forthwith to transmit the intelligence thereof to the governour or commander-in-chief for the time being, who is hereby impowred, with the advice and consent of the council, to take such further order therein as they shall think fit for preventing the spreading of the infection.

[*Passed June 25; published June 28, 1701.*]

From this time on, the tendency of provincial legislation was to throw more and more of the burthen of caring for the health of the growing populations upon local authorities by enlarging their powers. I shall not encumber this account with a recital of the modifications suggested by a century of progress before the final supersedure of this fundamental act, June 22, 1797. The action of the selectmen of Salem, which I shall detail, found its warrant in this fundamental law of 1701 and its several amendments.

In April, 1705, the Sloop Sterling brings the Small-Pox from Barbadoes and her crew are put ashore on Misery Island [an island about five miles down the harbor].

In the summer of 1711, the small pox was again brought in from Barbadoes in a brig commanded by Capt. Eben. Hathorne.

In 1716-17 the Province built a Hospital on Spectacle Island in Boston Harbor and all infected persons and merchandise which could "without great inconveniency and damage" be sent there, were so ordered. This was the first quarantine establishment in Massachusetts.

April 22, 1721, it was agreed with Malachie Foot and Matthew Barton to keep watch and ward at Winter Island until all vessels due "from Barbadoes and Tortudas are arrived, to prevent the infection of the Small Pox." [We then cleared eighty sail per year for foreign ports.] "An house was appointed for those who should take the disease." It was raging also in Boston and "threatened the land," having been brought to that port by the "Saltortugas fleet." Dr. Boylston and Rev. Cotton Mather urged inoculation.

In 1721-2 a new Provincial act was passed for protection against the plague then raging in France and the Mediterranean ports, which required vessels from those parts to perform quarantine for forty days at least at some appointed place, on penalty of death to every master or commander who should after notice "presume to unlade any part of his goods or cargo before he have perform'd such quarentine." The operation of this act was limited to three years and it was not extended. It covered also vessels from Newfoundland, Cape Breton and Canso, which had within six months been in any port of France or other infected place, or taken on board goods from such ports. A resolve of the same year, 1722, declared that the orig-

inal act of 1701, authorized the removal of infected persons into separate houses, by warrant of the justices with the consent of the selectmen.

"At a meeting of the Selectmen, present, Cap^t Bowditch, M^r Flint, M^r Orne, Tho. Barton. May 11, 1726.

Ordered, Whereas M^r John Crowningshield in a sloop of this place, arrived on Saturday night last from the West Indies and it haveing happened in their passage to have one of his men visited with the small pox & but very lately recovered thereof, and for the better preventing the spreading of the infection; on Sabbath day morning early a warrant was obtained from two of His Maj^{ties} Justices as the law directs, & executed, to prevent and restrain all persons belonging to the vessell from coming on shoar as also to restrain all persons from going on board till farther order, and for the more effectuall accomplishing of the affair the Selectmen did order & desire M^r Rich^d Palmer & Malachie ffoot to ward on the Neck, near to the place where the vessell layd all that & every day till other care & more effectuall provision could be made. Wherefore the Selectmen do now agree & have taken up Cap^t Gardners little house on the point below Benj^a Holms's in the South field, to remove & place the infected persons in, and the house being out of repair it is Ordered that it be forthwith repaired & made convenient for the service."

"At a meeting of the Selectmen present, Cap^t Bowditch, M^r Manning, M^r Flint, M^r Orne, Tho^s Barton. May 27, 1726.

Ordered, The Selectmen takeing into consideration the case of Thomas Marston, the person lately recovered of the small pox on board M^r Crowningshield in his passage from the West Indies, he haveing been on shoar about a fortnight, & with Abraham Cabot his nurse, confined to Cap^t Gardners house in the South field, and all proper

means used for their cleansing whether or no they may now be allowed with safety to come home to their families ; It is agreed that they may not come away yet but that they keep there one week longer, or 'till after the Selectmens next meeting on the first Monday of the next month."

"At a meeting of the Selectmen present, Cap^t Bowditch, M^r Manning, M^r Orne, Thos. Barton. June 16, 1727.

Ordered, Whereas M^r William Cash master of a Brig^t of this place, is this day arrived from New Castle, and it haveing happened in his passage to have two of his men visited with the small pox, and as yet are not perfectly recovered & free from the infection. Wherefore for preventing the spreading of the infection, it is agreed that a warrant be procured from His *His* Maj^{ties} Justices as the law directs, to prevent & restrain all persons, seamen, passengers & others from coming on shoar & going on board without leave of the Selectmen or furthur order from the Justices. A warrant is accordingly obtained & by Constable John Chapman executed.

June 18. The Brig^t being now ordered up toward fforest River behind the South field the two men that never yet had the small pox are taken on shoar to Capt. Gardners house on the point behind Holms's in the South field, to prevent their taking any furthur infection, there to remain 'till after the next full or change of the moon, that if possibly they may escape having the distemper, and the meantime the other men with the master are confined on board, & not allowed to come on shoar 'till both they and the vessell shall be sufficiently cleansed and air'd."

"At a meeting of the Selectmen present, Cap^t Bowditch, M^r flint, M^r Manning, M^r Orne, M^r Procter, Cap^t flint, Thos^s Barton. July 3, 1727.

Ordered, The selectmen taking into consideration the case of the two men taken ashoar from M^r Cash to prevent

the spreading of the infection of the small pox and they having been well cleansed & air'd, it is advis'd that they may with safety go to their homes, and that Sam^l Calton & Jon^a Hart who had the small pox in their passage do come ashoar at the same house in the South field in order to their being further cleans'd & air'd."

"At a meeting of the Selectmen present, M^r Orne, Cap^t Plaisted, Cap^t Barnard, M^r Ward, Tho^s Barton. Octob^r 16th, 1730.

Ordered, Whereas information is given that there are some careless persons that going to & from Marblehead in this time of their visitation of the small pox and that some has been to visit the sick there which put us much to fear the danger of infection thereby—Wherefore the Selectmen do take this oportunitie of a town meeting for choosing of jurymen to give out a warrant, to advise with the Town what may be proper to be done for their preservation and that there be instructions given the Selectmen accordingly.

"Ordered, Whereas the Selectmen are informed that Do^r Geo. Jackson of this town is gone to Marblehead in order to visit the sick of the small pox there, and we doubt unknown or without the leave of the Selectmen of that Town, Wherefore it is agreed that the town clerke write to the Selectmen of Marblehead and acquaint them thereof, as also to write to Do^r Geo. Jackson concerning the same, and that we look upon ourselves to be in great danger thereby, and shall take all proper methods to prevent his passing & repassing thither."

"At a town meeting legally assembled Dec. 21, 1730. Voted.— Cap^t Ichabod Plaisted Moderator.

It being accounted unsafe to the inhabitants of this town that the South Ferry in Salem at this time be kept up, to carry & recarry passengers & goods to & from the town of Marblehead, where the infection of the small pox is so prevailing —Wherefore

Voted, That the said Ferry be stopt from y^e 23^d day of December instant untill such time as the Selectmen may judge it safe & necessarie to open the same.

Voted, That no inhabitant of the Town of Marblehead from & after the 25th instant be admitted to reside in this Town within the Town Bridge, as an inmate, boarder, or tenant, untill such time as the Selectmen may judge they can be allowed with safety, nor in the out parts of the town without leave of the Selectmen.

Voted, That there be a committee of five persons chosen to be assisting to the Selectmen in case the small pox should come into this town.

Voted, To serve on this committee, M^r James Lindall, Cap^t Joseph Hathorne, Cap^t Tim^o Orne, M^r Sam^l Barton, & M^r Warwick Palfrey."

In this vote of Decr. 21, 1730, we have the germ from which was developed our modern Board of Health. The five citizens selected for this auxiliary function were of our best. In the year 1730 the small-pox was making itself a troublesome factor in public affairs. A Provincial Act was passed empowering the several Courts of Justice to abandon the shire-towns when threatened, and hold lawful terms in towns not affected, and the General Court itself was driven out of Boston by the pest, sitting in the "College Hall" at Cambridge & in the East Meeting House at Roxbury.

The next year produced the following Provincial legislation :

An Act to prevent persons concealing the small-pox.

Whereas it has been represented that the small-pox has been designedly concealed in divers families within this province, which practice greatly tends to the spreading of that mortal distemper ; for remedy whereof,—

Be it enacted by His Excellency the Governour, Coun-

cil and Represent[ati]ves in General Court assembled, and by the authority of the same,

[Sect. 1.] That from and after the publication of this act, when any person is visited with the small-pox, in any town of this province, immediately upon knowledge thereof, the head of that family in which such person is sick, shall acquaint the selectmen of the town therewith, and also hang out, on a pole at least six feet in length, a red cloth not under one yard long and half a yard wide, from the most publick part of the infected house, the said sign thus to continue till the house, in the judgement of the selectmen, is thoroughly aired and cleansed; upon penalty of forfeiting and paying the sum of fifty pounds for each offence, one-half for the informer and the other half for the use of the poor of the town where such offence shall be committed, to be sued for and recovered by the treasurer of the town, or the informer, by action, bill, plaint or information, in any of his majesty's courts of record; and if the party be unable or refuses to pay such fine, then to be punished by whipping not exceeding thirty stripes.

And be it further enacted by the authority aforesaid,

[Sect. 2.] That when the small-pox is in any town of this province, and any person in said town, not having had the same, shall then be taken sick, and any pustulous eruptions appear, the head of that family wherein such person is, shall immediately acquaint one or more of the selectmen of the town therewith, that so the sd selectmen may give directions therein; upon penalty of forfeiting the sum of fifty pounds, to be recovered and applied for the uses aforesaid, the whole charge to be born by the person thus visited, if able to defrey the same, but if in the judgement of the selectmen of the town such person is indigent and unable, then the said charge to be

born by the town whereto he or she belongs: *provided, always*, that this act shall not be understood to extend to persons in any town where more than twenty families are known to be visited with the small-pox at one and the same time.

[Sec. 3.] This act to continue for the space of ten years from the publication thereof, and no longer. [*Passed February 2; published February 3, 1731-2.*]

In 1737, the Province Hospital was removed from Spectacle to Rainsford Island, in Boston Harbor.

In 1739, a Provincial act which seems to have been anticipated by the order of our selectmen touching the Marblehead Ferry, and which was extended from time to time for twenty years, provided for the regulation of Ferryways and for the prompt reporting of strangers arriving from neighboring colonies. It was as follows:

An Act to prevent the spreading of the small-pox or other infectious sickness.

Whereas the inhabitants of sundry towns in this province are often exposed to the infection of the small-pox and other malignant, contagious distempers, by persons coming from the neighbouring governments visited with such infectious sickness, and by goods transported hither that carry infection with them,—

Be it therefore enacted by His Excellency the Governour, Council and Representatives in General Court assembled, and by the authority of the same,

[Sect. 1.] That any person or persons coming from any place, in either of the neighbouring colonies or provinces, where the small-pox or other malignant infectious distemper is prevailing, into any town within this province, who shall not, within the space of two hours from their first coming, or from the time they shall first be informed of their duty by law, in this particular, give no-

tice to one or more of the selectmen or town clerk of such town, of their coming thither, and of the place from whence they came, shall forfeit and pay the sum of twenty pounds; and if any person or persons coming into any town of this province, from any such place visited with the small-pox or other infectious sickness, shall not, within the space of two hours, after warning given him or them for that purpose, by the selectmen of such town, depart out of this province, in such case it shall and may be lawful for any justice of the peace of such county, by warrant directed to a constable or other proper officer, to cause such person or persons to be removed, with any their goods that may probably give infection, unto the colony or government from whence they came; and any person remov'd by warrant as aforesaid, who, during the prevalency of such distemper, shall presume to return into any town of this province, without liberty first obtained from such justice, or from the selectmen of such town, shall forfeit and pay the sum of one hundred pounds.

And be it further enacted by the authority aforesaid,

[Sect. 2.] That any inhabitant of this province, who shall entertain in his house any person warned to depart as aforesaid, by the space of two hours after notice given him or her by one or more of the selectmen, of such warning, shall forfeit and pay the sum of twenty pounds.

And be it further enacted by the authority aforesaid,

[Sect. 3.] That it shall and may be lawful for the selectmen of any town or towns near to or bordering on either of the neighbouring governments, to appoint, by writing, under their hands, some meet person or persons to attend at ferrys, or other places, by or over which passengers and travellers coming from such infected places may pass or be transported; which person or persons, so

appointed, shall have power to examine such passengers and travellers as they may suspect to bring infection with them, and, if need be, to hinder and restrain them from travelling till licensed thereto by a justice of the peace within such county, or by the selectmen of the town into which such person or persons shall come; and any passenger, who, coming from such infected place, shall, without license as aforesaid, presume to travail or abide in this province after they shall have been cautioned and admonished, by the person or persons appointed as aforesaid, to depart, shall forfeit and pay the sum of twenty pounds, and be removed thence by warrant as aforesaid.

[Sect. 4.] The several forfeitures arising by virtue of this act, to be one moiety to and for the use of the town where the offence shall be committed; the other moiety to him or them who shall inform and sue for the same, in any of his majesties courts of record within this province.

[Sect. 5.] This act to continue and be in force for the space of three years, and no longer.

[Passed June 15; published June 16, 1739.]

In 1746, June, "The major part of the selectmen together with Thom^s. Barton & Sam^l. Barnard Esq^r. two of His Majestys Justices of the Peace for this County met on acc^t. of Peter Huxford who was sick of y^e small-pox on board y^e sloop "Wheel of Fortune" John Wakefeild master lately arrived from S^t. Eustatia also a boy on board s^d. sloop named William, who was likely to have that distemper, & sent the said Peter & William, by John Webb to y^e care of y^e Keeper of y^e pest house on Rainsfords Island, & y^e s^d. Justices ordered the said sloop up Forrest River under y^e care of Cap^t. Woodbridge."

Town Meeting—May 11, 1747.

On reading and considering the report of y^e Select

men which is as follows; "We in conformity to the vote of y^e town making us a comittee to consider of some sutable place for erecting a Pest House and making an estimate of the charge of such a house, have attended that service and are of opinion that Roach's point on the Neck is the most sutable place for that purpose, and that such a house may be erected & sutablely finished at about the cost of seven hundred pounds old Tenor; which is humbly submitted, by order of y^e Selectmen

Benjamin Browne.

Salem, 11 May, 1747."

Voted, that y^e same be accepted, and that y^e sum of four hundred pounds, old Tenor, be paid out of y^e Town Treasury toward erecting said House, provided y^e sum of two hundred pounds, old Tenor, can be raised by subscription, towards perfecting y^e same.

Voted, that Roach's Point be y^e place for y^e erecting said House.

Voted, that M^r. Stephen Putnam, Cap^t. Jon^a. Gardner, Benj^a. Brown Esq., M^r. John Procter Jun^r., & Deacon Beckford be a committee to get the said subscription and to cause the said House to be erected, and to draw on the Treasurer for the said four hundred pounds & lay out y^e same with what shall be obtained by subscription for y^e purpose aforesaid.

[The subscription seems to have failed and on March 30, 1752, the proposal to build at the Town's charge is negatived in Town Meeting.]

In 1752 an act supplementing the provisions of the act of 1701 in some essential particulars was passed in these words:

An act in addition to an act made and pass'd in the thirteenth year of King William the third, intituled "An act providing in case of sickness."

Be it enacted by the Lieutenant-Governour, Council and House of Representatives,

[Sect. 1.] That when and as often as there shall be brought into any town within this province, whether it shall be from any other town within the province, or from parts without the province, any baggage, cloathing or goods of any kind soever, and it shall be made to appear by the selectmen of the town, or major part of them, to which such baggage, cloathing or other goods shall be brought, to the satisfaction of any one of his majesty's justices of the peace, that there is just cause to suspect such baggage, cloathing or other goods to be infected with the plague, small-pox, pestilential fever, or other malignant, contagious distemper, it shall and may be lawful for such justice of the peace, and he is hereby required, in such case, by warrant, under his hand and seal, directed to the sheriff or his deputy, or any constable of the town in which such baggage, cloathing or other goods shall be, requiring him to impress so many men as said justice shall judge necessary, to secure such baggage, cloathing or other goods to be secured, and said men to set and post as a guard and watch over the house or houses, or other place or places where such baggage, cloathing or other goods shall be lodged; which guard and watch are hereby required to take effectual care to prevent such baggage, cloathing or other goods being removed or intermeddled with by any persons whatever, until due inquiry be made into the circumstances thereof; and in case it shall appear to the said justice highly probable that such baggage, cloathing or other goods are infected with the plague, small-pox, pestilential fever, or other malignant, contagious distemper, said justice is hereby impowred and directed to issue a warrant, under his hand and seal, directed to the sheriff or his deputy,

or the constable of the town where such goods, cloathing or baggage shall be, requiring said sheriff, deputy or constable to remove said baggage, cloathing or other goods, to some convenient house or place from whence there shall be the least danger of the infection's spreading, or being conveyed, there to remain until such baggage, cloathing or other goods shall be sufficiently aired, and until it shall appear to the satisfaction of the selectmen of the town where such baggage, cloathing or other goods shall be, that they be free from all infection; and said sheriff, deputy sheriff or constable, in the execution of said warrant, are impowred and directed, if need be, to break up any house, warehouse, shop or other place or places, particularly mentioned in such warrant, where such baggage, cloathing or other goods shall be; and in case of opposition or resistance, to require such aid and assistance as shall be necessary to effect the removal of such baggage, cloathing or other goods, and repel the force and resistance which shall or may be made thereto.

[Sect. 2.] And all persons are hereby required, at the commandment of either of the said officers having such warrant, under the penalty of forty shillings, to be recovered before the justice granting the same, to assist said officer in the removing said baggage, cloathing or other goods, unless they make an excuse to the satisfaction of such justice; and the charges of securing such baggage, cloathing and other goods, transporting and airing the same, shall be born and paid by the owners thereof, at such rates and prizes as shall be set and appointed by the selectmen of the town where such baggage, cloathing or other goods shall be; and in case of refusal, to be recovered by suit at law by all and every person and persons concerned and employed in and about the business of securing, removing and airing said baggage, cloathing or other goods.

And be it further enacted,

[Sect. 3.] That if need so require, any justice of the peace may, and is hereby impowred, on application to him made by the selectmen of the town in which such infected baggage, cloathing or other goods shall be, to make out a warrant to the sheriff of the county or his deputy, or constable of the town where such baggage, cloathing or other goods shall be, requiring said officer, with the advice and direction of the selectmen of said town, to impress and take up convenient housing or stores, for the receiving, lodging and safe keeping thereof, until the same shall be sufficiently aired, as aforesaid.

[*Passed January 30; published January 31, 1752.*]

This winter of 1751-2 seems to have been a peculiarly disastrous one. The Governor was addressed by the Legislature to appoint a fast for "distress of the Provinces, particularly Small Pox & Fevers;" houses, nurses, and other necessaries for the sick were impressed here, and gates established at the entrances to the town in accordance with the action of the Selectmen which follows. During this year attempts were made in Salem, through anonymous letters, to communicate the small pox to the family of Judge Lynde, afterwards Chief Justice of the Province, and a large reward of £ 500 old tenor was offered, and an Executive proclamation issued for the detection of the offenders.

"At a meeting of y^e selectmen of Salem, March 25, 1752, all present.

Agreed that y^e Clerk forthwith Issue Warrants for a meeting of y^e Freeholders & other Inhabitants of said Town, at y^e Town House on y^e 30th instant at two of y^e clock afternoon, at y^e request of Epes Sargent Esq. & others, To consider the great hazard, y^e s^d Inhabitants are now in of being infected with y^e small pox which prevails

in y^e town of Boston, & in many parts abroad; and if they shall see meet, to order a House to be built at y^e charge of y^e town in some suitable place & fit for y^e reception of all such as may be visited with any Infectious sickness, & to do whatever else y^e town shall judge necessary or prudent for preserving y^e said Inhabitants from y^e said Infection, at this juncture."

"At a meeting of y^e Freeholders & other Inhabitants of y^e Town of Salem, lawfully qualified to vote, March 30th, A. D. 1752.

Voted, Col. Ichabod Plaisted, Moderator of this meeting.

It being put to vote, whether it was y^e mind of y^e Town that y^e Selectmen should take all proper measures to prevent y^e spreading of y^e small pox in case it should come amongst them, it past in y^e affirmative.

It being put to vote whether they would order a House to be built at y^e charge of y^e Town, in some suitable place, & fit for y^e reception of all such as may be visited with any Infectious sickness, it past in y^e negative.

Voted & Order'd, that the Selectmen forthwith erect a Fence across y^e highway at y^e Town Bridge, and y^e highway by y^e South Mills & such other places as they shall think proper; and that they appoint one or more proper person or persons, as a watch & Guard at each of those places, & direct them carefully to examine every person who shall attempt to pass there, and if He, she, or they come from Boston or any other place visited with the small pox, and for that or any other reason the Guard shall judge it probable y^e inhabitants of this Town would be in danger by such persons coming into Town, & having that Infectious Distemper communicated to them, Then to stop & hinder such person or persons, from passing y^e s^d way, or coming into Town any other way, till they have y^e advice & permission of y^e Selectmen. And that y^e town

will indemnify y^e Selectmen and also y^e Guards to be by them appointed, from all cost, charge & damage which shall arise herein.

Voted, that the Selectmen be directed to apply to the Great and General Assembly as soon as may be, and pray that such acts & laws may be made & passed in addition to those already provided in case of sickness, as shall be judged necessary to secure the Inhabitants of this town from all infectious distempers and prevent y^e spread of y^e same in case any person should be visited therewith. And that the s^d Selectmen may joyn with y^e Selectmen of Marblehead, or such as are appointed by that town, in petitioning said Great & General Court for y^e purpose aforesaid."

"At a meeting of y^e inhabitants of y^e town of Salem and of y^e District of Danvers qualified to vote in y^e choice of Representatives, at y^e Court House in Salem, May 18th, 1752.

The Selectmen of said town of Salem being present,

It being put to vote, whether they would make choice of any person to represent them in y^e Great & General Court, appointed to be held at Concord on the twenty seventh instant, pursuant to a precept for this purpose, it past in y^e negative.

Voted, that the Honourable the House of Representatives next to be assembled, be desired not to lay any fine on said inhabitants for not sending a Representative for y^e following reasons, viz^t.—

First, For that it's not owing to any disrespect or design'd affront to that Hon'ble House.

2^dy Because by y^e late division of s^d town of Salem it's at this juncture especially impracticable to choose Representatives consistent with y^e peace of y^e said inhabitants.

3^dy In as much as y^e small pox is in several of y^e fam-

ilys of said town and it's probable will spread, the said Hon^l House would be in great danger of having that infectious distemper communicated to them by y^e Representatives of s^d inhabi^{ts} if any such were chosen, and

4thy As it's probable y^e s^d distemper will spread in said town, and thereby very heavy charges occur to y^e inhabitants they think in that case many of said inhabitants will be unable to bear y^e charge of sending a Representative.

Voted, that a copy of these votes accompany y^e precept."

By Chap. III of a Session begun May 25, 1757, the quarantine legislation was further perfected. The act was as follows :

An act in addition to an act intituled: *An act for regulating the hospital on Rainsford's Island, and further providing in Case of Sickness.*

Whereas in and by an Act Intituled, *An act for regulating the Hospital on Rainsford's Island, and further providing in Case of Sickness, it is provided, That "when and so often as any Ship or other Vessel, wherein any Infection or infectious Sickness hath lately been, shall come to any Port or Harbour within this Province; or when and so often as any Person or Persons, belonging to or that may, either by Sea or Land, come into any Town or Place near the public Hospital within this Province, shall be visited with any infectious Sickness; two of the Justices of the Peace or Select Men of such Place, be and hereby are impowred immediately to order the said Vessel and sick Persons to the Province Hospital or House aforesaid, there to be taken Care of:"*

But no Penalty is annexed to the Breach of the afore-recited Paragraph of said Act: Wherefore, Be it enacted by the Governour, Council and House of Represen-

tatives, That when any Ship or other Vessel, wherein any infectious Sickness is, or hath lately been, shall come to any Port or Harbour in this Province, and either two Justices or the Select-Men of the Place shall order the said Vessel to the Province Hospital; and the Master or Mariners of such Vessel, shall refuse or delay by the Space of six Hours after said Order, given to said Master or either of the Owners of said Vessel, or of the Factors of either of said Owners, to come to sail, if Wind and Weather permit, in order to proceed to said Hospital, the Master of said Vessel shall forfeit and pay the Sum of *One Hundred Pounds*, and suffer six Months Imprisonment; one half of said fine to be to the Informer or Prosecutor, and the other half to the Poor of the Town or District, to which such Port or Harbour belongs; the Offender to be prosecuted in any Court of Justice proper to try the same.

Again, in 1764, Salem was fenced off from her neighbors by the Selectmen, Jany. 21, and a watch ordered, but these precautions were suspended March 8th, and one thousand persons had the disease by voluntary inoculation, out of a population of forty-four hundred.

“ At a meeting of the Selectmen of Salem August 24th, 1772, all present.

The selectmen being informed that Cap^t John Batton had arrived at Salem in a vessel from abroad, & that one of his hands on board was sick of the small pox—

Agreed that an order be sent to said Batton in the form following, viz^t

“ To Capt. John Batton,

Sir, We as selectmen of Salem being impowered & directed by the laws of this Province to take care for preventing the spreading of infectious diseases, more particularly in the case of vessels coming from abroad;

pursuant to said Laws we hereby direct & require you, with all convenient speed, to proceed with your vessel from hence to Rainsford Island, where proper houses & accommodations are provided for the reception of your men infected, or in danger thereof, & for cleansing them and the vessel & goods on board; and you are to take care that none of your men, nor yourself, come on shore here, as you & they would avoid the penalties of the Laws in this case provided. Given under our hands at Salem this twenty fourth day of August, 1772.

(signed) GEORGE DODGE,
 GEORGE WILLIAMS,
 JOHN FELT,
 JOHN GARDNER, 3^d,
 TIM[']^x PICKERING, jun^r."

[The above order was given the same day to Rich^d. Derby, jun^r., Esq^r., to be delivered to said Batton; who proceeded as therein was required.]

We now approach the period at which the general treatment of small pox by wholesale inoculation prevailed. Salem had, by the first census,—that of 1765,—a population of forty-four hundred and twenty-seven souls, five hundred and nine houses, and nine hundred and twenty-three families, and, by the next colonial census of 1786, a population of fifty-three hundred and thirty-seven. Marblehead was as large. October 19, 1773, was opened by Elbridge Gerry, afterwards Vice-President of the United States, and others, on Cat Island, in Salem Harbor, near Marblehead, the first general hospital for inoculation known to have existed in New England, and, it has been also claimed, the first in the country. This establishment accommodated classes of one hundred or more, who remained under treatment four or five weeks. After a few months of success, it was burnt by a mob. Meantime

another similar establishment, like the first a private enterprise, was opened in the Great Pasture near Castle Hill in Salem, Dec. 9, 1773, with a class of 132 patients, a second class of 137 following Jan. 7, 1774, and inoculating hospitals soon became a common and favorite measure of prevention in this region. So virulent was the type of the natural disease prevailing here that winter that sixteen out of twenty-eight persons, suffering with it at the pest-house, died. March 14, 1774, the inhabitants of Salem voted to withdraw the license granted the proprietors of this Hospital for inoculation because the Suttonian or English method there practised had lost caste, to reimburse them for their outlay and to assume the establishment as public property. I take from the Town Records some account of the regulations under which it was conducted. One of the Selectmen was Timothy Pickering, afterwards Adjutant General of the Revolutionary Army and Secretary of War under Washington.

Meeting of Inhabitants of Salem at the Court House there, Sept. 29, 1773, at 4 o'clock in y^e afternoon.

"Voted, that a committee of nine persons be chosen to assist the Selectmen, in stopping the spread of the small pox and removing those who break out with it."

"Voted, John Prince, Benjamin Pickman Esq., John Warden, Richard Derby Jun^r Esq., Cap^t Jon^a Mason, Abraham Watson, Capt. Will'm Pickman, David Mason, & Richard Ward, be the above committee."

"Voted, that the Selectmen be directed to take up and use as many houses as they think necessary for removing those persons who may be infected or break out with the small pox."

[In the autumn of this year an order was cried by Thomas Heather, the town-crier, requiring that cats & dogs be killed, as a precaution against the spread of small-pox.]

Town Meeting, Novem. 1st., 1773.

The Committee chosen at the town meeting of October 27th, made report in the following words, to wit. The Committee appointed by the town at their meeting on the 27th *instant* to consider of a proper place, and to draw up Restrictions & Regulations for inoculating, and to make report thereof to the town, at the adjournment, Report as follows, to wit,—

1. That a Hospital be erected at the southeast corner of the Great Pasture near the land set off from it to the late Co^l. Pickman, on such a spot as the committee shall judge most suitable.
2. That the Hospital be built and furnished by the subscribers and in such manner as they, at a meeting warned for that purpose, shall direct.
3. That in like manner the subscribers shall appoint a committee for building the Hospital, and a Physician or Physicians to attend it.
4. That Overseers be appointed by the town, to manage and direct all the affairs of the Hospital.
5. That before the Hospital be opened, the Overseers shall appoint suitable nurses, cleansers, guards and tenders.
6. That a fence shall be set up at a proper distance from the Hospital; and on some convenient spot, twenty feet distant from the fence, a bar shall be erected; and the guards shall suffer no communication between persons at the Hospital & others, but at that spot and distance.
7. That the guards shall permit none to leave the Hospital, till the cleanser hath certified that they have been properly cleansed and shifted.
8. That the cleanser shall not himself go into, nor suffer others to enter, the clean Room during their residence at the Hospital, and when any persons are

ready to shift, the cleanser shall attend them to the shifting room, and there receive all the apparel worn by such persons during their residence at the Hospital, and after washing and fumigating shall admit them into the clean room, there to put on clean apparel & be discharged; the foul cloaths to be sufficiently washed and cleansed, and then returned to the owners.

9. That one of the guards shall never enter the Hospital; and to him the tenders shall deliver the supplies, at the Bar, beyond which they shall never go; nor handle anything that is brought from the Hospital.
10. That nothing shall be received from the Hospital without the cleanser's allowance; or delivered at the Hospital but by or under the inspection of the Guard.
11. That the nurses, tenders, guards & cleansers shall give bond, to the satisfaction of the Overseers, for the faithful observance of these Regulations, and such others as, for the general good, the Overseers shall from time to time think best to establish.
12. That every ten pounds subscribed shall intitle the subscriber to the admission of one person of his appointment in the first class; and the same Rule shall be observed with all other subscribers, in the same or any succeeding classes, in proportion to the sums they subscribe, such subscription not being less than ten shillings each. And persons subscribing less than ten shillings, and all others who pay their own charges of inoculation, shall be next admitted; & all such admissions shall be by lot, if more apply in any class than the Hospital will accommodate.

13. That on admission each patient shall pay to the Treasurer for the Doctor's fee; and for defraying the other necessary expences of inoculation; and twelve shillings towards paying for the house & furniture, and raising a fund for inoculating the poor. And if these sums should exceed the real charges of inoculation, the surplusage shall go to the Poor's fund.
14. That the Overseers of the Hospital, with the advice of the Overseers of the Poor of the town, shall determine what persons shall be inoculated gratis, or for less than is stated in the thirteenth Article.
15. That no person belonging to other towns shall be admitted into the Hospital to the exclusion of town inhabitants.
16. That a Bond of fifty pounds penalty (but without sureties) shall be given to the Treasurer for each patient to secure the observance of these Regulations, and such others as shall be made by the overseers as before mentioned.
17. That a Treasurer of the Hospital be appointed by the town, & obliged by Bond, to the satisfaction of the Overseers, to observe the duties of him required by these Regulations.
18. That the Treasurer give a receipt to each subscriber upon his payment of the money subscribed.
19. That the committee for building and furnishing the Hospital, draw upon the Treasurer for what monies they need; but that the Treasurer make no other payments without order from the overseers; and that he account with them from time to time, at their request, for all monies by him received.

20. That whenever requested the Treasurer and Overseers shall lay all the Hospital Accounts and transactions before the town for examination.

All which is submitted by

ABRA ^m WATSON	}	The Committee.
RICH ^d WARD		
ELIAS HASKET DERBY		
BARTH ^o PUTNAM		

[NOTE. Co^l. Benja^a Pickman the other of the Committee was out of town when the foregoing report was made.]”

The foregoing Report, having been read, was accepted; and the twenty articles thereof were voted, one by one.

Voted, that there be five Overseers to manage and direct all the affairs of the Hospital. Then the following persons were chosen Overseers by five several votes, in the order they here stand. Jonathan Gardner jun., Stephen Higginson, Timo. Pickering jun., John Prince & William Pickman.

Voted, Benjamin Pickman Esq. Treasurer of the Hospital.”

[March 14, 1774, the town assumed the Hospital as public property.]

Town meeting, March 17, 1777, at 9 o'clock in the morning.

“Voted, that the Hospital in the great Pasture be opened for inoculating for the small pox.”

“Voted, that a committee be chosen to draught regulations for the above Hospital.”

“Voted, that this Comm. consist of five persons viz: Bart^w Putnam, Nath^l Whittaker, Jacob Ashton, John Andrew & W^m Wetmore.”

Town Meeting, March 18, 1777.

“Voted, that five persons be chosen as overseers of the

Hospital for inoculating for the small pox & the following persons were chosen, viz: Jonathan Peele j^r, John Gardner y^e 3^d, Capt. Sam^l Williams, Rich^d Ward, & Rich^d Manning.

“Voted, that one person be a Comm^e. to wait on Doc: Holyoak to ask his present attendance here & that Nathan Goodale be this person.”

“Voted, that a treasurer be chosen for the Hospital.”

“Voted, that Joseph Henfield be this Treas^r.”

“Voted, that the town make choice of Edw^d A. Holyoak Esq. as a physician to take care of the Hospital for inoculating for the small pox.”

“Voted, that the overseers treat with Doc. Holyoak respecting the terms in his attending at the hospital.”

“Voted, that the twenty one Articles now read to the town respecting the Hospital be adopted & accepted.”

Town Meeting, Mch. 21, 1777.

“Voted, that an addition of one person be added to the Overseers for the Hospital for inoculation for the small pox, & that John Gardner be this person.”

“Voted, that the town empower the overseers of the Hospital to make application to three Justices, or if 'tis found necessary to the Court of Sessions within this County for liberty to open s^d Hospital.”

“Voted, that this meeting be adjourned to the 10th of April next, & that the town then consider those seventeen setts, or Rooms who applied to go in to the Hospital, but was excluded by lot, whether they shall have the preference to any other of the inhabitants of the town.”

Town Meeting, April 10, 1777.

“Voted, that those seventeen setts of persons who applied to go into the Hospital, but was excluded by Lot, shall not have any preference as to admission any more than any other inhabitant of this town.”

[March 28, 1777, a class of 149 was admitted; May 2, a class of 227; and June 5, a third class of 214.]

Meeting of Selectmen, May 30, 1777.

“Order’d that the town clerk forthwith issue out Warrants to warn the freeholders, & other inhabitants of the town of Salem, lawfully qualified to vote in town affairs, to assemble at the town house, on Monday, the second day of June next, at nine o’clock in the forenoon,— to consider & determine upon the petition of Ichabod Nicholls & others whether the town will consent that a general inoculation for the small pox shall take place throughout the town, or any part thereof, or whether they will do any thing respecting that matter.”

Town Meeting, June 2, 1777.

“The question was put whether the town will consent that a general inoculation for the small pox shall take place, throughout the town, & it unanimously passed in the negative.”

“Voted, that a certain number of houses in the town be taken up for the purpose of inoculation.”

“Voted, that three persons be a committee for the above purpose.” “For this Committee Geo: Crowningshield, Benj^a Ward, & Sam^l Williams.”

“Voted, that the above Comm. post up notifications desiring all persons (inhabitants of Salem) who have a mind to receive the small pox by inoculation to give in their names to the Comm: chosen for that purpose.”

“Voted, that y^e report of the Comm. to take up Judge Lynde’s Castle hill house for inoculation be not complied with.”

Our Maritime importance was promptly recognized at the outbreak of the Revolution as it had been in the previous French war. Washington took command of the armies at Cambridge, July 3, 1775, and without awaiting

the tardy movements of Congress, at once applied himself to extemporizing a navy. To this end he sent agents to Salem, Beverly, Marblehead and other ports to search out able seamen and fast sailing craft, and commissioned these to "take and seize all such vessels as are employed for the purpose of aiding and assisting the ministerial troops or navy." We fitted out in this war at least one hundred and fifty-eight private armed vessels from Salem carrying probably 2000 guns, and of this fleet, which brought in about four hundred prizes, we lost fifty-four sail. The tonnage of Salem declined from 9,223 tons in 1771 to 8,652 tons in 1781, but it increased so rapidly after the close of the war as to have nearly doubled in a decade and to have reached in 1800, twenty-five thousand, and in 1807, forty-three thousand six hundred tons. Our brilliant commercial period dates from the close of the Revolutionary War, and doubtless the impetus which our extensive privateering gave to seamanship and ship-building explains its origin. The adoption of the Federal Constitution seems to have given it another impulse, and probably the turbulence prevalent in Europe, during the wars of the French Revolution, helped our commerce. Until the war of 1812, it left no check. Before 1789, Elias Hasket Derby's barque "Light Horse" had opened American trade with St. Petersburg, leaving port June 15, 1784; his ship "Grand Turk" with the Isle of France and China, clearing, Nov. 28, 1785; in 1787-8 his ship "Atlantic" was the first American craft to display our flag at Surat, Bombay, and Calcutta.³ By the census of

³ One of his vessels is claimed to have been the first to show the stars and stripes at Siam, and on April 26, 1798, his ship "Recovery," Capt. Joseph Ropes, master, left Salem for Mocha, arriving there Sept. 9, in advance of all other American vessels. Salem vessels were the first to display the American flag at the Island of Java, in 1796; and Nov. 3, 1795, the schooner "Rajah," of 130 tons burthen, carrying four guns and ten men, built for Jonathan Peele and commanded by Capt. Jonathan

1790, Salem had a population of seventy-nine hundred and twenty-one; by that of 1800, a population of ninety-four hundred and fifty-seven. In 1812, we had eight hundred seamen afloat, and imperilled by the declaration of war, in a population of less than thirteen thousand.

Notwithstanding these new commercial relations our Quarantine system modified itself but slowly and little was done save under the pressure of sudden epidemic. Licensed tenements were still resorted to as late as 1792 for the treatment of the small pox by inoculation, as appears from votes which follow, and for several years after, there was great uneasiness, manifested in legislative resolves, executive proclamations and local regulations, on account of the threatening approaches of yellow fever. General inoculations were common, down to the introduction of vaccination in 1796. These prevailed during the British occupation of Boston and New York. Gen. Washington was inoculated at New York June 27, 1776, and may have submitted to something like the heroic treatment by Glauber's salts, pill-cochiæ, emetics, Indian meal gruel with molasses, and drum and fife exercise, which prevailed at the general hospitals of that day.

Town Meeting, Oct. 19, 1792.

“Voted, that the Barracks at the New Fort (so called) be licensed to be open for inoculation for the small pox, together with the house now improved by Mr Perkins on the Neck (so called) subject to such Restrictions & Regulations as may hereafter be agreed on.

Carnes, cleared from Salem under secret orders, leading the way to the Island of Sumatra, threading unknown seas without chart or pilot, the pioneer of a great flotilla, and getting off with the first cargo of pepper in bulk ever brought to this country. Joseph Peabody's ship "Franklin" from Boston, commanded by Capt. James Devereux of Salem, was the first American vessel to open trade with Japan, and the second to enter was the ship "Margaret" of Salem, Capt. Samuel Derby, master, which left Salem harbor, Nov. 25, 1800, and July 19, 1801, fired her salutes in the port of Nagasaki.

Voted, that the house of Joseph Metcalf be licensed to be open for inoculation for the small pox to be under such restrictions & regulations as may hereafter be agreed on.

Voted, that the two houses at Castle Hill be licensed to be open for inoculation for the small pox, to be under such restrictions & regulations as may hereafter be agreed on.

Voted, that the farm house in South Fields owned by Col^o Pickman & improved by M^r Boynton be licensed to be open for inoculation for the small pox to be under such regulations as may hereafter be agreed on.

That the Selectmen be impowered to open such houses for the purpose of inoculation for the small pox, as they may hereafter have occasion for & think necessary.

Voted, that a Committee be appointed to superintend the inoculation at the Neck, for the Barracks, Perkins's &c., such houses, & the patients, to be subject to such restrictions and regulations in every respect as they may prescribe, with the advice & consent of the Selectmen. For this Committee, Cap^t Edw^d Allen, Cap^t Benj. Ward & Cap^t Jon^a Mason.

That a Committee be appointed to superintend the inoculation at Castle Hill, M^r Metcalfs house, & Col^o Pickmans farm house, together with such other houses as may hereafter be licensed by the Selectmen for inoculation for the small pox. The patients and such houses, to be under such restrictions & regulations in every respect as they may prescribe with the advice and consent of the Selectmen.

For this Committee M^r Jn^o Norris, Jn^o Treadwell Esq., M^r Nat Ropes, Deacon Holman and Deacon Sanderson."

At last, in 1797, probably under the stress of this yellow fever panic, quarantine regulations were placed on a new

footing by an act, passed June 22, repealing much of the earlier legislation, codifying the rest of it, and establishing a system which, with some modifications, has endured. I omit this act, which may readily be referred to [Chap. XVI, of 1797,] because many of its provisions, bearing upon the health of Salem, were embodied, two years later, in a special act for this town, which I insert. The latter was drawn by the Hon. William Prescott, and became a law simultaneously with a similar act for the town of Boston, June 21, 1799. Since the passage of this act and the modification of it which follows, passed June 16, 1800, little change has been made in the State quarantine legislation touching Salem, and such modifications of detail or method as have occurred seem to be without interest for the historical student.

[ACTS OF 1799, CHAP. XIII.]

An act to empower the Inhabitants of the Town of *Salem* to choose a Board of Health, and for removing and preventing Nuisances in said Town.

[Sect. 1.] *Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, That the freeholders and other inhabitants of the Town of Salem, qualified to vote for Town Officers, may on the first Monday of April annually, or at any other meeting legally called for the purpose, choose a Board of Health, consisting of nine persons, not less than two of whom shall be chosen out of each Ward in said town; the members of which Board of Health shall elect a President, and a Clerk whose duty it shall be to record the votes and doings thereof; and in case of the death or resignation of any one of the members of said Board, the said freeholders or other inhabitants may, at*

any meeting legally called for the purpose, elect a member out of the same Ward, to supply his place.

[Sect. 2.] *Be it further enacted*, That it shall be the duty of the Board of Health, and each member thereof, to examine into all nuisances and other causes injurious to the health of the inhabitants; whether the same shall be caused by stagnant waters, drains, common sewers, slaughter-houses, tan-yards, fish, fish-houses, docks, necessaries, hog-sties, putrid animal or vegetable substances, or any other cause of whatever kind, which in his or their opinion may be injurious to the health of the inhabitants as aforesaid. And upon complaint on oath being made to any Justice of the Peace by any member of said Board of Health, or other person, that he suspects any of the nuisances or causes aforesaid to exist in any dwelling-house, cellar, store, other building, ship or vessel, it shall be the duty of such Justice to issue his Warrant, directed to the Sheriff of the County of *Essex* or his Deputies, or to any Constable of the town of *Salem*, commanding him or them forcibly to enter, and, together with a member of said Board of Health, to search the same in the day time, and upon the discovery of such nuisance, or other cause, injurious to the health of the inhabitants, to remove the same.

Provided however, That no Sheriff, or Deputy Sheriff, or Constable, shall execute any civil process, either by arresting the body or attaching the goods and chattels of any person or persons, under color of any entry made for the purposes aforesaid, unless such service could by law have been made without such entry; and all services so made under color of such entry, shall be utterly void, and the officer making such service shall be considered as a trespasser to all intents *ab initio*. And any person or persons who shall resist such search, shall forfeit and pay the sum of *twenty dollars*, to be recovered in manner hereinafter provided. And it shall be the duty of the Board of Health, upon the discovery of any such nuisance or

other cause injurious to the health of the inhabitants of said town, forthwith to remove the same; and upon complaint to any Justice of the Peace within the said town or in said County, made upon oath by one or more of the said Board of Health, briefly therein stating the facts, together with the costs of such removal, such Justice shall grant a Warrant, therein expressing the substance of the said complaint, directed to the Sheriff of the County of *Essex*, or his Deputy, or any Constable of the town of *Salem*, commanding him to notify and require the person or persons in whose possession, or upon whose estate such nuisance or other cause aforesaid existed; or in case of his absence, his agent or attorney, to appear forthwith before such Justice; and if such person or persons shall neglect then and there to appear, or appearing shall not shew good cause, to the satisfaction of said Justice, why judgment should not pass against him or them; the said Justice shall then and there adjudge that such person or persons shall pay a fine of *thirteen dollars*, and the costs of such removal, and double costs of prosecution; and shall thereupon issue his Warrant, directed to the Sheriff of the county of *Essex*, or his Deputy, or any Constable of the town of *Salem*, thereby commanding him to levy the expence of said removal, together with said fine and double costs, on the goods and estate, and for want thereof, on the body of the said occupier or proprietor of the house, land, cellar, docks, store or vessel in which said nuisances existed; and said fine shall be paid over to the Town Treasurer for the use of the said town. *Provided always*, That any person or persons aggrieved at any judgment of a Justice, passed against him or them, as aforesaid, shall have a right to appeal therefrom, to the Court of General Sessions of the Peace, then next to be holden within and for the County of *Essex*, who shall hear and determine on such complaint, with or without the intervention of a Jury, as the case may require, and thereupon render such judgment as the Justice is herein before authorized to do in an original complaint

to him, with additional costs; and the judgment of said Court thereon shall be final. *Provided nevertheless*, That no such appeal shall be granted, unless the respondent shall claim the same on the day on which the Justice's judgment shall be rendered, and shall enter into recognizance with two sufficient sureties to prosecute said appeal with effect. And said Board shall have authority to appoint Scavengers, and such other Officers to assist them in the execution of their office, as they shall judge necessary; for payment of whom, and all necessary expences which may arise in the exercise of their office, the said Board shall be authorized to draw upon the Treasurer of said town.

[Sect. 6.] *Be it further enacted*, That whenever it shall appear to the said Board of Health, that the safety of the inhabitants of the town of *Salem* requires that any vessel or vessels, which shall arrive within the harbor of Salem from any port or place, should perform quarantine, the said Board are hereby required and empowered to cause such vessel or vessels to perform quarantine at such place as they shall appoint, and under such restrictions, regulations and qualifications as they may judge expedient; and any owner, master, or supercargo, officer, seaman or consignee of any vessel, or any other person, who shall neglect or refuse to obey the orders, directions, rules, regulations, restrictions, or qualifications of the said Board of Health respecting said quarantine, and shall be thereof convicted upon indictment, or information, before the Supreme Judicial Court, or Court of General Sessions of the Peace, held in said County of *Essex*, shall be fined a sum not exceeding *five hundred dollars*, or be imprisoned for a term of time not exceeding six months, or both, at the discretion of the Court, having cognizance of such offence.

[Sect. 8.] *Be it further enacted*, That no master of a vessel, or other person, shall remove from any vessel in the

harbor, or lying at any of the wharves in *Salem*, any sick or diseased person, before the name of such sick or diseased person has been reported to the Board of Health, and a written permit obtained from at least two of them, authorizing such removal, and expressing the manner thereof, the time when, and the place to which such person shall be removed. And any master of a vessel, or other person, who shall remove such sick or diseased person, without first obtaining such permit therefor, or contrary to the tenor and directions thereof, shall, on conviction before the Court of General Sessions of the Peace, in said County, be fined a sum not exceeding *one hundred dollars*, or suffer imprisonment not exceeding two months, or both at the discretion of said Court.

[Sect. 10.] *Be it further enacted*, That every diseased mariner or other person, who shall be removed or sent to any hospital or other place by the said Board of Health, shall be there kept and maintained at his or their own cost and expence, or his or their parent's or master's, (if able), otherwise at the charge of the town or place to which they belong, and in case such person or persons have no legal settlement in any town or place within this State, then at the charge of this Commonwealth; and every person sent to any Hospital or Place for the purpose of purification as aforesaid, shall be subject to the same restrictions as are provided by the seventh section of an Act of this Commonwealth, passed the twenty-second day of *June*, one thousand seven hundred and ninety-seven, entitled, "*An act to prevent the spreading of contagious sickness.*"

[Sect. 11.] *Be it further enacted*, That no person, excepting those employed by or under the Board of Health, shall go on board any vessel, during the time she is performing quarantine, nor shall any person go within a line designated upon the land, at the place appointed for cleansing and purifying vessels; and every person who

shall transgress in either of these cases, shall be considered as contaminated with infection, and held to undergo purification, in the same manner, and under the same regulations and restrictions, as those performing quarantine at such place, and shall there remain until discharged by the visiting Physician ; and the said Physician, or the person employed by the Board of Health, to superintend such place, may forcibly detain such person.

[Sect. 12.] *Be it further enacted*, That if any vessel subject to quarantine, shall come into the harbor of *Salem*, it shall be the duty of the Board of Health, or any two of them, to order the master or person, having the command of said vessel, immediately to proceed with her crew, passengers and cargo, to the place by them appointed for cleansing and purifying vessels ; and in case the said master or person, having the command of said vessel, shall refuse or neglect so to do for the space of one hour after said order, he shall, on conviction before the Supreme Judicial Court, or Court of General Sessions of the Peace, forfeit and pay a fine not exceeding *one thousand dollars*, or suffer imprisonment not exceeding six months, or both, at the discretion of the Court ; and the said Board of Health, or any two members thereof, on any neglect or refusal as aforesaid, shall have full power and authority forcibly to enter on board such vessel, and to require the assistance of as many persons as they shall judge necessary, and proceed with said vessel, her crew, passengers and cargo to the place appointed for cleansing and purifying vessels ; the expence of which removal shall be paid by the owner of such vessel, and shall and may be recovered by an action of the case in any Court competent to try the same ; and any person who shall refuse to give his assistance when required, shall forfeit *thirteen dollars*, to be recovered by an action of debt.

[Sect. 13.] *Be it further enacted*, That all the powers and duties which are given to and required of the Se-

lectmen of the town of *Salem*, by a certain law of this Commonwealth, passed the twenty-second day of *June*, one thousand seven hundred and ninety-seven, entitled "An Act to prevent the spreading of contagious sickness," shall be, and they hereby are transferred to and made the duty of the said Board of Health, anything in said law to the contrary notwithstanding.

[Sect. 14.] *Be it further enacted*, That the said Board of Health, be, and hereby are empowered from time to time, to choose a suitable and discreet person to act as a visiting Physician to said Board; whose duty it shall be to visit all vessels coming from any place or places in which the said Board shall think any contagious sickness prevails; and such Physician shall be under direction of said Board, and may be removed by them, whenever they shall see cause.

And whereas by the eleventh section of the Act of this Commonwealth, entitled, "An Act to prevent the spreading of contagious sickness," it is enacted, that each town and district in this Commonwealth, may at their meeting held in *March* or *April* annually, or at any other meeting legally warned for that purpose, when they shall judge it to be necessary, choose and appoint a Health Committee, in the manner and for the purposes in said eleventh section mentioned.

[Sect. 15.] *Be it enacted*, That so much of said law as respects the future appointment of a Health Committee for the town of *Salem*, be, and the same is hereby repealed, and that the Board of Health to be appointed by virtue of this Act, be, and they hereby are made and shall be the Health Committee for the town of *Salem*, and be invested with all the powers and duties, which are granted to or imposed upon said Health Committee in and by said Act.

[Sect. 16.] *Be it further enacted*, That all penalties and forfeitures arising from this Act, except in those cases in which it is herein otherwise provided, shall accrue to the

use of the town of *Salem*, and shall be prosecuted and recovered by action of debt in the name of the President of the said Board of Health, or by information in any Court competent to try the same. And it shall be the duty of the Board of Health and of each member thereof, to pursue and enforce the due execution of the foregoing law, and prosecute all offenders for all penalties and forfeitures which may accrue under the same.

[*This Act passed June 21, 1799.*]

[ACTS OF 1800, CHAP. XX.]

An Act in addition to an act, entitled, "An Act to empower the inhabitants of the Town of Salem to choose a Board of Health, and for removing and preventing nuisances in said Town," and for repealing part of said Act.

[Sect. 2.] *Be it further enacted*, That any master or commander of any vessel, who shall enter the harbour of *Salem* with his said vessel, after notice given to him by any person or persons whomsoever, that quarantine has been directed by said Board of Health for all vessels coming from the port or place from which such master or commander shall have arrived, or who shall falsely or fraudulently attempt to elude the directions of the said Board of Health, by false and unfounded declarations of the port or place from whence he came, or as to the sickness or deaths which may have happened on board said vessel, during her then last voyage, or who shall land, or suffer to be landed from his vessel, any person or apparel, bedding, goods, or merchandize whatsoever, without the permission of the said Board of Health, every such master or commander, shall, upon conviction thereof in manner and form pointed out in the sixth section of the act to which this is an addition, forfeit and pay a sum not exceeding *five hundred dollars*, or suffer imprisonment for

a term not exceeding six months, or both, at the discretion of the court having cognizance of the offence.

[Sect. 3.] *Be it further enacted*, That whenever the visiting Physician of the Board of Health, shall think it necessary that any vessel should be purified and cleansed and perform quarantine, he, or any other person authorized thereto by the Board of Health, may direct the master or commander of such vessel to proceed to, and anchor at such place as the said Board of Health shall have appointed for cleansing, and purifying vessels: And it shall be the duty of said Physician to apply to the Board of Health to direct the time and manner in which such purification shall take place, and the expenses shall be defrayed by the master, commander, owner or consignee, to be recovered by an action of the case in the name of the President of the Board of Health; and each and every master, commander, owner or consignee of every such vessel, who shall neglect or refuse to comply with such directions, shall, on conviction thereof, before the Court of General Sessions of the Peace, be fined, not exceeding *one thousand dollars*, or suffer imprisonment for a term, not exceeding six months, or both, at the discretion of the Court.

[Sect. 4.] *Be it further enacted*, That all pecuniary penalties and forfeitures, arising from this act, shall accrue to the use of the town of *Salem*, and shall be prosecuted for, and recovered by action of debt in the name of the President of the said Board of Health in any Court competent to try the same, excepting in those cases in which it is herein otherways provided: And that the fourth, seventh, and ninth sections of the act to which this is an addition, be, and the same are hereby repealed, excepting so far as respects the recovery of any fines, or forfeitures already incurred thereby.

[*This Act passed June 16, 1800.*]

I hesitate to extend this statement further because I find nothing in the modern record which is distinctive or

characteristic of the place. Of course, in common with the country at large, in 1831-2, we had our cholera scare, but the distemper gained no foothold. Salem accepted a City Charter in 1836, and, in 1839, passed a Health Ordinance which has been in operation with little amendment since. Under the act of 1799, a Board of Health was at once established, July 1, and, July 5, a new Health House at Watch House Point had been contracted for, a Port Physician engaged, a boat bought, quarantine established at the Junipers, and two boarding officers secured. The board met every Monday morning at eight o'clock at the Court House, and showed commendable zeal and vigor in combating the approach of "Disorders from abroad." They describe this as the "primary object" of the act and resolve by vote that "they will see the act in full effect," especially as regards quarantine, "that part of their duty which is disagreeable and expensive." Now it is arrivals from "Philadelphia or any port within the Delaware," now from "Gibraltar and the Mediterranean," now "from Havana and St. Thomas," and again "from the Chesapeake," which give occasion for their vigilance. But the modifications of the system which have from time to time occurred, and the measures taken by our Board of Health from that day to the present have been so substantially in accord with those adopted all over the country, and especially in seaport towns of about our own size, that I do not feel at liberty to extend this already protracted account by a recital of them.

I am, Gentlemen, very respectfully
and truly yours,

ROBERT S. RANTOUL.

Salem, March, 1882.

4198. Aug. 15, 1882.

BULLETIN

OF THE

ESSEX INSTITUTE.

VOL. 14. SALEM: APRIL, MAY, JUNE, 1882. Nos. 4, 5, 6.

REGULAR MEETING, MONDAY, JANUARY 16, 1882.

MEETING this evening. The PRESIDENT in the chair. Records read. Donations and correspondence announced.

MR. JOHN H. SEARS read a communication on "The Forest Trees of northern New York;" a continuation of his remarks at a previous meeting (Monday, Dec. 19, 1881). The subject was discussed by Messrs. F. Israel, D. B. Hagar, R. C. Manning, John H. Sears, and the chair.

The chair alluded to a recent communication from the Secretary of the Virginia Historical Society, announcing the gratifying intelligence of its good fortune in obtaining ample accommodations for the arrangement of its library and collections; also its intention of renewing its publications, in printing some of the valuable manuscripts in its possession relating to the early history of the Old Dominion, and of many of its illustrious sons who took a conspicuous part in the formative period of this republic of states.

After a consideration of the subject of a Winter Field Meeting, adjourned.

REGULAR MEETING, MONDAY, FEB. 6, 1882.

AT the meeting this evening, Messrs. Lawrence E. Millea of Salem, and George Plumer Smith of Philadelphia, were elected members.



WINTER FIELD MEETING.

On Saturday, Feb. 11, at a little after ten o'clock A. M., a party of some fifty persons left Plummer Hall in two open sleighs for Wenham Lake. The day was brilliantly fair, the going fine, and, but for the two postponements necessitated by the great snowstorms of the preceding week, the attendance, as indicated by applications for places, would have been much larger. Arrived at the Lake at about eleven o'clock, an hour was passed in observing the various processes of cutting, gathering and storing ice. Large and hurried operations were in progress, since the ice-crop was a little late this season, and the Lake, its crystal surface sparkling in the noonday sun, presented a unique and busy scene. Every possible facility was extended in the most hospitable spirit by Mr. Durgin, the local agent, and by the employés, who conducted the business of harvesting the crop for Messrs. Addison Gage & Co. Other firms own ice-houses at the southern end of the Lake where large gangs of men were at work, but these were not visited.

The number of men and horses employed during the winter at Wenham Lake depends upon the quantity of snow which may fall. The winter of 1881-2 was exceptional as to its snow-fall, the two storms of January 31 and February 4 aggregating thirty inches on a level.

During the scraping, which continued almost uninterruptedly from the day the ice was thick enough to bear a horse until the last block was housed, about seventy horses and one hundred men were employed by the Messrs. Gage & Co. in that department, the cutting and housing requiring about two hundred more men.

The hoisting capacity of one chain is 6,000 tons per day. The elevator is designed for two chains which will be used when permanent houses are erected, the engine being of sufficient power to carry two. This will be at the rate of twenty-five tons per minute, through the working hours. No packing material is used in the body of the ice, but it is covered to the depth of eighteen inches with clean meadow hay. The men and teams employed are from the neighboring farms. This winter husbandry distributes large sums of money among the young farmers who have little for their hands or their teams to do at this season, even shoemaking—their old-time resource—having deserted the country, roadside shoe-shop for the crowded factory in town.

The Ice property now owned by Addison Gage & Co. at Wenham Lake was created in 1845 by Charles B. Lander of Salem who, with his brother, Genl. Frederick William Lander, and their associates, carried on the Ice business under the style of "The Wenham Lake Ice Co."

In 1846 the company made several shipments to London, Genl. Lander acting as its agent, and making quite a reputation for the Wenham Lake Ice.

The enterprise proved a failure, the property remaining idle from 1847 till December 1850 when it was purchased by Addison Gage, and his partners, Jacob Hittinger and Timothy T. Sawyer, who then formed the firm of Gage, Hittinger & Co.

From the date of its purchase until 1859 it was held

more as a reserve than as a source of regular supply, owing to the lack of proper terminal facilities for the loading of vessels.

In 1859 the Eastern Rail Road Company furnished good wharf accommodations at East Boston and up to 1867 the property was "worked" every year, excepting when the crop failed.

In 1866 some of the original houses were taken down and modern ones erected: at the same time, steam hoisting power was adopted in lieu of the old fashioned method of filling by horse power; the intention being not only to increase the storage capacity, but to make the crop more certain by housing the Ice by steam, three times as fast as it was possible to do by horse power. These improvements were hardly completed when the Eastern Rail Road Company raised the freight charge to such a point that the ice could not be shipped at a profit, with an ordinary market.

On the night of November 9, 1873, the first anniversary of the Boston fire, the houses, containing 35,000 tons of superior ice, housed the previous winter, together with the hoisting machinery, were totally destroyed by fire; without doubt incendiary.

The freight charge still being as established in 1866, no attempt was made to rebuild with any view to permanency. Late in 1876, however, the management of the Eastern Railroad, recognizing the importance of the Ice business, made such a proposition, as to induce the company again to utilize the property. A permanent elevator and temporary houses were at once erected and were ready for the crop of 1877 which proved to be a full one, as did those of 1879 and 1881. The crop of 1878 was less than one-half the average yield while that of 1880 was a total failure, a circumstance which seems to have

happened but once before in the history of the establishment.

The whole amount of Ice shipped from Wenham Lake, by the firms of Gage, Hittinger & Co. and Addison Gage & Co. from 1856—the records from 1851 to 1855 inclusive are missing,—to Jan'y 1882 is 353,450 tons, actual car weight, packed on board vessels at East Boston, to ship which it is necessary to cut and house at least 475,000 tons, the difference being the waste in meltage and breakage in handling; of amount the shipped, not over 70 per cent. on the average is landed at the ports of destination, principally the southern ports of the United States and the West India Islands, while not over 33 per cent. of the whole amount shipped is sold.

It is to be observed, therefore, that of the *ton* cut and housed, but a very small portion reaches the consumer.

The Wenham Lake Ice still maintains the high reputation which it immediately acquired on its introduction into the market, and to-day is advertised as sold in all the large cities of the United Kingdom, although not a ton of it has reached there excepting, perhaps, in the refrigerator of a Cunarder, for over thirty years.

In nearly all those cities there is a Wenham Lake Ice Company, but the ice which they sell is from Wenham Lake, Norway, not from the one we know so well and have enjoyed so much.

The ice at this time was 14 inches thick and several acres of surface were ready for storing, being cleared of the recent snow fall by a horse-power scraper,—grooved and ploughed by other machines similarly propelled and lifted into the store-houses by steam power on the elevator, a mechanism not unlike the endless apron. Manual labor is only applied at two points of the process. A little hand sawing is required in separating the cakes of ice,

and in their progress through the canals to the elevator. In their distribution in the packing houses, some guidance is required from men who stand by with stout boat-hooks in hand.

At noon the sleighs were refilled and the party driven to the Chebacco Ponds, leaving the opal ice-masses glittering in the snow behind them.

Arrived at Whipple's Hotel at Chebacco Ponds the company were soon seated at a comfortable dinner, after rising from which they met in the adjoining hall and were called to order by the President of the Institute, Dr. WHEATLAND, who opened the afternoon session at about 3 o'clock with some historical account of the locality, alluding to the old, unpainted, provincial farm-house, with lean-to roof and little window-glass, which the hotel had replaced, and to the Knowlton and Burchstead families, which had owned it. In his early scientific rambles he had often been led there by botanical research, and recalled the hospitality and kindness with which, a half century ago, an old matron of the place cooked the pickerel he and his young associates used to catch in the pond and furnished from her dairy and cupboard the needful accessories of a midday meal.

He then introduced Mr. ROBERT S. RANTOUL who said that, twenty years ago, he had occasion to inform himself very accurately and exactly about the nature of Wenham Pond water, for he was taking a position in advocacy of its introduction into Salem, which position was thought unbecoming by many excellent persons and severely criticised by some of his best friends; and it was necessary for him to be very sure indeed that he was making no mistake about its quality and abundance. He therefore collected and collated all the printed and scientific evidence he could find and then, by repeated visits and

inspections of the pond itself, gathered all he could learn by word of mouth, from life-long residents near it, and from the living evidence of his own senses.

Mr. Rantoul proceeded to read extracts from a mass of notes thus accumulated, most of which are to be found in print in *Histor. Coll. Essex Institute*, Vol. VI, pp. 82-3 and 141-52 and Vol. VIII, pp. 118-23, and commented on these extracts in the light of his recent European experience. He felt that if the people of Salem were more accustomed to leave home, they would appreciate more fully the blessings of Wenham Water, and he cited the evidence of its superior excellence and fame which he had collected from such authorities as Faraday, Dr. Charles T. Jackson, Sir Charles Lyell, Sir Francis Bond Head, Professor Chase of Brown University, the historians Alonzo Lewis of Lynn, and Dr. Allen of Wenham, and "Wilmer and Smith's European Times."

Rev. GEO. H. HOSMER, of the East Church, Salem, spoke of the interest with which these remarks had been listened to, and added that when a boy, living in another part of the country, he had taken part in an amateur performance of an English play called "The Serious Family" in which a feast was described, and among the delicacies enumerated was "Wenham Ice." This he had supposed to mean some English variety of ice cream unknown in this part of the world. He was amused on moving east, to find himself a neighbor of Wenham Lake and a consumer of its ice and water.

Mr. JOHN H. SEARS, of the Peabody Academy of Science, at Salem, then addressed the gathering, illustrating what he said about "Buds and the ramification of Branches" with a collection of twigs he had made from the neighboring forest trees. He said the time of the year was favorable for this investigation.

Branches are secondary stems developed from a primary one. When the leaves are opposite, as in the Maple, the branches will be opposite, and when they are alternate, as in the Beach, the branches will be alternate. In the axil of each leaf there are normally from one to three buds which are branches in a rudimentary form. In the Maple there are three, one directly in the axil of the leaf which is called the axillary bud, and one on each side called accessory buds. These do not all develop into branches: indeed if all the buds grew into branches there would be as many branches as leaves. In the normal condition the axillary and terminal buds are more fully developed, so that they are ready to commence growth as soon as the season permits, but if the terminal or axillary bud is destroyed, then the accessory buds take their place, so that this mode of development holds sufficiently to determine and exemplify the plan of ramification.

This plan of growth, which is carried out in the Maple, does not hold good in all other trees, as in the Lilac, for example, the terminal always fails and the lateral or accessory buds take its place, producing the forked form of branching.

A similar growth takes place in the Sassafras. Buds and branches can be observed in the winter season with more accuracy than at any other time, as the leaves are all off, giving an uninterrupted view of the whole tree. Every different species of tree has a form or symmetry peculiarly its own, and the nurseryman or botanist is as sure of a tree in the winter as in the summer, provided it is growing naturally or has been pruned by one who understands the natural symmetry of the tree. Certain causes, such as a prolonged season of warm weather, or an unusually severe frost in the early fall, work a marked change in the ramification of branches. In either case the frost kills

back the primary stem which has not become thoroughly ripened, thereby destroying the terminal bud: the result is that a two-forked growth takes place as the accessory buds take the place of the terminal. This is seen in the Red Maple in exposed situations on roadsides and on the borders of fields, but in the groves, where the different trees protect each other, this seldom happens. The principal reason why one cannot study the ramification of branches from shade trees in cities and towns is because, first, in transplanting, it is thought to be necessary to prune the stem and branches to make them correspond with the roots which have been mutilated by the spade in the process of removing. This pruning is often performed by persons who do not understand the natural laws which govern the ramification of the branches; the result is, a branch is removed here and there, without any regard to the natural symmetry of the tree.

Thus, as is the case with many of the shade trees growing in Salem and vicinity, the natural plan of the branches is destroyed. Shade trees need pruning but it should be performed by, or under the immediate direction of, some one who knows the natural laws which govern the symmetry of the tree to be pruned. For instance, a tree whose leaves are opposite should not be made to grow branches alternately on the primary stem; nor should we try to grow opposite branches on the stem of a tree whose leaves are alternate, for as soon as this is done the natural symmetry of the tree is lost. With the growers of fruit trees, pruning is often a science, indeed so much so that the nurseryman is always with his assistants to point out each limb that is to be removed, until the men become proficient in the business. But as a natural form of symmetry is not required in fruit trees; a man may be ever so expert in this business and not know how properly to

prune a forest tree so as to keep the original plan of the species. To any one who has given this subject a thought, to see the way in which shade trees in Salem are pruned, it would seem as if all that was required was to saw down as many branches as possible in the shortest possible time. The consequence of this is that, not only has the tree lost many of its fine branches, but its entire beauty, in so far as its natural symmetry is concerned, is lost. In order to understand the ramification of branches it is also necessary to know the plan of the growth of buds and the different species of trees. Buds are the germs of stems; leaf-buds are those devoted to vegetation. Mixed buds contain both foliage and flowers. Commonly, in plants that live from year to year, growth is divided into seasons or stages with intervals of repose. In such cases, especially in trees and shrubs, instead of a succession of foliage, the period of interruption is apt to be marked by the production of scales or rudimentary leaves which serve to protect the tender rudiments or growing points within, during the season of rest. This being the winter season in cold climates, Linnæus gave to such bud-coverings the name of *Hibernacula* and from the usual scale-like character of this covering they take the name of scaly buds. Large and strong ones of this kind, such as those of the Horse-chestnut, Magnolia and Hickory, may be taken as the type of this form of buds. In regard to the nature of bud-scales, that they answer to leaves is manifest from a consideration of their situation and arrangement, which are the same as that of the proper leaves of the species, and from the gradual transition from scales to leaves. In the unfolding buds of the Horse-chestnut every gradation may be traced between bud-scales and foliage.

Of the various kinds of buds it is needful to mention some, as there are shrubs and trees even in the coldest

climates whose buds are naked, that is to say, they are unprotected by special scales. Such are the *Viburnum nudum* or Whiterod, and the Hobblebush; the latest pair of leaves and also the flower cymes remain in a nascent state over winter without covering and expand into the first foliage in early spring. In other hardy shrubs and trees the buds are equally destitute of protecting scales, but they are usually minute and hidden in the bark or otherwise inconspicuous. Such examples may be seen in the *Robinia* (Locust) or the *Rhus* (Sumach). In the Plane tree or Buttonwood the buds are called subpetiolar, as they are formed under the base of the protecting leaf-stock, which forms a sheath or inverted cup fitted to and concealing the conical bud until autumn, when by the fall of the leaves the bud is exposed.

Again there are buds of an abnormal and irregular character, being produced without order and from any part of the stem and even from the roots. The latter, like the internodes of a stem, although normally destitute of buds, do produce them under certain conditions, as in the Willow and Popple, when wounded or pollarded. Even leaves may develop buds and then be used for propagation as in the *Bryophyllum*. Such buds are freely produced on the margins of the blade or its leaflets and are called adventitious buds.

At the close of the afternoon session the company returned to Salem.



SALEM, FEBRUARY 20, 1882.

A REGULAR meeting of the Society was held this evening; the PRESIDENT in the chair.

Mr. Austin D. Kilham of Beverly and Mr. C. C. Whittemore of Salem were duly elected members.

The President remarked that before proceeding to the regular communication of the evening it seemed highly appropriate that a tribute of respect be paid to the memory of a son of Salem, Rev. Samuel Johnson, who has long been known for his literary and philosophical writings, and whose brilliant career in the fields of study and research closed in death last evening at his residence in Andover.

The President called on Rev. E. B. WILLSON, who spoke of the life and services of Mr. Johnson, his eloquence in the pulpit, and the purity of his character and motives, relating incidents of his early life and ministry, and the impression his serious earnestness made upon those with whom he came in contact. He referred to the value of his work on Oriental Religions, and the very faithful labor expended upon its preparation, the volumes appearing at wide intervals of time, and only after the most conscientious and exhaustive preparation. Mr. Willson expressed regret that the work was left unfinished, and concluded by relating the following incident of Mr. Johnson's ministry, illustrative of the high appreciation of his character by the Rev. Dr. Flint. Dr. Flint, it seems, from time to time, asked Mr. Johnson to preach in his pulpit. The preaching never failed to call forth remonstrances from some of the doctor's parishioners against his inviting one of such unconventional sentiments to speak in his place. In each instance Dr. Flint would answer the complainant with some kind and appreciative words for the offending young man, and express full confidence that he would outgrow his erroneous views. The parishioner, thinking that his counsel had taken effect and that his pastor had been sufficiently warned against a repetition of his indiscretion, would be surprised to find afterwards by another appearance of Mr. Johnson in the East Church pulpit,

how great was the good doctor's regard for him, and his confidence that he would "come out all right."

Mr. WILLIAM P. ANDREWS then spoke of Mr. Johnson's great moral earnestness, and his devotion to the loftiest ideals. He had been called an iconoclast, and while it was true that he was an image breaker, and did not always allow for the reverential feeling of his hearers for the cherished forms and creeds, he never attacked them wilfully, nor from other than the noblest motives. When he did so, it was in the lofty spirit of the Puritan: he strove to destroy the idol, that the God behind and above all outward forms might stand revealed. Mr. Johnson was, Mr. Andrews said, a Puritan in the best sense of the word, pure, high-minded, and devoted to every noble cause. He alluded to the very high estimate placed on the value of his volumes on Oriental Religions by persons most conversant with the subject in England and the East, and to the published recognition of his services in this direction. He then spoke of the warm sympathy and kindly aid and encouragement extended by Mr. Johnson to younger men, and in conclusion offered the following *Resolutions* which were seconded by Rev. Mr. Willson, and being submitted to the meeting by the President, were unanimously adopted:—

Resolved, That in the death of Rev. Samuel Johnson of North Andover, the community has lost an accomplished scholar, a singularly conscientious clergyman and noble friend.

Resolved, That this Society acknowledges with just pride Mr. Johnson's contributions to literature, and to the

science of comparative theology; and desires to express its profound regret that his faithful labors have been so sadly interrupted.

Resolved, That recognizing his eloquence as a preacher and writer, this Society further desires to record its appreciation of Mr. Johnson's exalted character, and the exceptional purity of motive which marked him in every relation of life :

Resolved, That these Resolutions be spread upon the records of the Essex Institute, and that the Secretary be instructed to transmit a copy of the same to the members of Mr. Johnson's family.

REV. C. F. RICE, of Salem, then presented, in an informal manner, an interesting sketch of his trip to England and the Continent, during the past summer.



REGULAR MEETING, MONDAY, MARCH 20, 1882.

MEETING this evening. The PRESIDENT in the chair. Records read. Correspondence and donations announced.

E. P. ROBINSON, ESQ., of Saugus, occupied the hour of the meeting with a graphic and stirring paper on "What I know about Whaling." The results of his experience and observations, when a young man, during a

whaling voyage from New Bedford, of some two years duration, were vigorously presented.



REGULAR MEETING, MONDAY, APRIL 3, 1882.

MEETING this evening. PRESIDENT in the chair. Records read.

Prof. G. F. WRIGHT, of Oberlin, Ohio, gave an account of the discoveries made in Pennsylvania last summer by him and Prof. H. C. Lewis concerning the southern limits of ice-action (otherwise called the terminal moraine) during the glacial age. These investigations were made under the direction of Prof. Lesley, who has charge of the elaborate geological survey now in progress in that state.

Previously to last summer, Clarence King had first, in 1876, through a paper of Mr. Wright's before the Boston Society of Natural History (see Proceedings, Vol. XIX, pp. 60-63), called attention to the terminal moraine at Wood's Hole. Subsequently, Warren Upham, taking up the clew, had followed it through Cape Cod and Long Island, where the line joined on to that discovered by Prof. Cook of New Jersey, reaching the sea at Perth Amboy just below New York, and crossing the Delaware river at Belvidere, a little above Easton, Pennsylvania. From this point the line of the terminal moraine was seen laid down upon a map fifteen by ten feet, displayed for the first time to a scientific society, crossing Northampton county by a general northwestern course to the centre of Monroe county; thence westward crossing the Lehigh fifteen miles above Mauch Chunk, and the Susquehanna twenty miles below Wilkesbarre; thence by

a northwesterly course through Columbia county, rising to the summit of the Alleghanies in Lycoming county, and crossing them diagonally through Tioga and Potter counties, where the general elevation of the country is upwards of 2,000 feet. From Potter county the moraine enters Cattaraugus county, N. Y., and continues to trend northward as far as Little Valley, six miles north of Salamanca, where it makes a sharp turn to the southwest, running nearly parallel with the Alleghany river to Columbiana county, Ohio. The whole length of the line explored this last summer is about four hundred miles. The signs of glacial action abruptly cease along this line, and it is marked by a special accumulation of unstratified material composed of clay, scratched stones, and granite boulders. North of that line the signs of glaciation are everywhere apparent. South of it there are no scratched stones, no transported boulders, and no "till," or boulder clay. Where streams cut through the line, however, boulders of granite and quartzite have been transported by water and deposited in terraces and deltas. The gravel of Trenton, N. J., in which Dr. C. C. Abbott has found palæolithic implements is in a delta terrace thus formed when the river was fifty feet higher than now. Every stream to the westward, which rises in the glaciated region and flows through the unglaciated region, has formed corresponding terraces and deltas, and is full of interest. Thorough search for palæolithic implements should be made in all such formations.

The majestic proportions of the great ice movement are seen in the fact that it advanced as far south upon the mountains as in the valleys. For example, the valley between the Kittatinny and Pocono mountains, though twenty miles wide and one thousand feet deep, caused

but a slight deflection of the ice-front to the south. The same is true where the moraine crosses the valley of the east branch of the Susquehanna. The grand deflection of the line to the northward is evidently due to variations in the forces which were pushing from behind.

Now that an accurate knowledge of the southern limits of the continental glacier is being obtained, it will be possible to get a variety of approximate estimates of the quantity of erosion which has taken place since the great ice age, and so a more correct idea of its antiquity. A full account of this subject will appear in the Report of the Pennsylvania Geological Survey. Arrangements are in progress for Mr. Wright to continue the exploration through Ohio during the coming summer of 1882.

The remarks of Professor Wright, illustrated by reference to the great, original map above alluded to, were heard by an appreciative gathering, who also examined with interest, a dozen or more specimens of the "scratched stones," showing glacial action, as well as some of the palæolithic implements exhibited by the speaker. At the close of his address a discussion arose between the Rev. R. Randall Hoes, of Lambertville, near Trenton, N. J. (who happened to be in town, engaged in some genealogical research, and knew the locality well, having a large collection illustrating the mineralogy and ethnology of the region on his own shelves), John H. Sears of the Peabody Academy of Science, Prof. I. J. Osburn of the State Normal School, and Professor Wright, in which some difference of opinion was developed as to the power of running streams to cut their way down through obstructions of stone or gravel, and as to the rate of cutting.

REGULAR MEETING, MONDAY, MAY 1, 1882.

MEETING this evening at 7.30 o'clock. The President in the chair. The records of the last meeting read. Donations and correspondence announced.

The letters from Mr. George E. Davenport, Corr. Sec'y of the Middlesex Institute, tendering an invitation to unite in a joint Field Meeting to be held at the Middlesex Fells, and suggesting June 17 as the day of Meeting, and from the Boxford Natural History Society, accepting an invitation from the Institute to visit Salem, were referred to the Field Meeting committee.

The PRESIDENT referred to the previous meeting held by the Institute in commemoration of this day, tracing back the origin of its observance to remote antiquity and alluding briefly to the views of the early settlers respecting the festivities of its occurrence, to whom they were extremely distasteful; soon after the landing of the Pilgrims at Plymouth, events occurred in their neighborhood which called forth an official denunciation by the colonial authorities; the celebration at Ma-re-mount, now Mount Wollaston, Quincy, under the direction of Thomas Morton of Clifford's Inn in 1626 was cited as a familiar illustration. Times have changed, and May day morning is frequently observed to welcome the sun's return, the bursting of the buds and the birth of the flowers.

MR. JOHN H. SEARS read an interesting paper giving the date of the appearance of several of our spring flowers; also a list of those that have been noticed in bloom the present season. The following is an abstract:—

During a series of years, now nearly twenty, in which I have taken notes on the time of blossoming of the early spring flowers, I have come to the conclusion that April is the earliest season in which we can say that the spring flowers are in blossom. This, of course, is the time when any one, who is conversant with their habit and has a knowledge of localities, may find them. Any earlier time of flowering is due to a series of peculiar circumstances. Sometimes early seedlings blossom in October and November; I have found the *Hepatica* and the *Thalictrum* every month in the year except September. In 1869 the *Hepatica* was in blossom in December, in January 1870, and though we had a snowstorm the 2nd of February, I collected some on the 4th from under the snow. March 4th to 10th I have got some *Hepaticas* in flower every year since, and not in the same place more than two seasons in succession. If an early snow remains on the ground through November, December and January, in a locality called Oakes' Ledge in Danvers, the frost will have come out sufficiently for them to blossom on the last of February or first of March, or shortly after the Line Gale which usually occurs at about this time, as the snow is usually carried away by it. Again, at Mile Brook, another locality in Danvers, unless we have a snowstorm from the southeast in the latter part of February, we are almost sure to find *Hepaticas* in early March. This spot is a rocky ravine facing the southeast. Something similar might be said of several other localities in this vicinity. Again the *Symplocarpus fetidus* (Skunk Cabbage) may be found on the borders of Leach's Swamp, in a series of large spring holes, at any time after January. I have collected it for analysis for the last ten years each succeeding February or early March. Save

in this locality April is early for it. The *Draba verna* (Whitlow Grass) I have found in the last of February and first of March, in Peabody, for twelve years or more, but in a locality in Danvers facing the southeast, a very early spot, it is not in flower till the last of April or first of May, so that in my estimation it is not so much due to the direct influence of the season as it is to some peculiar circumstances by which the plant is surrounded.

The whole number of plants that have been and are in blossom in the fields up to this date is thirty-nine. They are the *Hepatica triloba*, *Draba verna* and *Draba Caroliniana*, *Houstonia cœrulea*, *Thalictrum anemonoides*, *Anemone nemorosa*, *Saxifraga Virginiana*, *Aquilegia Canadensis*, *Taraxacum Dens-leonis*, *Erythronium Americanum* (Adder's tongue), *Viola odorata* (European, introduced), *Viola lanceolata*, *Viola sagittata*, *Sanguinaria Canadensis* (Blood-root), *Caltha palustris* (Marsh Marigold), *Ranunculus abortivus* (Small flowered Crow-foot), *Acer dasycarpum* (White Maple), *Acer rubrum* (Red Maple), *Ulmus Americana* (Elm), *Corylus Americana* and *Corylus rostrata* (Hazel), *Alnus incana* (Alder), *Lindera Benzoin* (Benjamin-bush), *Salix discolor*, *Salix cordata*, *Salix sericea*, *Salix purpurea*, *Salix humilis*, *Populus tremuloides*, *Comptonia asplenifolia* (Sweet-Fern), *Myrica Gale*, *Amelanchier Canadensis* (Shadbush), *Stellaria mediu* (Chickweed), *Capsella Bursa-pastoris* (Shepherd's Purse), *Juniperus Virginiana* (Red Cedar), *Taxus baccata* (Yew), *Carex Pennsylvanica* (a Sedge), *Equisetum arvense*, *Potentilla Canadensis*, *Epigœa repens*, *Cassandra*, *calyculata*.

To these may be added twelve hardy Cultivated plants which have blossomed in the open air, making fifty-one

kinds and *Dirca palustris*, *Callitriche verna*, *Populus balsamifera candicans*, or fifty-four kinds in all.

A discussion on the topics alluded to in the above paper followed, participated in by the President, Messrs. Richard C. Manning, John H. Sears and others.

Adjourned.



ANNUAL MEETING, MONDAY, MAY 15, 1882.

THE annual meeting this evening at 7.30 o'clock. The PRESIDENT in the chair. Records of the last annual meeting read.

The reports of the Secretary, Treasurer, Auditor, Librarian, and the Curators and Committees were read and duly accepted, and ordered to be placed upon file.

Mr. T. F. HUNT, chairman of the committee on nominations, reported the following list of officers, who were duly elected; Messrs. Hunt and Israel having been requested to collect, assort, and count the votes.

PRESIDENT:
HENRY WHEATLAND.

VICE-PRESIDENTS:

ABNER C. GOODELL, JR.
FREDERICK W. PUTNAM.

DANIEL B. HAGAR.
ROBERT S. RANTOUL.

SECRETARY:

GEORGE M. WHIPPLE.

TREASURER:

GEORGE D. PHIPPEN.

AUDITOR:

RICHARD C. MANNING.

LIBRARIAN:

WILLIAM P. UPHAM.

CURATORS:

History—HENRY F. WATERS.

Manuscripts—WILLIAM P. UPHAM.

Archæology—FREDERICK W. PUTNAM.

Numismatics—MATTHEW A. STICKNEY.

Geology—ISAAC J. OSBUN.

Botany—GEORGE D. PHIPPEN.

Zoölogy—EDWARD S. MORSE.

Horticulture—JOHN E. PEABODY.

Music—JOSHUA PHIPPEN, JR.

Painting & Sculpture—T. F. HUNT.

Technology—EDWIN C. BOLLES.

COMMITTEES:

Finance:

The PRESIDENT, *Chairman ex off.*
JAS. O. SAFFORD. HENRY M. BROOKS. GEO. R. EMMERTON.
The TREASURER, *ex off.*

Library:

CHARLES W. PALFRAY. GEORGE F. FLINT. HENRY F. KING.
WILLIAM NEILSON. WILLIAM D. NORTHEND.
The LIBRARIAN, *ex off.*

Publication:

EDWARD S. ATWOOD. ABNER C. GOODELL, JR. EDWIN C. BOLLES.
H. F. WATERS. T. F. HUNT.
JAMES A. EMMERTON.

Lecture:

ROBERT S. RANTOUL. FREDERICK W. PUTNAM. AMOS H. JOHNSON.
FIELDER ISRAEL. ARTHUR L. HUNTINGTON.

Field Meeting:

The SECRETARY, *Chairman ex off.*

GEORGE A. PERKINS, Salem
GEORGE COGSWELL, Bradford.
FRANCIS H. APPLETON, Peabody.
NATHANIEL A. HORTON, Salem.
EDWARD S. MORSE, Salem.

GEORGE D. PHIPPEN, Salem.
FRANK R. KIMBALL, Salem.
EBEN N. WALTON, Salem.
WINFIELD S. NEVINS, Salem.
JOHN H. SEARS, Salem.

THE RETROSPECT OF THE YEAR

compiled from the several reports read at the meeting, and the remarks of several members in relation thereto, presents the work of the Institute in the various departments since the last annual meeting.

MEMBERS.—Changes occur in the list of our associates by the addition of new names and the withdrawal of some by resignation, removal from the county or vicinity, or by death.

We have received information of the decease of twelve resident members, during the year.

JOHN V. STEVENS, born in Peabody, Nov. 22, 1807, tanner and currier; died at Peabody, June 19, 1881. Elected a member May 6, 1867.

NATHANIEL SILSBEE, son of Nathaniel and Mary (Crowninshield) Silsbee, born in Salem, Dec. 28, 1804; graduated at Harvard College, 1824, merchant; mayor of Salem 1849, 1850, 1858 and 1859; died at Milton, July 9, 1881. An original member.

ELIJAH W. UPTON, son of Elijah and Phebe (Wood) Upton, born in Danvers, now Peabody, Feb. 24, 1811, a glue manufacturer; died in Peabody, Oct. 5, 1881. Elected a member June 26, 1850.

BENJAMIN FABENS, son of Benjamin and Hannah (Stone) Fabens, born in Salem, May 28, 1809, merchant; died at Salem, Dec. 8, 1881. Elected a member March 30, 1859.

FRANCIS CHOATE, son of John and Susanna (Choate) Choate, born in Essex, Dec. 30, 1798, a trader; died at Salem, Jan'y 20, 1882. Elected a member July 6, 1864.

JOHN PICKERING, son of John and Sarah (White) Pickering, born in Salem, Nov. 8, 1808; graduated at Harvard College, 1830, a broker in Boston; died at Salem, Jan'y 20, 1882. Elected a member May 3, 1848.

THOMAS H. FROTHINGHAM, son of Daniel and Hannah (Frothingham) Hoppin, born in Salem, Oct. 20, 1823, a stove dealer; died at Salem, March 5, 1882. He assumed the maiden name of his mother. Elected a member April 24, 1857.

JOHN BERTRAM, son of John and Mary (Perchard) Bertram, born in the Isle of Jersey, Feb. 11, 1796, merchant; died at Salem, March 22, 1882.

MILTON P. BRAMAN, son of Isaac and Hannah (Palmer) Braman, born in Rowley, now Georgetown, Aug. 6, 1799; graduated at Harvard College 1819; minister of the First Church in Danvers from April 12, 1826 to Sept. 2, 1863; died at Auburndale, April 10, 1882. An original member.

WILLIAM SUTTON, son of William and Nancy (Osborne) Sutton, born in Salem, July 26, 1800, manufacturer; died at Peabody, April 18, 1882. Elected a member March 29, 1848.

DANIEL C. MANNING, son of Richard and Abby (Lane) Manning, born in Ipswich Dec. 27, 1805, stabler in Salem; died at Winchendon, N. H., April 30, 1882. Elected a member April 5, 1875.

DAVID NICHOLS, son of Stephen and Abigail (Moulton) Nichols, born at Salem, Aug. 22, 1809, tanner; died at Salem, May 1, 1882. Elected a member Nov. 21, 1876.

FIELD MEETINGS.—These have been perhaps of more than usual interest, several papers of marked quality having been presented and read. During the year six were held as follows: *First*, at Rowley (an old and interesting

town incorporated in 1639) on Tuesday, July 7, 1881. The forenoon was devoted to a ramble in the woods under the guidance of John H. Sears. At the afternoon session in the Town Hall, Mr. Sears exhibited the plants collected during the day, with appropriate and instructive remarks. Miss Mary N. Plumer of the State Normal School, Salem, read a very interesting and able paper on "The Dissemination of Seeds." Rev. John Pike, of Rowley, Rev. G. M. Harmon, of Peabody, Rev. Charles C. Bruce, of Rowley, and Hon. N. A. Horton, of Salem, followed, pleasantly alluding to several topics suggested by the place and the occasion.

Second meeting.—At Marblehead Neck, Wednesday, August 3, 1881. Mr. John H. Sears, of Salem, Hon. J. J. H. Gregory, of Marblehead, Prof. E. S. Morse, and Hon. W. D. Northend, both of Salem, took part in the exercises of the afternoon session.

Third meeting.—At Saugus, Wednesday, August 30, 1881. Mr. John H. Sears exhibited and described several specimens of plants collected during the forenoon ramble. Prof. H. B. Adams read a paper on "The Commons and Commoners of Salem." Dr. J. W. Goodell, of Lynn, and Mr. E. P. Robinson, of Saugus, presented communications of historic interest.

Fourth meeting.—At Boxford, Saturday, Oct. 8, 1881. At the afternoon session, Rev. William P. Alcott, of Boxford, presented a collection of introduced plants found in the vicinity of a wool-scouring establishment, and has since prepared a valuable communication on the same, which is printed in the Bulletin. Mr. John Robinson and others took part in the exercises.

Fifth meeting.—At Chelsea, Friday, October 14, 1881. The party after visiting the "Art Tile Works" of the

Messrs. Low, and the works of the "McGee Furnace Company," assembled in the rooms of the Chelsea Review Club, where brief remarks were offered by Mr. J. G. Low, who gave an account of the tile factory, how it was commenced, and its progress to the present time; by Prof. E. S. Morse, who spoke of the pottery of the Japanese; and by Vice Pres. F. W. Putnam, on the pottery of the several Indian tribes of America.

Sixth meeting.—At Whipple's, near the shores of the Chebacco pond, on Saturday, Feb. 11, 1882, stopping at Wenham pond to see the process of cutting and storing ice. At the afternoon session Mr. R. S. Rantoul gave an historical sketch of Wenham Pond, alluding to the introduction and extent of the ice-cutting operations conducted by the Messrs. Gage & Hittenger. Remarks were also made by the chair, Mr. John H. Sears, the Rev. George H. Hosmer and others.

EXCURSIONS.—*First*, to Cambridge, on Wednesday, May 25, 1881, by the polite invitation of President Eliot, Mr. F. W. Putnam and other officers, having in charge the various libraries, museums, etc. The Peabody Museum of American Archæology and Ethnology, Museum of Comparative Zoölogy, Gymnasium, Memorial Hall, Sever Hall, Library in Gore Hall, Chemical Laboratories, the mineralogical collection in Boylston Hall, the Botanic Garden and Herbarium, and the Observatory were visited.

Second.—To New York city, Manhattan Beach, West Point, and the Catskill Mountains; leaving Salem on Wednesday, July 13, 1881, and returning on Thursday, July 21.

The third.—To Mt. Desert, leaving Salem on Tuesday, Sept. 13, returning on Friday, Sept. 16, 1881.

LECTURES.—A course of seven lectures, under the direction of the lecture committee, have been delivered as follows: *First*, J. E. Russell, "An Inter-oceanic Canal," Monday, Oct. 18, 1881. *Second*, Prof. T. C. Mendenhall, "Earthquakes," Friday, Nov. 25, 1881. *Third*, Rev. James Freeman Clarke, "English Literature," Monday, Dec. 5, 1881. *Fourth*, Rev. E. G. Porter, "Arms and Armor," Monday, Jan'y 9, 1882. *Fifth*, E. H. Elwell, "Conversation," Monday, Jan'y 30, 1882. *Sixth*, Dr. B. Joy Jeffries, "Color Blindness," Monday, Feb'y 27, 1882. *Seventh*, Prof. E. S. Morse, "Japan," Monday, March 27, 1882.

In addition to the above a course of four free lectures was given by George M. Towle, of Boston, upon famous men of our day: I. Wednesday, Nov. 9, 1881, "Bismarck." II. Wednesday, Nov. 16, "Gladstone." III. Wednesday, Nov. 23, "Beaconsfield." IV. Wednesday, Nov. 30, "Gambetta." These lectures were delivered in the afternoon at four o'clock.

Subsequently, three lectures were given by the same gentleman, the subjects being "Victor Hugo," "Victoria," and "The Nihilist," on the afternoons of Wednesdays Feb'y 1, 8, and 15, 1882.

Three lectures on art were delivered by S. R. Kœhler, Esq., of Boston, during the afternoons of Wednesdays, March 1, 8, and 15, 1882. The first was on "The future of Art in America;" the remaining two on "Color Printing."

CONCERTS.—Under the personal direction of the curator of Music, four concerts in the regular, and three in a supplementary course have been given with great acceptance. This was the thirteenth concert season of the Institute: *First*, on Monday evening, Dec. 12, 1881, by

Miss H. A. Brooks, Mrs. George Henschel, and Mr. J. Phippen, jr. *Second*, Monday evening, Dec. 26, 1881, by Miss Sarah C. Fisher, Messrs. A. W. Foote, Charles N. Allen, and Wulf Fries. *Third*, Monday evening, Jan'y 23, 1882, by Mrs. M. E. Gibson, soprano; Mrs. W. H. Wadleigh, alto; Mr. C. J. Parker, tenor; Mr. W. H. Wadleigh, tenor; Dr. E. C. Bullard, bass, and Mr. H. M. Aiken, bass. *Fourth*, Monday evening, Feb. 6, 1882, by Miss Sara Barton, soprano; Miss Sophie Rohe, pianoforte; Mr. Bernhard Listemann, first violin; Mr. Fritz Listemann, second violin; Mr. Carl Meisel, viola; Mr. Alexander Heindl, violoncello. *Supplementary, first*.—Friday evening, April 21, 1882, by Harvard Glee Club. *Second*, Tuesday afternoon, April 25, 1882, by Mr. J. Phippen, jr., with the assistance of Miss Annabelle Clark, of Boston, soprano, and Mr. W. J. Lefavour, violinist. *Third*.—Tuesday afternoon, May 2, 1882, by Miss Clara L. Emilio, assisted by Mrs. Anna S. Brown, Mr. Wm. S. Fenollosa, and Mr. Jean M. Missud.

MEETINGS. Regular meetings occur on the first and third Monday evenings of each month. At these the following communications were received and lectures delivered: From *John H. Sears*, "Notes on the Forest Trees of Northern New York;" *Rev. C. F. Rice*, "A familiar talk on his recent trip to Europe;" *Rev. George F. Wright*, "On the Terminal Moraines of Pennsylvania;" *John J. Latting*, of New York, "List of Marriages by Rev. Daniel Hopkins, of Salem, 1778 to 1814;" *F. M. Ray*, of Portland, "The journal of Dr. Caleb Rea written during the expedition against Ticonderoga in 1758;" *Eben Parsons*, "Sketch of the First Church in Lynnfield;" *Wellington Poole*, of Wenham, "Abstracts of Wenham Records;" *E. P. Robinson*, of Saugus,

"What I know about Whaling;" *Henry F. Waters*, "An account of the Newhall Family," etc., etc.

A SOCIAL MEETING of the members and their families was held on the evening of Jan'y 6; Prof. E. S. Morse gave an illustrated talk on Japan; and at a later hour refreshments were served.

PUBLICATIONS have been issued as heretofore,—the Bulletin, vol. xiii, and the Historical Collections, vol. xviii. The exchange list, with few exceptions, continues the same as last year.

LIBRARY.—The additions to the Library for the year (May, 1881 to May, 1882) have been as follows.

By Donation.

Folios,	25
Quartos,	117
Octavos,	663
Duodecimos,	474
Sexdecimos,	133
Octodecimos,	6
Total of bound volumes,	1418
Pamphlets and serials,	7560
Total of donations,	8978

By Exchange.

Quartos,	5
Octavos,	68
Duodecimos,	5
Total of bound volumes,	78
Pamphlets and serials,	1678
Total of exchanges.	1756
Total of donations,	8978
Total of exchanges,	1756
Total of additions,	10,734

Of the total number of pamphlets and serials, 3,361 were pamphlets, and 5,877 were serials.

The donations to the Library for the year have been received from one hundred and eighty-two individuals

and fifty departments of the General and State governments and societies, eleven of which are foreign. The exchanges from one hundred and fifty-five societies and incorporate institutions of which one hundred and one are foreign; also from editors and publishers.

The annual examination of the Library has been made. Of the twelve volumes that were missing last year, ten have been returned; seven others are now missing from their places.

Donations or exchanges have been received from the following:—

	Vols.	Pam.
Adams, Herbert B., Baltimore, Md.,		1
Adelaide, R. Society of So. Australia,	1	
Almy, James F.,	2	
Alnwick, Eng., Berwickshire Naturalists' Club,	1	
American Association for the Advancement of Science,	2	
Amiens, Société Linnéenne du Nord de la France,		20
Amsterdam, K. Z. Genootschap "Natura Artis Magistra,"	1	
Anagnos, M., So. Boston,		1
Andrews, Mrs. James H.,		1
Andrews, William P.,		50
Anthony, Mrs. John G., Cambridgeport,	25	32
Appleton, William S.,		2
Archæological Institute of America,		1
Archer, Miss Rebecca, Newspapers,		
Augsburg, Naturhistorischer Verein,		1
Baltimore, Md., Maryland Historical Society,		1
Baltimore, Md., Johns Hopkins University,		1
Baltimore, Md., Peabody Institute,		1
Bancroft, C. F. P., Andover,		1
Barstow, Benjamin,	1	1
Bartlett, J. W., Marblehead,		1
Batavia, K. Naturkundige Vereeniging in Nederlandsch Indie,		1
Baton Rouge, La., State University,		1
Bemis, Luke, West Chester, Pa.,		2
Berlin, Gesellschaft Naturforschender Freunde,		1
Berlin, Verein zur Beförderung des Gartenbaues,		12
Berlin, Zeitschrift für die Gesammten Wissenschaften,	1	
Bern, Naturforschende Gesellschaft,	1	

	Vols.	Pam.
Bolles, Rev. E. C.,	52	200
Bologna, Accademia delle Scienze,		1
Bonn, Naturhistorischer Verein der Preussischen Rhein- lande u. Westfalens,	1	3
Bordeaux, Académie Nationale des Sciences, Belles-Let- tres et Arts,	1	
Boston, American Academy of Arts and Sciences,	1	1
Boston, Appalachian Mountain Club,		1
Boston, Athenæum Library,		1
Boston, Board of Health,		2
Boston, City of,	6	
Boston, Massachusetts Historical Society,	2	
Boston, Massachusetts Horticultural Society,		4
Boston, Massachusetts Institute of Technology,		1
Boston, Massachusetts Medical Society,	1	1
Boston, Massachusetts State Board of Health, Lunacy and Charity,	2	
Boston, Massachusetts State Library,		1
Boston, National Association of Wool Manufacturers,	1	3
Boston, New England Historic Genealogical Society,		5
Boston, Public Library,		5
Boston, Scientific Society,		4
Boston, Society of Natural History,		16
Boston, Zoölogical Society,		1
Bradlee, Rev. C. D., Boston,		1
Braunschweig, Archiv für Anthropologie,		2
Braunschweig, Verein für Naturwissenschaft,		1
Bremen, Naturwissenschaftlicher Verein,		3
Briggs, Miss M. E.,	2	
Brinley, Francis, Newport, R. I.,		1
Brock, R. A., Richmond, Va., Newspapers,		
Brooklyn, N. Y., Church of the Saviour,	1	
Brooklyn, N. Y., Collegiate and Polytechnic Institute,		2
Brooklyn, N. Y., Long Island Historical Society,		1
Brooks, Rev. Charles T.,		1
Brooks, Henry M.,	3	13
Brooks, Mrs. Henry M., Newspapers,		23
Brown, Henry A.,	1	1
Brown, John Coffin Jones, Boston,		1
Brown, S. J., Salisbury,		1
Browne, Miss Frances,	60	
Brünn, Naturforschender Verein,		1
Bruxelles, L'Académie R. de Belgique,	6	6

	Vols.	Pam.
Bruxelles, Société Belge de Microscopie,		8
Bruxelles, Société Entomologique de Belgique,		5
Bruxelles, Société R. Malacologique de Belgique,	2	9
Bryant, James S., Hartford, Conn.,	5	
Buenos Aires, Sociedad Científica Argentina,		8
Buffalo, N. Y., Society of Natural Sciences,		2
Burnham, John H., Bloomington, Ill.,		1
Bützow, Verein der Freunde der Naturgeschichte in Mek- lenburg,	1	
Caen, Académie Nationale des Sciences, Arts et Belles- Lettres,	2	
Calcutta, Geological Survey of India,	3	25
Caller, James M.,	1	
Calley, Samuel,	1	1
Cambridge, Library of Harvard University,		6
Cambridge, Museum of Comparative Zoölogy,	2	2
Cambridge, Nuttall Ornithological Club,		4
Cambridge, Peabody Museum of American Archæology and Ethnology,		2
Carpenter, Rev. C. C., Mount Vernon, N. H.,		1
Case, Theodore S., Kansas City, Mo.,		1
Cassel, Verein für Naturkunde,		1
Chamberlain, James A.,	4	234
Chandler, Gardner L.,	5	
Chemnitz, Naturwissenschaftliche Gesellschaft,		1
Cherbourg, Société Nationale des Sciences Naturelles,		1
Chicago, Ill., Historical Society,	1	
Chicago, Ill., Public Library,		1
Choate, George F.,	10	
Choate, Joseph H., New York, N. Y.,		1
Cincinnati, O., Board of Education,	1	
Cincinnati, O., Public Library,	1	1
Cincinnati, O., Society of Natural History,	1	26
Cleveland, O., Western Reserve and Northern Ohio His- torical Society,		3
Cleveland, Mrs. William S.,	41	
Cole, Miss C. J.,		2
Cole, Mrs. N. D., Newspapers,		128
Columbia, Missouri State University,		1
Conant, W. P.,	18	106
Cooke, Caleb, Estate of the late,	148	
Copenhagen, Société de Botanique,		2
Cox, Hon. William R., Washington, D. C.,		1

	Vols.	Pam.
Crosby, Mrs. M. K., Matfield,		19
Curwen, George R.,		10
Curwen, James B.,		28
Cutter, Abram E., Charlestown,		1
Danzig, Naturforschende Gesellschaft,	1	
Darinstadt, Verein für Erdkunde,	1	
Dean, John W., Boston,		12
De Borre, Alf Preudhomme, Bruxelles,		1
Dexter, George, Boston,		1
Doolittle, Miss E., Troy, N. Y.,		1
Dresden, Naturwissenschaftliche Gesellschaft, "Isis,"		1
Dublin, Royal Irish Academy,		8
Dublin, Royal Society,		7
Eastman, S. C., Concord, N. H.,		1
Eddy, Miss Harriet,	1	
Edinburgh, Royal Society,	1	
Ellery, Harrison, Boston, Chart of the Ellery Family,		
Elwell, E. H., Portland, Me.,		2
Emerson, Mrs. Jasper,		1
Emmerton, James A.,	1	19
Epping Forest and County of Essex Naturalists' Field Club,		2
Erlangen, Physikalisch-medicinische Societät,		2
Falmouth, Eng., Royal Cornwall Polytechnic Society,		2
Felton, Cyrus, Marlborough,		1
Fewkes, J. Walter, Cambridge,	1	
Firenze, R. Institut di Studi Superiori,		5
Flanders, Rev. G. T., Lowell,	24	110
Folger, William C., Nantucket, Newspapers,		8
Foote & Horton, Newspapers,		
Foote, Rev. Henry W., Boston,		1
Ford, Patrick, New York, N. Y.,		1
Frankfurt, a. m., Neue Zoologische Gesellschaft,		12
Frankfurt, a. m., Senckenbergische Naturforschende Ge- sellschaft,	2	
Frankfurt, a. m., Verwaltung des Medicinalwesens,		1
Genève, L'Institut National Genevois,	1	
Genève, Société de Physique et d'Histoire Naturelle,		1
Gerould, Sam'l L., Goffstown, N. H.,		1
Giessen, Oberhessische Gesellschaft für Natur u. Heil- kunde,		1
Gillis, James A.,	15	135
Glasgow, Natural History Society,	1	

	Vols.	Pam.
Goodell, A. C., Jr., Newspapers,		
Goodwin, J. M., Sharpsville, Pa.,		1
Görlitz, Naturforschende Gesellschaft,	1	
Göttingen, K. Gesellschaft der Wissenschaften,	1	
Gould, Jno. H., Topsfield,		3
Green, Jesse S., West Chester, Pa., Newspapers,		
Green, Sam'l A., Boston,	9	617
Guye, M., Amsterdam,	1	
Hagar, D. B.,	1	
Hale, Rev. E. E., Roxbury,		16
Halifax, Nova Scotian Institute of Natural Science,		1
Halle, K. Leopoldinisch—Carolinische Deutsche Akademie der Naturforscher,		12
Hamburg-Altona, Naturwissenschaftlicher Verein,		1
Hannover, Naturhistorische Gesellschaft,		1
Harlan, Caleb, Wilmington, Del.,	1	
Harlem, Société Hollandaise des Sciences,		5
Hart, Charles Henry, Philadelphia, Pa.,		3
Hartford, Conn., Trinity College,		1
Hassam, John T., Boston,	1	1
Hazen, William B., Washington, D. C.,	1	2
Hervey, Rev. A. B., Taunton,	1	
Hingham, First Parish,	1	
Hobart Town, Tasmania Royal Society,	1	
Hodges, Mrs. John, Charts,	130	33
Hodges, Osgood, Estate of the late, Maps,	5	699
Hoffman, W. J., Washington, D. C.,		1
Hölder, Alfred, Wien,		1
Holmes, John C., Detroit, Mich., Newspapers,		1
Horton, N. A.,	5	33
Hunt, T. F.,	54	92
Illinois Department of Agriculture,		6
Ireson, Mrs. Samuel J.,	1	
Israel, Rev. Fielder, Newspapers,	1	136
Ives, Stephen B.,	1	
Jackson, Miss Nellie,	2	402
James, U. P., Cincinnati, O.,		1
Jaques, Alonzo P., West Newbury,	10	23
Jenison, O. A., Lansing, Mich.,		3
Jenks, Rev. Henry F., Lawrence,		1
Jewett, Rev. George B.,	25	9
Johnson, Henry, Brunswick, Me.,		2
Kiernan, T. J., Cambridge,		4

	Vols.	Pam.
Kimball, Mrs. James,	1	
Kjöbenhavn, K. D. Videnskabernes Selskab,		3
Lander, Miss Elizabeth,	1	
Langworthy, Rev. I. P., Boston,		1
Lansing, Michigan Agricultural College Library,	1	
Lansing, Michigan State Library,	91	17
Lathrop, J. C., Bridgeport, Conn.,		1
Lausanne, Société Vaudoise des Sciences Naturelles,	1	
Lawrence, Public Library,		4
Leavitt, William,	11	
Lee, F. H., Newspapers	140	456
Leeds, Eng., Philosophical and Literary Society,		1
Le Mans, Société d'Agriculture, Sciences, et Arts de la Sarthe,		4
Liège, Société R. d'Horticulture,		1
Liège, Société R. des Sciences,		1
Lincoln, Marvin, Malden,	1	
Lincoln, Solomon, Jr.,	35	967
Liverpool, Eng., Literary and Philosophical Society,	2	
London, Eng., Royal Society,	1	7
Loring, George B.,	49	3
Lowell, Old Residents' Historical Association,		1
Luxembourg, Institut R. Grand Ducal,	1	
Lynn, Public Library,		1
Lyon, Académie des Sciences, Belles-Lettres et Arts,	1	
Lyon, Société d'Agriculture, Histoire Naturelle, et Arts Utiles,	1	
Lyon, Société Linnéenne,	2	
Mack, Miss Esther C.,	204	
Mack, William, Newspapers,	5	73
Madison, Wisconsin State Historical Society,	1	1
Manchester, Eng., Literary and Philosophical Society,	1	4
Manchester, Eng., Scientific Students' Association,		1
Manchester, Rev. L. C., Lowell,		76
Manning, Jacob W., Reading,		300
Manning, Robert, Newspapers,		104
Manson, A. S., Boston,	1	
Marshall, John W., Rockport,		1
Massachusetts, Commonwealth of,	3	
McDanolds, James S., Trenton, N. J.,	1	
Meek, H. M.,	1	
Merrill & Mackintire,		1
Merrill, N. F.,		1

	Vols.	Pam.
Mexico, Museo Nacional,		3
Middletown, Conn., Wesleyan University,		1
Milwaukee, Wisconsin Natural History Society,		1
Montreal, Geological Survey of Canada, Maps,	1	1
Morison, George S., New York, N. Y.,	1	
Morrissey, D. H., Boston,	1	
Morse, E. S.,	1	2
Moulton, Joshua W.,		1
München, K. B. Akademie der Wissenschaften,		25
Münster, Westfälische Provinzial Verein,		1
Neuchâtel, Société des Sciences Naturelles,	1	1
Nevins, W. S., Newspapers,		15
Newark, New Jersey Historical Society,	2	1
New Haven, Conn., Yale College Library,		3
New York, Academy of Sciences,		4
New York, American Geographical Society,	2	6
New York, Astor Library,	1	5
New York, Chamber of Commerce,	3	
New York, Genealogical and Biographical Society,		4
New York, Historical Society,	1	
New York, Mercantile Library Association,		1
Nichols, Andrew, Jr.,		7
Northend, William D.,		6
Norwegian North Atlantic Expedition, Editorial Com- mittee of,		3
Nurnberg, Naturhistorische Gesellschaft,		1
Offenbach, a. m., Offenbacher Verein für Naturkunde,		1
Osborn, Stephen H.,		40
Paine, Albert W., Bangor, Me.,	1	
Palfray, Charles W.,		36
Paris, Journal de Conchyliologie,		3
Paris, Société d'Acclimatation,		12
Paris, Société d'Anthropologie,		4
Paris, Société des Etudes Historiques,		3
Paris, Société Zoologique de France,		1
Peabody Education Fund, Trustees of,		1
Peabody, Mrs. Ephraim, Boston, Newspapers,		
Peabody, John P.,		5
Peabody, Mass., Peabody Institute,		4
Peele, Miss Eliza,	1	
Peet, Rev. S. D., Clinton, Wis.,		4
Peirce, B. O., Beverly,	12	18
Peirce, Henry B.,	6	

	Vols.	Pam.
Perkins, A. C., Exeter, N. H.,		2
Perkins, George A.,		73
Perley, Jona.,	2	7
Perley, Sidney, Boxford,		2
Perry, William Stevens, Davenport, Ia.,		1
Philadelphia, American Philosophical Society,		2
Philadelphia, Library Company,		2
Philadelphia, Mercantile Library,		1
Philadelphia, Numismatic and Antiquarian Society,		1
Philadelphia, Pennsylvania Historical Society,		4
Philadelphia, Pennsylvania Museum and School of Industrial Art,		1
Phillips, Henry, Jr., Philadelphia,		5
Phippen, George D.,		4
Pickering, Miss Mary O.,		334
Plumer, Miss Mary N.,		6
Poole, Wellington, Wenham,	3	10
Pope, Miss Lydia, Newspapers,		
Porter, Rev. E. G., Lexington,		1
Portland, Maine Historical Society,	1	
Priest, Henry, Barre, Vt.,		13
Providence, Athenæum,		1
Providence, Public Library,		1
Providence, Rhode Island Historical Society,	3	4
Pulsifer, David, Boston,		1
Putnam, Rev. A. P., Brooklyn,	1	5
Putnam, Mrs. Eben,		91
Putnam, F. W., Cambridge,		25
Quebec, Literary and Historical Society,		1
Ramsay, Alexander, London,		6
Rantoul, R. S.,		1
Reading, Pa., Society of Natural Sciences,	1	
Regensburg, K. B. Botanische Gesellschaft,	1	
Regensburg, Zoologisch-mineralogischer Verein,		1
Richardson, F. P.,		234
Richmond, Virginia Historical Society,		1
Riga, Naturforschender Verein,		2
Robinson, E. P., Saugus, Newspapers,		1
Robinson, John, Newspapers,		87
Ropes, Joseph,	1	
Ropes, Rev. William L., Andover,		1
Ryder, J. Orne,	1	

	Vols.	Pam.
Salem, Peabody Academy of Science,		17
San Francisco, California Academy of Sciences,		1
San Francisco, Mercantile Library Association,		1
Santa Fé, New Mexico Historical Society,		1
S'Gravenhage, Nederlandsche Entomologische Vereeniging,		4
Smith, George Plumer, Philadelphia,		1
Soule & Bugbee, Boston,	3	39
Springfield, Mo., Drury College Library,		8
Stettin, Entomologischer Verein,	1	
St. Gallen, St. Gallische Naturwissenschaftliche Gesellschaft,	1	1
Stickney, George A. D.,		9
Stickney, Miss Lucy W.,		4
Stilson, Rev. Arthur C., Ottumwa, Ia.,		1
St. John, New Brunswick Natural History Society,		4
St. Louis, Academy of Science,		1
St. Louis, Missouri Historical Society,		1
St. Louis, Public School Library,		3
Stockholm, Vetenskaps Akademien,		2
Stone, Alfred, Providence,	1	
Stone, Benjamin W.,	2	1
Stone, Eben F., Washington,	2	60
Stone, Robert, Newspapers,		
St. Pétersbourg, Académie Impériale des Sciences,		26
St. Pétersbourg, Entomological Society,		1
St. Pétersbourg, Jardin Impérial de Botanique,		1
Sturgis, Mrs. Elizabeth O., Boston,	1	1
Sydney, Royal Society of New South Wales,	1	
Tasmania, Government of,	1	
Taunton, Eng., Somersetshire Archæological and Natural History Society,	1	
Taunton, Public Library,		1
Thayer, C. P., Boston,	1	
Thronhjelm, K. Norske Videnskabers Selskab,		2
Tokio, University,	1	
Topeka, Kansas Academy of Science,		1
Topeka, Kansas Historical Society, Newspapers,	1	
Toronto, Canadian Institute,		1
Trenton, New Jersey State Library,	1	
Tyler, Arthur W., Indianapolis,		1
Unknown,	2	13

	Vols.	Pam.
U. S. Bureau of Education,	1	10
U. S. Chief of Engineers,	7	
U. S. Department of the Interior,	48	3
U. S. Department of State,	6	
U. S. Life Saving Service,	1	
U. S. National Board of Health,		38
U. S. National Museum,	1	15
U. S. Naval Observatory,	3	
U. S. Patent Office,	2	53
Van Voorhis, Elias W., New York,	1	
Walton, Eben N.,	8	
Warren, George Washington, Boston,		1
Warren, J. Collins, Boston,		1
Washington, Smithsonian Institution,	2	
Waters, H. F.,		1
Waters, J. Linton,	1	4
Waters, Stanley,	1	70
Waterville, Me., Library of Colby University,		1
Webster, John,	6	173
Weston, Edward S.,	41	
Wheatland, Henry,		13
Wheatland, Miss Martha G.,		341
Wheildon, William W., Concord,	2	5
Whipple, George M.,	2	
Whitcher, Mary, Shaker Village, N. H.,		130
White, Rev. William O., Brookline,	6	28
Whitney, Mrs. Mary W., Lawrence, Newspapers,		
Wien, K. K. Zoologisch Botanische Gesellschaft,	1	
Wien, Verein zur Verbreitung Naturwissenschaftliche Kenntnisse,	1	
Wilder, Marshall P., Boston,		2
Willson, Rev. E. B.,	1	72
Winchell, N. H., Minneapolis, Minn.,	1	6
Winsor, Justin, Cambridge,		50
Winthrop, Robert C., Boston,		3
Wisconsin State Board of Health,		1
Woods, Mrs. K. T.,		23
Worcester, American Antiquarian Society,		2
Worcester, Society of Antiquity,		5
Wright, Frank V.,	2	
Würzburg, Physikalisch—medizinische Gesellschaft,		1
Zurich, Naturforschende Gesellschaft,		7

The following have been received from editors or publishers :—

American.	Medical Register.
American Journal of Science.	Musical Herald.
American Naturalist.	Nation.
Antiquarian Papers.	Naturalists' Leisure Hour and Monthly Bulletin.
Appleton's Literary Bulletin.	Nature.
Beverly (N. J.) Banner.	Newton Transcript.
Canadian Naturalist.	Our Dumb Animals.
Cape Ann Bulletin.	Peabody Press.
Danvers Mirror.	Publishers' Weekly.
Essex Co. Statesman.	Quaritch's Catalogue.
European Mail.	Sailors' Magazine and Seamen's Friend.
Fireside Favorite.	Salem Gazette.
Francis' Catalogue.	Salem Observer.
Gardener's Monthly and Horti- culturist.	Salem Post.
Hammatt Papers.	Salem Register.
Ipswich Chronicle.	Turner's Public Spirit.
Lawrence American.	Ward's Natural Science Bulletin.
Lynn Bee.	Zoologischer Anzeiger.
Marblehead Messenger.	

AN ART EXHIBITION, of the work of artists in Salem and vicinity, was held in May last ; opening on Wednesday evening, May 18, 1881, and closing on Saturday evening, May 28, 1881. It included oil paintings, water colors, sketches in charcoal, pen and ink, and etching, also decorated china and pottery, embroideries and needle-work. The whole number of articles was 402. The following is a list of contributors :—

Subjects.

Two oil paintings and plaque,
Five oil paintings,
Seven paintings,
Three water colors,
Two sketches—exhib.,
Decorated umbrella stand,
Pencil drawing, etc.,
Five decorated articles,
Six butter plates and plaque,

Artists and Exhibitors.

Minna P. Needham.
Albert I. Whipple.
Miss L. L. A. Very.
Mrs. H. M. Chase.
G. L. Chandler.
Miss A. S. Wardwell.
Mrs. S. K. Hart.
Miss E. G. Peirce.
Miss L. C. G. Peirce.

Oil nasturtiums,	Miss E. A. Nichols.
Pottery, etc.,	Miss Louisa Lander.
Five oil and charcoal drawings from life,	Miss M. P. Kilham, Beverly.
Two tiles and pitcher,	Miss H. M. King.
Eleven oil paintings,	Miss Alice Hanson, Danvers.
Nine oil paintings,	Mr. Jos. Ropes.
Two paintings,	Miss L. W. Whipple.
Seven paintings,	Miss L. Lander.
Two birthday cards,	Mrs. W. H. A. Putnam.
Five sketches,	Miss H. E. Carlton.
Six cups and saucers,	Miss S. S. Kimball.
Lamp screen, etc.,	Miss K. Cloutman.
Bag and tidy,	Miss A. E. Cloutman.
Three paintings,	pupils of Miss Oliver.
Eight paintings,	Miss S. E. C. Oliver.
Study and panels,	Miss C. Goldthwaite.
Study and panels,	Miss Helen Brown.
Panel, etc.,	Miss A. M. Quimby.
Painting,	Thos. A. L. McGowen.
Umbrella stand,	Miss Amy S. Wardwell.
Two water colors,	Mrs. K. T. Woods.
Panel,	Miss L. L. Read.
Painting, exhib.,	Mrs. George Upton.
Four studies,	Miss M. L. Webb.
Four ornaments,	Mrs. E. S. Johnson.
Table cloth,	Mrs. Chas. S. Osgood.
Eight sketches,	Miss S. E. Smith.
Two sketches,	pupils of Miss S. E. Smith.
Copy,	Miss S. W. Pickering.
Panel,	Mrs. N. G. Symonds.
Two charcoals,	R. C. Manning, Jr.
Cup and saucer,	Mrs. J. T. Mooney.
Nine decorated articles,	Miss L. B. How.
Screen,	Miss Sophie Harris.
Four paintings,	Mr. Geo. W. Harvey.
Embroidery,	Leonnette Luscomb.
Pair of storks,	Mrs. Joseph Symonds.
Pair of storks,	Miss S. Kelly.
Tidy, panels, etc.,	Mrs. Jas. Roberts.
Sofa pillow, etc.,	Miss E. R. Edmunds.
Five paintings,	Miss M. E. Phippen.
Embroidered India dress,	Mrs. J. C. Osgood.
Embroidery,	Mrs. G. B. Jewett.
Miniature,	Miss Osgood.

Poppies,	Miss C. Chase.
Plates, etc.,	Miss M. L. King.
Miniature, exhib.,	Mrs. S. J. Ireson.
Panel, etc.,	Mrs. J. R. Emery.
Four decorated articles,	Miss A. F. Perkins.
Twelve butter plates,	Miss A. G. Endicott.
Six specimens inlaid work,	Mr. E. C. Larrabee.
Embroidery,	Miss C. G. Grant.
Cups and saucers,	Miss A. B. Holden.
Embroidery,	Mrs. Geo. Harrington.
Two studies,	Miss A. S. Symonds.
Eight oil and water colors,	Mr. J. J. Redmond.
Two plaques,	Miss G. M. Benson.
Two plaques,	Miss E. U. Benson.
Decorated bottle,	Mrs. G. W. Benson.
Six sketches,	Frank W. Benson.
Marine view,	John P. Benson.
Three decorated articles,	Miss E. W. Chadwick.
Six paintings,	Miss M. M. Brooks.
Three paintings,	Mr. C. C. Redmond.
Two water colors,	Miss F. G. Babson.
Panels, etc.,	Miss E. B. Gardner.
Two paintings, exhib.,	J. J. Muhlig.
Nine paintings,	H. F. Osborne.
Six water colors,	A. H. Hayward.
Decorated articles,	L. E. Merrill.
Three articles,	Miss S. F. Upton.
Four decorated articles,	Mrs. N. A. Frye.
Decorated articles,	Miss A. B. Willson.
Six water colors,	C. K. Bolles.

The following are exhibitors of single articles:—Miss K. Phillips, Miss E. Ropes, Miss I. Jackson, Miss C. Harrington, Miss A. E. Smith, Mrs. Nathan Frye, Mrs. J. Kimball, Mrs. L. T. Savory, Miss F. Osborne, Miss Mary L. Webb, Miss Louisa Pierson, Miss A. Batchelder, S. S. Peele, Mrs. Emilio, N. C. Harris, Miss A. L. Short, Miss A. B. Holden, Miss C. L. Read, Miss L. S. Gifford, Miss A. Machado, Miss M. J. Ashby, Miss M. Whipple, Miss Edith Dalton, Mrs. C. Osgood, Miss E. W. Fiske, L. F. Endicott, Miss J. F. Pinkham, Miss A. Pingree, Miss S. E. Smith, Miss C. H. Sweetzer, Miss J. Purbeck, Miss H. E. Carlton, Mrs. J. C. Abbott, Miss N. J. Brown of Peabody, Mrs. E. H. Trumbull, Miss L. P. Robinson, Miss A. S. Tukey, Miss H. L. Kimball, John C. Chadwick, Dr. A. M. Dudley, Miss Mary Stevens.

Frequent and valuable additions to the art library are

made by the curator of art, and the number of persons interested in this subject who consult this library is increasing. Many of the volumes contain useful and valuable information which the student could not easily obtain elsewhere.

HORTICULTURAL EXHIBITION.—The annual exhibition of flowers and fruit opened at the rooms of the Essex Institute on Wednesday, Sept. 7. Although the display was not so large as that of some previous seasons, the collection was on the whole quite as interesting as any of the society's exhibitions. The general arrangement of the hall under the care of the curator of horticulture, Mr. J. Endicott Peabody, was very tasteful, and the plants and flowers were displayed to their best advantage. Among the most noteworthy exhibits were the collection of greenhouse ferns and other pot plants of S. E. Peabody, the fine collection of *Coleus* of H. W. Putnam, the beautifully arranged bank of cut flowers of Mrs. L. P. Weston of Danvers, the Ferns and Begonias of John Robinson, the seedling *Gladioli* of C. A. Putnam, and the cut flowers of Miss Mary Ropes. Fruit was exhibited by F. Lamson, J. P. Cook, Wm. Mack and Wm. A. Ireland. Cut flowers by Mary K. Robinson, George D. Phippen, and others. A finely arranged basket of flowers was shown by George W. Peabody, and a specimen of the cotton plant by John Webster.

Among the curiosities were the smallest fern grown in America, the "*Trichomanes petersii*," from Alabama, contributed by Mr. John Robinson; an exceedingly curious water plant, contributed by Dr. H. C. Merriam; and a cotton stock raised on the Red River in Louisiana, near the Texas line, planted April 1, and taken up the latter part of August, and presented to Mr. John Webster. Mr. S. E. Peabody and Mr. John Robinson contributed

a fine exhibit of ferns, pot plants and begonias. Mr. H. W. Putnam had a splendid show of coleus, and C. A. Putnam exhibited a beautiful display of gladioli, as did also Mr. James J. H. Gregory of Marblehead. The exhibit of fruit and vegetables was as before stated necessarily meagre, owing to the season. Mr. Charles A. Ropes was the leading exhibitor of pears and apples. Mr. G. F. Brown came next, and Miss E. P. Richardson and Mr. James P. Cook had a creditable display of pears. Mr. S. Endicott Peabody showed some magnificent grapes, and Mr. Fred Lamson some luscious peaches and exceedingly roseate apples. The vegetables formed a very creditable display and were from Kernwood.

The following awards were made: Greenhouse and stove plants, best twelve varieties, premium \$10, to S. E. Peabody; foliage plants, best six varieties, premium \$5, to S. E. Peabody; cut flowers, best display, premium \$5, to Mrs. L. P. Weston of Danvers; same, second premium, \$3, to Miss M. T. Ropes, Salem; gladioli, first premium \$5, to C. A. Putnam; gladioli, second premium, James J. H. Gregory; coleus, best display, gratuity \$5, to H. W. Putnam; ferns, best six named, premium \$5, to S. E. Peabody. Pears, best twelve Bartletts, premium to G. H. Frye; pears, best six of any kind, premium to George F. Brown; same, second premium, W. A. Ireland; apples, Gravensteins, gratuity \$3, to Charles A. Ropes; same, Rhode Island Greening, gratuity \$2, to Charles A. Ropes; grapes, best bunches white foreign, premium to S. E. Peabody; grapes, best "Black Hamburgs," premium to Jacob C. Rogers, Oak Hill, Peabody; peaches, first premium and second premium to Fred Lamson, Salem, "Early Crawford" and "Haley's Early."

The following were the entries:

Apples.—C. A. Ropes, Fred Lamson.

Pears.—C. A. Ropes, George F. Brown, Miss E. P. Richardson, William A. Ireland, J. P. Cook.

Apricots.—Mrs. Wilkinson of Beverly.

Peaches.—Fred. Lamson, E. Goss, W. A. Ireland.

Grapes.—S. E. Peabody, Jacob C. Rogers, C. A. Ropes, E. Goss.

Bartlett Pears.—George F. Brown, James B. Dugan, S. E. Peabody, C. A. Ropes, G. H. Frye, J. P. Cook, Miss E. P. Richardson.

Vegetables and Melons.—S. E. Peabody.

Pot Plants and Ferns.—S. E. Peabody, John Robinson, Dr. H. C. Merriam, G. Bailey, Annie S. Brooks, Helen Philbrick.

Gladioli.—J. J. H. Gregory, C. A. Putnam.

Coleus.—H. W. Putnam, S. E. Peabody.

Cut Flowers.—G. F. Brown, Miss M. K. Robinson, Mrs. L. P. Weston, Miss M. T. Ropes, William A. Ireland, J. J. H. Gregory, G. W. Peabody, F. Lamson, John Robinson, George D. Phippen.

It is interesting to note the great change that has taken place in the character of the exhibitions of to-day, as compared with those of forty years ago. We now miss from the stands the large collections of dahlias of every shade of coloring, from the gardens of the Putnams, Ropes, Driver, Upton, Oliver, Thayer, the Phippens and others; also the great variety of annuals, roses, lilies, etc., sent by various contributors. From the tables, the great collection of pears numbering some hundreds of varieties, the plums of fifty or more kinds, also apples, peaches, etc., from the well known pomological garden of Robert Manning, whose name is prominent in the annals of pomology; grapes in variety (cultivated under glass) from the houses of Allen, Lee, Silsbee, West, Dean, Hoffman, Pickman, Bowker, Gardner and others. The large collections of fruits, principally pears, from

Lee, Cabot, Putnam, Upton, Emmerton, Mansfield, Ives, etc.

Scarcely a pot plant or any of the well known vegetables were on exhibition. The cut flowers and the fruit occupied every available space in the rooms. The dahlia, once so prominent, has almost disappeared; the few that are seen may be considered as representatives of a previous age. The annuals, once so highly prized, have given place to the collections of foliage plants, ferns, begonias, caladiums, etc. The vegetables, in great variety, now receive merited attention in all horticultural displays.

The change in the specimens exhibited is no greater than in the exhibitors. That generation has nearly all passed away; and their children, and those who have since that time become residents of our city, remain to carry forward the work so auspiciously commenced.

MUSEUM.—The specimens in natural history, including those in archæology, which have been given during the year, are on deposit with the Trustees of the Peabody Academy of Science, in accordance with previous arrangements. Those of an historical character or that possess an artistic interest have been arranged in the rooms. The following may be specified as contributors: Mrs. Samuel G. Ireson, F. A. Fielden, C. T. Brooks of Newport, R. I., Mrs. N. D. Cole, Miss Nellie Jackson, Gardner L. Chandler, Charles O. Welch, James Shatswell, Henry M. Brooks, James L. Putnam, S. Grindall of Augusta, Me., James S. Bryant, of Hartford, Conn., Stephen Henry Osborn, E. N. Walton, Benjamin Knights, S. A. Green, of Boston, Wm. P. Andrews, E. C. Bolles, John Robinson, R. S. Rantoul, S. A. Jones, George D. Phippen, Mrs. Sarah H. Swan, of Cambridge, Esther C. Mack, Miss C. P. Chadwick (estate of), James A. Emmerton.

FINANCIAL.—The Treasurer's Report of the receipts and expenditures of the past year (condensed for printing).

RECEIPTS.

General Account.

Balance on hand at commencement of year		\$69 76
Dividends of stocks,	\$25 00	
Return state tax,	11 05	
Assessments of members,	934 00	
Publications,	550 65	
Lectures, Concerts, Excursions, Hall, etc.,	829 11	
Salem Athenæum,	210 34	
	<hr/>	\$2560 15

Hist. Soc. Fund.

Dividends of stocks,		25 00
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Nat. Hist. Soc. Fund.

Dividends of stocks,		36 00
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Davis Fund.

Interest of bonds,		407 30
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Ditmore Fund.

Interest of bonds and stocks,		180 40
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Manuscript Fund.

Interest of Savings Bank,		22 10
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Ladies' Fair Fund.

Interest of bond,		60 00
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Derby Fund.

Sale of land and rent,		417 50
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Howes Fund.

Interest of bonds,		1,490 00
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\$5,268 21

EXPENDITURES.

General Account.

Salem Athenæum,	\$350 00	
Salaries,	1,752 81	
Publications,	1,881 62	
Fuel,	152 50	
Repairs, Express, Postage, etc.,	294 06	

\$4,430 99

Historical.

Books and binding,		210 98
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Natural History and Horticulture.

Book-binding, etc.,		90 00
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Ditmore Fund.

Mr. Perkins' annuity,		110 00
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Manuscript Fund.

Savings Bank, interest added to fund,		22 10
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Davis Fund.

Savings Bank, interest added to fund,		27 30
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Balance cash on hand,		376 84
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\$5,268 21

The invested funds of the Institute are,

\$37,665 43

AN AMENDMENT TO THE ACT OF INCORPORATION granted by the Legislature of 1882, on the petition of the Institute.

AN ACT to authorize the Essex Institute to hold additional personal estate.

Be it enacted, etc., as follows:

SECT. 1. The Essex Institute, incorporated by chapter five of the acts of the year eighteen hundred and forty-eight, is hereby authorized to hold personal estate, exclusive of the books, papers and articles in the cabinets of said corporation, to an amount not exceeding one hundred thousand dollars.

SECT. 2. This act shall take effect upon its passage.

[*Approved February 24, 1882.*]

The Secretary closes his annual report in the following words:

“Thousands of pamphlets and newspapers have found their way to our rooms during the year. Many hundred volumes of books of more or less value have also been given to the society, and each year comes the question where shall such material be deposited? The shelving capacity of the building is exhausted. Many valuable historical pictures and prints are lying unseen in various places about the rooms for want of proper hanging space. It is known that portraits of great value and of much historical interest would come to the Institute, if secure and fire-proof accommodations were offered. Could the means be supplied to meet the imperative need, there can be no doubt that large additions would be made to the various departments of the Institute, thereby largely increasing its usefulness in our own county, and its importance among the historical societies of the country.”

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CARCINOLOGICAL NOTES; NUMBER V.¹

BY J. S. KINGSLEY.

IN the present number of these notes I have gathered a number of new species and remarks on little known forms of macrurous Crustacea, the results of my studies of the collections at Salem, Boston and Philadelphia, together with outline illustrations of some hitherto unfigured forms.

Genus **PENÆUS** FABR.

Mr. E. J. Miers has recently given a revision of the species of this genus (Proc. Zool. Soc'y, London, 1878, pp. 298-310) and I would here give the localities of the specimens which I have examined.

Penæus affinis.

Specimens in the Museum of the Peabody Academy of Science, Salem, Mass., from Hawaiian Islands (A. Garrett), Hong Kong (Capt. W. H. A. Putnam), Zanzibar (Capt. Webb).

¹The previous articles of this series may be found in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1880. (No. I, pp. 34-37; No. II, pp. 135-155, pl. X; No. III, pp. 179-186; No. IV, pp. 187-224.)

Penæus amazonicus.

Specimens in the Museum of the Boston Society of Natural History from the upper Amazon (James Orton).

Penæus avirostris Dana.

Boston Society : Japan (E. S. Morse).

Penæus braziliensis Latr.

P. brevirostris Kingsley.

Boston Society : Trinidad (W. O. Crosby), Bahamas (Dr. Henry Bryant). Union College : Sarasota Bay, Marcou Pass and Charlotte Harbor, Fla., Beaufort, N. C. (H. E. Webster). Peabody Academy : Rio Grande, Brazil (Capt. Harrington); Bahia, Brazil (Prof. C. F. Hartt); Magdalena River, New Granada (A. P. Smith); Realigo, West coast of Nicaragua (J. A. McNiel).

Penæus brevicornis M.-Edw.

Peabody Academy : China (Capt. W. H. A. Putnam).

Penæus canaliculatus Oliv.

Boston Society : Japan (Prof. E. S. Morse).

Penæus constrictus Stimp.

Union College : Marcou Pass, Fla. (H. E. Webster). Peabody Academy : Ft. Jefferson, Fla. (Lient. Jacques).

Penæus kroyeri Heller.

Xiphopeneus hartii Smith.

Peabody Academy : Abrolhos, Brazil (Prof. C. F. Hartt).

Penæus monocerus Fabr.

Peabody Academy : Whampoa, China (Capt. W. H. A. Putnam).

Penæus monodon Fabr.

Peabody Academy : Hong Kong (Capt. W. H. A. Putnam).

Penæus sculptilis Heller.

Peabody Academy : Pulo Penang (Capt. W. H. A. Putnam).

Penæus semisulcatus Dr. Haan.

Peabody Academy : Singapore (Capt. W. H. A. Putnam).

Penæus setiferus Linn.

Boston Society: Guatemala (C. H. Van Patten), Port Orange, Fla. (S. N. Chamberlain). Peabody Academy: Charleston, S. C. (A. S. Packard, jr.).

Genus **PALÆMON** FABR.**Palæmon africanus** n. s.

Carapax microscopically granulate, hepatic spine present. Rostrum shorter than the antennal scales, with nine or ten teeth above and five or six below, the tip three toothed. First pair of feet slender; the middle of the carpus extending as far forward as the tip of the antennal scale; hand about one-third the length of the carpus, fingers with pencils of hairs. Second pair of feet equal, greatly elongate and armed with longitudinally arranged spiniform tubercles; the meros is shorter than the carpus and about equal to the palm. Carpus slightly shorter than the hand, fingers occupying from one-third to two-fifths of the manus, completely closing, the occludent margins smooth, toothless and covered with hairs. Its nearest allies are *P. idæ* Heller, from which it differs in the shorter carpus and longer meros; *P. acanthurus*, which has a longer and reflexed rostrum, and *P. japonicus* de Haan, in which the first pair of feet are much longer. It may prove to be *P. macrobrachion* Hecklots (Addit. Faun. Africam Occid.) but the description of that species is too imperfect to decide the question.

West coast of Africa; P. du Chaillu (Philadelphia Academy). West coast of Africa; Dr. Perkins (Boston Society of Natural History, *type*).

Palæmon grandimanus Randall.

The types (two in number) of this species are still preserved in the Philadelphia Academy.

Palæmon jamaicensis (Herbst) Oliv.

P. carcinus Leach, Zool. Misc., ii, p. 92, pl. 92, 1815.

P. punctatus Randall, Jour. Phil. Acad., viii, p. 145, 1839.

An examination of Randall's type of *P. punctatus*, which is preserved in the museum of the Philadelphia Academy of Natural Sciences, shows it to belong to the well-known *P. jamaicensis*. In the same collection are specimens from St. Martin's (Dr. Rigjersma), San Domingo (W. M. Gabb), Guatemala (W. S. Vaux), Cuba (Guerin), Brazil (Dr. T. B. Wilson). In the Peabody Academy of Science there are specimens brought by J. A. McNeil from Polvon, on the west coast of Nicaragua.

Palæmon longimanus Fabricius.

P. longimanus Fabr., Suppl. Ent. Syst., p. 402, 1798.

P. lar Fabr., l. c., p. 402, 1798.

P. ornatus Oliv., Encyc. viii, p. 660. Edw. Hist. Nat. Crust., ii, 396, 1837.

These three descriptions were doubtless drawn from individuals of the same species, and of the two Fabrician names I have chosen *longimanus* to stand for the species, as it is to a certain extent descriptive.

Palæmon ohionis Smith.

This species was described by Professor Smith from specimens taken in the Ohio river at Cannelton, Indiana. Prof. S. A. Forbes (Bulletin Ill. Mus. Nat. Hist., i, p. 5, 1876) reports it from several places in Illinois and, on the authority of boatmen, from St. Louis to New Orleans, growing larger towards the south. I have seen specimens in the museum of the Boston Society of Natural History from Milliken's Bend, Miss. (C. A. Shurtleff), and in the Museum of the Academy of Natural Sciences of Philadelphia, from Vicksburg, Miss. (L. C. Rice) and Mississippi (Guerin-Meneville, types of *P. sallei* Guer. MS.).

Palæmon sinensis Heller.

Specimens of this species, which was originally described from Shanghai, were brought from Japan by Prof. E. S. Morse and are now in the museum of the Boston Society of Natural History.

Palæmon acanthurus Wiegmann.

P. forceps Milne-Edwards.

Three specimens of this species in the Museum of the Peabody Academy brought by J. A. McNeil from the west coast of Nicaragua. It has hitherto been known only from the eastern shores of this continent.

Genus **LEANDER** DESMAREST.**Leander hammondii** n. s. Pl. I, fig. 2.

Carapax smooth; rostrum elongate, a fifth longer than carapax and considerably recurved, its dorsal margin armed with nine or ten nearly equidistant teeth, the two posterior being on the carapax; inferior margin six-toothed, the apex bifid. Last two joints of antennular peduncle subequal, and together about equalling the preceding joint. The two basal joints armed externally with a slender spine, each of which extends beyond the middle of the succeeding joint. Three

antennular flagella, the two outer (and stouter) branches being united for about a fifth of their length. Antennal scale narrow and very long, nearly equalling the rostrum in length. Antennal flagellum slightly longer than the whole body. External maxilliped hirsute, small, slender and not reaching beyond the tip of the antennular peduncle. First pair of feet slender, extending half way between tip of antennular peduncle and the apex of the rostrum. Second pair also slender; ischium, meros, and carpus sub-equal. Palm inflated, fingers about equal to palm, depressed, slender and gaping, and extending their whole length beyond the rostrum. Remaining feet slender, propodal joints spinulose beneath. Telson slender, triangular, with four dorsal aciculi and its apex armed with four small spines, the two outer ones the shorter. Length of body 29 mm., carapax 13 mm., second pair 15 mm.

The specimens on which this species is founded are in the museum of the Peabody Academy of Science at Salem, Mass. (no. 171), and were brought from Baker's Island, North Pacific, by Capt. Joseph Hammond, who for many years has been in charge of the Exhibition Rooms of the Academy and for whom I have named the species. Its closest relative seems to be *L. modestus* Heller (Verh. k. k. zool. bot. Gesellschaft in Wien xii, pl. 527, 1862) from Shanghai, from which it appears to differ in the shape of the rostrum, hands, etc.

Genus *Anchistia* DANA.

Anchistia Americana, Kingsley, Proc. Acad. Nat. Sci., Philadelphia, 1878, p. 96.

A few details of this species are given on plate II, fig. 10.

Genus *ALPHEUS* FABER.

(Including *Betaeus*, Dana.)

Notwithstanding the remarks of my friend Mr. Lockington (Ann. & Mag. Nat. Hist. V, i, p. 466, 1878), I am still of the opinion that these two genera should be united and the examination of many hundred specimens of the two forms in the largest museums of America, only renders me more certain of my position. Mr. Miers says (Proc. Zool. Soc., 1879, p. 52): "There is probably scarcely any genus of Crustacea in which the species are more numerous, and which more greatly needs revision than the present," with which I fully agree. I commenced a revision some three years ago, but for several reasons I have been unable to finish it. Moreover, some sheets of my manuscript having been mislaid I cannot give this list of species that completeness which I could wish and which it once possessed. Still it is to be

hoped that the following notes which embrace almost every species, nominal or otherwise, will aid some future reviser in the work.

To aid in the identification of forms I have thrown the species into groups characterized by more or less prominent features; but there remain a number of nominal forms which (either from inadequacy of description or from the works in which they are published being inaccessible to me) are not so arranged.

A. Rostrum present; orbital hoods prolonged into spines.

a. Dactylus of 1st pair normal, *i. e.*, working in a vertical plane and above the pollex.

* Larger hand constricted above and below.

§ A spine on basal joint of antenna.

***Alpheus megacheles* Norman.**

Hippolyte rubra Westwood. Mag. Nat. Hist., viii, p. 272 (1835); *non*
Alpheus ruber Edw. ex Rafinesque.

Hippolyte megacheles Hailstone. Mag. Nat. Hist., viii, p. 395 (1835).
Dienecia rubra Westwood, *l. c.*, p. 552 (1835).

Alpheus edwardsii Edwards. Hist. Nat. Crust., ii, p. 352 (1837); Dana
U. S. Exp. Exp. Crust., p. 543, pl. xxxiv, fig. 2 (1852); *non*
Audouin.

Alpheus affinis Guise. Ann. & Mag. N. H., II, xiv, p. 275 (1854).

Alpheus platyrhynchus Heller. Sitzungsber. K. Akad., Wien, xlv, i,
p. 400, pl. 1, f. 21-24 (1862).

Alpheus milnei Guerin, in De Sagra's Hist. Cuba, Crust., p. xlix (1857).

Alpheus megacheles Norman. Ann. & Mag., N. H., IV, ii, p. 175
(1868).

England to the Mediterranean (Auct.).

***Alpheus thetis* White. Pl. II, fig. 7.**

Alpheus thetis White. List Crust. Brit. Mus., p. 75 (1847) *sine descr.*
Miers Zoöl. Voyage Erebus & Terror, Crustacea, p. 5, pl. iv, f.
7 (1875).

The following description giving some details additional to those of Mr. Miers, is drawn from two specimens in the museum of the Academy of Natural Sciences of Philadelphia, presented by Dr. T. B. Wilson and labelled in Adam White's handwriting. They agree well with the figure quoted above and may be regarded as typical.

Front three spined, rostrum slightly longer than the ocular spines and separated from them by deep sulci. Second joint of antennular peduncle much the longest, the peduncle equalling the antennal scale in length. External maxillipeds much exceeding the antennal scales.

Larger hand longer than the carapax and shaped much as in *A. strenuus* Dana, but more elongate. Both margins are constricted and a well marked longitudinal sulcus runs backward on the lower margin. The inner and outer surfaces of the hand are sulcate. The fingers are nearly as long as the palm, the dactylus being slightly longer than the pollex. The carpus of the second pair is five jointed; first joint as long as the next two, second as long as the third and fourth, which are equal and together are as long as the fifth. The hand is about as long as the fourth and fifth carpal joints together.

New Zealand! (Dr. Wilson, Phil. Acad.); New Holland (White).

***Alpheus bellimanus* Lockington.**

Alpheus bellimanus Lockington. Proc. Cal. Acad., vii, p. 34 (1876);
Ann. & Mag. Nat. Hist., V, i, p. 470 (1878).

San Diego, Cal. (Lockington).

***Alpheus sulcatus* Kingsley.**

Alpheus sulcatus Kingsley. Bull. U. S. Geol. Surv., iv, p. 193 (1877).
Panama! and Zorritas, Peru! (F. H. Bradley, Yale College).

***Alpheus dentipes* Guerin.**

Alpheus dentipes Guerin. Exp. Sci. Morée, Zoöl., p. 39, pl. xxvii, f.
3 (1832).

Mediterranean (Guerin, Lucas and Heller).

***Alpheus equidactylus* Lockington.**

Alpheus equidactylus Lockington. Proc. Cal. Acad., vii, p. 35 (1876).
Alpheus æquidactylus Lockington. Ann. & Mag., N. H., V, i, p. 472
1878.

Monterey, Cal. (Lockington).

§§ No spine on basal joint of antenna.

***Alpheus Websteri* Kingsley. Pl. II, fig. 5.**

Alpheus Websteri Kingsley. Proc. Acad. Nat. Sci., Philadelphia, p.
416 (1879).

In this species the constriction on the lower margin of the palm is very slight and possibly it should be placed near *A. lottinii* (*infra*), but it appears, however, to be more closely allied to *Alpheus sulcatus* than to any other form. The types are in the collection of Union College and were brought from Key West, Fla., by Prof. H. E. Webster, to whom the species is dedicated.

Alpheus euchirus Dana.

Possibly this species should be arranged here. I have, however, placed it in the section with contorted hands. The dactylus works slightly out of the vertical plane.

** Larger hand notched above, entire below.

§ A spine on basal joint of antenna.

Alpheus gracilipes Stimpson.

Alpheus gracilipes Stimpson. Proc. Acad. Nat. Sci., 1860, p. 31.
Tahiti (Stimpson).

Alpheus malleator Dana.

Alpheus malleator Dana. U. S. Exp. Exp. Crust., p. 557, pl. 35, f. 9
(1852).

Rio Janeiro?! (Wilkes Exp., Phil. Acad.).

Alpheus gracilis, Heller.

Alpheus gracilis Heller. Sitzungsber. k. Akad., Wien, xlv, i, p. 271,
pl. III, figs. 19-20 (1862).

Red Sea (Heller).

§§ No spine on basal antennal joint.

Alpheus trispinosus Kingsley.

Betæus trispinosus Stimpson. Proc. Acad. Nat. Sci., p. 32 (1860).

Alpheus trispinosus Kingsley. Bull. U. S. Geol. Surv., IV, 190 (1878).

What reason Dr. Stimpson had for calling this a *Betæus* I cannot imagine; for, according to his description, it has a long rostrum and the larger hand is not inverted, the only characters given for the genus *Betæus* by Dana.

Port Jackson, Australia (Stimpson).

*** Larger hand with both margins entire.

§ First joint of carpus of second pair of feet shorter than, or at the most equal to, the second and third joints. A spine on the basal joint of the second antenna.

Alpheus socialis Heller.

Alpheus socialis Heller. Reise der Novara, Crustaceen, p. 106, pl. 10,
f. 1 (1865); Miers Catalogue New Zealand Crustacea, p. 82
(1876).

Auckland, Sydney (Heller); New Zealand (Miers).

***Alpheus panamensis* Kingsley.**

Alpheus panamensis Kingsley. Bulletin, etc., p. 192 (1877).

Acajutla, Central America! and Panama! (F. H. Bradley, Yale College Museum).

***Alpheus lottinii* Guerin.**

Alpheus lottinii Guerin. Voyage Coquille, Crustaces, p. 38, pl. III, f. 3 (1830).

Alpheus ventrosus Edw. Hist. Nat. Crust., ii, p. 352 (1837).

Alpheus lævis Randall. Jour. Acad. Nat. Sci., Phil., viii, p. 141 (1839); Dana U. S. Exp. Exp. Crust., p. 556, pl. XXXV, f. 8 (1852).

A comparison of the types of Guerin and of Randall shows the specific identity of the two so-called species. Guerin's figure is poor, that of Dana is far better. The bottle containing Guerin's type bears the label (in his handwriting) "303 *Alpheus lottini*. Guer. Voy. Coq. Edw. 2. 353, Ile de France;" while the manuscript catalogue of his collection (which was purchased by Dr. Thomas B. Wilson, and by him presented to the Academy of Natural Sciences of Philadelphia) has "303 *A. lottinii* Guer. Voy. Coq. Edw. 2. 353 (type) Nouvelle Irlande, 1 Alk." In the published description Nouvelle Irlande is given as the locality. Under these circumstances I am inclined to believe that the locality "Ile de France" was a slip of the pen.

New Ireland! (Guerin, Phil. Acad. *type*); Sandwich Islands! (T. Nuttall, Phil. Acad., Randall's *type*); Zanzibar! (C. Cooke, Peabody Acad.); Red Sea, Nicobar and Sydney (Heller); Fiji (Dana); Mauritius (Edw.); Society and Friendly Islands.

***Alpheus rouxii* Guerin.**

Alpheus rouxii Guerin, in De Sagra Hist. Cuba, Animaux Articulés, p. 1 (1857).

Bombay (Guerin).

This in all probability is the same as the preceding. Guerin's description runs: "Très voisin de l'*A. ventrosus*, Edw., p. 352. Il en diffère par ses pattes mâchoires externes qui ne sont pas larges et obtuses au bout, mais qui sont, au contraire, larges à la base du dernier article, avec son extrémité effilée et aigüe; par l'article basilaire des antennes externes qui porte une forte épine atteignant presque la moitié de la pièce lamelleuse du pédoncule."

Alpheus ventricosus Kingsley.

Cryptopthalmus ventricosus Costa, Fauna Napoli, Crustacei, pl. vii, f. 3.²

I place this species in this section with some doubt, as I know nothing of the presence or absence of an antennal scale. Dr. Heller (Crustaceen des südlichen Europas, p. 272, 1863) regards this identical with his *Alpheus lavimanus*, but Costa's figure represents a widely different species. Dr. Heller also quotes as a synonym "*Cryptopthalmus costæ*, Prestandrea Nuovi annali d. sc. nat. 1838, p. 298," a paper which I have not seen. Dr. Heller's synonymy is, however, never to be relied upon.

§§ First joint of carpus of second pair of feet larger than the second and third together.

Alpheus minus Say.

Alpheus minus Say. Jour. Acad. Nat. Sci., Phil., i, p. 245 (1818); Edw. Hist. Nat. d. Crust., ii, p. 536 (1837); Kingsley Bulletin, l. c., p. 190 (1877).

Alpheus formosus Gibbes. Proc. Am. Assoc. Adv. Sci., iii, p. 196 (1851).

Alpheus tridentulatus Dana. Proc. Phil. Acad., vi, p. 22 (1852); U. S. Exp. Exp. Crust., p. 552, pl. xxxv, f. 4 (1852).

Alpheus saulcyi Guerin, in De Sagra's Hist. Cuba, p. xlvi, pl. II, f. 8 (1857).

Alpheus minor Lockington. Ann. & Mag. N. H., V, i, p. 472 (1878).

Beaufort, N. C.! (H. C. Yarrow, Yale College); Florida! A. S. Packard, jr., Peabody Academy); Martinique! (Guerin's type of *A. saulcyi* in Philadelphia Academy); Bermudas! (G. B. Goode, Yale College); Panama! (F. H. Bradley, Yale College); Bahamas! (H. Bryant, Boston Society); Trinidad! (W. O. Crosby, Boston Society).

Alpheus neptunus Dana.

Alpheus neptunus Dana. Proc. Phil. Acad., vi, p. 22 (1852); U. S. Exp. Exped. Crust., p. 553, pl. XXXV, f. 5 (1852).

?*Alpheus biungulatus* Stimpson. Proc. Phil. Acad., 1860, p. 31.

² This work is one of the wonders of book-making. It has neither consecutive pagination nor systematic numbering of plates, there being half a dozen "Pl. I," and others in similar proportion. The parts themselves are not numbered, nor are the signatures dated or numbered. In the two copies which I have seen, the covers, in which the parts were issued, were wanting and so I can not give the dates. Some parts were apparently issued before the publication of the first volume of Milne Edwards' Classic (1834), while others were not written until 1851.

?*Alpheus læviusculus* Lockington. Ann. & Mag., V, i, p. 474 (1878);
(*nec* Dana).

?*Alpheus charon* Heller. Verhandlung der zoöl.-bot. Gesellschaft in
Wien, Bd. xi, p. 27 (1861).

The *Alpheus læviusculus* of Lockington is certainly the same as the
A. biungulus of Stimpson.

Eastern seas. ? W. coast America.

Alpheus spiniger Stm.

Alpheus spiniger Stm. Proc. Phil. Acad., 1860, p. 31.

Near Loo Choo (Stm).

Alpheus tricuspidatus.

Alpheus tricuspidatus Heller. Verhandl. zoöl.-bot. Gesellschaft in
Wien, xi, p. 26 (1861).

Red Sea (Heller).

Alpheus lævimanus Heller.

Alpheus lævimanus Heller. Sitzungsber. k. k. Akad., Wien, Bd. xlv,
p. 403, pl. I, f. 25-27 (1862); Crust. s. Europa, p. 272 (1863);
non syn.

Mediterranean (Heller).

Alpheus tenuimanus Lockington.

Alpheus tenuimanus Lockington. Ann. & Mag. Nat. Hist., V, i, p.
473 (1878).

Gulf of California (Lockington).

The following species which belong in section *** I am not able to
assign more nearly to their proper position, on account of insuffi-
cient detail in the descriptions and figures.

Alpheus doto White, Miers.

Alpheus doto White. List Crust. in Brit. Mus., p. 75 (1847) *sine*
descrip.; Miers Zool. Voy. Erebus and Terror, Crustacea, p. 5,
pl. iv, f. 5 (1874).

Sir Charles Hardy's Island, Australia (Miers).

Alpheus poeyi Guerin.

Alpheus poeyi Guerin, in De Sagra's Cuba, Crust., p. 1, pl. II, f. 10 (1857).

The type of this species is preserved, though in an imperfect condition, in the museum of the Philadelphia Academy.

Cuba! (Guerin).

Alpheus bidens Edw.

Palæmon bidens Olivier, Encyclopedie Methodique, viii, p. 663 (1790).

Alpheus bidens M. Edw. Hist. Nat. Crust., ii, p. 353, pl. XXIV, f. 11-12 (1837).

In Milne Edwards figure (*l. c.*) this species is represented as having a four jointed carpus, probably an error on the part of the artist.

Asiatic seas (M. Edw.), New Holland (Olivier).

Alpheus villosus Edw.

Palæmon villosus Olivier, *l. c.*, p. 664 (1790).

Alpheus villosus Edw. Hist. ii, p. 354 (1837).

Asiatic seas (Edw.), New Holland (Oliv.).

Alpheus spinifrons Edw.

Alpheus spinifrons Edw. Hist. etc., ii, p. 355 (1837).

Alpheus panamensis Kingsley, may prove to be this species but only a study of Milne Edwards type can determine; his description is utterly inadequate and would apply to several other species as well.

Chili (Edw.).

Alpheus savignyi Guerin.

Athanas nitescens Audouin (*nec* Leach) Expl. Pl. Savigny, p. 274, pl. 9, f. 4 (teste Guerin).

Alpheus savignyi Guerin, in De Sagra's Hist. Cuba, Animaux Articulés, p. xlix (1837).

Egypt (Savigny).

Alpheus comatularum Haswell.

Alpheus comatularum Haswell, Catalogue of Australian Crustacea, p. 189 (1882).

Queensland (Haswell).

b. Hand contorted, the dactylus working either in a horizontal plane or in a vertical one below the pollex.

* No spine on the basal joint of the antenna.

Alpheus streptochirus Stm.*Alpheus streptochirus* Stm., Proc. Phil. p. 30 (1860).

Cape Verdes Is. (Stm.).

Alpheus brevipes Stm.*Alpheus brevipes* Stm. Proceedings Phil. Acad., p. 30 (1860).

Hawaiian Is. (Stm.)

Alpheus barbara Lockington.*Alpheus barbara* Lckn.*Alpheus clamator* Kingsley, Bull. U. S. Geol. Survey, iv, p.**Alpheus euchirus** Dana.*Alpheus euchirus* Dana.

** A spine on the basal joint of the antennæ.

Alpheus clamator Lockington.*Alpheus clamator* Lock., Proc. Cal. Acad. vii, p. 43 (1876) Ann. and
Mag. N. H.

Sta. Barbara Is. (Lock.),

Alpheus collumianus Stm.*Alpheus collumianus* Stm., Proc. Phila. Acad., p. 30 (1860).

Bonin Is. (Stm.)

The following species belong in the section with the three-spined front (A) but no details are given of the hands and so their affinities cannot be recognized from the descriptions given.

Alpheus acutofemoratus Dana.*Alpheus acutofemoratus* Dana, Proc. Phil. Acad., vi, p. 22 (1852) U. S.
Ex. Crust. p. 550, pl. XXXV, f. 2 (1852).

Balabac Straits (Dana).

Alpheus monoceros Heller.*Alpheus monoceros* Heller, Sitzungsberichte, K. Acad. Wiss. Wien,
xliv, p. 274 (1862).

Red Sea (Heller).

B. Rostrum spiniform, ocular hoods rounded, not spiniform.

a. Basal joint of antennal with an external spine.

* Larger hand constricted above and below.

§ First joint of carpus of second pair longer than the second joint.

Alpheus parvirostris Dana.

Alpheus parvirostris Dana, Proc. Phila. Acad. vi, p. 22 (1852) U. S. Ex. Ex. Crust. p. 551, pl. XXXV, f. 3 (1852).

Balabac Straits (Dana), Red Sea (Heller).

Alpheus diadema Dana.

Alpheus diadema Dana, Proc. Phila. Acad. v, p. 23 (1852) U. S. Exp. Exped. Crust. p. 555, pl. XXXV, f. 7 (1852).

In this species the constriction of the larger hand is very slight and possibly the affinities are with *A. fasciatus*, *infra*, and the name is for that reason repeated there.

Hawaiian Islands (Dana).

Alpheus parvimanus Kingsley.

Alpheus parvimanus Kingsley, Bulletin, etc., p. 195 (1877).

Panama! (F. H. Bradley, Yale College Museum).

Alpheus sulcatus Kingsley.

Alpheus sulcatus Kingsley, Bulletin, etc., p. 193 (1877).

Panama! Zorritas, Peru! (F. H. Bradley, Yale Museum).

This species has affinities with this section and hence is repeated.

§§ First and second joints of carpus of second pair of feet equal.

Alpheus normannii Kingsley.

Alpheus affinis Kingsley, Bulletin, etc., p. 195, 1871 (*nec* Guise).

Alpheus normannii Kingsley, Proc. Phil. Acad. 1878, p. 93.

Panama! (F. H. Bradley, Yale Museum).

Alpheus packardii Kingsley, Pl. II, fig. 2.

Alpheus packardii Kingsley, Proc. Phila. Acad. 1879, p. 417 (1880).

Key West, Fla.! (H. E. Webster, Union College Museum).

§§ First joint of carpus shorter than the second.

Alpheus spinicaudus Lockington.

Alpheus spinicaudus Lockington, Ann. and Mag. Nat. Hist. V, i, p. 476 (1878).

Gulf of California (Lockington).

** Larger hand notched above, entire below.

§ First carpal joint shorter than second.

Alpheus pugnax Dana.

Alpheus pugnax Dana, Proc. Phila. Acad. vi, p. 23 (1852) Ex. Ex. Crust.
p. 554, pl. XXXV, f. 6 (1852).

Hawaiian Islands (Dana).

§§ First and second carpal joints equal.

Alpheus insignis Heller.

Alpheus insignis Heller, Verh. z. b. Ges. Wien xi, p. 26, 1861; Sitzungsber. k. k. Akad. Wien, xlv; p. 269, pl. III, f. 17-18 (1862).

Red Sea (Heller).

*** Both margins of larger cheliped entire.

§ First carpal joint larger than second.

Alpheus fasciatus Lockington.

Alpheus fasciatus Lockington, Ann. and Mag. N. H., v, p. 478 (1878).

Gulf of California (Lockington).

Alpheus diadema Dana. *Vide supra.*

§§ First and second carpal joint nearly equal.

Alpheus novozelandiæ Miers.

Alpheus novozelandiæ Miers, Ann. and Mag. N. H. p. 82, pl. II, f. 2
(1876).

New Zealand (Miers).

§§§ First carpal joint shorter than the second.

Alpheus ruber Milne Edwards.

Cryptopthalmus ruber Costa *op cit.*

Alpheus ruber M. Edw. Hist. Nat. de Crust. ii, p. 351 (1837); Règne
Animal de Cuvier, III^e édition Crustace, pl. 53, fig. 1.

Mediterranean! (Phila. Acad.)

§§§§ No details of carpal joints.

Alpheus crassimanus Heller.

Alpheus crassimanus Heller, Verh. z. b. Ges. Wien, p. 526 (1860).
Nicobars (Heller).

b. Basal joint of antennæ without an external spine.

* Dactylus working in a horizontal plane, at right angles to the usual one.

Alpheus cylindricus Kingsley.

Alpheus cylindricus Kingsley, Bulletin, etc., iv, p. 196 (1877).
Panama! (F. H. Bradley, Yale Museum).

** Dactylus normal.

§ Both margins of larger cheliped constricted.

Alpheus bisincisus De Haan.

Alpheus bisincisus De Haan, Fauna Japonica, Crustacea, pl. XLV, f. 3
(1849).

Alpheus avaris De Haan, l. c. p. 179 (1849).

Alpheus strenuus Dana, Proc. Phila. Acad. p. 21 (1852) U. S. Ex. Exped.
Crust. p. 543, pl. XXXIV, f. 4 (1852).

Japan (De Haan), Tongatabu (Dana), Eastern Seas (Auct.).

Alpheus lobidens De Haan.

Alpheus lobidens De Haan, F. Jap. Crust. p. 179 (1849).

Japan (De Haan).

Alpheus Edwardsii Audouin.

Alpheus Edwardsii Audouin, Explication Planches de Savigny, Egypt,
pl. X, fig. I (*teste Auct.*) Heller, Sitzungsber. K. Akad. Wien,
xliv, i, p. 267 (1862).

Alpheus neptunus White, Zool. Ereb. and Terror, pl. iv, f. 3 (1874).

Red Sea (Heller), Mozambique (Bianconi), Port Essington, Australia (Miers).

Alpheus heterochelis Say.

Alpheus heterochelis Say, Jour. Acad. Nat. Sci. Phila. i, p. 243 (1818);
Kingsley, Bulletin, etc., iv, p. 194 (1877).

Alpheus armillatus Edw. Hist. Nat. Crust. ii, p. 354 (1837).

Halopsyche lutaria Saussure, Rev. et Mag. de Zoologie, 1857, p. 100.

Alpheus bispinosus Streets, Proc. Phila. Acad. 1872, p. 242.

Alpheus lutarius Saussure, Mem., Soc. Phys. et Hist. Nat. de Geneve, t. xiv, p. 461, pl. III, f. 24 (1858) [ext. p. 45].

From North Carolina! to Brazil, Rio Janeiro! West Indies! Panama! Realijo, Nicaragua! This form belongs to both coasts of tropical and sub-tropical America. Mr. Lockington (Ann. and Mag. Nat. Hist. V, i, p. 475, 1878) reports it from Lower California.

Alpheus pacificus Dana.

Alpheus pacificus Dana, Proc. Phila. Acad. vi, p. 21 (1852) U. S. Expl. Exped. Crust. p. 544, pl. XXXIV, f. 5 (1852).

Hawaiian Is. (Dana).

Alpheus japonicus Miers.

Alpheus japonicus Miers, Proc. Zool. Socy., London 1874, p. 53.

Japan (Miers).

Alpheus spinicaudus Lockington.

Alpheus spinicaudus Lockington, Ann. and Mag. Nat. Hist. V, i, p. 476 (1878).

Lower California (Lockington).

Alpheus jourdainii Guerin.

Alpheus jourdainii Guerin in De Sagra, Hist. Cuba, p. li (1837). [= ? *A. sculptimanus*.]

No locality given.

Alpheus sculptimanus Guerin.

Alpheus sculptimanus Guerin, l. c. p. li, 1837.

Janaon (Guerin).

Alpheus laevigatus Guerin. Pl. II, fig. 3.

Alpheus laevigatus Guerin, Voy. Coquille Crust., p. 38.

Alpheus strenuus.

Alpheus strenuus Dana, U. S. Ex. Ex. Crust. 543, xxxiv, f. 4 (1852).

Alpheus doris White, List Crust. Brit. Mus. 75, 1847, Crust. Erebus and Terror, pl. 4, f. 2 (1874).

Alpheus rhode White, l. c.

? *A. Avarus* Heller, Voy. Novara, Crust. p. 108 (1863).

Torres Straits, Sydney, Tongatabou, Philippines.

§§ Upper margin of larger chela notched, the lower entire.

***Alpheus brevirostris* Edw.**

Alpheus brevirostris (Edw.) (*ex* Olivier) Hist. Nat. d. Crust. ii, p. 350 (1837). New Holland.

***Alpheus kingsleyi* Miers.**

Alpheus kingsleyi Miers, P. Z. S. London, 1879, p. 54.

Japan (Miers).

***Alpheus rapax* Fabr.**

Alpheus rapax Fabricius, Suppl. Ent. Syst. p. 405, 1798, De Haan, op. cit. p. 177, pl. XLV, f. 2 (1849).

Japan (De Haan).

***Alpheus malabaricus* Fabr.**

Alpheus malabaricus Fabr., Suppl. f. 405 (1798) De Haan, op. cit. p. 177, Pl. XLV, f. 1 (1849).

Alpheus brevicristatus De Haan, l. c.

Japan (De Haan).

§§§ Both margins of the larger chela entire.

***Alpheus chiragicus* Edw.**

Alpheus chiragicus Edw., Hist. Nat. des Crustaces, p. "354" (1837).

Asiatic Seas (Edw.)

***Alpheus crinitus* Dana.**

Alpheus crinitus Dana, Proc. Phila. Acad. vi, p. 21 (1852) U. S. Ex. Exped. Crust. p. 548, pl. XXXIV, f. 8 (1852).

Balabac Straits (Dana).

***Alpheus obesomanus* Dana.**

Alpheus obesomanus Dana, Proc. Phila. Acad. vi, p. 21 (1852) U. S. Ex. Ex. Crust. p. 547, pl. XXXIV, f. 7 (1852).

Samoan Is. ! (Phila. Acad.) Fiji Archipelago (Dana).

Alpheus floridanus Kingsley, Pl. II, fig. 8.

Alpheus floridanus Kingsley, Bulletin, U. S. Geol. Geog. Survey, iv, p. 193 (1877).

Fort Jefferson, Fla. ! (Lieut. Jacques, Peabody Academy).

Alpheus mitis Dana.

Alpheus mitis Dana, Proc. Phila. Acad. vi, p. 22 (1852) Ex. Ex. Crust. p. 549, pl. XXXV, f. 1 (1852).

Balabac Straits (Dana).

Alpheus paracrinatus Miers.

Alpheus paracrinatus Miers, Ann. and Mag. Nat. Hist., Nov., 1881, p. 365.

Goree, Senegambia (Miers).

C. Front of carapax truncate, rostrum absent, orbital hoods without spiniform prolongation.

a. Hands normal.

Alpheus frontalis Edw.

Alpheus frontalis Edw., Hist. Nat. Crust. ii, p. 356 (1837). R. An. Cuv. pl. 53, fig 2.

New Holland (Edw.), Tahiti (Heller).

Alpheus emarginatus Edw.

Alpheus emarginatus Edw., Hist. Nat. Crust. ii, 357 (1837).

Locality unknown (Edw.).

Alpheus pachychirus Stm.

Alpheus pachychirus Stm. Proc. Phil. Acad., p. 30 (1860).

Loo Choo (Stm.).

Alpheus simus Guerin.

Alpheus simus Guerin, in De Sagra's Hist. Cuba, p. li, pl. 2, f. 11 (1857).

Cuba (Guerin).

Alpheus affinis Guerin.

Alpheus affinis Guerin, in De Sagra's Hist. Cuba, p. li (1857).

Bombay (Guerin).

Alpheus sinuosus *Guerin*. Pl. II, fig. 6.

Alpheus sinuosus Guerin, in De Sagra, p. li (1857).

Callao, Chili! (Guerin, type in Philadelphia Academy).

b. Hands inverted.

Alpheus longidactylus.

Betæus longidactylus Lockn. Proc. Cal. Acad., vii, p. 35 (1876).

Alpheus longidactylus Kingsley. Bull. U. S. Geol. Surv., iv, p. 198 (1877).

Alpheus harfordi *Kingsley*. Pl. II, fig. 4.

Alpheus lævigatus Nicollet in C. Gay, Hist. Chili, Zool., iii, p. 215 (1849); *non* Guerin.

Betæus equimanus Lckn. Proc. Cal. Acad., vii, p. 43 (1876); *non* Dana.

Alpheus harfordi Kingsley. Bull. U. S. Geol. Surv., iv, p. 198 (1877).

Alpheus equalis Kingsley, l. c., p. 199 (1877).

Betæus æqualis Lckn. Ann. and Mag. N. H., V, i, p. 478 (1878).

Alpheus australis *Kingsley*.

Betæus australis Stm. Proc. Phil. Acad., p. 31 (1860).

Alpheus australis Kingsley. Bull. U. S. Geol. Surv., iv, p. 190, 1877.
Port Jackson, Australia (Stm).

Alpheus æquimanus *Kingsley*.

Betæus æquimanus Dana. U. S. Exp. Exped., Crust., p. 560, pl. XXV, f. 11, 1852.

Alpheus æquimanus Kingsley. Bull. U. S. Geol. Surv., iv, p. 190 (1877).

Alpheus candei *Guer*.

Alpheus candei Guer., in De Sagra's Hist. Cuba Zool., vii, p. pl. fig. (1857).

Alpheus transversodactylus Kingsley. Bull. U. S. Geol. Surv., iv, p. 196 (1877).

Santa Barbara! (W. G. W. Harford, Yale, Peab. Acad.); San Diego, Cal.! (Yale, Dr. E. Palmer); Bermudas! (J. M. Jones, Yale); Key West, Fla.! (H. E. Webster, Union College); Cuba! (Guerin, Phil. Acad.).

Alpheus truncatus Kingsley.

Betæus truncatus Dana. U. S. Ex. Ex. Crust., p. 559, pl. xxxv, f. 5 (1852).

Alpheus truncatus Kingsley. Bulletin Geol. Surv., iv, p. 190 (1877).
Terra del Fuegia (Dana).

Alpheus scabrodigitus Kingsley.

Betæus scabrodigitus Dana, l. c., p. 560, pl. xxv, f. 12 (1852).

Valparaiso (Dana).

The following species are either too imperfectly characterized to admit of recognition, or do not belong to the genus *Alpheus* as at present restricted.

Alpheus aculeatus Sabine = *Hippolyte grönlandica*.

Alpheus amethysteus Risso = *Anchistia amethystea*.

Alpheus amphitrite White MS.

Alpheus avarus Fabr.

Alpheus caramote Risso = *Peneus caramote*.

Alpheus cougneti Risso = ?*Hippolyte* sp.

Alpheus elegans Risso = *Gnathophyllum elegans*.

Alpheus elongatus Risso = *Hippolyte* sp.

Alpheus ensiferus Risso = *Hippolyte* sp.

Alpheus marmoratus Fabr. = *Hippolyte marmoratus*.

Alpheus monopodium Bosc. = *Alpheus edwardsii*.

Alpheus olivieri Risso = *Hippolyte* sp.

Alpheus polaris Sabine = *Hippolyte polaris*.

Alpheus punctulatus Risso = ?.

Alpheus pelagicus Risso = ?.

Alpheus scriptus Risso = *Anchistia scripta*.

Alpheus sivado Risso = *Pasiphæ sivado*.

Alpheus spinus Leach = *Hippolyte spinus*.

Alpheus tamulus Fabr.

Alpheus tyrrhenus Risso = *Pontonia tyrrhena*.

Alpheus viridis Otto = *Hippolyte* sp.

Of the following species I can say nothing, as the descriptions are in works at present inaccessible to me.

Alpheus galathea.

Alpheus galathea White. List B. M. Crust., p. 75 (1847), *sine descr.* ;
Miers Zool. Erebus and Terror, p. 5, pl. iv, f. 4 (1875).
Port Essington, Australia.

Alpheus alope *White.*

Alpheus alope White. List B. M. Crustacea, p. 75, 1847 (s. d.) ; Miers
Zool. Erebus and Terror, p. 5, pl. iv, f. 6 (1875).
Port Stephens, Australia.

Alpheus costæ.

Cryptophthalmus costæ, Prestandrea. Nuovi annali d. sc. nat., 1838, p.
298 (*teste* Heller).
Mediterranean.

This is given by Heller (Crust. süd. Europa, p. 272, 1863) as a synonym of *A. lævimanus* ; but whether it be that species or *A. ventricosus* or rather a distinct species I have not the means at hand to determine.

Alpheus digitalis *De Haan.*

Alpheus digitalis De Haan. Fauna Japonica, p. 178, pl. xlv, f. 4.
Japan (De Haan).

Alpheus forceps *White MS.*

Alpheus latifrons *A. Milne Edwards.*

Alpheus latifrons A. Milne Edwards. Jour. Mus. Godeffroy, iv, p. 87,
1873.
Samoan Islands (A. M.-E.).

Alpheus minor *De Haan.*

Alpheus minor De Haan, *op. cit.*, p. 180, pl. xlv, f. 6.
Japan (De Haan).

Alpheus triton *White MS.*

Alpheus lineifer Miers.

Alpheus lineifer Miers. Ann. and Mag. Nat. Hist., IV, xvi, p. 343, 1875.

Samoan Islands (Miers).

This species belongs either in the section with *Alpheus bisincisus* or in that which contains *A. parvirostris* and *A. spinicaudus*; but as no details are given regarding antennal spine and carpal joints, its affinities cannot be more closely indicated.

Genus **HIPPOLYTE** LEACH.

Hippolyte prionota Stimpson. Pl. II, fig. 9.

Hippolyte prionota Stimpson. Proc. Phil. 1864, p. 153.

I figure this beautiful species from a specimen from Puget Sound, in the collection of the Philadelphia Academy.

Genus **CARIDINA** EDW.

Caridina africana *nov. sp.* Pl. I, fig. 3.

Carapax smooth, compressed; suborbital spine alone present; rostrum nearly as long as the carapax; its apex slightly reflexed and armed above and below with minute teeth. Peduncle of antennulæ about as long as the rostrum, its penult and last joints subequal. Antennal scale slightly longer than antennular peduncle, its apex regularly ovate, its sides parallel, no spine on the basal joint. Ambulatory feet very slender, short, the carpus of the first pair about as long as the palm, of the second as long as the handfingers of both terminated by pencils of short hairs. Dactyli of three posterior pairs of feet slightly curved, simple and about one-fifth the length of the propodal joints. Telson narrow, the sides straight and but slightly converging to the truncate tip which falls a little short of the narrow caudal lamellæ of the sixth segment.

Zulu Mission, South Africa (S. A. Grout).

Genus **XIPHOCARIS** MARTENS.

In my revision of the genera of Palæmonidæ (Proc. Acad. Nat. Sci. Phila., 1879, p. 426), I referred the single species of this genus to *Caulurus* of Stimpson; but having since seen specimens, I have

found that its affinities are not with the Palæmonidæ, but rather with *Atya* and *Caradina*, as it possesses the mandibles characteristic of that group.

Genus **HIPPOLYSMATA** STIMPSON.

Hippolysmata wurdmanni Stimpson. Pl. I, fig. 8.

Hippolysmata intermedia Kingsley. Pl. I, fig. 4.

I give figures of some details of these two species to aid in their identification.

Genus **NECTOCRANGON** BRANDT.

N. alaskensis nov.

Carapax but little depressed, with four prominent equally spaced teeth in the median line, the anterior one forming the rostrum, and with a fifth smaller tooth between the first and second. A strong spine on each hepatic region. Front strongly elevated, the orbits elongate, tubular, and each with two spiniform teeth above. Pterygostomial spine very prominent. Peduncle of antennulæ barely reaching to middle of the antennal scale, and the flagella not reaching its tip, otherwise both pairs of antennæ are much as in *N. lar*. The external maxillipeds and thoracic feet present no important differences from *N. lar*. The sterna of the three last thoracic segments bear large prominent spines. The abdomen has a median dorsal carina, which on the sixth segment and telson is double as in the previously described species. Length about one and one-half inches.

Marmot Island, Kodiak Archipelago, Alaska (Dr. W. H. Jones, Philadelphia Academy).

Genus **CRANGON** FABRICIUS.

Crangon tenuifrons nov. Pl. I, fig. 10.

Carapax depressed, its surface uneven, with two spines in the median line above, of which the posterior is just behind the middle and the smaller, anterior one at the base of the rostrum. Rostrum elevated, arcuate, somewhat elongated, and reminding one of that of *Sabinea septemcarinata*. Subocular, pterygostomial, and hepatic spines prominent. Antennulæ with a broad basal scale, the peduncle extending nearly to the middle of the antennal scale. Two flagella present, the outer thicker one reaching the tip of the antennal scale,

the inner extending a little farther. Antennal scale narrow, elongate, flagellum two-thirds as long as the body. External maxillipeds with the distal joints hairy, and exceeding by half their length the antennal scales. First pair of feet much as in *C. vulgaris*, the carpus with a spine on each side below. The occludent margin of the hand very oblique. Second and third pairs of feet slender, the second chelate and a little shorter than the third; fourth and fifth pairs elongate cylindrical, the dactyli styliform. First five joints of the abdomen with a median carina, the sixth and telson with two carinal telson elongate, sides straight, tip acute.

Length two inches.

Marmot Island, Kodiak Archipelago, Alaska (Dr. W. H. Jones, Phila. Acad.).

I insert for comparison figures of *C. vulgaris* (pl. I, fig. 5), *C. boreas* (pl. I, fig. 6), and *C. franciscorum* (pl. I, fig. 7).

Crangon vulgaris Fabr. Pl. I, fig. 5.

I have examined numerous specimens of this species from the east and west coasts of America and from Europe, and fully agree with Professor Smith in uniting with it the form formerly known as *C. nigricauda*. Specimens in the Peabody Academy from Beverly, Mass. (No. 138) have the sixth and seventh abdominal segments sulcate above as in the majority of the west coast forms. Kinahan's figures (Proc. Roy. Irish Acad., viii, pl. iv, 1864) are very incorrect. The second pair of feet are greatly larger than in any specimens I have seen, and the joints of the external maxillipeds are wholly unlike those found in nature.

Crangon salebrosus Owen.

This is probably to be found in North American waters; there are specimens in the museum of the Philadelphia Academy without locality, but which came with other American forms (*Paracrangon echinatus*, *Hippolyte prionota*, etc.). Its original locality, Kamschatka, would seem to favor this idea.

Crangon batei.

Crangon intermedius Bate. Proc. Zoöl. Soc'y, London, 1863, p. 503, pl. XLI, f. 6. Haswell Cat. Australian Crust., 181 (1882), desc. compiled.

This Australian species must be renamed, the term *intermedius* having been used in 1860 by Stimpson for a species from Behrings Straits. Mr. Bate is rather unfortunate with the species described in this paper,

for with the exception of this and one other species, every form is assigned to a wrong genus. The genus *Angasia* is, as I have previously shown, synonymous with the earlier *Tozeuma* of Stimpson.

***Evaxius tricarinatus* n. g. et n. s. Pl. I, fig. 1.**

A single imperfect specimen, lacking both chelipeds, forms the basis of this description. I should hesitate to describe it were its other characters so well marked as to render it a very distinct and interesting form.

Cephalothorax small, compressed; abdomen large and somewhat depressed. Body everywhere with a sparse pubescence, among which are interspersed larger hairs. Carapax with a median dorsal carina extending from the "cervical suture"³ as far as the eyes and terminating anteriorly by a sharp tooth; just behind this tooth occurs a broad and shallow emargination. On either side of this median carina is found a less conspicuous one extending from above the eyes half way back to the "cervical suture;" its anterior extremity likewise terminating in a tooth similar to that of the median carina. In front of these carinæ the carapax is strongly deflexed and terminates anteriorly in a small triangular rostrum extending about half its length, beyond the eyes. The anterior and inferior margins of the carapax are smooth and unarmed. The basal joints of the antennulæ are hairy, the two distal ones being subequal. Flagella two, of equal length, but the inner of smaller diameter; no spines or scales on the basal joints. Antenna without a basal scale, the penult joint compressed and over twice the length of the last joint; flagellum a little longer than the carapax. External maxillipeds pediform, flattened and extending to the extremity of the antennal peduncle. In the specimen the first pair of pereopoda had been broken off during life, but were in process of restoration; the chelæ were didactyle, the fingers being equal. Second pair of walking feet compressed; carpus and propodus subequal; the chelæ well formed. Third and fourth pairs also compressed, monodactyle, the propodus pectinate and bristled beneath. Fifth pair smaller, subchelate. Pleopoda small and inconspicuous. Lower margins of abdominal segments rounded. Caudal lamellæ broad with rounded extremities, each with a median

³This suture does *not* indicate the line of division between the head and thorax as is usually stated. Those who may be interested will find a masterly exposition of the meaning and significance of this line in the portions on the morphology of the Crustacea with which Professor Dana begins his splendid work on the Crustacea of the U. S. Exploring Expedition.

carina on the dorsal surface. Telson broad and rounded, ecarinate, pubescent above, extremity rounded. Length one and one-half inches.

The single specimen which is in the Museum of the Boston Society of Natural History was brought from Zanzibar by Dr. Charles Pickering.

This form clearly belongs to the Gebidæ as limited by Dana, but it is clearly separated from all known genera by well marked characters: from *Gebia* and its allies by the absence of the antennal scale and the chelate second pair of pereopoda; from *Axius* in the absence of the antennal scale and from *Gebiopsis* A. Milne-Edwards, by the characters of the second pair of walking feet. Its position seems to be intermediate between *Axius* and *Gebiopsis*.

***Nephrops occidentalis* Randall.** Pl. II, fig. 1.

Nephrops occidentalis Randall. Jour. Phila. Acad., viii, p.
1839 [1840].

When at work at the collections of the Philadelphia Academy, I was unsuccessful in my search for the type of this species, which was supposed to have been brought from the west coast of America. In the collection which formed the basis of Dr. Randall's paper, there were specimens from California and from the Sandwich Islands, and it is possible that some transfer of labels took place here as well as in the case of one of the *grapsidæ*. This supposition is rendered the more probable from the fact that this species has never been reported from our shores, except by Randall, and so far as I am aware, it has never been seen by carcinologists since his day. In going over the collections of the Boston Society, I found, however, three imperfect specimens from Maui, Hawaiian Islands, presented by Dr. Winslow, which agree well with Dr. Randall's description, and one of which furnished the illustration accompanying the present article. It is a valid member of the genus, and can readily be identified by the figure and description.

EXPLANATION OF PLATES.

PLATE I.

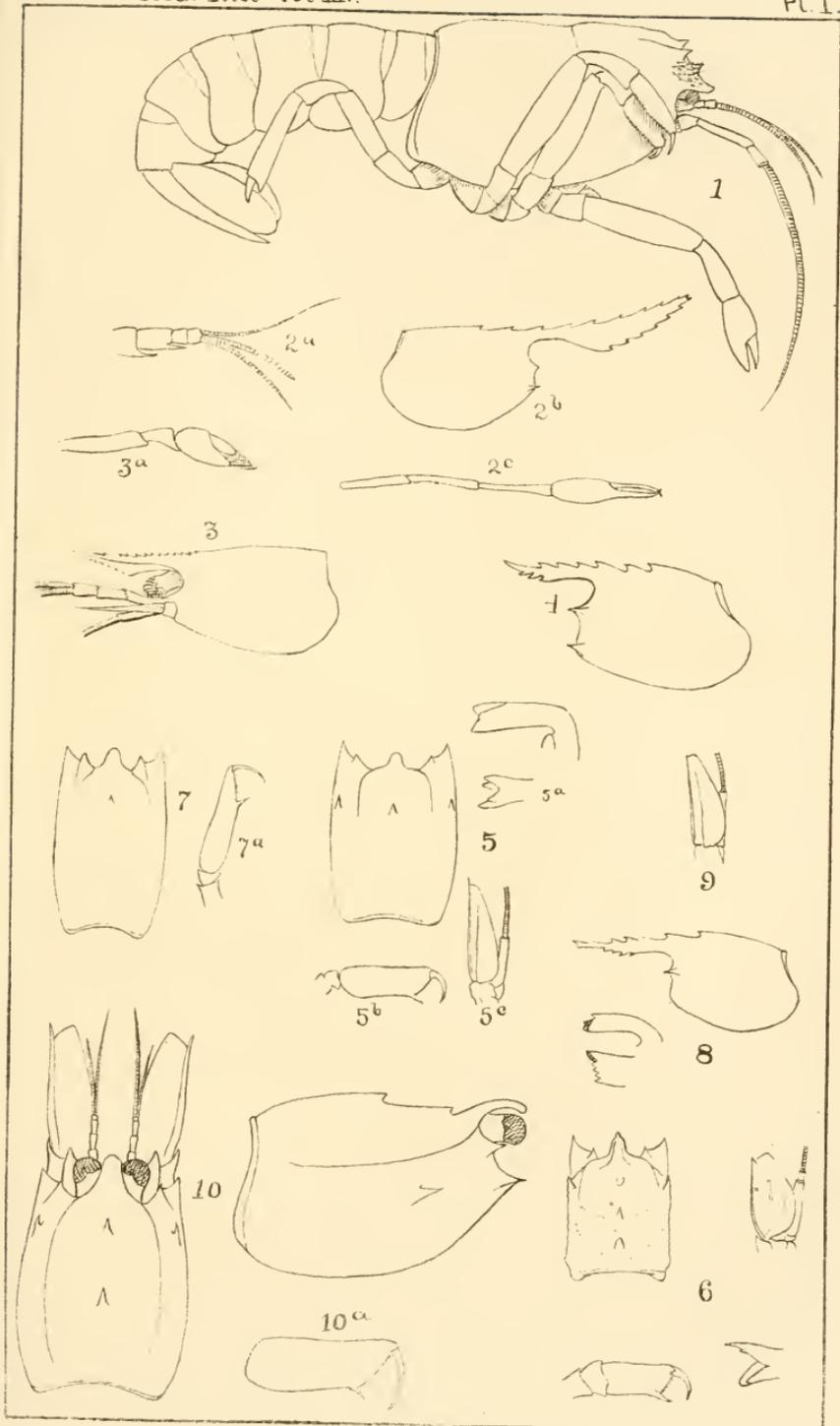
FIG.

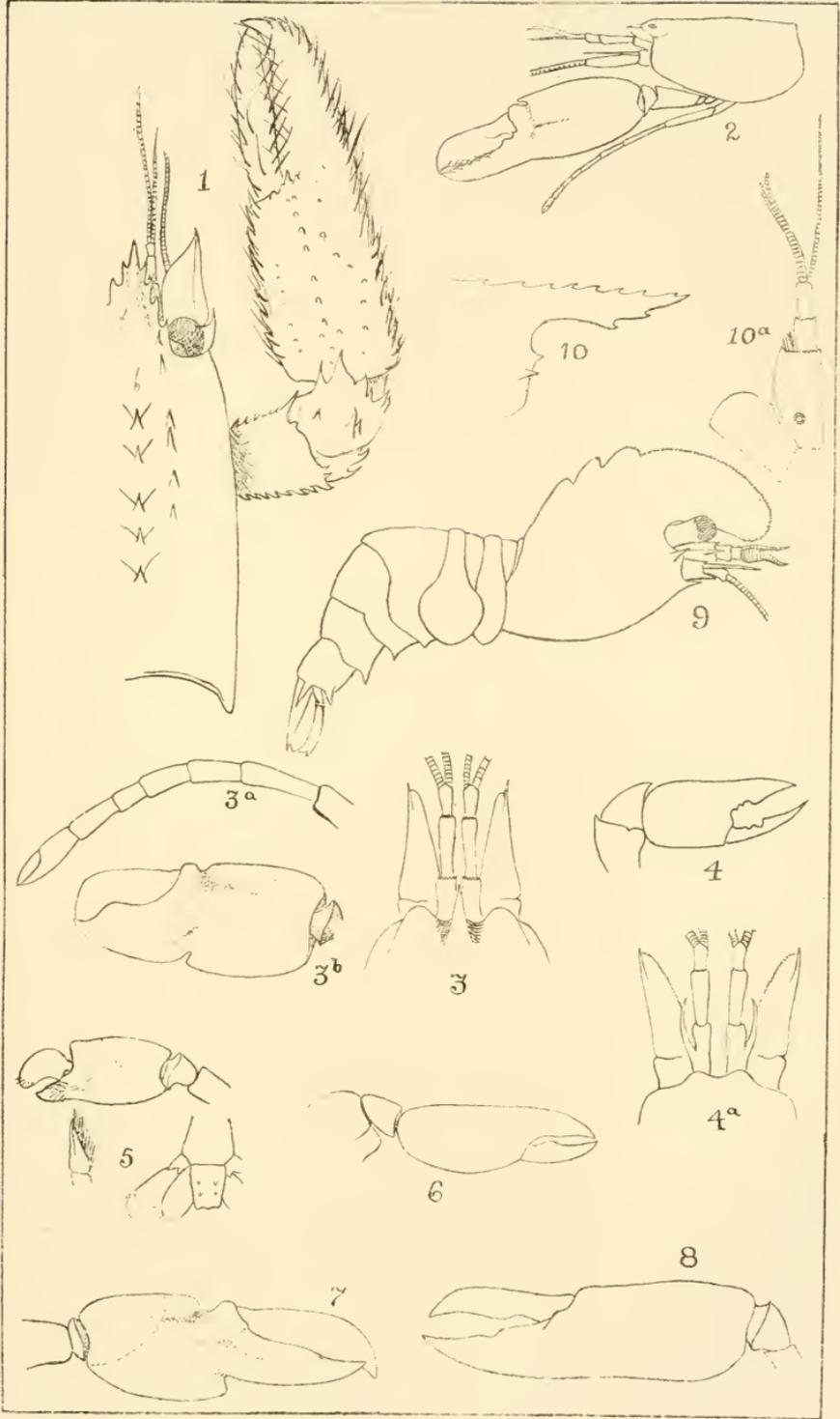
- 1 *Evaxius tricarinatus*.
- 2 *Leander hammondi*; a, antennula; b, carapax; c, second thoracic foot.
- 3 *Caradina africana*; a, second thoracic foot.
- 4 *Hippolysmata intermedia*.
- 5 *Crangon vulgaris*; a, mandible; b, chela; c, antennal scale.
- 6 *Crangon boreas*; with chela, mandible and antennal scale.
- 7 *Crangon franciscorum* and chela.
- 8 *Hippolysmata wurdemanni* and mandible.
- 9 Antennal scale of *Crangon vulgaris* (the form described as *nigricauda*).
- 10 *Crangon tenuifrons*.

PLATE II.

FIG.

- 1 *Nephrops occidentalis*.
- 2 *Alpheus packardii*.
- 3 *Alpheus lævigatus*; a, second thoracic foot.
- 4 Chela of *Alpheus harfordi*; a, anterior portion of carapax, etc.
- 5 *Alpheus websteri*.
- 6 *Alpheus sinuosus*.
- 7 *Alpheus thetis*.
- 8 *Alpheus floridanus*.
- 9 *Hippolyte prionota*.
- 10 Rostrum and a, antennula of *Anchistia americana*.





POPULAR ERRORS REGARDING THE DURATION OF LIFE.

A paper read before the Essex Institute, Oct. 9, 1882.

BY ADONIRAM C. ORNE.

THERE is probably no subject on which so much has been written, so much labor bestowed, which is so little understood as the duration of life. The popular idea is that a generation passes away in about thirty-three years.

I shall endeavor to show that this is a very great mistake and arises from a misapprehension of the facts in the case. I propose to show that we live much longer, and to point out where statisticians make their mistakes.

It is universally admitted that not exceeding two per cent of the entire population die annually. This fact being admitted, it follows logically that, if two per cent die in one year, it will require fifty years for the whole population to die; and if it requires fifty years for a generation to pass away, this establishes the fact that the average life of a generation is fifty years instead of thirty-three as is generally supposed.

The mistake arises from the fact that in making up their calculations statisticians do not take into consideration the difference between the average age at death and the average duration of life. For example, suppose you want to get the duration of life of one thousand children, you must first ascertain the age at death of the entire thousand which cannot be done until all have passed away.

The mistake arises with our statisticians from the fact that they attempt to give it before half have died. They base their calculations upon the number of deaths without taking into consideration the increase of population arising

ing from the excess of births over deaths, and from immigration. In our registration report of 1875 it is said "In these thirty-five years, a period within which an entire generation of mankind has passed through its stages of infancy, maturity, and decay, the registration officers of Massachusetts have recorded the facts concerning 761,428 deaths within the borders of the State."

After reading the report I called on the author and put this question to him: "How did you succeed in getting rid of a generation in thirty-five years, when but two per cent a year of deaths have taken place for the last thirty-five years?" His reply was: "According to latest authorities the length of a generation was thirty-four years; and as the population of 1840 was 737,700 and as 761,428 deaths occurred in the thirty-five years which was 23,728 more than the population of 1840, this would favour the idea of a generation passing away in thirty-four years." Now, if the population of the state had remained stationary for the thirty-five years this calculation would have been correct, but unfortunately for his calculation that was not the case. The population of the state in 1840 was 737,700; in 1875 it was 1,651,912, making a gain in thirty-five years of 890,484 which was 152,784 more than the population of 1840, with all the deaths taken out. He should have found what the average population for the thirty-five years was, which was 1,210,277, and this would give fifty-five years for a generation to pass away. The first attempt to prove by statistics that a generation passes away in thirty-five years was a complete failure. The increase of population is greater than the deaths for eleven, thirty-five or one hundred years, taking the population of 1875, and is a larger number than the deaths for the previous hundred years. Massachusetts Registration Reports demonstrate that the deaths under five years for eleven, thirty-five or one hundred years, do not amount

to more than eighteen per cent if we take into the account the number living from which the deaths under five years have been taken. In Massachusetts, of all the population, there are twice as many that live to be seventy as die under five. In the City of Salem there were living in the year 1875 a number of persons between seventy and eighty years of age equal to thirty-two per cent of all births that occurred from seventy to eighty years previous. In the State of Massachusetts there were, between seventy and eighty years of age, thirty-eight per cent of the number that were born seventy and eighty years previous to the year 1875. From this fact we learn, as well as from all the census reports, both state and national, that thirty-eight per cent of all the population of the state live to be seventy years and upwards. There is not a single life-table that gives anywhere near the correct number who die under five, and who live to be seventy and upwards. The true duration of life of the different countries of the world is as follows :

	yrs.	mos.
England and Wales,	45	5
Russia,	37	8
Austria,	32	6
France,	42	3
Hungary,	25	1
Switzerland,	41	8
Italy,	33	5
Spain,	33	8
German Empire,	37	0
The Netherlands,	40	5
Massachusetts,	50	4
Denmark,	50	4
Sweden,	51	0

It will be seen by the above that the English life-tables fall short of the actual duration of life, according to the

Carlisle table, seven years; according to the English life-table, five years; while what we call the American life-table falls short twenty-two years. I am satisfied that the Wigglesworth table is founded on the same principle as the English tables, but the increase of population is so much greater in Massachusetts than in England that in Massachusetts, if we go back to the year 1800, we have to multiply by four to get the population of 1880; while in England if we go back to 1800, to get the population of 1880, we have to multiply by two only. In getting the number who live to seventy and upwards we go back from seventy to one hundred years. The population of the state at that time was very small. Massachusetts was in her infancy. Massachusetts should have a life-table based on the vital statistics of Massachusetts. We spend money enough every year to have one. It is a disgrace to the state to have such a table as Wigglesworth's which has the sanction of the Supreme Court of Massachusetts, and is used by them and by other courts of the country in ascertaining the value of life estates, widows' dowers, annuities, etc. Of the 700,167 added to the state from 1865 to 1875, eleven years, there were 315,286 deaths; there were 113,424 under five years of age, which was thirty-six per cent; 43,413 that lived to be seventy and upwards. These deaths under five were taken from a birth rate of thirty-nine thousand per year. The number that lived to be seventy and upwards were taken from a birth rate of ten thousand per year. To the 700,167 added to the state we stop adding any more births; we take the years 1876, '77, '78, '79. After we find the number of deaths under five years for the four years, we add them to the 113,424, which makes 123,260; this number is all the deaths under five of the 700,167, which makes seventeen and two-thirds per cent. A num-

ber equal to thirty-eight per cent will be alive in seventy years from their birth; so, to find the average duration of life in Massachusetts, we find that seventeen and two-thirds per cent die under five years of age, thirty-eight per cent live to be seventy and upwards.

	Under 5 years per cent.	70 yrs. & upwards per cent.	5 to 70 years per cent.
Carlisle table . . .	32	24	44
Wigglesworth . . .	39	14	47
English life-table . .	25	25	50
Mass. average-at- death table . . .	36	14	50
Mass. average-dura- tion-of-life table . .	18	38	44

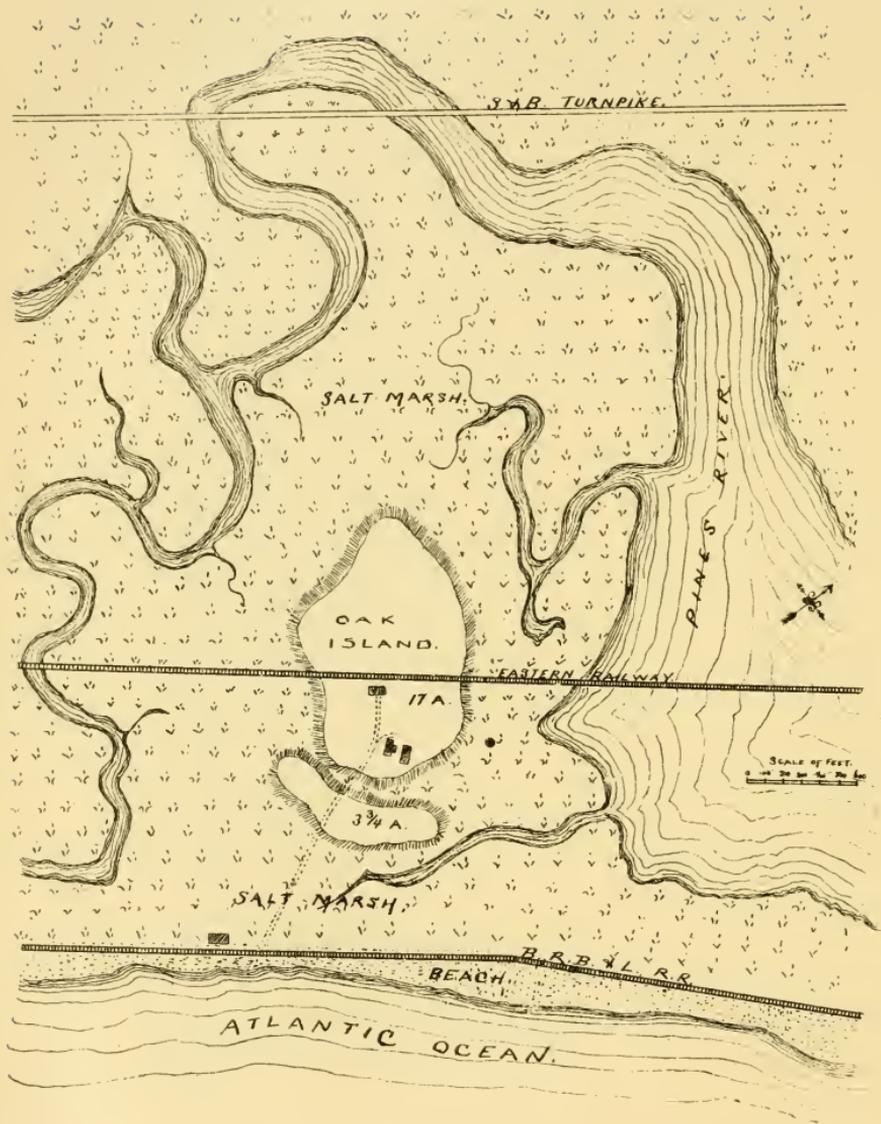
In the town of Munroe, in Franklin county, in the year 1875, there was one death, a child two years old; and the report for that year makes the average age at death two years. As the population of Munroe was one hundred and ninety, and the death rate one per year, it would take one hundred and ninety years for a generation to pass away. Now, suppose the oldest person in that town had died, who was eighty years of age, the report would have been that the average age at death was eighty years, and as only one death occurred the length of a generation would be one hundred and ninety years. Massachusetts has expended a very large amount of money to ascertain the average age at death of all persons whose death takes place within the state, and we have tables showing the average age at death in every town and city of the state, and this average age at death is mistaken for the average duration of life. There is a difference of twenty years between them. It is these tables that have given the impression that the length of a generation is thirty years in Massachusetts. They are very deceptive and of little use. When such a man as Carrol D. Wright is deceived by such statistics, they can be of little use to the common

reader. In his report on the census of Massachusetts, he says "while from the Massachusetts Registration Reports it is learned that the average age to which all live is about thirty," he comes within twenty years of the right figure. The most important fact and the easiest obtained is to get the number of the population and the number of deaths. For the City of Salem the deaths for the eleven years, from 1865 to 1875, were 54.07, the population 25,958 or 1.89: to 100 living; if we take the average of the population for the eleven years it is a trifle over two per cent, which would take forty-nine years as the length of a generation in this city.

Holyoke is considered the most unhealthy city in Massachusetts: the deaths under five years are fifty-two per cent of all the deaths in the city. This is calculated on the births which for the eleven years were 4,065. There were added to the city by immigration during the eleven years, 10,612, of which number sixteen and one-half per cent were under five years of age, which makes 1,750 added to the city by immigration, making with the births, which were 4,065, 5,815 to draw the deaths under five from. Now, if 5,815 gives fifty-two per cent deaths under five years, what will 4,065 give? answer, thirty-six per cent, just the average of the whole state. There were added to the state by immigration in the eleven years, 273,044, of this number 255,992 were added in cities. Of this 255,992, there were added to the cities 42,238 under five years of age in the eleven years; that is what makes the deaths under five greater in the cities, 42,238 being distributed in the different cities according to the increase of population; this number is in addition to the births of the cities. Our registration officers have left out entirely the number under five that have been added to the state by immigration, and many blunders

have taken place in consequence. Should the city of Salem have gained in population as large a percentage as Holyoke did, the city would have had as large a death rate under five as Holyoke had, and would have been called the most unhealthy city in the state, and the State Board of Health would have had a special report on your city, with a map showing the causes of the great death rate under five years, as they did of Holyoke. They had three maps of Holyoke, and after a thorough investigation they report: "As far as situation and surroundings are concerned, Holyoke should be a healthy place," and Holyoke is a healthy place, and the death rate is no greater than the average of Massachusetts. The mistake is in our registration officers and State Board of Health. They leave out of the calculation the increase of population. Holyoke, in 1865, a town of 5,648, becomes a city in 1875, of 16,260, having added to her population 10,612 in the eleven years. The children under five years of this 10,612 are left out of the count, the number being 1,750. With this 1,750 left out, the deaths under five are 52 per cent; with the number added, thirty-six per cent, which makes Holyoke as healthy as the state averages. So of the other cities of the state; they are considered unhealthy just in proportion to the percentage of the increase of population. The greater the increase of population the greater the death rate under five will be. Holyoke is very much annoyed by these reports. People coming there to settle, the first question they ask is, "Is Holyoke a healthy city?" and it is a healthy city, and the citizens say it is healthy. They are met with the remark that it is the most unhealthy place in the state, and the report of our registration officers and State Board of health are given as authority. These reports based on ignorance are doing a great amount of mischief. Suppose

Salem had as great an increase of population as Holyoke, you would have had as large a death rate under five as Holyoke. The State Board of Health would have had a map of your city and with the Mill Pond nuisance and the North River, and you could not have made people believe that your death rate under five was due to any other cause than the two causes named. A great deal of mischief results from not understanding the causes of the great death rate in certain localities. A great amount of labor has been expended to show that our cities have a much larger death rate under five than the country towns. I fail to see it. I see where our state officials make their mistake. They have left out of their calculation the number under five added to the state by immigration, nearly all of which goes to the cities, and the cities that draw the largest percentage are considered the most unhealthy. Had this immigration gone to the country towns instead of the cities, what would our registration officers and Board of Health have said was the cause of the deaths under five years being greater in the country towns than in the cities, as they surely would have been had immigration gone to the country towns instead of the cities? I imagine they would have said the cities have pure water, their sanitary conditions are better regulated, they are under better police regulations, and the cities draw the most able physicians in the state. There is no reason why the cities of the state should not be as healthy as the rest of the state and they are.



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CATALOGUE OF THE FLORA OF "OAK ISLAND,"
REVERE, MASSACHUSETTS: WITH NOTES.

BY HERBERT A. YOUNG.

INTRODUCTION AND SUMMARY.

BY JOHN ROBINSON.

"OAK ISLAND," or "Chelsea Beach Island," as it was called before North Chelsea was rechristened Revere, is a slight elevation of land, covered with trees, hardly reaching more than three or four feet above the surrounding saltmarsh, within the limits of the town of Revere, Massachusetts, and just a few rods beyond the inlet which separates that town from the town of Saugus in Essex County.

The island begins at about 800 feet back from what is now called Revere beach, with a strip of land running north and south 1,000 feet, having a breadth of 100 feet which is connected with the larger portion of the island which runs east and west some 1,400 feet, and has a breadth of 800 feet. This latter portion is divided into two unequal parts by the Eastern Railway which runs through it north and south. The Salem and Boston turn-pike road runs by the island to the west at a distance of about a quarter of a mile. Formerly this station was only accessible to pedestrians and to the salt hay teams by a rough road from the beach.

Recently, however, with the opening of Revere beach as a pleasure resort, a picnic ground with its accompany-

ing dance stands and "flying horses" has been established on the easterly portion of the larger section of the island, and not only is the pleasant seclusion of the place interfered with, but at no distant day this interesting and historic botanical station will become for botanists a memory of the past. Mr. Young observes that the smaller detached portion of the island is more elevated and dryer than the larger portion, and that it possesses a somewhat different flora.

The wood upon the island has been cut from time to time, the last general cutting having been made perhaps not long after the Eastern Railway was built in 1837. The growth of timber now on the island is of deciduous-leaved trees, and consists chiefly of oaks, basswood, hickory and sassafras, the only coniferous tree being the red cedar (*Juniperus Virginiana*) which is represented by a few scattered specimens.

The soil is a vegetable humus on sand and gravel, upon which the plants thrive in moist seasons with great luxuriance.

The island is also a favorable locality for the collection of land snails and has been well known to botanists and conchologists for many years.

The whole number of plants noted in Mr. Young's list which includes the phanerogams, ferns and mosses, is three hundred and sixty-two, divided among the different families as follows :

NOTE.—Mr. C. E. Faxon and Geo. E. Davenport have kindly looked over Mr. Young's list and the collection of specimens which he has preserved, and add the following as the only species which they have noticed on or near the island not included. *Ranunculus Cymbalaria*, Pursh; *Ranunculus sceleratus*, L.; *Sagina procumbens*, L. Along the railroad track between Revere station and Oak Island near the last bridge (G. E. D.). *Cynoglossum Morisoni*, DC. On the island (C. E. F.).

	Gen.	Sp.	Int.		Gen.	Sp.	Int.
Ranunculaceæ.	4	10	2		111	182	26
Berberidaceæ.	1	1	1	Labiataæ.	8	8	
Cruciferæ.	7	9	3	Convolvulaceæ.	1	1	
Violaceæ.	1	3		Solanaceæ.	1	1	1
Cistaceæ.	2	2		Gentianaceæ.	1	1	
Hypericaceæ.	1	3	1	Apocynaceæ.	1	1	
Caryophyllaceæ.	8	11	5	Asclepiadaceæ.	1	2	
Portulacaceæ.	1	1	1	Chenopodiaceæ.	5	7	2
Tiliaceæ.	1	1		Amarantaceæ.	1	2	2
Geraniaceæ.	3	3		Polygonaceæ.	2	10	4
Anacardiaceæ.	1	3		Lauraceæ.	1	1	
Vitaceæ.	2	2		Euphorbiaceæ.	2	3	
Celastraceæ.	1	1		Urticaceæ.	2	2	
Leguminosæ.	7	14	5	Cupuliferæ.	3	10	
Rosaceæ.	10	18		Myricaceæ.	1	1	
Saxifragaceæ.	1	2		Betulaceæ.	1	1	
Hamamelaceæ.	1	1		Salicaceæ.	2	4	
Onagraceæ.	3	5		Coniferæ.	1	1	
Lythraceæ.	1	1		Araceæ.	1	1	
Umbelliferæ.	5	5	1	Naiadaceæ.	1	1	
Araliaceæ.	1	1		Alismaceæ.	1	1	
Cornaceæ.	1	1		Orchidaceæ.	1	1	
Caprifoliaceæ.	4	4		Iridaceæ.	2	2	
Rubiaceæ.	2	4		Smilacæ.	1	2	
Compositæ.	23	48	4	Liliaceæ.	8	10	1
Campanulaceæ.	1	1		Juncaceæ.	2	6	
Ericaceæ.	4	6		Cyperaceæ.	5	24	
Aquifoliaceæ.	1	1		Gramineæ.	22	44	9
Plantaginaceæ.	1	3	1	Equisetaceæ.	1	1	
Plumbaginaceæ.	1	1		Filices.	4	4	
Primulaceæ.	1	2		Ophioglossaceæ.	1	1	
Orolanchaceæ.	2	2		Musci.	16	25	
Scrophulariaceæ.	6	10	2	Hepaticæ.	3	3	
Verbenaceæ.	2	2					
	<hr/>	<hr/>	<hr/>		<hr/>	<hr/>	<hr/>
	111	182	26		213	364	45

	Ord.	Gen.	Sp.	Int.
Exogens.	50	144	237	35
Gymnosperms.	1	1	1	
Endogens.	10	44	92	10
Vascular Cryptogams.	3	6	6	
Muscineæ.	2	19	28	
	<hr/>	<hr/>	<hr/>	<hr/>
	66	214	364	45

THE FLORA OF OAK ISLAND.

 BY HERBERT A. YOUNG.

The species enumerated in the following list were mostly observed during the year 1882, although the writer has been familiar with the station for many seasons previous. Representatives of nearly all the species have been preserved. As the list is therefore based upon the work of a season rather unfavorable for botanical collecting, on account of the drought of July and August, it is probable that other species might be added especially to the list of mosses which owing to their small size are easily overlooked.

The region was evidently familiar to Dr. Bigelow, for in the "Florula Bostoniensis" he mentions the following species as found on "Chelsea Beach Island:"

- Ranunculus recurvatus, *Poir.*
- Arabis falcata, *Michx.*
- Cryptotænia Canadensis, *D C.*
- Osmorrhiza longistylis, *D C.*
- Circæa lutitiana, *L.*
- Desmodium cuspidatum, *Torrey.*
- Monarda allophylla, *Michx.*
- Phryma leptostachia, *L.*
- Scrophularia Marilandica, *L.*
- Lysimachia ciliata, *L.*
- Allium Canadense, *L.*
- Leersia Virginica, *Willd.*
- Botrychium Virginicum, *Willd.*

With the exception of Phryma all have been collected during the past season. The portion of the island to the

east of the tracks of the Eastern Railway has for several years been used for the purposes of a picnic ground, so that the herbs and undershrubs are fast disappearing, and can only now be collected in the spots along the outskirts, and in a few years the farther portion of the island to the west of the Eastern Railway will undoubtedly share the same fate, thus entirely destroying one of the most interesting botanical stations in this part of the country.

Ranunculaceæ.

- Anemone Virginiana*, *L.* A few specimens found.
Anemone nemorosa, *L.* Abundant.
Thalictrum dioicum, *L.* Abundant.
Thalictrum purpurascens, *L.* Abundant. Matures a short time after *T. dioicum* and before *T. Cornuti*. Recognized first by the peculiar odor of the leaves.
Thalictrum Cornuti, *L.* Abundant.
Ranunculus recurvatus, *Poir.* Not very abundant.
Ranunculus abortivus, *L.* Abundant.
Ranunculus bulbosus, *L.* One specimen only obtained.
Ranunculus acris, *L.* Only a few specimens noticed.
Actuæ spicata, *L.* var. *rubra*, *Michx.* Abundant.

Berberidaceæ.

- Berberis vulgaris*, *L.* One bush in the western part.

Cruciferæ.

- Cardamine hirsuta*, *L.*, var. *sylvatica*. Scarce.
Arabis Canadensis, *L.* Abundant in the western part.
Arabis perfoliata, *Lam.* A few specimens noticed in 1878.
Sisymbrium officinale, *Scop.* Abundant near the barn.
Capsella Bursa-pastoris, *Mæench.* Near house and barn.
Lepidium Virginicum, *L.* Mostly on the road from the beach to the island.
Lepidium ruderales, *L.* Mostly on the road from the beach to the island.
Cakile Americana, *Nutt.* Around the edges.
Raphanus Raphanistrum, *L.* One specimen only.

Violaceæ.

- Viola cucullata*, *Ait.* Specimens abundant and very large.
Viola sagittata, *Ait.* A few small specimens only found.

Viola pubescens, *Ait.* Quite abundant in the western part: growing scarcer.

Cistaceæ.

Hellianthemum Canadense, *Michx.* Found in extreme eastern part.

Lechea major, *Michx.* Found in the extreme eastern part.

Hypericaceæ.

Hypericum perforatum, *L.* Quite abundant.

Hypericum corymbosum, *Muhl.* Found in the western part.

Hypericum mutilum, *L.* Scarce. Found near railroad track.

Caryophyllaceæ.

Dianthus Armeria, *L.* A few specimens obtained.

Silene inflata, *Smith.* Abundant near railroad track.

Silene antirrhina, *L.* Abundant near railroad track.

Arenaria lateriflora, *L.* Abundant.

Stellaria media, *Smith.* Abundant.

Cerastium viscosum, *L.* Abundant.

Lepigonum rubrum, *Fries.*, var. *campestre*. Only one specimen found.

Lepigonum medium, *Fries.* Common in the western part along the edge bordering on the salt marsh.

Lepigonum salinum, *Fries.* Abundant. Growing with *L. medium*.

Scleranthus annuus, *L.* Scarce. On the railroad track.

Mollugo verticillata, *L.* On the railroad embankment.

Portulacaceæ.

Portulaca oleracea, *L.* On the railroad embankment.

Tiliaceæ.

Tilia Americana, *L.* The most abundant tree.

Geraniaceæ.

Geranium maculatum, *L.* Abundant.

Impatiens fulva, *Nutt.* The form producing without flowering most abundant.

Oxalis stricta, *L.* Abundant.

Anacardiaceæ.

Rhus typhina, *L.* Not very abundant.

Rhus glabra, *L.* Not very abundant.

Rhus Toxicodendron, *L.* Very abundant.

Vitaceæ.

Vitis Labrusca, *L.* A few plants noticed.

Ampelopsis quinquefolia, *Michx.* Quite abundant.

Celastraceæ.

Celastrus scandens, *L.* A few vines noticed.

Leguminoceæ.

Trifolium arvense, *L.* Abundant on the railroad track.

Trifolium pratense, *L.* Quite abundant. Scattered.

Trifolium hybridum. One plant noticed.

Trifolium repens, *L.* Quite abundant.

Trifolium agrarium, *L.* One plant noticed.

Medicago lupulina, *L.* Only a few plants on the island.

Desmodium acuminatum, *D C.* Abundant in the west part.

Desmodium canescens, *D C.* Found a few years ago by Mr. C. E. Faxon. Not found since.

Desmodium Canadense, *D C.* Quite abundant.

Lespedeza capitata, *Michx.* A few plants in the extreme eastern part.

Lathyrus maritimus, *Bigelow.* A few specimens noticed a short distance from the island on the railroad track.

Lathyrus palustris, *L.* In extreme eastern part.

Apios tuberosa, *Mœnch.* Not very abundant.

Amphicarpæa monoica, *Nutt.* Abundant in western part.

Rosaceæ.

Prunus Virginiana, *L.* Not very abundant.

Prunus serotina, *Ehrhart.* A few small trees in western part.

Spiræa salicifolia, *L.* A few bushes.

Agrimonia Eupatoria, *L.* Scattered.

Geum album, *Gmelin.* Mostly near the hotel.

Potentilla Norvegica, *L.* Around the edges, north side.

Potentilla Canadensis, *L.*, var. *simplex*, *T. & G.* Abundant.

Potentilla argentea, *L.* A few specimens only.

Potentilla Anserina, *L.* Around the edges mostly on north side.

Fragaria Virginiana, *Ehrhart.* In extreme eastern part.

Rubus strigosus, *Michx.* A few specimens on north side.

Rubus occidentalis, *L.* Quite abundant.

Rubus villosus, *Ait.* Quite abundant.

Rubus Canadensis, *L.* Quite abundant.

Rubus hispidus, *L.* Mostly on the north side.

Rosa lucida, *Ehrhart.* Abundant.

Pirus arbutifolia, *L.*, var. *erythrocarpa.* Scattered, not abundant.

Amelanchier Canadensis, *T. & G.*, var. *oblongifolia.* A few trees in western part.

Saxifragaceæ.

- Ribes oxycanthoides*, *L.* A few plants.
Ribes floridum, *L.* Three plants noticed.

Hamamelaceæ.

- Hamamelis Virginica*, *L.* A few plants; scattered.

Onagraceæ.

- Circæa Lutetiana*, *L.* Abundant in the western part.
Epilobium angustifolium, *L.* Three or four plants noticed.
Epilobium coloratum, *Muhl.* Scattered.
Oenothera biennis, *L.* A few plants only.
Oenothera pumila, *L.* Not abundant.

Lythraceæ.

- Lythrum Hyssopifolia*, *L.* Abundant.

Umbelliferæ.

- Cicuta maculata*, *L.* One or two specimens.
Osmorrhiza longistylis, *D C.* Abundant.
Cryptotænia Canadensis, *D C.* Abundant.
Sanicula Marilandica, *L.* Abundant.
Carum Carui, *L.* One specimen only in extreme eastern part.

Araliaceæ.

- Aralia nudicaulis*, *L.* Abundant in western part.

Cornaceæ.

- Cornus paniculata*, *L'Her.* Abundant in southwestern part.

Caprifoliaceæ.

- Diervilla trifida*, *Mœnch.* In southwestern part.
Triosteum perfoliatum, *L.* Scattered. Not abundant.
Sambucus Canadensis, *L.* In extreme eastern part. A few bushes.
Viburnum dentatum, *L.* A few bushes around the edge.

Rubiaceæ.

- Galium Aparine*, *L.* Abundant.
Galium triflorum, *Michx.* Abundant.
Galium circæzans, *Michx.* Not abundant.
Houstonia cærulea, *L.* A few specimens only.

Compositæ.

- Eupatorium purpureum*, *L.* Abundant in western part.
Aster corymbosus, *Ait.* In western part. Scarce.
Aster lævis, *L.* Scarce.
Aster undulatus, *L.* Abundant.
Aster cordifolius, *L.* Abundant.

- Aster multiflorus*, *Ait.* Abundant.
Aster miser, *L.* Abundant.
Aster carneus, *Nees.* In western part in one spot only.
Aster longifolius, *Lam.* Abundant.
Aster Novæ-Angliæ, *L.* Mostly in one spot in eastern part.
Aster linifolius, *L.* Around the edge. Abundant.
Erigeron Canadense, *L.* Mostly on approach to the island from the beach.
Erigeron annuum, *Pers.* Scattered.
Erigeron strigosum, *Muhl.* In extreme eastern part.
Solidago cæsia, *L.* Two small patches in the western part.
Solidago bicolor, *L.* Not abundant.
Solidago sempervirens, *L.* Very abundant around the edges.
Solidago arguta, *Ait.* Abundant.
Solidago altissima, *L.* Not abundant.
Solidago odora, *Ait.* A few plants in the extreme eastern part.
Solidago nemoralis, *Ait.* Not abundant.
Solidago Canadensis, *L.* Two forms occur.
Solidago lanceolata, *L.* Scarce.
Solidago sp.? Perhaps a cross between *S. sempervirens* and *S. altissima*.
Iva frutescens, *L.* A few plants on the eastern edge of the island near the road.
Ambrosia artemisiæfolia, *L.* Abundant.
Xanthium strumarium, *L.* Abundant near the barn.
Rudbeckia hirta, *L.* A few plants in the eastern part.
Helianthus strumosus, *L.* Abundant.
Helianthus divaricatus, *L.* Abundant.
Bidens frondosa, *L.* Around the northern edge; not abundant.
Maruta Cotula, *D C.* Not abundant.
Achillea Millefolium, *L.* Scarce.
Leucanthemum vulgare, *Lam.* Two specimens only.
Artemisia caudata, *Michx.* Mostly on the road from the beach to the island.
Gnaphalium polycephalum, *Michx.* A few specimens in the extreme eastern part.
Gnaphalium uliginosum, *L.* A few specimens; scattered.
Antennaria margaritacea, *R. Br.* A few specimens in the extreme southeastern part.
Antennaria plantaginifolia, *Hook.* A few specimens in the extreme eastern part.
Erechthites hieracifolia, *Raf.* Abundant on northern border.
Circium discolor, *Spreng.* Three specimens.
Circium horridulum, *Michx.* In the extreme western part.

Cirsium arvense, *Scop.* Scarce.

Lappa officinalis, *Allioni.* Scarce.

Nabalus albus, *Hook.* Abundant in the western part.

Taraxacum Dens-leonis, *Desf.* About four plants seen.

Lactuca Canadensis, *L.* Not abundant. Scattered.

Mulgedium leucophæum, *D C.* Not abundant. Scattered.

Campanulaceæ.

Specularia perfoliata, *A. D C.* Abundant in the eastern part in the early part of the season. The form found was very small, and perfected the fruit without producing any corolla. It was identified for me by Mr. C. E. Faxon.

Ericaceæ.

Gaylussacia resinosa, *T. & G.* Only found in the extreme southeastern part.

Vaccinium Pennsylvanicum, *Lam.* Only found in the extreme southeastern part.

Vaccinium vacillans, *Solander.* Only found in the extreme southeastern part.

Vaccinium corymbosum, *L.*, var. *atrococcum.* A few plants.

Andromeda ligustrina, *Muhl.* One bush in the extreme eastern part.

Pyrola elliptica, *Nutt.* A few plants in the western part.

Aquifoliaceæ.

Ilex verticillata, *Gray.* Not abundant. Mostly around the western border.

Plantaginaceæ.

Plantago major, *L.* Abundant.

Plantago Rugellii, *Decaisne.* Abundant.

Plantago decipiens, *Barneoud.* Abundant around the western border.

Plumbaginaceæ.

Statice Limonium, var. *Caroliniana.* Abundant on the neighboring marsh.

Primulaceæ.

Lysimachia quadrifolia, *L.* Abundant.

Lysimachia ciliata, *L.* Abundant in the western part.

Orobanchaceæ.

Epiphegus Virginiana, *Bart.* Found by Mr. F. S. Collins a few years ago.

Aphyllon uniflorum, *T. & G.* Three plants in the eastern part near railroad.

Scrophulariaceæ.

- Verbascum Thapsus*, L. Not abundant.
Linaria Canadensis, *Spreng.* Near the railroad mostly.
Linaria vulgaris, *Mill.* Near the railroad mostly.
Scrophularia nodosa, L. A few plants in the middle of the western part.
Veronica arvensis, L. A few plants in the extreme eastern part.
Veronica peregrina, L. Scattered.
Gerardia purpurea, L. About a dozen specimens on the southwestern edge of the island.
Gerardia maritima, *Raf.* Very abundant on the neighboring marshes.
Gerardia quercifolia, *Pursh.* Abundant in the western part near the railroad.
Pedicularis Canadensis, L. In the extreme western part. Not abundant.

Verbenaceæ.

- Verbena hastata*, L. Scattered. Not abundant.
Phryma Leptostachya, L. *Bigelow*, *Florula Bostoniensis.* Not found since.

Labiatae.

- Teucrium Canadense*, L. Abundant around the borders.
Trichostema dichotomum, L. One plant on the Eastern Railroad track.
Lycopus sinuatus, *Ell.* Abundant.
Hedeoma pulegioides, *Pers.* Abundant in the eastern part.
Collinsonia Canadensis, L. Quite abundant in the western part near the railroad.
Monarda fistulosa, L. A few plants in the western part.
Lopanthus scrophulariæfolius, *Benth.* A few plants in the middle of the western part.
Brunella vulgaris, L. Abundant.

Convolvulaceæ.

- Convolvulus sepium*, L. Abundant on the western border.

Solanaceæ.

- Solanum nigrum*, L. Near the house.

Gentianaceæ.

- Gentiana Andrewsii*, *Griseb.* Two plants only found.

Apocynaceæ.

Apocynum androsæmifolium, *L.* In northern part near railroad.

Asclepiadaceæ.

Asclepias Cornuti, *Decaisne.* Along the railroad bank.

Asclepias phytolaccoides, *Pursh.* In the centre of the western part.

Chenopodiaceæ.

Chenopodium album, *L.* Abundant.

Chenopodium hybridum, *L.* In the eastern part.

Atriplex patula, *L.*, var. *hastata.* Abundant around the border of the island.

Atriplex patula, *L.*, var. *littoralis.* Abundant around the border of the island.

Salicornia herbacea, *L.* Abundant on the marsh adjacent.

Suaeda maritima, *L.* Abundant around the borders.

Salsola Kali, *L.* Mostly on the approach to the island from the beach.

Amarantaceæ.

Amarantus retroflexus, *L.* Abundant near the house.

Amarantus albus, *L.* A few plants only.

Polygonaceæ.

Polygonum Persicaria, *L.* Abundant.

Polygonum Hydropiper, *L.* Abundant.

Polygonum aviculare, *L.* Abundant.

Polygonum erectum, *L.* Scarce and somewhat doubtful.

Polygonum maritimum, *L.* Abundant on the borders.

Polygonum sagittatum, *L.* One plant only found.

Polygonum Convolvulus, *L.* Not very abundant.

Polygonum dumetorum, *L.*, var. *scandens.* Abundant in western part.

Rumex crispus, *L.* Abundant.

Rumex Acetosella, *L.* Abundant.

Lauraceæ.

Sassafras officinale, *Nees.* Abundant in the western part.

Euphorbiaceæ.

Euphorbia polygonifolia, *L.* Scarce. Abundant on the beach opposite.

Euphorbia maculata, *L.* Abundant on the railroad bank.

Acalypha Virginica, *L.* Abundant.

Urticaceæ.

Ulmus Americana, *L.* A few trees. Scattered.

Pilea pumila, *Gray.* Abundant in the western part. It all dried up and disappeared before flowering.

Cupuliferæ.

Carya alba, *Nutt.* Abundant.

Carya tomentosa, *Nutt.* Scarce. Two or three trees only.

Carya porcina, *Nutt.* Abundant.

Carya amara, *Nutt.* The most abundant hickory.

Quercus alba, *L.* Quite abundant. One of the largest trees; about fifteen inches in diameter, is a white oak.

Quercus bicolor, *Willd.* Most abundant in the extreme eastern part.

Quercus coccinea, *Wang.* There is one tree which seems to be intermediate between *Q. coccinea* and *Q. rubra*. It has the acorn of *coccinea* and the leaf of *rubra*. The leaf is rather small.

Quercus tinctoria, *Bart.* One tree in the extreme southeastern part. Identified by the fringed acorn and the bright orange inner bark.

Quercus rubra, *L.* Abundant. This species with *bicolor* constitutes the greater part of the oaks.

Corylus Americana, *Walt.* In the middle of the western part.

Myricaceæ.

Myrica cerifera, *L.* Not abundant.

Betulaceæ.

Betula alba, var. *populifolia*, *Spach.* A few small trees.

Salicaceæ.

Salix discolor, *Muhl.* A few bushes.

Salix humilis, *Marshall.* A few bushes.

Populus grandidentata, *Michx.* This species and the next occur together as small shrubs in the extreme southeastern part.

Populus tremuloides, *Michx.*

Coniferæ.

Juniperus Virginiana, *L.* The only conifer. A few trees only.

Araceæ.

Arisæma triphyllum, *Torr.* Abundant.

Naiadaceæ.

Ruppia maritima, *L.* In a pool of water near the island.

Alismaceæ.

Triglochin maritimum, *L.* Abundant on the saltmarsh adjoining.

Orchidaceæ.

Orchis spectabilis, *L.* Bigelow found this plant. It is now found in the western part. Some years it is abundant, while in others it is very scarce. It was abundant this year (1882).

Iridaceæ.

Iris Virginica, *L.* A few specimens on the southern edge.
Sisyrinchium Bermudiana, *L.* Not abundant.

Smilacaceæ.

Smilax rotundifolia, *L.* In the northwestern part.
Smilax herbacea, *L.* Scattered.

Liliaceæ.

Uvularia perfoliata, *L.* Abundant.
Oakesia sessilifolia, *Watson.* Abundant.
Smilacina racemosa, *Desf.* Abundant.
Smilacina bifolia, *Ker.* Abundant in the extreme western part.
Polygonatum biflorum, *Ell.* Abundant in the western part.
Asparagus officinalis, *L.* One specimen only found.
Lilium Philadelphicum, *L.* In the extreme eastern part.
Lilium Canadense, *L.* Scattered.
Erythronium Americanum, *Smith.* Very abundant.
Allium Canadense, *Kalm.* Abundant.

Juncaceæ.

Luzula campestris, *D C.* Not abundant.
Juncus Balticus, *Dethard.* On the adjacent marshes.
Juncus bufonius, *L.* Abundant around the borders.
Juncus Gerardi, *Loisel.* On the adjacent marshes.
Juncus tenuis, *Willd.* Abundant.
Juncus acuminatus, *Michx.* Not abundant.

Cyperaceæ.

Cyperus Nuttallii, *Torr.* Not abundant.
Cyperus strigosus, *L.* Not abundant.
Cyperus filliculmis, *Vahl.* Not abundant.
Eleocharis obtusa, *Schultes.* One specimen found.
Eleocharis palustris, *R.Br.* A variety on the adjacent salt-marsh.
Eleocharis tenuis, *Schultes.* Quite abundant.
Scirpus pungens, *Vahl.* Near the railroad on the north side.
Scirpus planifolius, *Muhl.* One bunch in the western part.

- Scirpus maritimus*, *L.* Abundant around the borders.
Fimbristylis capillaris, *Gray.* On the railroad.
Carex stipata, *Muhl.* Not very abundant.
Carex sparganioides, *Muhl.* A few plants in the eastern part.
Carex cephalophora, *Muhl.* Abundant.
Carex rosea, *Schk.* Abundant.
Carex scoparia, *Schk.* Abundant.
Carex silicea, *Olney.* On the road from the beach to the island.
Carex cristata, *Schw.*, var. *mirabilis*, *Boot.* Abundant.
Carex straminea, *Schk.* Several varieties are found.
Carex virescens, *Muhl.* Scarce.
Carex laxiflora, *Lam.* Two varieties occur.
Carex Emmonsii, *Dew.* Abundant in the western part.
Carex Pennsylvanica, *Lam.* Abundant.
Carex lanuginosa, *Michx.* Not abundant.
Carex vestita, *Willd.* Not abundant.

Gramineæ.

- Leersia Virginica*, *Willd.* In the western part near the railroad. Scarce.
Alopecurus pratensis, *L.* Abundant.
Phleum pratense, *L.* Not abundant.
Agrostis perennans, *Tuckerman.* Two specimens only.
Agrostis scabra, *Willd.* Quite abundant.
Agrostis vulgaris, *With.* Abundant.
Agrostis alba, *L.* Abundant between the extreme eastern and the main eastern parts.
Muhlenbergia Willdenovii, *Trin.* A few specimens only in the middle of the western part.
Calamagrostis arenaria, *Roth.* On the road from the beach to the island.
Calamagrostis Canadensis, *Beauv.* Abundant.
Oryzopsis asperifolia, *Michx.* Found three specimens in 1879.
Spartina cynosuroides, *Willd.* Abundant around the edges.
Spartina juncea, *Willd.* Mostly on the adjacent saltmarsh.
Spartina stricta, *Roth.* Mostly on the borders of the creeks and pools adjacent.
Glyceria maritima, *Wahl.* On the adjacent saltmarsh.
Glyceria distans, *Wahl.* This species is a little doubtful.
Brizopyrum spicatum, *Hook.* Abundant on the adjacent marsh.
Poa annua, *L.* In front of the house in the eastern part.
Poa compressa, *L.* The most common grass.
Poa serotina, *Ehrhart.* Abundant.
Poa pratensis, *L.* Abundant.

- Poa trivialis*, *L.* A little doubtful.
Festuca ovina, *L.*, var. *duriuscula*. Scarce.
Festuca elatior, *L.* Abundant.
Festuca nutans, *Willd.* Abundant in the western part.
Phragmites communis, *Trin.* Three specimens in the north-western part.
Triticum repens, *L.* Abundant.
Elymus Virginicus, *L.* On the approach to the island mostly. Scarce.
Elymus striatus, *Willd.* Quite abundant in the western part.
Gymnostichum Hystrix, *Schreb.* Abundant in the western part.
Danthonia compressa, *Austin.* Abundant.
Hierochloa borealis, *R. & S.* Quite abundant.
Anthoxanthum odoratum, *L.* A few specimens only.
Panicum virgatum, *L.* Abundant around the borders.
Panicum latifolium, *L.* Abundant.
Panicum pauciflorum, *Ell.* Abundant.
Panicum dichotomum, *L.* This species is a little doubtful.
Panicum sanguinale, *L.* Mostly on the railroad.
Panicum capillare, *Bosc.* Mostly on the railroad bank.
Panicum Crus-Galli, *L.* A few specimens found.
Setaria glauca, *Beauv.* Mostly on the railroad bank.
Setaria viridis, *Beauv.* Mostly on the railroad bank.
Setaria Italica, *Kunth.* Two or three specimens only found.
Andropogon furcatus, *Muhl.* A few specimens found in 1880.

Equisetaceæ.

- Equisetum arvense*, *L.* Abundant.

Filices.

- Pteris aquilina*, *L.* The most abundant fern.
Aspidium Thelypteris, *Swartz.* Abundant.
Asplenium Filix-fœmina, *Bernh.* Scarce.
Onoclea sensibilis, *L.* Not abundant.

Ophioglossaceæ.

- Botrychium Virginianum*, *Swartz.* Very fine specimens obtained. Not abundant.

The following is a list of mosses collected this season (1882). The list is undoubtedly incomplete, as many must have escaped my notice.

MUSCI.

- Fissidens osmundioides*, *Hedw.* Rare. One specimen only obtained.
- Ceratodon purpureus*, *Brid.* Not common.
- Trichostomum pallidum*, *Hedw.* Very common in the western part.
- Orthotrichum strangulatum*, *Beauv.* Abundant on trees.
- Orthotrichum Hutchinsiae*, *Smith.* On rocks. Not abundant.
- Hedwigia ciliata*, *Ehrh.* Not very common.
- Atrichum angustatum*, *Beauv.* Common.
- Polytrichum commune*, *L.* Common in the eastern part.
- Polytrichum juniperinum*, *Hedw.* Common in the eastern part.
- Mnium affine*, *Bland.* Very common.
- Mnium hornum*, *Hedw.* In one spot in the northwestern part.
- Bryum cæspiticium.* Frequent.
- Funaria hygrometrica*, *Hedw.* Not common.
- Physcomitrium pyriforme*, *Br. & Sch.* Not common.
- Anomodon attenuatus*, *Hub.* On one rock in the western part.
The species is somewhat doubtful.
- Thelia hirtella*, *Sulliv.* On trees. Not common.
- Cylindrothecium seductrix*, *Bryol. Europ.* Not common. One specimen only obtained.
- Hypnum cupressiforme*, *L.* Not common.
- Hypnum nitens*, *Schreb.* Not common. Determination very doubtful.
- Hypnum salebrosum*, *Hoffm.* Common.
- Hypnum rutabulum*, *L.* One specimen only obtained.
- Hypnum populeum*, *Hedw.* The most abundant moss.
- Hypnum hispidulum*, *Brid.* Rare.
- Hypnum serpens*, *Hedw.* Quite abundant on rocks with *H. populeum.*
- Hypnum adnatum*, *Hedw.* Rare.

HEPATICÆ.

- Lophocolea heterophylla*, *Nees.* Not common.
- Madotheca platyphylla*, *Dumortier.* Common on the rocks.
- Frullania Grayana*, *Montagne.* Common on trees.

OPENING OF A NEWLY DISCOVERED SHELL- HEAP AT IPSWICH.

COMMUNICATED BY JOHN ROBINSON.

THE shellheaps in the vicinity of Ipswich have long been a subject of study and investigation for the archæologists of this region. Messrs. Wyman, Putnam, Morse, Cooke, Lebaron and others have, from time to time, worked upon these shellheaps and collected many interesting specimens from them besides adding to the scientific knowledge of the subject. In no single instance, however, has any particular shellheap been carefully turned over from end to end, nor have the contents of a heap been collected and preserved as a special collection. This is to be regretted, as there is now hardly any shellheap to be found in this vicinity at which some one has not worked to a greater or less extent.

Early in September (1882), Mr. I. J. Potter of the Ipswich Chronicle, an earnest student of the Indian remains in the neighborhood of Ipswich, called the attention of the officers of the Peabody Academy of Science to a shellheap which he had observed on the shore of Ipswich river. An examination showed that this heap had never been disturbed and it was at once determined to investigate it carefully and to retain as one exhibit everything of scientific value that might be obtained. Permission was kindly given to the Academy by Mr. Perkins, the owner of the land upon which the heap was found, to do the work, and on September 17, the first examination was made.

The shellheap is situated on the northeastern end of Perkins island in Ipswich river, now incorrectly known as

Treadwell's island, it having been in possession of the Perkins family for several generations during the early days of Ipswich, when it was always recorded on deeds by that name. The heap was oval in form and bordered upon the salt marsh for about one hundred feet, and extended back towards the southwest some sixty feet, where it became of little depth and was lost in a ploughed field. The depth of shells varied from a few inches on the outside to rather more than three feet in hollows. The southern end of the heap was composed almost entirely of oyster shells, reaching in places to a depth of over two feet and extending over a space ten feet square, and another smaller space towards the northern end was also entirely composed of these shells to about the same depth. The larger portion of the heap was, however, of clam shells intermixed with those of the hen clam and quahaug, black earth, charcoal, burnt stones and bones, with here and there, the shells of the mussel, cockle and limpet. Where the oyster shells were thickest but few other objects were found. One perfect valve of the smooth species of *Pecten* was collected; the species so common in the shellheaps at Marblehead being entirely absent. Three sinkers were found near the centre of the heap, at a depth of one foot and but a few feet apart. A few arrowpoints, knives, rude stone implements and chips were collected in various places, and, at different depths, a broken gouge and portions of other implements including a socket or handle apparently made from the antlers of a deer. At the bottom, everywhere, were the shells of the *Helix albolabris*, the common land snail, and in similar situations but less frequent, were those of another snail. In the lower stratum, covering a space of about two square feet, was quite an amount of some friable substance which has not yet been identified, but which may prove to be the

remains of some large fish. Several interesting bone implements were collected, and the bones of various mammals, birds and fishes were found in considerable quantity. In one spot, at the depth of two feet in the clam shells and debris, nearly two quarts of human bones were found broken into short pieces. Very little pottery was discovered and that was of a coarse quality and but slightly ornamented. One or two of the shells found were pierced with small holes as if used as ornaments.

The uninjured valves of the clam shells preserved show a great variety in form : some are rough, thick and narrow, while others are thin, large and very wide. Among the bones found were three pieces which appeared as if thoroughly calcined, and when struck gave out a metallic ring. It was noticed that only one specimen of *Natica duplicata* was collected, while in other heaps it is abundant. The oyster shells were all very much broken, and it was with difficulty that a sufficient number of whole valves were preserved for comparison and study. It should be borne in mind that the oyster is not now found in these waters.

The bones of a rodent were found nearly a foot below the heap, doubtless those of some animal that died in his burrow which extended through the heap, as such burrows were here and there noticed, and some of the other bones found in the heap had been gnawed by a rodent.

It is not intended here to enlarge or theorize upon the results of this exploration, but only to give the facts in the simplest manner, upon which, the specialist may build a story of the people whose homes and firesides were on or about this refuse pile.

It has been impossible to identify accurately all the bones found, and therefore only a rough outline can be given here of the contents of the shellheap, which may be summarized as follows :

Stone chips, 50; burnt broken stones, 20 preserved; round stones, 11 preserved; long stone, 1; arrowpoints, 6; arrowpoints (broken), 5; sinkers, 3; potsherds (two pots), 26 pieces; bone implements, 5; human bones and teeth (1 adult, and 1 child), 2 qts.; bones of various animals including those of the deer, moose(?), bear, wolf, and two other carnivorous species; several species of birds, including the turkey; a few bones of the turtle and of the porpoise, and numerous fish bones, 3 qts.; pierced shells (*Mya*), several; charcoal and unidentified substance.

The Mollusks preserved were:—

Venus mercenaria, *Ostrea edulis*, *Mya arenaria*, *Mactra solidissima*, *Mytilus edulis*, *Crepidula fornicata*, *Pecten tenuicostatus*, *Purpura lapillus*, *Natica heros*, *Natica duplicata*, *Neptunea islandica*, *Hymanassa obsoleta*, *Helix albolabris*, *Anguispira alternata*.

MR. F. W. PUTNAM remarked that the collection before us is one of great interest and importance. The bringing together of relics from the shellheaps is a matter of interest at any time, but to carefully collect and preserve, as a complete exhibit, the entire contents of one such heap is of vastly more value. It gives us important facts in the history of a family in one epoch. This collection is in many ways a remarkable one. In the first place it contains more stone implements than have been found in all the other shellheaps of this vicinity investigated by Wyman, Morse, Cooke and myself put together. Of course the oyster was abundant in the neighborhood when this heap was formed, although it is well known that it is impossible to collect them in any numbers in this vicinity now, and the *Pecten*, too, is now rare about our bays. Among the shells preserved I notice several pierced as if used for ornaments. Of the bone implements,

one is a perforator made from deer bone, and others are fish spearheads almost precisely like those from Alaska and the Western Eskimo. The specimens of land snail (*Helix albolabris*) are very numerous, the animal having undoubtedly gone under the shells to hibernate, as they were found at the bottom of the heap. It is curious to note the small amount of pottery collected, portions of two pots only having been found.

But the most interesting part of the collection before us is the box of human bones, all collected in one spot and broken up as if for the stew pot in precisely the same manner as those of the moose, deer, bird and other bones collected in this same heap and now in this case. That cannibalism was practised by the early inhabitants of this region there is no doubt. Wyman has found convincing evidence of this in Florida, and history records its occurrence in some parts of this continent in comparatively recent times. It might not have been cannibalism purely for the love of human flesh, but practised as a sort of religious or superstitious rite. Many tribes believed that to eat the flesh of a captured brave of the enemy incorporated his valor with their own, and more than that, it would prevent him from being an enemy in the world beyond, for if devoured, was he not then a part of themselves? This may be the explanation in this instance, and these broken pieces of bones may be the relics of such a feast.

Regarding the age of these heaps no definite conclusions can be drawn. That some extend far back into prehistoric times there is no doubt, while others were formed in part after European contact with the Indians, as shown by objects of European make found near the surface on some heaps. It is, however, only by such investigations as these which Mr. Robinson has conducted, that a com-

parative chronology can be obtained or a true history of the people who made them be established.

ARROWMAKER'S WIGWAM AT PINE GROVE.

COMMUNICATED BY JOHN ROBINSON.

DURING the latter part of September, 1882, Mr. J. H. Sears and myself visited the Pine Grove region in Marblehead for the purpose of examining some of the shell-heaps, but finding nothing of interest in them we were about to return home, when our attention was attracted by numerous pieces of upturned turf, where some of the young relic hunters from South Salem had made random diggings in search of "Indian relics." In one of the little excavations we noticed numerous porphyry chips, and for want of other occupation began to dig in the vicinity, saving all the chippings found. As we proceeded, we noticed that the chippings were all within a few inches of the surface, just beneath the turf, on an undisturbed yellow loam, and that they were all found in a band of about eighteen inches in width, which was also observed to take a curving shape. Continuing the work, we at last found ourselves at the point at which we started, having collected some four quarts of sharp chips of porphyry, of the sort found in the neighborhood of Marblehead, besides a few broken implements resembling large spearpoints. The circle represented by the band of chippings was eight and one-half feet in diameter, and was probably formed by the old arrowmaker who occupied a wigwam of that breadth, and who swept to the edges of his house the chips he had made during his work, leaving for us a perfect

ground plan of his dwelling, and the evidence of his industry.

Besides the chips and broken implements we collected, there have been added to them others obtained by Arthur Toppan, who, it was found, had commenced the excavation a few days before, and who then noticed and collected some of the chippings.

Near by was a very shallow shellheap extending some distance at one point being within four or five feet of the circle of chips. The site of the wigwam was at the edge of a pretty hill overlooking Forest river to the southwest. The specimens collected are now all in the museum of the Academy.



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