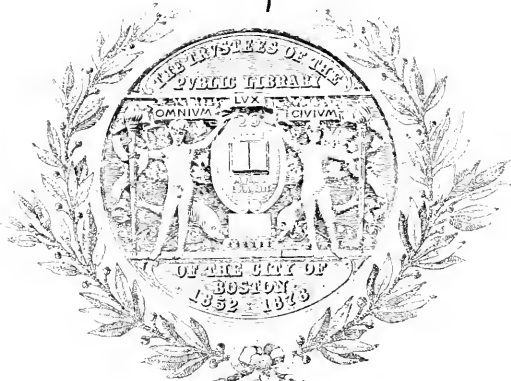
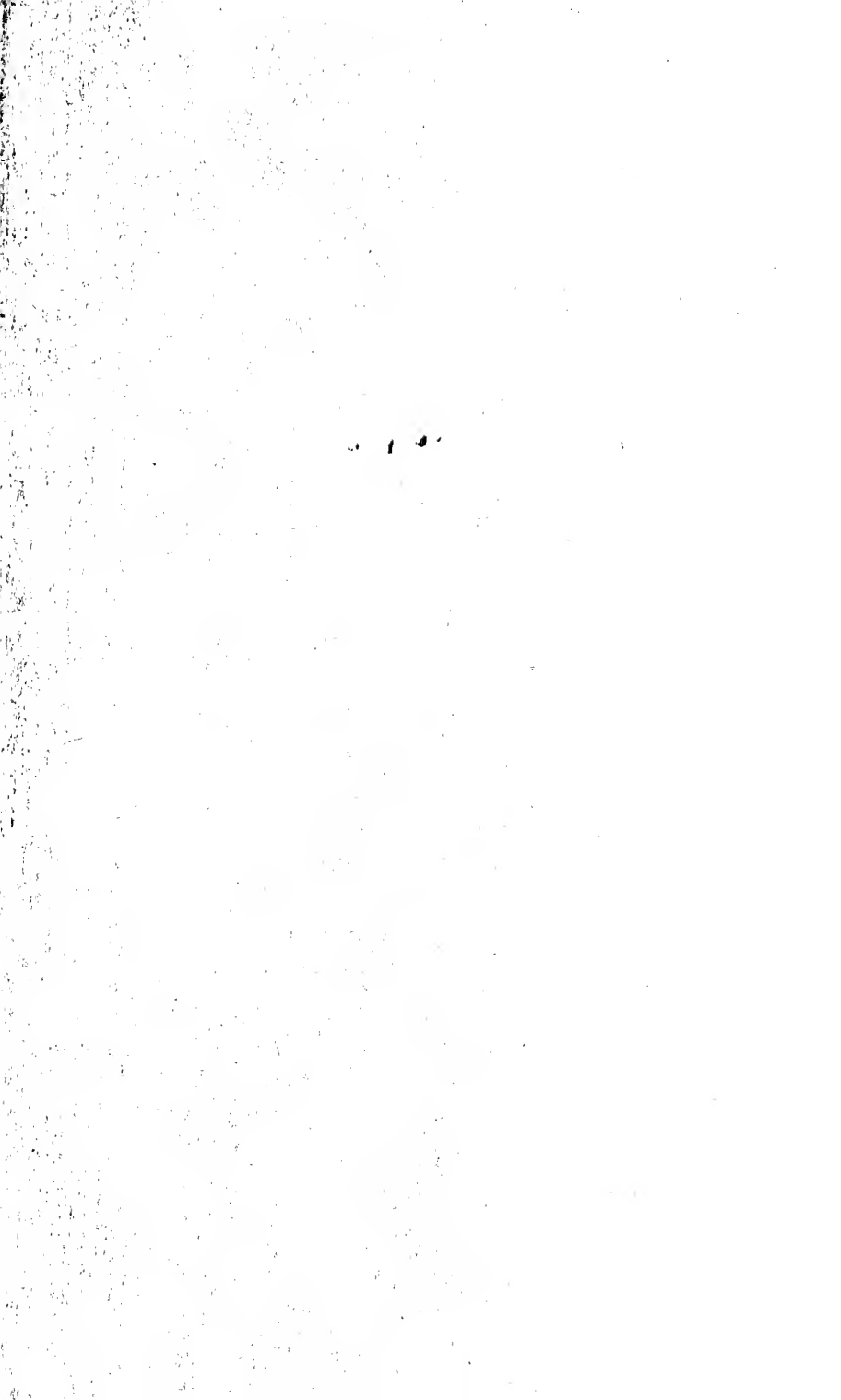


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REPORTS

OF THE

COMMISSIONERS

ON THE

ZOOLOGICAL SURVEY

OF THE STATE.

Boston:

DUTTON AND WENTWORTH, STATE PRINTERS.

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UNIVERSITY
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To the Senate and House of Representatives :

I transmit to the House of Representatives, for the information of the Legislature, a Report on Quadrupeds, by Professor Emmons, of Williams' College; a Report on Birds, by Rev. W. O. B. Peabody, of Springfield; and a Report on Fishes, by D. Humphreys Storer, M. D., of Boston: Commissioners appointed to survey the Zoology of the State, under a Resolve of April 12th, 1837.

EDWARD EVERETT.

COUNCIL CHAMBER,
6th April, 1838.

DR. EMMONS' REPORT.

To His Excellency,

EDWARD EVERETT,

Governor of the State of Massachusetts :

SIR,—The subscriber in fulfilment of the trust committed to him by the Executive, to make farther investigations in relation to the animals of this State, offers the following Report :

In the first place, I deem it proper to state the difficulty I met with in satisfying myself as to the manner in which the work ought to be performed. The difficulty arose not from a deficiency of interest, nor a want of importance to a *scientific* public, but from a doubt how the work could be made of practical importance to the community at large ; the requirement that it should possess this character, being distinctly set forth in the commission.

After some reflection on the subject, and consultation with the gentlemen associated in the enterprize, it was considered expedient to confine my investigations, in part at least, to the domestic animals. Though this field has been occupied more or less by members of our excellent Agricultural Societies, still, many facts, it was supposed, might be gleaned, highly useful to the public.

In addition to the above, as well as to what has been made public, concerning the animals of the state, in the preceding reports, I determined to figure and describe some of the rarer animals which had come under my particular notice. This part of the work seemed to be left discretionary, as no adequate provision had been made for its execution ; but no doubt could be entertained of its acceptability, if correctly performed. Another consideration which has induced me to undertake this difficult task, is the fact, that many of our animals are incorrectly described and badly figured. This is said without imputing to any one of our naturalists, inattention or incompetency. The subject has inherent difficulties, and it cannot be expected that any individual can give a full and correct account even of the animals

of a small district, without the labor of years ; and this is emphatically true, when a naturalist attempts to describe all the native animals of this country. In the first settlement of a country, where almost every thing is new, and all is to be learned, it cannot be expected, that correct descriptions of natural objects will be made immediately.

Much time must necessarily be consumed in the collection of materials, and their accumulation is slow ; and besides, it requires a certain degree of advancement towards affluence, or at least to be above want, before a community will turn its attention to subjects not recognized as being of immediate utility.

The ultimate end however, of the study of zoology, is the discovery of facts which shall be beneficial to mankind. One reason why this result is questioned by any, is, that *utility* is confined by them within too narrow bounds. Another is, that the true method of study is not understood, and as it is not known that many things are to be learned which cannot be shown to be useful, unless they are links which will lead to the discovery of other important truths, so this class of facts, or this kind of knowledge may be set down for nothing. Every one admits the value of method in all pursuits, the value of a discriminating mind, or in other words, of a correct and sound judgment, and also, what must precede these, a talent and a habit for observation. Whatever therefore, serves to develop this talent and form this habit, and secure the possession of a sound and correct judgment, or in other words, increase the accuracy of the power by exercise, will not fail to be appreciated in those studies and investigations which are acknowledged to produce these effects.

These effects follow almost necessarily from investigation in natural history ; it is, in fact, impossible to advance a step without the adoption of method, or, which is much the same, without science ; for we cannot consider a subject according to a method, without also availing ourselves of some of the important principles of science. Nature, in conferring characters on the individuals of her works, has made such a subordination of them, that they may be included in certain groups or families, under a few common characters, and in the possession of these characters, there is a common resemblance which is confined to that group or family, and which is also exclusive of all others. The discrimination of character therefore, leads to the ex-

ercise of the same powers as are employed in the detection of counterfeit bills, in estimating correctly the difference of value between two horses, or two farms, or of the degrees of guilt in two criminals arraigned at the bar of justice, or the shade of difference in the meaning of two words. The method of nature has another advantage over any other, in this, that though we may be obliged to stop in our inquiries at a certain point, and though we cannot now see that they bear on the arts of life, or the good of the world, yet hereafter they may be taken up and pursued from the point at which we leave them, without having to go over the previous ground; they may subsequently be carried out, after light has been shed on the path by some kindred science, to a most valuable purpose in civilized life.

To pursue the preceding views a step farther, we may refer to the advantage of a scientific catalogue of animals, over one arranged alphabetically. If, in the former, the principle of resemblance has been employed to a legitimate extent, then the several groups contain individuals whose external as well as internal configurations are similar in some of their most important features; again, those groups or families, under some distinguishing name, will follow each other in some regular order, each family will be adjacent to those which it most resembles, while those whose resemblance is remote, will occupy a remote station. A system is thus formed of the series, easy of reference, and in which we may see at a glance the affinities of a whole kingdom. In the latter case it is easy to see, that the alphabetic arrangement is entirely deficient in information and value, except so far as names are concerned. It may be employed like a dictionary of words, and therefore may be employed occasionally for reference, but ought never to supersede the systematic arrangement.

I shall now pass from these general and somewhat desultory remarks, to the consideration of the subjects of this report. Of the domestic animals I have selected the ox as the first for description. The points on which I shall dwell at some length are, his natural history and anatomical structure, his diseases and mode of cure. The zoological characters of the class *Mammalia*, (the class of animals on which I am directed to report,) are the following, “Animals having *mammæ* or teats, or which suckle their young.” In this class

and in the order ruminantia, or animals which chew the cud, or chew their food a second time, is placed the ox." He belongs to the tribe *bovidæ* and genus *bos*; characterized by the horns occupying the crest, and projecting sideways at first, and being cellular within. The domestic ox belongs to a sub genus, or *bos taurus*. As an individual of this sub genus, he furnishes the following distinguishing marks or characters: whole number of teeth, 30; incisors or cutting teeth six in the under jaw, none in the upper; canine or tusks, none; molars or grinders, twelve in each jaw. The whole is expressed more concisely as follows, incisors $\frac{0}{6}$, canines $\frac{0}{0}$, molars $\frac{6\ 6}{6\ 6}$ total 30.

The native country of the ox is not certainly known, but he was probably domesticated very soon after the flood, and perhaps before, as we have this passage in the 4th chapter of Genesis, "Jabal was the father of such as dwell in tents, and of such as have cattle." The time therefore of his reclamation from the wilds of the forest, as well as his native country, is veiled in obscurity. The effect of domestication in this, as in all other instances, has been to diminish the size of the animal, and extinguish to a great extent the natural ferocity.

According to tradition, the wild oxen of Britain belonged to a very large race, and were very ferocious. Besides this traditionary evidence, there are found, in almost every country of Europe, the skull bones of oxen much larger than those of any of the living races. There is some doubt whether the animals to which these fossil bones belonged, were the parents of the present domestic ox. In this country, also, we have indications of the former existence on this continent of at least two, if not three species which have become extinct. We have also two living species, viz., the *bos Americanus*, or bison, and the *bos moschiferus* or musk ox. The former is now driven far westward, but once inhabited the states bordering on the Atlantic; and the latter is now confined to the Arctic Circle, but is supposed to have existed as low as 40° of latitude. Of the extinct species one has been named *bos Pallasii* by Dr. De Kay. Its skull was thrown out of the earth at the time of the eruption at New Madrid in 1812.

Dr. Harlan has described two other skulls, supposed to belong to two distinct species. One, the *bos bombifrons*, the other, *bos*

latifrons or broad-headed ox. The horns of the latter measured twenty-eight inches in circumference at the base. Skulls, and other bones of cattle are abundant at the Big-bone licks in Kentucky, in common and associated with, those of the mastodon. It appears, therefore, that these cattle were contemporary with this latter wonderful animal, and also perished with it, in the same general catastrophe. Without doubt these records of ancient days have a date more distant than the historical era. Such are some of the facts connected with the history of the genus to which the domestic ox belongs.

The effect of domestication in reducing the size of animals is not a necessary one, but is probably the result of severe and cruel treatment, and neglect in furnishing the confined animal with a sufficiency of food: for it is found that, since agriculturists have turned their attention to the improvement of certain varieties, they have increased in stature. But all changes which operate on races, whether they are for the better or worse, must take place slowly. There is, here and there, an individual, which exceeds the ordinary size, but this is usually to be ascribed to more than ordinary attention, and its progeny would not have, without good attention also, the qualities of its parent. This may not be true however, except in cases where the race had deteriorated generally, and the low standard was fixed by time. The size of an animal, therefore, diminishes to a certain standard, when it is neglected or only partly provided for, which in time becomes an established standard of growth. In raising the standard of size or of value, we are obliged to contend with a law of nature, which operates on the progeny even of improved individuals, in order to preserve them of about the same measure and weight as preceding generations. As they come down to a certain point, so they must go up, though, if any thing, more slowly, for a retrograde course is always the most rapid.

These remarks are intended to show the necessity of sustaining the efforts at improvement in cattle, till they attain their ancient stature, or the original cast of the parent stock. Beyond this, it is in vain to attempt to carry improvement; for we are met again by a law which limits the size and dimensions of all the families of animals. What is gained in size, beyond the limits of the species, is lost in

activity. The proportion of food, also, necessary to sustain large corporate powers, is disproportioned to the final value of its parts.

All species of animals have a certain stature to which they usually attain. If they increase much beyond its limits, a loss of power is the consequence ; it is the result of disease, rather than healthy action ; of morbid growth, rather than the natural deposition of healthy organic matter. If, again, on the other hand, they fall greatly under the natural size, the loss of power and value is no less than in the former case. Disease and an early death are the consequence in each case. The point to be attained or sought for then, is, that size or bulk which belongs to the original conformation. Nature has limited improvements beyond this, and to attempt to pass over these bounds will defeat our own intentions. While on the subject of domestication, it may be interesting to inquire, what are the animals which were designed for this state ? To this we may answer generally, that they are those which are social, or which live in families, or seek their prey or obtain their sustenance by concerted movements. Observation goes far to establish this position, and besides these, are reasons drawn from the laws of their minds, if the expression may be allowed.

In a state of nature, all those who associate in this way, acknowledge a head or chieftain ; their movements are governed by his, and his wishes they understand. There is a mutual compact for the time being : but the leader or chieftain maintains his place and authority by physical strength, and the class or family is ready to obey a new master, when the former is conquered in combat. This prepares the way for adopting man as his master, when he finds himself in his power, and is able to reward his obedience or punish his transgressions.

In domestication, therefore, there is but a change of masters. There is no infraction of a law of nature in the process, but rather a conformity to one in force in the wilds of the forest. These remarks are applicable to the elephant, dog, horse and ox : they have become the companions of man, and give to his commands implicit obedience. They are truly social animals.

Animals, like man, are also the creatures of habit. Circumstances modify their physical frame and constitution ; climate produces a

controlling influence, and changes especially the color of the external integuments, though the flexibility or accommodating powers of their constitutions, is probably much less than that of man. The flexibility of the constitution of the whole genus *bos*, is by no means small. By the fostering care of man, the domestic ox can accommodate himself to any climate. Without this care, the Bos Urus, the Aurochs of France and Germany, the Bison of the ancients, has been an inhabitant of nearly the whole of Europe. It is now to be found in the Caucasus, where are still the royal tiger and the panther; in Poland, in the forest of Bialowicza, with the wolverine, the *Ursus gulo* of Lin. and on the coast of Tenasserim, having for its companions the elephant and rhinoceros.

In a domestic state, *treatment* does much either to improve or injure the condition of an individual. Its influence may be seen in the body and disposition, independently of the amount of food it receives. One that has kind treatment, and is caressed by its owner, hardly ever fails of being in a good condition, while, on the other hand, one that is beaten and fears its owner, and flies from his presence, is, most generally, in a bad condition, and is not of half the value of the former.

Hence, in addition to the dictates of humanity, interest should compel us to treat the ox and other domestic animals with kindness, as, without this, a farmer must necessarily fail in all attempts at the improvement of his stock.

When first brought under the dominion of man, and subjugated to the yoke, something like harshness is necessary, till the individual is subdued. This, if followed by kindness, will make obedience more certain; it will secure a good understanding between the parties. The subjugation will be considered, in the first place, as a matter of right by the weaker party; it meets with the same trials in a state of nature, and is therefore no infraction of a law of nature, or trespass on the bounds of justice, for experience has taught it harsher lessons, while roaming its native plains and woodlands. When, however, it has submitted to the yoke of servitude, acts of kindness only can secure a devotion to our interest; if our treatment is marked with cruelty, it rouses a spirit of revenge, or breaks it down to a state of

stupid indifference, and creates, in the room of a faithful servant, a sullen ill-tempered dependant.

The intellect of the ox, though less than that of the horse, is yet of a high character, when compared with a majority of animals. That he is capable of filling the sphere in which he was destined to move, before his reclamation from the forest, is saying no more than can be said of all other animals. His intellect, under a course of education, will advance him higher than what we should expect from his ordinary appearance in a state of servitude.

Under some circumstances, he even exhibits the sagacity of the dog. In South Africa, the Hottentots train their oxen not only to guard themselves but their flocks. In case of war with neighboring tribes, he is sent forward on the battle field, and the herd, moving in concert, overthrow every opposing obstacle, and thus prepare the way for an easy conquest of the enemy. They in fact are both the protectors and servants of the Caffre. What the character of the Caffre ox is, so probably was our domestic ox previous to his galling servitude to the European. He is equally susceptible of improvement under the hand of culture, and equally capable of increasing his amount of service and of value. His fidelity and usefulness may yet be increased during his life, and when put to the stall for slaughter, he may yield a two-fold value to the proprietor.

The ox, in the domesticated state, seems more liable to disease than those species which yet remain unreclaimed from the forest. On this point, however, mistakes may arise from our not being able to observe the condition of the latter. It is rare to meet with any of the wild animals under disease. In original structure and bottom, the ox is firm and sound. The bones of the skeleton are hard and strong, and its general resemblance to that of man is quite striking. The greatest deviation of form in any single bone, is in that of the lower jaw. In man it is short and square; in the ox and all other quadrupeds, except the elephant, it is long and tapering. He differs from man also in the number and form of the metatarsal and metacarpal bones. His apparatus too, for digestion and assimilation, is larger even in proportion to size, and more complicated. In these particulars, and others which might be noticed, the changes are specially adapted to fit his organization to this condition. This is true of all the species of the

animal kingdom. The physical condition of the world once established, all organized bodies are fitted with reference to those conditions. No exception to the law is yet discovered.

In speaking of the diseases of the ox, and their mode of treatment, I shall confine myself to the statement of general principles. I take it for granted, that there is such a resemblance in the anatomical structure of the ox to that of man, that many of the principles which are established in the nature and treatment of disease, apply equally to each. To support this, there may be an appeal to facts. A few will suffice. 1. Our domestic animals are affected by many of the contagious diseases to which man is also subject. 2. The organs and forces which belong to organic life, present the same general phenomena. 3. Disease, involving structural derangement, presents the same morbid appearances. 4. Vital forces are the same in all mammiferous animals. 5. Exposure to atmospheric changes produces the same train of diseases as in the human family, as coughs, colds and consumptions. 6. Medicinal agents act on the same organs in each, and are followed by like effects. 7. Differences in the organs are differences in form, and are not *radical* differences, and amount only to certain modifications which are limited on all sides, the deviation never extending so far as to destroy the unity of the plan of construction. 8. The primary elements which enter into this construction, considered as mere machines, are the same. It is necessary to state here distinctly that we are speaking only of certain general principles, and it is not contended that there are not some differences, but the deviations from one plan cannot be very wide, since both families are fitted for the same physical conditions. When, therefore, so many principles are found to apply or belong to both families, in health and disease, may we not also farther infer that those practices in disease, which are established in particular cases in one, may be extended to the other? May not the experience in one, aid us in the other, or be used as a guide in the application of remedial agents? It is not necessary, however, to theorize, when there are so many facts of the specific action of medicines almost identical in man and beast. In each, opium relieves pain; aloes, senna, jalap, calomel, &c., act on the intestinal canal; nitre on the kidneys; camphor, opium, and nitre on the skin; alcohol on the brain; ginger, columbo, gentian,

and boneset act as tonics. The effect of bloodletting, in subduing and arresting inflammatory diseases, is another instance of the unity of effect in the cases already spoken of, and it may be employed so generally in the diseases of cattle that we never ought to lose sight of it. Too much importance cannot be attached to the employment of this remedy, for nine-tenths of the diseases in cattle, are those of increased action, or of an inflammatory action, and it makes no difference what the organ diseased is, or what function it performs in the system, if it is one of an inflammatory nature. Though each organ performs a distinct office in the system, and though the structures are different, yet inflammation, in its nature and effects, is the same, and is to be combatted by the same general remedies : and at the head of these remedies, in all cases, is bloodletting. Diseases in cattle are well known to be more simple than in man. The simplicity of their diet, and freedom from exciting passions, are the two causes most influential in preserving them from complicated structural derangements, and securing the healthy and regular operation of all their organs. Nature has pointed out their proper food, both in the instinctive choice of that which is congenial, and the instinctive rejection of that which would be injurious, and it is very difficult to compel them to change their natural aliments for those which are artificial.

For the successful treatment of inflammatory diseases, it is not necessary that we should understand the precise change which the organ so affected undergoes ; whether, in the first onset of it, the circulation of the part is less vigorous, or less rapid ; whether the quantity of blood in the capillaries is increased and accumulates in them, in consequence of debility, or not. We know that there is an accumulation, that there are increased heat and pain. We know that abstracting blood, and cold applications are the first natural remedies ; we know that withdrawing from the circulation a quantity of the fluids which act on the excitability of the heart, diminishes its force and thus gives an opportunity for the equalization of the powers of the system and of restoring it to its natural state. It is taking fuel from the fire. Perhaps this is not well expressed. It is difficult to explain some points without conveying erroneous views, and it is as much the case when we speak of diseased action, and the rationale

of remedial agents, as when we attempt to explain the operations of mind, will, free agency and the like.

Of diseases of the inflammatory character, there is probably none so fatal as *murrain*. However it may commence, whatever part it may attack, still it tends to a speedy and fatal termination. This is unquestionably an inflammatory disease, and its seat in the foot, in the fore quarter, side or hind quarter, does not alter its character. When it prevails as an epidemic, it is like all epidemics which attack man, more rapid in its course, and more certainly fatal in its termination. It hurries through its regular stages without giving the sufferer even temporary repose or intervals of abatement. As it commonly prevails in New England, it occurs in sporadic cases, and confines its attacks mostly to the young and thrifty cattle which have been turned into a rich pasture in the spring. The first intimation to the owner of a thriving herd of yearlings, that they are becoming too plethoric, is the finding already dead, one of the finest of the herd. When this is the case, it should lead to a careful examination of the remainder, to ascertain whether there are among them any that are lame or ill, or apparently of too full habit. If one or more be ailing, the first remedy to be applied is blood-letting. The vein in the neck is to be freely opened, that the blood may flow in a full stream. The quantity to be taken depends on the circumstances of the case, or the progress which the disease has made, and it is safer to let it flow till the animal staggers and his pulse flutters under the finger. This is to be followed by a pound and a half of epsom salts dissolved in thin gruel or warm water. If all appear in a healthy state, a safe and prudent course will be to turn them all into short feed for one or two weeks, and, during that time, mix with their salt a quantity of sulphate of magnesia. Such a course will remove a predisposition to the disease, if one exists. The latter course may be pursued even when no disease has appeared. A short dry pasture reserved for this purpose, where they can be exercised, (for cattle do become indolent,) will be of great value to the cultivator of this kind of stock, and save yearly one or more from falling victims to this disease.

To return again to the treatment of this malady, I remark that not only reducing remedies are to be relied upon, but those that heat the system or act as tonics, are to be withheld. The latter would de-

feat the good operation of the former, and render abortive the best of treatment.

The pulse may be examined on the side of the temple, on the lower jaw, or, better, on the left side, just at the point of the elbow. At the latter place we may ascertain the action of the heart. The average number of pulsations in a minute is forty.

The points to be determined in the examination of the pulse are, its frequency, its qualities, whether hard, soft, full or bounding. The strength of the pulse is estimated by the force required to suppress it under the finger.

A very important exercise of the judgment is not unfrequently required in violent and dangerous diseases, for the pulse may be of a deceptive character, not only in the commencement of the disease, but through its whole course, if the termination is fatal. The pulse in these cases will be found rather slow and small, that is, the artery feels smaller under the finger, but is not decidedly hard and wiry; it is rather weak and its motion sluggish, and the first impression would probably be, that the patient was already in a debilitated state. But in the early stage of severe diseases, we must not thus reason or thus decide, without a careful examination of all the symptoms of the case. The heart, which is the centre of the circulatory system, may be obstructed in its movements by an engorgement of blood in its cavities and the large vessels near it, and its free contraction and dilatation may be restrained. It may be drowned like a mill-wheel flooded with back water.

The concomitant symptoms of such a state are, a blood-shot eye, coldness of the ear, horn and extremities, panting for breath, and protrusion of the tongue. The neck will be outstretched, to assist in the efforts of breathing, with a heaving of the flanks. Cases answering to this description would be ranked among the extremes, but they are not hopeless, if suitable measures of relief are adopted and pursued promptly and vigorously.

Here I remark again, that bleeding is the first remedy and the only remedy which will be effectual, as without it, other remedies will not act with sufficient promptitude to save the patient. Bleeding prepares the way for the use of other means, which, without it, would not only afford no relief, but might increase the oppression. Bleeding,

arrests, for a time, the progress of the disease, removes a hindrance to the free circulation of the fluids, brings a temporary respite or mitigation ; it does not cure, but opens a prospect of curing, and the final termination will depend much on the course pursued during the interval of relaxation. The next step is the administration of a pound and a half of Epsom salts in warm gruel, to which may be added from 10 to 15 grains of tartar emetic. To secure its operation, it is necessary that it should be given carefully, that is, it should not be poured down the throat hastily and at once, as it will be very likely to fall into the first stomach or paunch, where it will remain inactive, or in a great measure inert. If, on the other hand, it is given slowly, it will be more likely to pass over the opening into this, and pass on to the fourth stomach.

To those who do not understand the effect of bleeding, or other remedies, or who do not know what changes to expect from their operation, either singly or combined, I state farther.—There are two kinds of changes which follow bloodletting, both of which are favorable ; they depend on the previous state of the circulatory system. If it is oppressed from engorgement ; bleeding, (if its effects are favorable,) will produce a more frequent, fuller, and rounder pulse, or the artery will be more expanded, seem larger in circumference ; but, if the pulse, previous to bleeding, is bounding, frequent, or hard, it will be less bounding, less frequent, and softer. The system, in the first case, will be relieved of a load, under which it could not freely act ; in the last, there are abstracted from the circulation, fluids, which, by their over-stimulating effects, tend rapidly to the extinction of the vital principle, or the destruction of some vital organ. The first state, is one *preceding* reaction, and in which nature requires assistance to develop ; the latter is *one of reaction*, and requires moderating, before any of the vital organs suffer from structural derangement. The first state is one, much like that which follows a blow on the head, the whole system is laboring under a depression, and this may be so great, that the circulation in the capillaries is wholly impeded. The appearances after death in such a case, are black extravasations in the diseased part, or decided mortification. The last is more like the excitation from stimulating liquids, and ends in the suppuration of some part, on which the disease falls. Sometimes some organs are

found in a state of mortification, and others in suppuration, or both states are found in the same organ. It may be well to remark here, that the same train of symptoms does not always follow a state of inflammation, or, in other words, the train of symptoms depends somewhat on the part affected, or on the office the diseased organ sustains in the system. This difference is partly in degree, partly in the rapidity by which a termination is produced. Each organ is to be considered as a part of the whole, and connected with the general system by peculiar sympathies, and each organ in itself as the centre of this train. Now an organ being diseased, its functions are not only deranged, but the functions of some other part are deranged also. Knowing, therefore, the functions of a part, we may know generally whether those functions are deranged; but it is not so easy to determine whether the derangement is primary or secondary, primary or sympathetic. But the course to be pursued, is not so obscure; for the nature of inflammation is the same in all organs, and its results the same; and it is an established rule that the general treatment is the same. The simplification of treatment, in this way, is of great importance, and is particularly well adapted to the simplicity of the diseases of cattle. We have not to be on the lookout for particular remedies in each case, so long as we are in possession of general principles to guide us. A milder state of inflammation than what has been described already, is characterized by dulness, dryness of the muzzle, ceasing to graze or ruminate; increase of heat at the root of the horn, and increase of the number of pulsations in the artery, which will vary from 40 to 80 in a minute, according to the severity of the disease. We are to estimate the immediate danger, by the departure from a healthy state; by this we are to proportion or graduate the activity of the means of cure. In cattle, as in man, after the active stage of the disease is past, tonics may occasionally be useful to restore the stomach to a proper standard of action. But this class of remedies is much less useful than is generally supposed, and in the milder forms of disease, if the first treatment has been proper, they will not be needed. Those of the most value, both as it regards safety and restorative qualities are the cold infusions of columbo, gentian, eupatorium, or boneset, to which may be added ginger, if

an aromatic is wanted. The vegetable class of tonics are, in their nature, adapted to the constitutions of all ruminant animals.

The preceding views contain some of the leading general principles of the nature and cure of inflammatory diseases. More might be said, but it is thought best to leave the subject here for the present. The great object has been to put the farmer in possession of a few established points, that they may supply the place of the irrational and empirical modes of practice which have hitherto exclusively prevailed in this country.

Many of the articles in use by the cow doctor, are not only inert, but filthy in the extreme. Some prescriptions recommend themselves to the farmer because they contain a host of articles; it is therefore thought that some one of them, or all taken together, must certainly cure. But let it be remembered, the more simple the prescription, the better.

The varieties of cattle in New England are evidently numerous. The red cattle bear the marks of the Devonshire breed, and probably differ as little from them as possible, under the climate and mode of treatment they have met with. It is not supposed that any are of a pure blood, except those recently imported. Where care has been taken of young stock, i.e., the ordinary care of a good husbandman, it is believed that the cattle in this state have as much power and as much speed at the plough, as any in the world, even as the best of the Devonshire in their own country. It remains to be shown by experiment, how much the present race may be improved by extra care, or what advantages are to accrue from crossing with the best English stocks. It is the opinion of the writer, that the most feasible course for the New England farmer, is to improve the present mixed race. This race is inured to the climate, is not very deficient in good points, attains a good size; the males are good workers, and the females not deficient in milk. They are a race, like the New England people, who, though descended from the English, retain but few of their characteristics, and having acquired some new ones, are, on the whole, not inferior to the original stock. A fine field is opened to the husbandman, for the improvement of the stock now on his farm, not by expensive, uncertain importation of cattle from a climate essentially different from ours, but by selecting the best of his

present stock for breeders. Much has been said on the best mode of breeding cattle, and undoubtedly on this, as on all obscure subjects, there has been a mixture of truth and error.

In a state of nature, there are few changes for the better or worse. The species attains a certain size, has similar marks from age to age, when living under the same circumstances. But changes in size, color, &c., do occur even in a wild state, yet more limited than in a state of domestication. How many varieties may spring from a single stock, it is impossible to tell. The variation is so great in some cases, that the individuals are considered for a time as distinct species. The practice of breeding in and in, as it is termed, although advocated by eminent men, cannot raise a variety to the highest perfection of which the species is susceptible. For it is evident, that on the principle on which this is advocated, viz. : "that like will produce its like," if the variety has any defects, they too must find a place in the progeny, as well as its perfections.

Besides, the practice of breeding in and in, has another more serious objection, the stock will not hold its own for many generations, but it will finally depreciate till it has become worthless. This rests on a law of the animal and vegetable kingdom. Another question has been discussed in relation to mutual influence of parents on their offspring. Linneus, who was one of the most accurate observers of nature, has satisfactorily elucidated this point. According to him, the male imparts the *external* characters, and the female the *internal*.

The breeding of the jack with the mare, produces a mule,—having the ears, head, skin and tail of the former. The common goat, whose hair is always coarse and useless, crossing with a fine fleeced Angora goat, produces, like the male parent, an offspring, whose coat is also coarse and worthless, but change the order, in the latter case, and the coating is improved. These facts have an important bearing on the improvement of both cattle and sheep. It is hardly necessary to make the application to either of this species of stock ; it is sufficient to say, that we need not expect fine wool from a coarse woolled buck, nor a large quantity of milk from a mother whose milk is deficient in this respect ; and the principle holds true in relation to quality. The character of the most importance in cows, then, is their milk. It is true, beef may be made of a cow not re-

markable for milk ; it is, however, but reasonable to infer, that a good milker will also make beef *easily*, and of a good quality, when she is dried, for the matter for the secretion of milk, will then be converted into meat. The value of a cow does not depend on the number of quarts of milk she gives, but on the quantity of cream. The best method of determining the quantity of cream, is to divide a tall glass into equal parts, or inches, and let the last inch be divided into quarters or tenths, according to the point of accuracy it is wished to observe ; let this glass be filled with milk and set aside, the proportion of cream to the milk may then be known by the proportion of the parts it occupies.

To improve the husbandry of this state, it is not necessary to copy the system of husbandry of foreign countries. A successful system in one country is not certainly successful in another. Considerations of climate, soil, exposure, general features, &c., are to be taken into consideration, when a new system is proposed. Besides, the distance from market is by no means to be lost sight of. For instance, the farms of two individuals, equally good as to quality, but located differently as regards a market, would not be equally profitable to the owners by the same course of husbandry. The farm, in one instance, might be turned to the raising of wheat, and, in the other, to the making of cheese. It is evident, that cheese will bear a more distant transportation than wheat ; for \$1000 worth of cheese may be transported to market with much less expense than the same value of wheat. A gentleman in the vicinity of the metropolis, may turn his whole farm to garden sauce, to great profit ; he will, of course, adopt the drill husbandry, but a distance of 20, 30, and 40 miles will prevent the successful adoption of this kind of crop, and this system of husbandry.

I shall conclude this part of my report with remarks on some of the animal secretions.

1. *Fat.* The beauty and roundness of form depends on the accumulation of fat. It is to be considered as a secretion, deposited in the cellular system for certain purposes. It never accumulates, except the animal has more than a supply of food for the immediate wants of the system. Its use in the animal economy is plain, viz., to furnish nourishment when other supplies fail. It is an internal store-house, from which the system draws nourishment in time of

outward famine. Were it not for this, few could survive a protracted illness, and in the winter many wild animals would perish. Accumulating in a season of plenty, and being of the most nourishing substance known, and as it is already animalized or assimilated to the system, it is in a state fit for immediate use, without a laborious change in the digestive apparatus. Thus in sickness, when the animal powers are greatly weakened and unfit for labor, the fat becomes an important store-house; or when food is beyond the reach, it supplies strength till its prey is found, and the calls of nature satisfied.

The consistence of fat is known to vary with the food from which it is formed. It is in itself unorganized, being in this respect like an excretion. It is no more organized than bile or saliva. It is deposited in little cells, in a state as pure as after it is expressed. In the economy of animals, its presence is an illustration of the foresight of the wants of a created being, and such an exhibition of wisdom in meeting those wants, as is worthy of admiration.

The fatty principles derived from animals are very analogous to the fixed oils of vegetables; they are also composed of the same elements, viz., carbon, hydrogen and oxygen. A substance similar to fat has been prepared artificially, by several distinguished chemists. The proportion of the above elements in the fat of animals, is 76 carbon, 11.44 hydrogen, 9.98 oxygen. The composition of olive oil is 77.21 carbon, 13.36 hydrogen, 9.42 oxygen; and of alcohol, 52.17 carbon, 13.04 hydrogen, 34.79 oxygen. Thus nature, from two or three elements, elaborates a multitude of homogeneous or apparently simple bodies. Of this multitude we have no conception, till we sit down and enumerate, one by one, the products of the animal and vegetable kingdoms, all of which are composed, with trifling exceptions, of those simple elements combined in different proportions.

Milk. This well known fluid consists of three distinct substances or parts,—cream, curd and whey,—into which it separates spontaneously by repose. Cream has a specific gravity of 1.0244, according to Berzelius, and consists, in 100 parts, of butter 4.5, caseous matter 3.5, and whey 92. During the ordinary process of churning, it is said that there is an elevation of temperature amounting to three or four degrees; at the same time oxygen is absorbed, and

an acid is generated. But the formation of butter, or its separation from the other elements of cream, does not depend on the absorption of oxygen gas, as it can be obtained when the atmosphere is entirely excluded. The curd which is formed, soon after the separation of the cream, becomes a sort of coagulum, by the action of a free acid, or by rennet. It is considered as pure caseous matter, or the basis of cheese. The action of rennet, in separating the caseous matter, is not well understood, but it is generally supposed to act in consequence of the presence of gastric juice, which is always more or less acid.

Caseous matter yields, on analysis, carbon 59.78, hydrogen 7.42, oxygen 11.40, nitrogen 21.38. When burnt, it yields an ash which amounts to 6.5 of its weight, the greater part of which is phosphate of lime. This substance makes the caseous matter so valuable as an article of food to young animals. It is during this period that the bones require the deposition of this solid earthy matter to give them strength and consistence. Milk, when deprived of cream, has a specific gravity of 1.03, and yields, in the 1000 parts, water 928.75, caseous matter 28, sugar of milk 35, muriate and phosphate of potassa 1.95, with traces of a few other unimportant elements.

The following concise description of a few of the rarer animals of this state, is offered in the room of a general catalogue. This course appeared the most expedient, as two editions of the Geological Reports have been distributed in all the towns in the state, containing catalogues of the animals nearly complete, and in which very few additions or alterations can be made at the present time.

1. HYSTRIX.

Generic Characters. Teeth. Incisors $\frac{2}{2}$, canines $\frac{0}{0}$, molars $\frac{8}{8}$. Total 20.

H. dorsata, Gmelin. Porcupine. Color black. Feet armed with long and moderately curved nails, 4 on the anterior, and 5 on the posterior feet. Body and extremities covered with coarse hair,

more or less black, inclining sometimes to dark brown, and intermixed with spines, with black tips and white shafts. Tail thick, and 7 or 8 inches in length, and prehensile and ancipitate, or two edged. Herbivorous, living on fruits, grains, barks and roots of trees. Dwells in hollow trees and in dens. The porcupine passes much of its time in sleep, is sluggish in its habits, and clumsy in its form and motions, yet moves with security among the tops of trees. The length of the longest spines is about two inches and a half. These are a formidable means of defence against the attack of wolves, dogs and foxes. When assailed, it immediately throws its head between its fore legs, and erects the spines on its back, and at the same time elevates its posterior parts and tail. If the assailant is within reach, it gives it a smart blow with its tail, leaving the part struck covered with detached spines. Its tail is therefore its weapon most employed in its defence.

Whole length of the animal 26 inches. Highest part of the back about 14 inches. Flesh red and unpleasant, but relished by the Indians. Voice, a plaintive mew, which it utters on being disturbed with a stick or other instrument.

It is quite common on the mountains surrounding Williamstown. Sometimes an Albino of this species is met with.

2. MUSTELA.

Gen. Char. Teeth 34 or 38, $\frac{16}{18}$, or $\frac{18}{20}$, $\frac{6}{6}$, $\frac{2}{2}$, $\frac{8-10}{10-12}$.

Mustela Canadensis Lin. var. *Pennanti*.

Pekan Weasel, or Fisher Weasel. Fisher. Color mostly black; nose, rump, tail and extremities black, covered with fur and hair; the former, some shade of brown, more or less pale, or inclining to a yellowish; the latter is terminated with black and pale below. In the winter, it is long, and the animal is blacker than in summer. The animal approaches a brownish gray about the face and sides. White spots between its anterior and posterior legs, and a small one on the throat. Whole length 37 inches; tail 13 inches; height at the anterior legs $8\frac{1}{2}$ inches, at the posterior $9\frac{1}{2}$; from the nose to the base of the ear 3 inches. Dwells mostly in

hollow trees : rarely seen on account of its nocturnal habits. Lives on squirrels and other small animals. Is very troublesome on sable lines by robbing the traps of the sable. It is found occasionally on the mountains in the neighborhood of Williamstown.

Mustela Martes. Lin. Pine Marten.

Color yellowish brown. Head and margin of the ear whitish. Legs and extremity of the tail black. Long yellow stripe under the neck, and reaching along the space between the legs. Toes 5, armed with slender nails, almost concealed in the thick hair. Whole length 1 foot 11 inches. Length of the body 1 foot 2 inches. Height, at the anterior legs, $4\frac{1}{2}$ inches. This animal lives wholly in trees, and subsists on squirrels and other small quadrupeds. It is rarely seen on account of its nocturnal habits. Is found in the vicinity of Williamstown. The fur is beautiful and much esteemed.

3. LUTRA.

Gen. Char. Teeth, $\frac{6}{6}$, $\frac{2}{2}$, $\frac{10}{10}$: total, 36.

Lutra Canadensis, *Braziliensis* of Harlan. American Otter.

Color dark glossy brown ; pale or whitish about the throat and face. Feet with 5 toes on the anterior legs, and 4, with the rudiment of a fifth, on the posterior. Webbed, short and strong. Body long and cylindrical. Tail depressed at the base. Whole length 4 feet, tail 1 foot 5 inches. Height 10 inches, length of the head $4\frac{1}{2}$. Circumference at the middle of the back, 1 foot 7 inches. Measurements taken from a fine male caught in the Hudson, near Albany. One about the same size was taken in the Hoosic, in Williamstown. Lives in holes on the banks of streams ; its principal food, fish, which it takes very expertly. Capable of being domesticated and becoming somewhat familiar. Skin very tough, and covered with the most valuable fur. Value of the skin, about \$8.

Note. Length of another individual, 3 feet, 5 inches. From the nose to the root of the tail, 2 feet 3 inches. Height at the fore legs, 8 inches. Length of the skull 4 inches and 3 tenths. Height $1\frac{1}{2}$ inches, breadth of the base, from one meatus to the other, 2 inches, measured on the outside. Greatest width of the zygomatic arches,

2½ inches. Narrowest part of the skull, just anterior to the line of greatest width, 8 tenths of an inch.

4. CANIS.

Gen. Char. Teeth, $\frac{6}{6}$, $\frac{2}{2}$, $\frac{12}{12}$: total, 40.

Canis lupus. Wolf. Color reddish yellow in the summer, black along the back in winter, and obscurely striped with black along the sides. Large patch of white beneath the lower jaw, and between the fore legs. Hair short in summer, and long in winter, and in northerly regions it often becomes white. Whole length about 3 feet. Height 2 feet 5 inches, tail, 12 inches. Head 10, ears from 2½ to 3. Length of the skull, from the base of the incisors to the middle of the meatus auditorius, 8 inches. Breadth at the base of the zygomatic process, three inches and a half. Greatest breadth of the zygomatic arches, 5 inches. Breadth of the cerebral mass, over the meatus, 2 inches and 3 tenths. Height over the same line, 2 inches and one tenth. The head is thick, but the snout long and slender, tail tufted with black and white, and never recurved like that of the dog. Anterior legs black in front. Voice a howl. Snaps when it bites, without retaining its hold. Hunts in packs when necessary, apparently with preconcerted movements. Female brings forth 4 or 5 young at a time, which are blind. The wolf acquires its full size in three years. It is capable of domestication, of becoming attached to its captor by kind treatment, yet, like the greyhound, is more forgetful than some other breeds of dogs, and cannot be made watchful of the premises of its master. Length of the individual from which the drawing was taken, 5 feet, measuring from the nose to the end of the shaft of the tail. Length of the shaft of the tail, 14 inches. Length of the tuft at the end of the tail, 3 inches. Height at the fore legs, 2 feet 1 inch; at the posterior, 2 feet 4 inches. From the nose to the base of the ear, 7½ inches, measured over the eye. Length of the ear 3 inches. Circumference, just behind the fore legs, 1 foot 9 inches.

Whole length of the skin of a *black* wolf, 4 feet 4 inches. Tail 12 inches. From the end of the foot to the centre of the back ante-

riorly, 1 foot 5 inches. Height posteriorly, 1 foot 8 inches. From the nose to the base of the ear, 7 inches. Length of the ear, 2 inches, and narrower than in the *canis lupus*, and the whole measurement shows it to be lower in proportion than the preceding.

5. FELIS.

Gen. Char. Teeth, $\frac{6}{6}$, $\frac{2}{2}$.

Felis Canadensis. Lin. Lynx.

Color gray, silver gray, with a yellowish tint beneath. Extremity of the hairs generally white, then yellowish brown, and the white extending to the base. Ears terminated with black pencils or tufts, one inch and a half in length; black at the tips, with a black border on the posterior side. Anterior border yellowish. Base of the jaws surrounded by a fringe of long hair, intermixed with gray, black, and white. Brownish around the mouth, white beneath. Whiskers black and white. Tail terminated with black; blackish along the back. Legs yellowish. Toes and nails concealed in long silky fur or hair. Whole length, 3 feet 6 inches; tail, 3 inches. Height at the posterior legs, 1 foot 11 inches; at the anterior, 1 foot 6 inches. Length of the ear, $1\frac{1}{2}$ inches. The above measurements were taken from a fine male taken in the winter, in the state of Maine. A few years since, there was one killed in Chester, or in the neighborhood of Chester village. It is valuable on account of its soft long hair and fur. It destroys sheep, pigs and other small quadrupeds. Never attacks man.

Felis rufa. Bay Lynx. Wild Cat.

Color yellowish, or reddish brown, mingled with darker spots of brown. Inferior parts of the throat and body, white or whitish. Eyes encircled with a whitish band. Front and portions about the upper lip striped with darkish. Irides yellow. Ears short, tufted with black hair, springing from the back of the ear near the tip. Inside of the legs spotted with brown. Tail terminated with dark brown, and obscurely banded. Fringe of hair, longer than the common peelage, near the base of the jaw. Ear surrounded posteriorly with a black border, within which is a triangular patch of yellowish

white. Whole length, 2 feet ; tail, 4 inches. Circumference, 14. Three times the size of the domestic cat.

The wild cat stands high upon its legs, has a short tail curved upwards, which makes the animal appear somewhat disproportioned. It resembles, in general appearance, the common cat. It resides in wooded and rocky districts, lives on squirrels, birds, &c., which it takes by surprise. It is very destructive to lambs. It is still found in the mountainous towns in the state, though not in numbers. There is probably but one species of wild cat. The difference of individuals is occasioned by season and food.

Note. Length of another individual, 2 feet 9 inches. Height at the anterior legs, 1 foot 4 inches. Height behind, 1. 5. Length of the tail, $4\frac{1}{2}$ inches. From the nose to the base of the ear, 3 inches. Length of the ear, 1 inch: ear pointed. The number of teeth in this specimen, and it appeared full grown and mature, is, incisors $\frac{6}{6}$, canine $\frac{2}{2}$, molars $\frac{2}{3} = 21$. Last molar in each jaw, very large.

6. CERVUS.

Gen. Char. Teeth, $\frac{0}{6}$, $\frac{0}{0}$, $\frac{12}{12}$: total, 30.

Cervus alces. Moose, Moose deer. Black or blackish brown, intermixed with gray. Neck surmounted with a short mane. Head large, and terminating with a large, thick, curved nose ; at the extremity is a small muzzle. Nostrils long, slouched and narrow. Neck short, and furnished with a hairy appendage. Head of the male adorned with broad palmated horns. Length, 6 feet 10 inches ; tail, $1\frac{1}{2}$ inch. Height, 5 feet 4 inches. Length of the head, 1 foot 11 inches. Ears, 10 inches. Length of the neck, 18 inches. Female is destitute of horns. The moose, which, in the Indian language, means *wood eater*, comes to maturity in five years. The female brings forth two calves in the spring. The rutting season is in October. In the summer, this animal frequents the swamps and marshy grounds in the vicinity of lakes and ponds. It feeds conveniently on the tall coarse grass on the margin of ponds and rivers. Its neck is so short that it cannot feed on the common grass, unless it spreads its legs wide asunder.

It is not at present found in the limits of Massachusetts. It herds together in the winter, eight or ten individuals occupying a common pen or enclosure during the whole season, unless disturbed by the hunters. Its meat is excellent, being tender and well flavored, and tasting more like beef than any other meat. The gait of the moose is a long shambling trot; at every step its hoofs spread apart, but the moment the foot is raised, they are brought together with a crack which may be heard at a distance.

This animal has been domesticated and broken to the harness. Under some circumstances it might be used to advantage. It is desirable that so noble an animal should not be suffered to become extinct. It is, however, difficult to enforce laws enacted for their preservation, so that it is probable, that in a few years not an individual will remain, unless, indeed, enterprising persons should anticipate a profit from domesticating a pair, and raising them for the value of their meat.

The following measurements I have taken from the skulls in my possession :

Length of the skull, from the occiput to the end of the maxillary bones, 2 feet 2 inches. Breadth over the centre of the orbits, 7 inches. From the crest of the occiput to the eye, 8. Height of the upper jaw, over the nasal and maxillary bones, $7\frac{1}{2}$. From the foramen magnum to the anterior portion of the maxillary bone, 1 foot 9 inches. Breadth of the jaw over the palatine bones and teeth, 5 inches; over processes of the ossa malorum, $7\frac{3}{4}$ inches. Length of the lower jaw, along the base, 1 foot $6\frac{1}{2}$ inches. Distance from the occipital crest to a prominence between the horns, $4\frac{1}{2}$ inches. From the prominence to depression in the os frontis, 2 inches. Amount of depression in the os frontis, measured from a line drawn from the prominence to the anterior portion of the nasal bones, $1\frac{1}{2}$ inch. From the prominence to the lower end of the nasal bones, 9 inches. From the lower end of the nasal bones, to the extreme of the maxillary, $10\frac{1}{2}$ inches. From the centre of the horn to the centre of the orbit of the eye, $3\frac{1}{2}$ inches. From the tip of one horn to the other, 2 feet 8 inches. Number of prongs, 8. Length of the horn, 2 feet 4 inches.

In conclusion, the undersigned begs leave to say, that most of the

foregoing statements in relation to the animals, were made, as well as the drawings, from the animals before him. That the descriptions will apply to every individual met with, is not expected ; for, on examination, I have found a greater diversity in the coloring than I had previously supposed. But the characters, in the main, together with the measurement, I have no doubt will be found accurate, and applicable to the species.

EBENEZER EMMONS.

Williamstown, Jan. 1st, 1838.

REV. W. O. B. PEABODY'S REPORT.

To G. B. EMERSON, Esq.

SIR:—To ascertain the names and habits of our common birds, and to collect the information concerning them required by the present survey, would be a work of no great labor or time. But the great proportion of our birds are visitors ; some regular, some occasional, and others accidental. To distinguish accurately between these classes, especially to ascertain which belong to the last, requires more than a single season : and as the purpose of those engaged in the survey, is to give authorities for their statements, it seems obvious that the duty assigned them cannot be well performed within the limits of a single year.

An acquaintance with the birds of our State is desirable on many accounts. The object of science is, not merely to satisfy curiosity, but to serve the wants and comfort of men.

One object of this survey should relate to the preservation of game, if it be an object to preserve it within our bounds. But in this particular, it will not be easy to contend with the order of nature, which is constantly reducing their numbers. When these regions were first visited by civilized men, this kind of food was abundant, being evidently intended to afford resources for subsistence until the earth should yield her increase. But, as soon as the earth was subdued, and these resources became less necessary, they began to diminish in numbers, leaving our woods and plains for others where they were needed more ; and now, when they would be rather an injury than a blessing, by encouraging habits of idleness in the community, they are almost gone, and legislation will not be able, even were it worth while, to preserve them.

To say that they are almost gone, is speaking comparatively: for, though their present numbers are nothing compared with former times, many are yet to be found. The water birds, which can retreat from persecution, are less wasted than the rest. The land birds are emigrating fast to securer regions. But the wild turkey, thought by many to be extinct in the Atlantic states, is found every year on the Holyoke range near Connecticut river, and other mountains at the west. The Pinnated grouse, formerly so common that domestics stipulated not to be fed with it too often, is met with in small numbers in Martha's Vineyard. The ruffed grouse, one of the greatest luxuries of the table, is sold in all our markets; and the quail is abundant in our woods.

Still the time is not distant when they must yield to the law of nature. The only chance to preserve them is, to change their habits by domestication, which in some instances is done with success. The Canada goose, the mallard, and some other birds of passage, have been tamed without difficulty; and many others, like the beautiful summer duck, which it has not been thought worth while to tame, will doubtless become dependent on human care. The quail and grouse are perhaps too vagrant in their habits; but careful and persevering effort may succeed, even where many attempts have been made in vain.

But a more important object of the survey is to ascertain, with respect to many birds which man pursues with unrelenting vengeance, whether they are really as injurious as is commonly supposed. The crow, the grackles, and other birds of that description, do certainly make havoc with the corn. The cedar birds, robins, cat-birds, and others make large demands upon the garden; but it is certain that the grubs which they devour, would, if suffered to live, destroy all the promise of the year; and while we have nothing but the birds to protect us from these destroyers, there are some means already known, and many others will be discovered, to prevent the birds from taking more than their share.

If any one will consider the subject, he will see, that insects are by far the most formidable enemy man has to contend with. The moscheto, for example, occasions far more suffering, and is actually more feared than the lion. Other enemies, equally contempti-

ble, are busy throughout the summer torturing our beasts to madness, and destroying the comfort of man. The birds are the instruments commissioned to keep down their numbers, and if they are exterminated, how is this work to be done? It may be said, that, if the injurious birds are destroyed, harmless ones will still labor in that vocation; but the misfortune is that all together are not sufficient for the purpose, and if any are exterminated, the evil will grow.

It is well known, that the cultivation of fruit is regarded as hopeless by many, and found discouraging by all who attempt it. And the reason is, not that the birds plunder the trees, but that insects destroy them. The insects then, and not the birds, are the proper subjects of extermination. Means may be found to prevent the birds from taking more than their portion of the fruit, but it is not probable that human agency can contend with the millions of the insect race. If so, we are taking the part of our enemies against our friends; and it may be our persecution of the birds, which has caused the insects to increase in numbers to such an extent, that many doubt, whether, under present circumstances, the more delicate kinds of fruit are worth the trouble and expense of cultivation.

Such are one or two of the practical objects of the survey, which deserve and will receive attention. Many intelligent observers are constantly engaged in this study, and every month adds something to the amount of our information on the subject; so that enough will be gained in point of accuracy and completeness, to compensate for any loss of time.

DR. D. H. STORER'S REPORT.

To His Excellency,

EDWARD EVERETT, Esq.,

Governor of Massachusetts :

Having been appointed, with several other gentlemen, "to make a further and thorough Geological, Mineralogical, Botanical, and Zoological Survey of this Commonwealth," the departments of Ichthyology and Herpetology were entrusted to me. I was expected to make as faithful and accurate a catalogue of our Fishes and Reptiles, together with a general notice of each species, as our present knowledge would allow. With alacrity, the duty was entered upon,—and, by being enabled to interest some of our fishermen, and several professional friends in various parts of the state, no small advance has been made in the work. In connection with this, a collection of species has been commenced, and presented to the Boston Society of Natural History. So little attention has been paid by scientific men, to say nothing of the community at large, to the branches referred to, that my means of acquiring the necessary information are extremely limited; and my progress, compared with the gentlemen who have undertaken to report upon the other branches of our Natural History, is very slow. Much time and labor are requisite to ascertain and determine species with accuracy, as well as to remove existing errors. The season had so far advanced, when the appointment was made, that many species could not be examined, the common names of which, are familiar to all. In different parts of New England, and even of this state, different species have oftentimes the same name applied to them; and it is absolutely necessary to receive specimens of each, to settle the species. Thus we are able to learn

that the most unpardonable mistakes are sometimes committed, and that the specimens prove to belong not only to distinct species, but frequently different genera.

A pretty little species of the genus *Leuciscus*, and another of the genus *Clupea*, may both be purchased in our markets in the spring and autumn, as the "*Shiner*." The *Sargus ovis*, a very excellent, and in many markets a highly valued fish, sometimes weighing as much as 15 pounds; and the *Peprilus cryptosus*, a little species, about 8 inches in length, and although by Mitchell, in his "*Fishes of New York*," called "a delicate fish to eat," used in this State only as manure, are each called "*Sheep's-head*." The *Squatina angelus* and *Lophius piscatorius*, are both known by our fishermen, as the "*Monk fish*." The *Pimelodus nebulosus*, and *Anarrhicas lupus*, are each designated "*Cat fish*." The *Pomotis vulgaris* and *Cephalus brevis*, the one a beautiful little pond fish, a few inches in length, the other a marine species, oftentimes weighing several hundred pounds, are both called "*Sun-fish*." The most common Sucker in our market, *Catostomus Bostoniensis*, is yearly sold in large quantities as the "*Mullet*," while as yet, I have not been able to ascertain with certainty, that the *Mugil cephalus* itself, was ever found in Massachusetts.

Many other instances might be adduced to show the necessity of the most careful attention in observing species before attempting to catalogue them. The brief time allowed me for the performance of this duty, has been utterly insufficient for its accomplishment. Anxious to present a *faithful report*, I have made every effort—improved every opportunity, to complete it. Were I fully to rely upon the testimony of others—to consider as scientific authority, the exaggerated accounts ever so freely offered by the well disposed, but credulous; or to infer, because certain species were supposed to have been found upon the American coast, that they would probably exist in the waters of this state, I might readily throw together a large mass of incongruous materials, and with comparatively little labor terminate my task. But to perform accurately and thoroughly the duty expected of me—to answer the demands of those, by whose partiality I have been selected, and to serve whom I am proud—I would rely in the investigation of species, so far as practicable to obtain them, upon the evidences alone of my own senses;—I would com-

pare all which are doubtful, with those with which they may be confounded ;—I would never admit a single species into the State's catalogue, which could be at a future day disproved, or even doubted ;—preferring, that further investigation should add hundreds to the list, rather than that *one* should ever be erased from it.

Trusting, that the reasons I have offered, may be considered sufficient for my catalogue not being prepared—and that another season will be allowed me to collect the needed materials, I would present the following general observations upon the subjects submitted to my attention.

No branch of Natural History has been more neglected in this country than Ichthyology—nor is this surprising. The beauty or facilities of acquiring the different species of Birds and Insects, and Shells, and Plants, and Minerals, have ever rendered *them* objects of study. While the disgusting appearance of several species ; the difficulty of procuring many, and of preserving even our most common Fishes, have caused them to remain almost entirely unnoticed. When the importance of the subject, however, is considered—the universal distribution of this class of animals is recalled—in some countries, being an important article of commerce ; in others, the principal subsistence of a great portion of the people—it deserves equally the attention of the scientific naturalist and enlightened economist.

Innumerable instances might be adduced to show, that immense sums had been in former times, expended for certain species,—that sea and land have been compassed to gratify depraved appetites, and pamper the insatiable epicure. That a Prince should ever have been such a glutton as to have expended 300 rubles for a *Sturgeon soup*—or, a German Countess, so regardless of the necessities of those around her as to lavish the larger portion of her income in the purchase of *Turbot's liver*—or, that a single Mullet, should ever have been considered worth between 60 and 70 pounds sterling—that such, and many other similar examples of prodigality which might be adduced, serve only to point out instances of uncommon extravagance, and do not awaken the slightest interest with regard to the real utility of the subject, is obvious. I shall, therefore,—avoiding all reference to whatever is extraneous to my subject,—take a glance at those Fishes found

in our waters, which are of value to this people, and which may be made more important, than they now are.

This class of animals is divided by Naturalists into two series—dependent upon their anatomical structure. These series are subdivided into orders—and these again into natural families, which include numerous genera and species.

The family Percoides—Perches—contains but few species which are in common use among us.

The *Perca flavescens*—yellow perch, is found in most of the ponds of the State, and is a good edible fish.

Two species of Bass are useful—*Labrax mucronatus*—white perch—is taken in Spring and Autumn in the ponds to which the sea has access, and is readily sold in the market.

Labrax lineatus—striped bass—at some seasons is brought into market in considerable quantities, and sold in the fresh state; and in 1836, a small number of barrels (sixty-seven,) were packed and inspected.

The *Pomotis vulgaris*—pond perch—is seldom seen in the market, but is nevertheless a very good fish.

Few as are the species among us, of utility, I might point to almost every one of the more than fifty genera which compose this family, as furnishing species important to the inhabitants of the countries in whose waters they are found.

In the 2d family—*Buccae loricatae*—not a single species of the numerous genera is employed; while the *Sebastes Norvegicus*—Norway haddock—and the *Cottus Groenlandicus*—father lasher,—or, as it is more generally called, sculpin—are considered, the one in the North Europe, and the other in Greenland, very palatable food.

The family Sparoides, furnishes the *Sargus ovis*—sheep's head—every where considered an excellent eating fish,—and the *Pagrus argyrops*—scapaug—a very common and useful species in the south-eastern markets of the State.

Passing to the family Scomberoides, we find many genera of fishes, of infinite importance in an economical and commercial point of view. To the seaman, the *Pelamys sarda*, improperly called here Bonito, is a very acceptable meal. Not only is the *Xiphias gladius*—sword-fish, salted and eaten by the Sicilians, but is be-

coming an article of commerce with us. About 200 barrels are annually taken at Martha's Vineyard, which are either sold fresh, or cut into slices and pickled or salted, and kept for sale in that state, throughout the year. The *Temnodon saltator*—*blue fish*—is taken at Nantucket in large numbers, and is highly esteemed by the inhabitants of that island. But the genus *Scomber*—*Mackerel*—is of infinitely more importance, than any other of the family. Two species are found upon our coast in immense quantities—the *grex* and *vernalis*—occasionally two or three other species are also taken, they are however all known under the common name of *mackerel*.

In the Mackerel fishery, so large an amount of capital is invested ; so many are immediately interested ; so great, in a word, is its importance, that I feel the following data will not be considered useless. I had hoped to have presented an accurate list of the number of vessels engaged in this fishery, in every town in the state—the number of men employed—the capital expended—the quantities of fish taken—and the gross proceeds ; but disappointed and chagrined in my means of obtaining information, I have been unable to collect perfect materials, and can only offer the annexed statement, which may serve to direct public attention to its importance.

Although as *fresh fish*, mackerel are sold in the markets along our whole coast, for several months in the year, and are considered by *all*, excellent food, (from 6 to 8000 barrels being sold annually in Boston market alone,) their great value to this people, arises from the means of employment afforded to an immense number, by the process of salting and packing.

Those packed in 1836, were furnished by the following towns :

Boston,	. . . . .	40,559 barrels.
Gloucester and Manchester,	. . . . .	43,937
Newburyport and Newbury,	. . . . .	21,463
Welfleet,	. . . . .	17,500
Provincetown,	. . . . .	14,139
Hingham,	. . . . .	13,882
Cohasset,	. . . . .	11,700
Barnstable,	. . . . .	4,115
Scituate,	. . . . .	3,782

Yarmouth,	2,446 barrels.
Salem and Beverly,	2,394
Plymouth,	1,477
Lynn,	1,400
Duxbury,	1,000
Charlestown,	822

At the prices these fish were worth in November, 1836, the value of the year's fishing, amounts to 1,264,012 dollars.

The whole number of barrels of mackerel, inspected in Massachusetts for the five last years, are as follows :

1832, 224,000 barrels : 1833, 225,000 : 1834, 253,000 : 1835, 197,000 : 1836, 180,616.

Although it would seem, from the above table, that a smaller quantity of mackerel had been packed in 1836, than the several years immediately preceding it, yet it cannot be inferred, from this circumstance, that fewer vessels were engaged, or that the business was considered less important than before. In some years, immense shoals of these fishes are readily met with, and the vessels return in a few weeks, with full cargoes ; while the same localities may be visited at other seasons, and the efforts of the fisherman prove fruitless, and his fare meagre indeed.

So peculiar are the habits of this Genus, that oftentimes weeks may pass, the fishing-smacks be surrounded by millions sporting upon the surface of the ocean, and scarce one allow itself to be taken, while again, the success of a few days will relieve the disappointments of nearly a season.

Thus, a fisherman informs me, that the last season, (1837,) having been to the bay of Chaleur, and taken but few fish, the vessel to which he belonged, was returning home, when, off Cape Cod, the fish were so numerous and voracious, that the crew, consisting of 10 men, captured in 2 hours, nearly 30 barrels of them. At this time about 200 smacks were together, and they were all equally successful, some of them, taking even 40 barrels of fish.

After being carefully inspected, these fish find a ready market in Philadelphia, New York, Baltimore and New Orleans, and from

this last port, they are sent over the entire western country. The inferior quality are shipped to the West India islands.

I have not been able to learn with accuracy the number of vessels engaged exclusively in this fishery ; in many towns, the same vessels are used at different seasons of the year for the Cod as well as the Mackerel fishery. I have ascertained however, that there were 202 vessels employed in this fishery in 1836, in the county of Barnstable, and that of this number, 98 belonged to Provincetown, which were valued at \$147,000.

In the family *Gobioides*, the *Anarrhicas lupus*—*Sea-wolf*, is not only eaten by the inhabitants of several countries of the north of Europe, and considered by *them* excellent food, but is even *here* esteemed by many, and thought inferior to but very few of our fishes.

In the family *Labroides*, the *Labrus Americanus*—*Tautog*, is taken in considerable quantities upon some portions of the coast, and in its *fresh* state finds a ready sale in the larger markets. I am informed that in 1836, *three* smacks were constantly employed in the harbor of South Wellfleet, in the Tautog fishery, from April to November, and that it was a profitable occupation to those engaged in it.

At New Bedford, 300 pounds of *fresh tautog* have been sold by a single market boat in a day. This fish is also pickled at the last place, and may be kept in a weak brine for a long time—in this state, they are considered by epicures, a great delicacy. The *Crenilabrus burgall* too—*Marine perch*—or, as it is most commonly called, “*Cunner*,” is for several months in the year, taken along our whole *sea-board*,—not only by the fishermen’s nets in myriads, but by the needy and destitute, from our wharves and bridges, and is one of the most common, as well as excellent species found in our waters.

The family *Cyprinidæ* includes many of our fresh water fishes, which, although not extensively used, are very good food.

Thus several species of the genus *Catostomus*—*Suckers*—are frequently found in our market in considerable numbers : so also of the genera *Cyprinus* and *Leuciscus*, the species of which being equally palatable, and somewhat similar in their appearance to the

European species, have received their names of *Carp*, and *Bream*, and *Roach*, and *Dace*, and *Chub*.

But few genera of the family *Esosés*, are found in our State. These, however, are far from being valueless. The *Esox reticulatus*—*pickerel*—a very common species, is by many considered a great treat. A species of *Scomberesox*—*bill-fish*—is collected by the inhabitants of the towns upon Cape Cod in large quantities in the autumn, at the appearance of the first frost, and thought very nutritious and grateful food. And the *Exocetus volitans*—*Flying-fish*—is no unpalatable meal.

The family *Salmonides* includes several genera of fishes, which for delicacy and richness are not surpassed. Previous to the separation of Maine from this state, large quantities of the *Salmo salar*—*salmon*—were packed—thus, in the year 1818, 2,381 barrels were inspected. Since that time *none* have been inspected. The building of dams and manufacturing establishments, by preventing the fishes from going up the rivers to deposit their spawn, has almost entirely annihilated them in this Commonwealth. About 17 years since, two waggons, each bringing from 30 to 40 fine salmon from the Merrimack river, supplied the Boston market every week during the season of the fish:—now, the few specimens taken are looked upon as rarities, and our market is enriched by the fishery of the Kennebec.

The *Salmo trutta*(?)—*Salmon trout*(?)—exists in considerable quantities at Sandwich, where not less than 1000 pounds are yearly taken.

The *Salmo fontinalis*—*Brook-trout*—often acquires considerable size, and when brought to market, meets with a ready sale. The *Osmerus viridescens*—*Smelt*—which is an universal favorite, is taken in great numbers in the spring and autumn, and through a great portion of the winter. In *Watertown* alone, about 750,000 dozen are taken annually in scoop-nets from the *first of March to the first of June*—and sent to Boston market.

The family *Clupeæ*, are among our most valuable fishes. The *Clupea vernalis*—*alewife*—is taken in immense quantities still, in several parts of the state, although in several places where they have heretofore been most abundant, the various encroachments of man have sensibly diminished them. A larger quantity of *alewives* are

packed, than of any other species of this family. In 1832, 1730 barrels were inspected : 1833, 2,266 : 1834, 4,320 : 1835, 5,600 : 1836, 5,000.

At *Watertown*, the average quantity of alewives for the last ten years, is 700 barrels. They are first pickled, then salted and barrelled, and sent to the West India Islands. They sell for \$1.50 to \$2.00 per barrel. At *Taunton*, which for years was so celebrated for its fishery, the alewives are gradually lessening. There are two or more dams across the Taunton "Great River," so called, which impedes their progress very much ; and on the "Little River," where many dams and factories have been erected ; and where, twenty years ago thousands were taken, not one is to be seen. Twenty-five years since they were taken in such abundance, that they sold for 20 cents per hundred, and a great business was carried on by barrelling and shipping them to the West India market.

The *Alosa menhaden* — *Pauhagen* — *Hardhead* or *Menhaden*, is also a very useful fish. In the summer season, it is taken in large quantities upon our coast, and used for *mackerel bait*, *manure*, and is also becoming an *article of commerce*. For the former purpose, it is worth from \$2 to \$4 per barrel, in proportion to the demand. At Lynn, in 1836, 1500 barrels were used for bait for other fishes, and as many more were thrown upon the land. At Provincetown, they are used only for mackerel bait. At Sandwich, where they are very abundant, the inhabitants strew them upon their lands by the cart-load ; and thus for miles, immense quantities enrich the soil. It is computed that a single menhaden of ordinary size is equal in richness to a shovel-full of barn-yard manure. It is getting likewise to be thought worthy of preservation as an article of food. In 1832, 300 bbls. were inspected ; in 1833, 480 ; 1834, 1008 ; 1835, 1443 ; 1836, 1488.

The *Clupea harengus*(?)—*common herring*(?)—is in some seasons taken in great numbers. The quantities of herring packed and inspected according to tables kept at the General Inspection office for the last five years, are as follows : 1832, 52 bbls. ; 1833, 36 ; 1834, 518 ; 1835, 963 ; 1836, 77. That a small quantity only of the *herring* taken, are packed, is obvious, from the fact, that in 1836,

500 bbls. were taken at Falmouth; 400 bbls. at Duxbury, and 3000 at Martha's Vineyard.

Upon some portions of our coast, *herring* have been limited in quantity for the few last years, and during the last *two years* very few, comparatively speaking, have been taken. Their scarcity has been attributed by the fishermen to *torching* them at night, by which the shoals are broken, and the fish frightened away.

The *Alosa vulgaris*—*shad*—is taken in several of our rivers in large quantities, at some seasons of the year, and quite a number of them are packed. In 1832, 100 bbls. were inspected; 1833, 321; 1834, 3; 1835, 310; 1836, 527. The quantities taken in Charles river at Watertown, for the five last years, have averaged about 6000 per annum: from 3000 to 4000 are yearly caught at Taunton. Those taken at the former place, are usually sent to Boston market, and sold at 25 cents each. Those caught at the latter locality are for the most part disposed of at the seines (fresh) and cured by the purchasers. When first taken, they sell for 100 cents per hundred—and as the season advances, diminish gradually in price to 50 cents.

No family of fishes, however, found in the state, presents a greater number of species of real utility, than that of the *Gadites*; and no species in the whole catalogue of our Ichthyology, is of greater importance than the *morrhua vulgaris*—*common Cod*; supplying our markets with an excellent food throughout the year, and giving employment to thousands. In some portions of the State, this fishery is entirely superseded by the taking of *whales*. Thus, while every town in the county of Barnstable, is more or less engaged in this business, and collectively exhibit an aggregate of 212 vessels, but a single fishing-smack was licensed in Dukes' County, in 1836,—and *not one* in the county of Nantucket—the attention of the inhabitants of the last two counties, being entirely engrossed in whaling.

Imperfect as are the following data, they may not be thought valueless. I have been able to ascertain that, in 1836, there were engaged in the cod fishery, from Gloucester, Marblehead, Provincetown, South Wellfleet, Cohasset, Duxbury, Plymouth, Manchester, Salem and Beverly, being *ten* towns, 561 vessels, having crews of 3816 men—and that by these vessels there were taken 263,454

quintals of fish. To these may be added the towns of Newburyport, Lynn Falmouth, Holmes Hole, and Sandwich, (in which I have not been able to learn the number of vessels exclusively employed in this fishery,) which furnished in 1836, 16,265 quintals. Thus exhibiting 279,718 quintals of cod fish, taken by the enterprise of the citizens of 15 towns. When it is observed, that about 3500 of the cod fish from the Grand Bank, (which are generally much larger than those from the Straits of Bellisle,) constitute a single quintal, some conception may be formed of the immense number taken. At the usual price of these prepared fish, the above mentioned number of quintals would sell for \$839,154.

Besides these *fishing vessels*, a great number of *boats* are constantly employed in supplying the markets with *fresh fish*. Thus, at Duxbury in 1836, there were 10 market boats, having 40 men on board, which took from 38,000 to 40,000 fish. At Provincetown, there were *ten boats* thus engaged. Boston market is supplied with cod fish by about 15 or 20 small schooners, and a large number of boats. By the kindness of Capt. Nathaniel Blanchard of Lynn, master of one of these smacks, I am enabled to furnish the following table, by which some idea may be formed of the amount of *fresh cod fish*, brought to our market. He has presented me the result of his labors with a vessel of 25 tons, and a crew of 6 men, for nearly 5 months, commencing October 24, 1836, and terminating March 20, 1837. His account exhibits the number of fish taken, and the price obtained for the same for each day during that period. From this minute statement, I am able to ascertain, that the *largest quantity* taken any one day, was 7124 pounds—December 13th—which sold for 5 shillings per hundred=\$59.39.

The *smallest quantity* taken any one day, was 337 pounds—January 16th—which sold for 12 shillings=\$6.67.

The *smallest receipts* were March 20th, when 359 pounds taken, sold for 10 shillings 6 pence=\$5.92.

The whole number of pounds taken during the period mentioned, were 194,125.

The entire receipts for the same, were \$3,026.14.

Besides the value of the fishes themselves in a fresh and dried

state, large quantities of *oil* are extracted from their *livers*, which is sold for about \$15 per barrel.

Immense shoals of the *Morrhua aeglefinus*—*Haddock*—are found on our coast in spring, and continue through the season until autumn. Large numbers are sold in the market—and during the entire summer it is generally eaten by the poorer classes, who are often able to obtain a fine fish weighing several pounds, for one or two cents. When taken in larger quantities than can be disposed of in market, they are frequently strewed over the earth for manure.

Until within a few years, the *Merlangus pollachius*—*Pollack*—was but slightly prized,—and the fishermen had so little demand for it, that they not unfrequently gave it away from their boats. Its useful qualities are beginning to be known and valued—and in several of the interior towns of the state, it is now as readily sold as any other fish. When salted, it was formerly the habit to throw them at once into old brine to increase their weight, which it did at the expense of their goodness. It is ascertained, that, when prepared in the same way as the cod, when intended for *dun-fish*, with proper care and good salt, this is really an excellent fish—and its value is increased from 9 shillings to from 3 to 4 dollars per quintal. Immense numbers of this species are found in our waters, in spring and autumn. To Jeffries' ledge, a fleet of 20 or 30 boats frequently go off in the fall of the year, and having fastened their craft together, and thrown over-board a quantity of bait to entice the fish, capture in a single night from 30 to 40 quintals of *pollack* to a boat.

The *Phycis longipes*—*Codling*—known by the name of *Hake*, along our entire coast, is taken in considerable quantities, and when salted, is exported to the West India markets.

The *Brosmius vulgaris*—*Cusk*—and *Merlangus vulgaris*—*Whiting*—are also excellent fishes—but are not found in our markets in great quantities.

The little *Morrhua tomcodus*—*Tomcod*—is by no means valueless. The amount of *Tomcod* taken at Watertown alone, is estimated at 2,000 bushels annually—they are sent to Boston market, and readily disposed of there.

Several valuable species are furnished us by the family, *Plani*—the most important, however, is the *Hippoglossus vulgaris*—*Hali-*

but. The flesh of this fish is rather coarse and dry, but is by many highly esteemed. An unusual number of this species were brought to Boston market in the early part of 1837, and were all sold at considerable profit. Eighty large schooners of from 60 to 80 tons burthen, belonging to Cape Ann were thus employed. *Smoked*, this fish is quite a delicacy : and when *dried*, as is the usual habit with the Greenlanders, it is, I can affirm, far from uninviting.

Among the *Anguilliformes*—the *Muraena Bostoniensis*—common eel—is taken along our whole coast, as well as in the rivers and ponds of the state. In winter, great quantities are *spear*ed through the ice :—those taken at this season, however, are not as large, nor is their flesh as rich, as those which are captured in summer.

The markets are usually supplied from the rivers, where they are taken in nets. At Medford, nets are stretched across the river, having in their middle a large bag, capable of containing from 15 to 20 bushels : as the eels are going up or down the river, they are thus caught ; and are kept alive for the supply of the market in large ditches excavated near the river, which are supplied by the tide with water. About 3,000 pounds are yearly taken at Watertown.

Although many *species* and even *genera* belonging to the second great division—*Chondrop terygii*—*Cartilaginous fishes*—are made useful in other countries—they are almost entirely neglected with us. The *Acipensor sturio*—*common sturgeon*—in the north of Europe, not only furnishes, by its flesh, an acceptable food ; but its *air-bladder* is converted into *isinglass*, and its *roe* into caviar.

The *Raia clavata*—*Thornback*—when salted, is eaten by great numbers of the poor in many parts of Great Britain. And the *Petromyzon marinus*—*Sea lamprey*—is highly esteemed there, as an article of food. I am not aware that any species are taken for *use* by our fishermen, save the *Carcharias glaucus*—*Blue Shark*—and the *Spinax acanthias*—*Picked dog-fish*—and these only, occasionally ; although both, at some seasons of the year might be taken in large quantities, and would prove of no inconsiderable value. The *liver* of the former furnishes a *valuable oil*. *Seven gallons of oil* are not unfrequently extracted from the liver of a single fish. And although it is generally used only by the *curriers*, yet, when carefully prepared by boiling the *fresh liver*, it is as good as *whale oil*,

to burn. The *Dog-fish* is a very useful scavenger to the fishermen, by cleaning the bottoms upon which they have thrown their offal, when preparing their fish for market. Its liver is boiled for the oil it contains—and its skin is considerably used for polishing by the mechanic.

Some idea of the immense quantities of fishes taken by the fishermen of several of our towns, may be learned from the following extract from a letter of my old friend, Capt. Blanchard, of whom I have already spoken—one of our oldest, most experienced, most worthy fishermen. He says, “I have made an estimate of the fish caught by the fishermen of this place (Lynn), and I find, that there are four millions, six hundred and eighty thousand pounds caught in one year :—which is a little more than a quarter of a pound, to each inhabitant of the United States of America. (This quantity of fish consists of cod, haddock and halibut.) There are nearly three hundred and twelve thousand *pohegans* used for bait—and nearly as many thrown away, and strewed on the land for manure.”

Thus have I taken a general survey of those species of fishes, which are in most common use among us. These observations might have been much more extended—but, desirous of awakening attention to this branch at this time only in its commercial bearing, I have endeavored to confine myself strictly to the *uses*—the *immediate importance* of its subjects :—intentionally avoiding many points, which might be highly interesting to the naturalist.

NOTE. In collecting the facts herein embodied, I have received from many gentlemen, essential aid—and it affords me great pleasure to extend my acknowledgments to the following :—Hon. Hezekiah Barnard, Nantucket—Henry Blood, Esq., New Bedford—James C. Doane, Esq., Cohasset—C. R. Vickery, Esq., Taunton—Solomon Lincoln, Esq., Hingham—L. J. Presson, Esq., Gloucester—Thos. Kidder, Esq., of the General Inspection office, Boston—Mr. Jonathan Johnson, Nahant—and Drs. Chandler Flagg, Marblehead—Henry Tuck, Barnstable—H. Willard, Provincetown—D. Davis, South Wellfleet—Charles. O. Barker, Lynn—H. C. Perkins, Newburyport—Leroy M. Yale, Holmes Hole—Hiram Hosmer, Watertown—A. Cornish, Falmouth—Horatio Robinson, Salem—E. H. Bartlett, Duxbury—W. Warren, Plymouth—John Appleton, Gloucester,—J. B. Forsyth, Sandwich :—to no individual, however, am I so deeply indebted, as to Capt. Nathaniel Blanchard, of Lynn, who has not only freely and promptly answered my numerous queries, but throughout the season has exerted himself to procure for me such fishes as he knew I wished to examine.

HERPETOLOGY.

Less than forty species of Reptiles have as yet been found in Massachusetts—and these are scarcely known even by our Naturalists. Unattractive for the most part, in their appearance—their habitats not easily ascertained ;—their importance not considered ;—they are generally neglected, as objects unworthy attention, or to be avoided for their imagined detriment.

Investigated, we find almost every species of more or less utility, and *one* only possessed of any noxious power.

The order *Chelonia* comprises our Tortoises. Of these, the *clausa*, *picta*, *punctata*, and *serpentina* are each used as articles of food ;—the last of these, being the largest species, is more generally eaten, and considered quite a delicacy when made into a soup. The *oil* obtained from this species is carefully preserved in many portions of the interior of the state, for its supposed virtues in bruises, sprains, &c., when externally applied.

The order *Ophidia*,—*Serpents*,—has ever been looked upon with superstition and terror. And, I believe, that at the present moment, it is almost universally supposed, that several species of venomous *Snakes* inhabit Massachusetts. Who has not heard of hair-breadth escapes from “*monstrous black snakes*” and “*great water adders* ? The beautiful *garter* and *ribbon*, and *green snake* even, are avoided with consternation by not a few. A *venomous coluber* does not exist among us. Perfectly innocuous and inoffensive, they should be looked upon with interest, as they undoubtedly destroy many animals which might be injurious. So great, however, is the prejudice against this genus, that if instances could really be produced of their importance with us, they would still be exterminated, as is the *erythrogrammus* of the southern states ; although it is well known, that

by this last species, thousands of rats are destroyed, which otherwise would have seriously injured the crops of *rice*.

The *Crotalus durissus*,—*Banded rattlesnake*,—is occasionally met with—but very seldom are accidents produced by its bite; proving its unwillingness to be the aggressor, and that the fangs are used only as weapons of defence, after sufficient warning has been given of its presence by the *rattles*. A few years since, a surgeon in a neighboring town became quite celebrated for a liniment he often prescribed, the *basis* of which, if not the *entire substance*, was the *oil* procured from this species.

Great errors also exist with regard to the order *Batrachia*. The acrid secretion found upon the skin of the *Hyla versicolor*, the *toad*, and several species of efts or newts, has caused them to be considered venomous,—which is incorrect. Every species of this order is inoffensive, and, when better known, will undoubtedly be found beneficial to man.

In some countries, the flesh of the different *Ranae*, *Frogs*, is an article of food. With us, the habits of the *Bufo Americanus*, *Common Toad*, are becoming better understood, and the Horticulturalist, instead of destroying, carefully preserves it on his grounds, for the benefit it affords him, by feeding upon noxious insects. In the same way are our springs and wells rendered the purer, by the presence of the carnivorous salamander.

No little confusion exists in the catalogue of our Reptiles. Each of the orders require, corrections, more or less important. It shall be my effort, to make the list as accurate as my means will allow.

All which is most respectfully submitted, by

Your Excellency's ob't. servant,

D. HUMPHREYS STORER.

To the Senate and House of Representatives :

I transmit to the House of Representatives, for the information of the Legislature, Reports from George B. Emerson, Esq., Chairman of the Commission for the Botanical and Zoological Survey, from Dr. Harris, on the Habits of Insects injurious to Vegetation, in Massachusetts, and from Dr. Gould, on Molluscos, and the other Lower Animals.

EDWARD EVERETT.

COUNCIL CHAMBER,
19th April, 1838.

MR. EMERSON'S REPORT.

To His Excellency, GOVERNOR EVERETT :

SIR :—I transmit a Report from Dr. Harris, upon the habits of some insects injurious to vegetation, in Massachusetts, and a Report from Dr. Gould upon the Molluscous and other inferior animals. These, with the reports I have already had the honor to transmit to your Excellency, although confessedly incomplete, are all that the Commissioners for the Botanical and Zoological Survey will be able to present, during the present season. Those upon the Botanical Survey are necessarily deferred, a single full year not having elapsed since the date of our commission.

Immediately after receiving from your Excellency that commission, which bore date June 10th, 1837, and by which Drs. Emmons, Gould, Harris, and Storer, and Messrs. Dewey, and Peabody, and myself were appointed upon the Botanical and Zoological Survey of the State, authorized by a resolve of April 12th, I made known to the other gentlemen the fact of their appointment, and laid before them the letter of instructions received from your Excellency. The great distance from the metropolis at which three of the gentlemen resided, making it inconvenient to have a full meeting, as would have been desirable, and as was recommended by your Excellency, I conferred with those gentlemen of the commission who resided in the immediate vicinity, and communicated with the others by letter, and thus arranged with them, by mutual agreement, an assignment of the separate portions of the work which should be undertaken by each.

In this arrangement, Dr. Emmons undertook to report upon the Mammalia of the State ; Dr. Storer, upon the Fishes and Reptiles ; Mr. Peabody, upon the Birds ; Dr. Harris, upon the Insects ; Dr. Gould, upon the animals of the lower orders ; Professor Dewey,

upon the herbaceous Plants ; leaving to me the Trees and larger Shrubs.

This arrangement having necessarily occupied considerable time, and made it somewhat late in the summer before any one could enter upon the survey of his department, the gentlemen of the commission soon came to the conclusion that it would be impossible for them to make a full and final report within the year, but hoped to make such progress as to satisfy your Excellency of the earnestness with which they entered upon the work.

We trust that the reports presented, however incomplete, will be satisfactory upon that point. It has been the aim of all the commissioners, to comply with the spirit of the resolve authorizing the survey, in having especial reference to the practical utility of their investigations. With this view, the commissioner on the Mammalia, aware that most of the native quadrupeds are objects of scientific rather than economical interest, has thought it within the scope of his commission, to give his chief attention to our domestic animals. He has also given accurate descriptions, accompanied by highly characteristic figures, of some of the least known and most interesting native quadrupeds.

The great importance of the Fisheries to the Commonwealth, and the fact that most of our fishes have been very imperfectly described, have led the commissioner upon that department, to give unwearied attention to his work, in the purpose of presenting an accurate scientific description of every fish, and making its history accessible to our fellow citizens. With that view he will continue his work, in the same spirit, if the Legislature authorize the continuation, until it shall be complete.

The commissioner on Ornithology has himself so fully shown the importance of an acquaintance with our native birds, to the agricultural interests of the State, as to render it unnecessary for me to say any thing. He hopes that farther time will be allowed him to complete his report.

The commissioner upon Insects, from his great stores of observation upon animals of this class, for many years, has presented only such as will at once be recognized as of obvious practical utility, in their bearing upon the culture of the trees, cereal plants and culinary

vegetables of most importance in the Commonwealth. He also is obliged to leave his report incomplete, and asks for further time.

The commissioner on the survey of the lower animals, has not been able to offer a full report. Those who are acquainted with science, in this vicinity, will bear testimony to the untiring zeal with which he constantly pursues the objects of his survey ;—and the great number of names of new animals, added to the catalogue within two years, give, evidence of success.

All which is respectfully reported by

Your Excellency's obedient servant,

GEORGE B. EMERSON.

BOSTON, April 19, 1838.

DR. HARRIS'S REPORT.

TO GEORGE B. EMERSON, Esq. :

SIR :—In compliance with your request, I now send you the first part of my report on the insects of Massachusetts.

The benefits which we derive from insects, though not few in number, nor inconsiderable in amount, are, if we except those of the silk-worm, the bee, and the cochenille, not very obvious, and are wholly beyond our influence. On the contrary, the injuries that we suffer from them are becoming yearly more apparent, and are more or less within our control. Before suitable remedies can be discovered, and effectually applied, it is necessary that our insect enemies should be recognized and their habits generally known. The instructions of His Excellency the Governor seemed to point to the economical advantages to be derived from natural history, as the most proper objects of our consideration. These instructions, together with the nature and extent of the branch of natural history assigned to me have led me to think that some account of the insects injurious to vegetation in Massachusetts would be acceptable and satisfactory to the governor, and to the people of this Commonwealth.

I have endeavored to treat the subject in a plain and familiar way, and have introduced no more of the science and language of entomology, than was absolutely necessary to define and discriminate the different insects whose transformations are described.

This portion of my report is wholly confined to the insects belonging to the order *coleoptera*, which, in the adult state, are commonly called beetles.

Habits of some of the Insects injurious to Vegetation in Massachusetts.

Insects are divided by popular writers into those which are injurious, and those which are beneficial to mankind. The former are appropriated to man and animals, or derive their sustenance from vegetables ; the latter are destined to balance the account by keeping in check the noxious insects, or by contributing directly to man's convenience.

The science of Entomology is of great importance in enabling us to detect our enemies, and discriminate our friends of the insect race.

In this portion of the Report, it is proposed to give an account of a few insects injurious to vegetation in this vicinity. It will be proper, however, first to explain some of the terms that must necessarily be used.

Insect, in Latin *insectum*, is an abbreviation of *intersectum* ; the body of insects being intersected or divided into segments. An insect is an animal with a double, knotted, medullary chord ; a body divided transversely into segments ; with no vertebræ nor internal bony skeleton ; without organs of circulation ; respiring by lateral pores or spiracles and tracheæ ; undergoing a metamorphosis of three stages before arriving at the perfect state ; and in that state having six legs only, a distinct head, immovable compound eyes, a pair of antennæ, and (with few exceptions) furnished with organs of flight. You probably know, that in man and quadrupeds the nervous system consists of a brain, spinal marrow, and the nerves which branch from them. In insects the brain is minute, but, to compensate for this, there issues from it a double medullary cord, dilating at intervals (usually corresponding with the segments) into knots or ganglions which give origin to the nerves.

In man and quadrupeds the spinal marrow is enclosed in a bony case, composed of several joints, which, united, form the back-bone or spine, and the whole body is built upon an osseous frame or skeleton. Insects have no bones, their external skin being sufficiently hard to give firmness and support to their bodies.

Insects have not an uninterrupted circulation of blood from a heart through arteries and veins. A longitudinal vessel, situated under the

skin of the back, represents the heart, and contains a pale-colored blood, which flows, with a wavy motion, from the tail to the head, and thence penetrates into the various crevices within the body.

Insects do not breathe through their mouths, and have no lungs ; they imbibe the air by means of several lateral pores called spiracles, from which it is distributed to every part of the body through certain tubes called tracheæ and bronchiæ, which thus perform the office of lungs.

These constitute the principal peculiarities of their internal structure. But the most wonderful characteristic of insects is this. In order to arrive at the full and complete possession of their powers, they must pass through three successive stages, in which they exhibit a greater or less change of forms. This change of form is called *metamorphosis*, which signifies transformation. The caterpillar, or grub, after feeding a certain time, casts off its skin and assumes a different shape, in which it remains at rest and takes no food ; sooner or later this second state is succeeded by another : the insect throws off its sluggish habit, emerges from the case or bandages in which, like a mummy, it was enveloped, and appears a renovated or resuscitated, volatile being, endued with new organs, and feeling the impulses of unknown passions. This is the perfect state, in which only it is capable of providing for a continuation of the species.

All insects, however, do not exhibit so great a dissimilarity in their three stages, and some, in the second, are capable of moving about, and even take food. The first state, in which an insect appears at its birth, is called the *larva* ; when it changes from this, it becomes a chrysalis or *pupa* ; the last metamorphosis produces the insect in its perfect state, the *imago*, image, or correct representation of the species.

The perfect insect has only six legs ; its head is distinct ; its eyes are compound, or composed of a great number of single eyes closely united together, and incapable of being rolled in their sockets. It has a pair of organs, situated near the eyes, called *antennæ*, which are the external recipients of some of their senses. The body is divided into three principal parts called, *head*, *thorax*, and *abdomen*. The situation of the head is obvious ; the thorax is placed immediately behind it ; the abdomen constitutes the posterior and

principal part of the body, and is covered above by the wings, which are two or four in number, and of various consistence.

An English Entomologist has stated, that, on an average, there are six distinct insects to one plant. This proportion is probably too great for our country, where vast tracts are covered with forests, and the other original vegetable races still hold possession of the soil. There are above 1200 flowering plants in Massachusetts, and it will be within bounds to estimate the species of insects at 4800, or in the proportion of four to one plant. To facilitate the study of such an immense number, some kind of classification is necessary; it will be useful to adopt one, even in describing the few species now before us. The basis of this classification is founded upon the number and nature of the organs of flight, and the first great divisions are called orders.

In the order *Coleoptera*, the upper wings, more generally named *elytra* or wing cases, are coriaceous (leathery) or corneous, (horny): the under wings are membranous, and are transversely folded. The first noxious insects belonging to this order which I shall describe, are named *Buprestes*.

Many of these, in their perfect state, are of brilliant or metallic colors. Their bodies are compact, firm, hard, of an elliptical form, obtuse before, tapering behind, broader than thick, so that, when cut in two transversely, the section is oval. Their heads are immersed to the eyes in the thorax, their antennæ are short and serrated on one side or notched like the teeth of a saw. Their feet are formed for standing firmly, rather than for rapid motion; the soles being composed of four dilated joints covered with little spongy cushions beneath, and terminated by a fifth joint which is armed with two claws. They are frequently seen on the trunks and limbs of trees basking in the sun. They walk slowly, and at the approach of danger contract their feet and fall from their situation. Being furnished with ample wings, their flight is swift and attended with a whizzing noise. They are not nocturnal insects, and are in motion only during the day.

The larvæ are wood-eaters or borers. Our forests and orchards are more or less subject to their attacks, especially after the trees have passed their prime. Their metamorphoses take place in the

bodies of trees. The larvæ that are known to me have a close resemblance to each other; a general idea of them can be formed from a description of that which attacks the pig-nut tree. It is of a yellowish white color, elongated and depressed in form, and abruptly dilated near the anterior extremity. The head is brownish, small, and merged in the next segment; the jaws are tridentate at the points, and of a black color; and the antennæ are very short. The segment which receives the head (collar,) is short and transverse; next to it is a large, oval segment, broader than long, depressed or flattened above and beneath; it forms the thoracic portion of the body. Behind this, the segments are very much narrowed and, from transverse, become gradually quadrate, but are still flattened, to the last, which is terminated by a rounded tubercle. There are no legs, nor any apparatus which can serve as such, except two small tubercles on the under side of the second segment from the thorax. The motion of the larva appears to be affected by the alternate contractions and elongations of the segments, aided, perhaps, by the tubercular extremity of the body, and by seizing hold, with the mandibles or jaws, upon the sides of its burrow. These larvæ are found under the bark and in the solid wood of trees, and sometimes in great numbers. It is not uncommon for them to bend the body sideways, so that the head and tail are approximated. This posture those found under bark usually assume. They appeared to pass more than one year in the larva state.

The pupa bears a near resemblance to the perfect insect, but is entirely white, until near the time of its last transformation. Its situation is immediately under the bark, the head being directed outwards, so that when the pupa coat is cast off, the perfect insect has merely a thin covering of bark to perforate, before making its escape from the tree. The form of this perforation is oval, as is also a transverse section of the burrow, that shape being best adapted to the form, motions and egress of the insect. *Buprestis Virginica* is probably our largest species. It inhabits the trunks of the *Pinus rigida* or pitch-pine tree. *Buprestis divaricata* is exceedingly injurious to the *Prunus Virginiensis* or wild cherry-tree, and sometimes attacks the peach tree. The perfect insect appears on the limbs of these trees in June, July, and August.

Buprestis obscura is appropriated to the *Carya porcina* or pig-nut-tree. *Buprestis fulvo-guttata* inhabits the *Pinus strobus*, or white pine. There is another species which attacks the small limbs of this tree. *Buprestis femorata* has frequently been taken from the peach tree. It also attacks the white oak. The perfect insect appears in June and July. *Buprestis characteristica* also inhabits the oak.

The situation of the larvæ in the solid bodies of trees renders unavailing our attempts to dislodge them. The only remedy that can be suggested, is, to commit to the flames, as soon as possible, any fruit trees which may be 'much infested or destroyed by them. In this way many larvæ may be prevented from going into the perfect state, and thus continue their species. Although these larvæ are beyond the reach of man, they do not escape the researches of the woodpecker, by whom they are sedulously and successfully sought and extracted from their retreats.

Closely related to these insects are the *Elaters* or snapping beetles, which are well known by the faculty they have of throwing themselves upwards with a jerk, when laid on their backs. On the under side of the breast, between the bases of the first pair of legs, is a short blunt spine, pointing backwards, and usually concealed in a corresponding cavity behind it. When the insect, by any accident, falls upon its back, its legs are so short that it is unable to turn itself over. It then draws the legs close to the body, bends back the head and thorax, and thus unsheaths its pectoral spine: then suddenly resuming its former position, the point of the spine strikes with force the edge of its sheath, which gives it the power of a spring, and reacts on the body of the insect, so as to elevate it perpendicularly into the air. When it again falls, if it does not come down upon its feet, which is usually the case, it repeats its exertions until its object is effected.

The larvæ are more or less injurious to vegetation. Some are confined to decaying trees, in the trunks and roots of which they reside. Others feed upon the roots of annual, perennial and herbaceous plants. These larvæ, in England, from their slender form and uncommon hardness, are called wire-worms.

They are not to be confounded with the wire-worm of America,

a species *Iulus*, which is not a true insect, but belongs to the class MYRIAPODA, a name derived from the great number of feet with which most of the animals included in it are furnished; whereas, the English wire-worm has only six feet. The European wire-worm is said to live, in its feeding or larva state, not less than five years; during the greatest part of which time, it is supported by devouring the roots of wheat, rye, oats and grass,—annually causing a large diminution of the produce, and sometimes destroying whole crops. It is particularly destructive in gardens recently converted from pasture lands.

We have several species allied to this destructive insect; the larvæ of which are quite common in newly broken up lands, but fortunately, as yet, their ravages are inconsiderable. We may expect these to increase in proportion as we disturb them and deprive them of their usual articles of food, and may then have to resort to the ingenious method adopted by Europeans for alluring and capturing the larvæ. This method consists in strewing sliced potatoes or turnips in rows through the garden or field; women and boys are employed to examine the slices the next morning, and collect the insects which are enticed to feed upon these substances.

The body in our species of wire-worm is elongated, linear, nearly cylindrical, or slightly flattened above and below. There are 12 segments besides the head. The jaws are strong, pointed and curved at the tips, without lateral teeth. There is no thoracic shield. The last segment is longer than the preceding one, and terminates in a small acute spine, on each side of the base of which is a deep cavity. Beneath this segment, is a minute retractile tubercle, or proleg, as it is called, which, when the animal walks, is thrust out, and serves the purpose of a foot, to support the posterior part of the body, and prevent it from trailing on the ground. There are six feet, one pair to each of the three anterior segments. The color of the body is pale brown or buff, the head and last segment being somewhat darker. The larvæ of our large species, which live upon decayed wood, are somewhat different. Their bodies are proportionally much broader and more depressed. The eyes, though small, are distinctly visible; are two in number and simple; one situated at the base of each of the antennæ. The last segment is somewhat mitre-shaped, the

margin above armed with the teeth, and the apex with a pair of forked, recurved horns or hooks. Beneath this is situated the anal proleg, which is retractile, and (at least in one species, *E. oculatus*,) furnished behind with two small incurved hooks, and spined at the sides. The true legs are six, each armed at tip with a single claw. The total length of the largest larva found here is $2\frac{1}{2}$ inches.

The pupæ of Elaters, like those of most coleoptera, bear a near resemblance to the perfect insect. After their last metamorphosis, Elaters make their appearance upon trees and fences, and some are found upon flowers. They fly both by day and night. Their food, in the perfect state, appears to be chiefly derived from flowers, though many species do not probably take any in this state. Whenever discovered, they should be immediately destroyed. The larva of *Elater noctilucus* resides in the interior of the sugar cane. The perfect insect is remarkable for its luminous properties. *Elater oculatus* I have found in the decayed stumps of apple trees, both in the larva and perfect state. We have a great many small species which appear to live upon the roots of the grasses. These will probably in time become serious assailants of vegetation. There are a few, which, in the perfect state, are found upon flowers, and which have their nails pectinated or divided, like the teeth of a comb.

Our attention is next attracted to that great family of insects comprehended in the Linnean genus SCARABÆUS. These insects are easily recognized by their antennæ, terminating in several leaf-like joints, and by their legs, particularly the first pair, which are furnished with several strong projecting teeth. Among these are the insects included by Fabricius in his genus *Melolontha*, a word used by the Greeks to distinguish these same insects. More than 400 years before the Christian era, Aristophanes alludes to a custom which his commentator says was common to the children at that time, of fastening a string to the leg of a Melolontha, and then allowing it to fly in the air. His words may be translated,

—“To winds thy cares commit
Like Melolontha string-bound by the feet.”

(Aristophanes' *Clouds*.)

It is not a little remarkable, that this kind of sport should still exist. De Geer says, that, in the Netherlands, the children amuse themselves

by attaching a long thread to one of the hind legs of the common Melolontha, and then leave it to fly, without suffering it to escape. Being thus restrained, its motions are confined to a circle, and these gyrations afford much pleasure to the little tormentors. De Geer further tells us, that the country children carry on a trade in these insects with the children of cities, and that he himself, when a boy, had purchased many of them. The same custom exists in the vicinity of Paris, and the children accompany the gyrations of the Melolontha, by the French called *Hanneton*, with a song or incantation, the burthen of which is “*Hanneton! volé, volé, volé*”—“*Hanneton! fly away, fly away, fly away.*” Those who have read the popular novel called *Torhill*, may remember that these were the words frequently sung by the volatile French servant. Thus are we led to observe a curious coincidence in the puerile sports among remote nations, while tracing the antiquity of a name.

The Melolonthæ are known in England by the names of *dorrs* or *chaffers*, and in this country, by those of *dorr-bugs* and *may-beetles*. They are characterized by having the body oblong, oval, and convex, the mouth covered above by a thin plate, beneath which, are situated the antennæ, consisting of ten joints, the terminal ones united by the end to a common centre, and expanding like the leaves of a book; the thorax more or less transversely quadrate or trapezoidal; the elytra convex above, not embracing the sides of the body, and leaving the posterior extremity exposed. The middle part of the fore legs is armed with 2 or 3 lateral teeth; and each foot, consisting of five small joints, is terminated by two strong claws or nails, furnished beneath with a small tooth or double point. The powerful and corneous jaws are admirably adapted for tearing and bruising the leaves of vegetables on which these insects live in their perfect state; their double or toothed claws support them securely upon the foliage; and their strong and dentated legs, being constructed for digging in the ground, indicate the place of their metamorphoses.

The general habits and transformations of the common cock-chaffer of Europe, will elucidate those of the whole genus, which are nearly the same.

This insect devours the leaves of trees and shrubs. Its duration

in the perfect state is very short, each individual living only about a week, and the species entirely disappearing in the course of a month. After the sexes have paired, the males perish, and the females enter the earth to the depth of six inches or more, making their way by means of the strong teeth which arm the fore legs; here they deposit their eggs, amounting, according to some writers, to nearly 100, or, as others assert, to 200 from each female, which are abandoned by the parent, who generally ascends again to the surface, and perishes in a short time.

From the eggs are hatched, by the warmth of the earth, little whitish grubs, each provided with six legs near the head, and a mouth furnished with strong jaws. When in a state of rest, these grubs usually curl themselves in the shape of a crescent. They subsist on the roots of trees and other plants, found in the ground, committing ravages among these vegetable substances, on some occasions of the most deplorable kind, so as totally to disappoint the best founded hopes of the agriculturalist. During the summer they live under the thin coat of vegetable mould near the surface, but, as winter approaches, they descend below the reach of frost, and remain torpid until the succeeding spring, at which time they change their skins and reascend to the surface for food. At the close of their third summer (or, as some say, of the fourth or fifth,) they cease eating, and penetrate about two feet deep into the earth; there, by its motions from side to side, the grub forms an oval cavity, which is lined by some glutinous substance, in which it is changed to a pupa by casting its last larva skin. In this state, the legs, antennæ, and wing cases are visible through the transparent skin which envelopes them, but appear of a yellowish white color; and thus it remains until the approach of the vernal season, when the thin film which encloses the body is rent, and the perfect insect digs its way to the surface, from which it finally emerges during the night. According to Kirby and Spence, the grubs of the cock-chaffer sometimes destroy whole acres of grass by feeding on its roots. They undermine the richest meadows, and so loosen the turf that it will roll up as if cut by a turfing spade. They do not confine themselves to grass, but eat also the roots of wheat and of other grains. About seventy years ago, a farmer near Norwich, in England, suffered much by them, and, with his man,

gathered 80 bushels of the beetles. In the year 1785 many provinces in France were so ravaged by them, that a premium was offered by government for the best mode of destroying them. The Society of Arts in London, during many years, held forth a premium for the best account of this insect, and the means of checking its ravages, but without having produced one successful claimant. In their perfect state, these, with several other species, act as conspicuous a part in injuring the trees, as the grubs do in destroying the herbage. Besides the leaves of fruit trees, they devour those of various forest-trees and shrubs, with an avidity not much less than that of the locust, so that, in certain seasons, and in particular districts, they become an oppressive scourge, and the source of much misery to the inhabitants.

Mouffet relates that, in the year 1574, such a number of them fell into the river Severn, as to stop the wheels of the water-mills; and, in the Philosophical Transactions, it is stated, that in the year 1688 they filled the hedges and trees of Galway, in such infinite numbers as to cling to each other like bees when swarming; and, when on the wing, darkened the air, annoyed travellers, and produced a sound like distant drums. In a short time, the leaves of all the trees, for some miles round, were so totally consumed by them, that at midsummer the country wore the aspect of the depth of winter.

Another chaffer, *Melolontha vitis*. *F.* is sometimes exceedingly injurious to the vine. It prevails in certain provinces of France, where it strips the vines of their leaves, and also devours those of the willow, poplar and fruit trees. The animals and birds appointed to check the ravages of these insects, are, according to Latreille, the badger, weasel, martin, bats, rats, the common dung-hill fowl, and the goat-sucker or night-hawk. To this list may be added the common crow, which devours not only the perfect insects, but their larvæ, for which purpose it is often observed to follow the plough. In "Anderson's Recreations," it is stated that "a cautious observer, having found a nest of five young jays, remarked, that each of these birds, while yet very young, consumed at least 15 of these full sized grubs in one day, and of course would require many more of a smaller size. Say that, on an average of sizes, they consumed 20 a piece, these for the 5 make 100. Each of the parents consume say 50; so that the pair and family devour 200 every day. This in 3 months

amounts to 20,000 in one season. But as the grub continues in that state 4 seasons, this single pair, with their family alone, without reckoning their descendants after the first year, would destroy 80,000 grubs. Let us suppose that the half, viz. 40,000, are females, and it is known that they usually lay about 200 eggs each, it will appear, that no less than 8 millions have been destroyed or prevented from being hatched by the labors of a single family of jays. It is by reasoning in this way, that we learn to know of what importance it is to attend to the economy of nature, and to be cautious how we derange it by our short-sighted and futile operations." Our own country abounds in insectivorous beasts and birds, and without doubt the more than abundant *Melolonthæ* form a portion of their nourishment.

In the year 1817, the Fabrician genus *Melolontha* contained 305 known species, 226 of which still retained that name, and 79 were separated into 5 distinct genera. A great number of new species have since been added to this list, which it has become necessary still further to subdivide. Having myself, in a paper on the noxious insects of this genus, published in 1827, indicated some new genera, and pointed out their types, I would, in my own justification, observe, that, (as I have since ascertained,) about the same time, there were established by European entomologists, similar genera, from a consideration of *the same* types.

We have several allied species of *Melolontha* whose injuries in the perfect and grub state approach to those of the European cockchaffer. *Melolontha quercina* of Knoch is our common species. In its perfect state it feeds on the leaves of trees, particularly of the cherry-tree. It flies with a humming noise in the night, from the middle of May to the end of June, and frequently enters houses, attracted by the light. In the course of the spring, these beetles are often thrown from the earth by the spade and plough, in various states of maturity, some being soft and nearly white, their superabundant juices not having been exhaled; others exhibit the true color and texture of the perfect insect. The grubs devour the roots of grass and other vegetables: in many places the turf may be turned up like a carpet in consequence of the destruction of the roots. The grub is a white worm with a brownish head, and, when fully grown, nearly as thick as the little finger. It is eaten with avidity by crows and

fowls. The perfect insect is devoured by some nocturnal animal, which frequents our gardens for that purpose, and whose beneficial foraging is detected by its abundant excrement filled with the wing-cases of the *Melolontha*. A writer in the "New York Evening Post" says, that the beetles, which frequently commit serious ravages on the fruit trees, may be effectually exterminated by shaking them from the tree every evening. In this way two pails full of beetles were collected on the first experiment; the number caught regularly decreased until the fifth evening, when only two beetles were to be found.

M. hirsuta is also found occasionally in gardens.

M. balia is more common in forests.

M. pilosicollis is quite common in gardens.

M. variolosa is one of our finest species as regards beauty and size. It is not common. An individual was captured near the mall in Boston, some years ago.

M. vespertina and *M. sericea* are destructive to the naturalized sweet-briar, on which the perfect insects may be found in profusion in the night, about the last of June.

All these species are nocturnal insects, never appearing except by accident in the day, during which they remain under shelter of the foliage of trees, or concealed in the grass. Others are truly day-fliers, committing their ravages by the light of the sun, and are always present to our observation. One of them appears about the middle of May, and may be found till the end of June.

It eats the tender leaves of the pear-tree, and feeds also on those of the poplar and oak. It is a large insect, and was described by Linnaeus as the *Scarabæus lanigerus*. It is not constant in its appearance; in some seasons being found in great profusion, when, by shaking the young pear-trees, any number of them may be obtained. *Melolontha punctata* is also a large species which is frequent on the grape vine in July and August. *M. varians*, a smaller species, appropriated to the cultivated and wild grape vine, is closely allied to the vine-chaffer of France, but fortunately, its ravages are not as yet so extensive as those of the latter. On these vines, and still more profusely on the Sumach, (*Rhus Typhinum*), it feeds during the months of June and July. The rose-chaffer or rose-bug, as it is

commonly called, is also a diurnal *Melolontha*. It is exclusively an American insect, and presenting peculiarities in its structure and form widely distinct from other species of the genus, has very properly been referred to a sub-genus,* of which, till lately, it was supposed to be the only species. The rose-chaffer is the *Melolontha subspinosa*, of Fabricius, by whom it was first described in the year 1751. The meaning of the specific name given by Fabricius is, *somewhat spinous*, because the thorax of the insect presents that appearance, in consequence of the blunt spine or tubercle which arms each side. It has since received several other names; but that given by the first describer, having the priority, must be retained. From my communications to the Massachusetts Agricultural Society, in 1826, and from the remarks of Dr. Greene, published in the *New England Farmer*, and since confirmed by my own observations, I shall be able to present a complete summary of the most important facts relative to the economy of this insect. The most remarkable of its habits are its voracity and its salaciousness. It attacks, without much discrimination, almost every tree, shrub, and plant, such as the oak, elm, cherry, and apple trees, the rose, sumach, and elder bushes, the grape-vine, and even herbaceous plants, particularly the common white weed, *Chrysanthemum leucanthemum*. Generally, during the day time, we find these insects paired, the male holding the female closely embraced, even when not *in coitu*. The male is readily distinguished by the greater length of the legs, and the elongated, pointed extremity of the body. The rose-chaffers make their appearance during the second week of June, or about the time of the blossoming of the damask rose. They do not attack the cinnamon rose, and are often seen on the elm and oak, before they appear on the garden or wild rose. Their numbers are rapidly augmented for several days, and, as different individuals appear in succession, the whole duration of the species is found to extend even to 30 or 40 days. In three weeks, the eggs of the female becoming mature, she enters the earth and deposits them at the depth of from one to four or more inches, according to the nature of the soil. The males and females then die, the former above, and the latter either beneath or above the surface of

**Macroductylus*, Latr., *Stenothorax*, mihi. There is a much larger species quite common in Carolina.

the earth. The number of eggs, in each individual, is stated by Dr. Green, never to exceed 30, being generally below 20. They are nearly globular, whitish, and about one thirtieth of an inch in diameter. In the space of 20 days after being deposited, they are hatched, and the young larvæ soon begin feeding on such vegetable substances as are within their reach. Like others of the genus, when not eating, they lie upon the side, with the body curved, so that the head and tail are nearly in contact. I have never been able to rear these insects in pots, so as to trace the *same individuals* from birth, through all their changes; and Dr. Green informs me, that he has been equally unsuccessful. However, by replenishing the pots, from time to time, with fresh larvæ from the ground, he has come to the conclusion, that they arrive at their full growth about the last of October. During the winter, they remain torpid, and at such depth in the soil, as to escape the effects of frost. At the approach of spring, they ascend near the surface, and prepare to take the pupa form. They are then about half an inch long, and over one line in diameter. The body of the grub is soft, whitish, with a bluish tinge near the tail, and slightly hairy. The head is covered with a corneous shell of a pale rust color, the jaws are rather darker. There are six legs near the head, namely, one pair to each of the first three segments of the body. About the first of May, the grub, by moving its body round and round, forms a little cavity or cell, in which, after a few days, it becomes a pupa. This change is effected by the alternate contractions and dilatations of the grub, during which, the skin near the head bursts and is gradually pushed down, (like a stocking from the leg,) until the pupa is entirely liberated. The pupa is of a yellowish white color at first, but gradually becomes darker, as it approaches the perfect state. The rudiments of the future wings, antennæ, and legs, are distinctly visible, folded under the body, and enclosed in a thin membrane, which wraps each part separately: the eyes appear as two blue spots; the dorsal segments of the body are prominent in ridges; the tail is acuminate, and retains upon it the exuviae or cast-skin of the larva, until a few days before it throws off its last covering, and emerges from the earth a perfect insect. This last and important change is not effected but by the greatest efforts, during which the pupa appears to writhe in agony, until, by its continued exertions, it

bursts its membranous shroud, and crawls to the surface, where it becomes, from a grovelling worm of the earth, an animated tenant of the air. Thus the various changes, from the egg to the full development of the perfect insect, are consummated in the space of one year.

Our insectivorous birds undoubtedly consume many of the rose-bugs in the perfect and larva state, and deserve to be cherished and protected for their useful habits. The perfect insects are eaten greedily by domesticated fowls, and, when exhausted and fallen on the ground, become food for other animals and insects, particularly ants. Dr. Green informs us that a species of dragon-fly, or devil's-needle, (*LIBELLULA*,) also destroys them. In France, a large insect, called *vinaigrier*, (*CARABUS auratus*, *L.*) devours the female *Melolontha vulgaris* at the moment when she is about to deposit her eggs. I have taken one specimen of this fine *Carabus* in Massachusetts, and we have several other species which are equally predaceous, and which probably contribute to check the increase of our native species of *Melolontha*. According to Dr. Green, the insect, which he calls the enemy of the cut-worm, preys also upon the grubs of the *Melolontha*. This predaceous insect is the larva of a species of *Carabus*.

Various remedies for protecting vegetation from the ravages of the melolontha have been suggested. The most useful are to strew air-slacked lime on the plants exposed to their attacks, or to cover them with millinet. Great numbers may be collected and destroyed by hand, and, were this made a general pursuit, it would be productive of considerable benefit. "Eighty-six of these spoilers," says Dr. Green, "were known to infest a single rose-bud, and were crushed with one grasp of the hand." Suppose, as was probably the case, one half of them were females; by this destruction about 800 eggs were prevented from becoming matured. The rose-bugs may be shaken or brushed from plants into tin vessels containing a little water, and afterwards committed to the flames, or killed by scalding water. The causes that contribute to the natural increase and diminution of these and other insects, are not sufficiently understood. Of the fact we are assured, that various destructive insects occasionally diminish in numbers, and nearly disappear. This has been the case with rose-bugs, which have sensibly decreased during several years past;—now, then, is the time when our efforts for their extermination would

be most successful, and which, as before said, consist in making a general pursuit and destruction of the insects in their perfect state. Those within reach of the hand may be gathered into suitable vessels, others may be shaken from small trees into cloths spread beneath them. It may even be worth the trouble to mow down rapidly the white weed in arid pastures, and consume it, with the sluggish rose-bugs upon it, on the spot.

Belonging to the great family of Scarabæidæ, and included in De Geer's division of flower-beetles, is one insect which has become injurious to fruit trees. It is the *Trichius scaber*, of Palissot de Beauvois. In *Trichius* the body is thick, short, flattened above. The plate (clypeus) above the mouth oblong square; the antennæ, like those of *Melolontha*, are terminated by a three-leaved club; the thorax is nearly orbicular, buckler-shaped, or hexagonal, usually longer than broad, and narrower than the abdomen; the elytra, taken together, are perfectly quadrate, with the posterior margin straight; the posterior extremity of the body is more exposed than in *Melolontha*; the nails are neither toothed or bifid. The larvæ live in the trunks of trees, and most of the perfect insects are clothed with hairs, whence their name *Trichius*, signifying hairy. The species under consideration, with two or three others, are entirely destitute of hairs, and offer other minute characters distinct from the hairy *Trichii*, whence they have been denominated *Gymnodi*, or naked.

The larva of *Trichius* (or more properly *Gymnodus*) *scaber* closely resembles that of *Melolontha*. It lives in the trunks of old cherry trees, whose decay it accelerates. In the autumn it forms a cell or cocoon of the debris or woody fibres of the tree, which is strongly cemented within; the perfect insect is developed in July. It flies abroad only in the night, and conceals itself during the day in the crevices of trees. It betrays its retreat by the powerful odor which it exhales, and which is perceptible at the distance of several feet.

The habits of the insects which belong to the genus *Lucanus* are similar to those of the insect just described. The larvæ have a general resemblance to those of the Scarabæi, and live in the trunks of old trees. The perfect insect is readily distinguished by the oblong form of its body which is rounded behind, and slightly flattened

above. The head is broad, the thorax short, transverse, and as broad as the elytra ; the antennæ are ten-jointed, the first joint being very long, and the four last projecting at the sides like the teeth of a comb. But the mandibles, or upper jaws, of great size, extending like the horns of cattle, or branched like those of the stag, form the most conspicuous character. These insects fly abroad during the night, and frequently enter houses. They are vulgarly called horn-bugs, and are dreaded for their formidable aspect, but are perfectly harmless. The larvæ are common in all decaying trees, and are frequently found in the trunks of apple-trees.

The preceding insects have five joints to all their feet. There are others which injure vegetation, and which have only four joints to the posterior pair of feet.

In *Tenebrio*, the body is elongated, hard, flattened, and entirely covered above ; the antennæ are moniliform, or composed of grains like the beads of a necklace, and gradually enlarge towards the tips ; the thorax is square ; the elytra are not united at their junction ; and the legs are curved. The larva is long, slender, nearly cylindrical, very smooth, and of a pale rust or dirty yellow color. The first segment behind the head is larger than either of the others ; this, as well as each of the two following segments, is furnished beneath with one pair of legs ; the tail is acuminate, the tip in some species furnished with two minute vertical spines ; under the tail, at the junction of the two last segments, is a membranous space in which is concealed a retractile fleshy tubercle, from which issue, when the animal walks, two horny movable parts which perform the office of legs. The larva state continues during two or more years. The perfect insects are nocturnal, as the name indicates.

Tenebrio granarius. The larva lives in stables and granaries, subsisting upon corn and meal. It has considerable resemblance to that of the small species of *Elatér*. The pupa is found in June in places inhabited by the larva. The perfect insect is developed about the middle of June.

A remarkable case of the introduction of this insect into the human body is recorded by the late Dr. Coffin of Boston, exhibiting a great change in the ordinary habits of the insect, showing the necessity of great attention to cleanliness in cases of sickness, and fur-

nishing a caution against the careless use of articles containing eggs or larvæ of insects. In the year 1812, a woman in Biddeford, Maine, had an issue of long standing in the back of her neck. At this period she was confined to a dark and dirty apartment. At length the issue healed, soon after which a tumor rose at the part, burst, and discharged a great number of larvæ, a tea cup full as was said. For several months these vermin seemed to be confined to the part, occasionally crawling out ; but when the abscess healed, the patient felt them to spread to the head, producing in their course severe pains, described by her as itching, biting, and gnawing sensations. Some time after these sufferings, larvæ were discharged from the ears, eyes, nose, and mouth, varying in number and size, sometimes one hundred in twenty-four hours, some as small as a hair, others almost as large as a pipe-stem, and two-thirds of an inch long. The woman continued to be troubled with these vermin four years. Some of them were sent to Boston, from one of which Prof. Peck obtained the perfect insect. It proved to be the *Tenebrio* just described. It is probable they were introduced in the egg state, either by the parent insect gaining admission to the sore, or what is more likely, that poultices, composed of meal containing eggs or larvæ, were applied to the sore, and proper attention to cleanliness not having been given, the larvæ established themselves unnoticed in the part.

Tenebrio punctulatus, badius, laevis, and several other species, are found in the decayed trunks of trees, upon the debris of which the larvæ subsist, and resemble those of the meal tenebrio.

The habits of the genus *Cistela* are similar to those of *Tenebrio*, but their injuries to trees are greater, for they subsist upon wood less advanced to decay than do the former. The body is oblong oval ; The antennæ are long, tapering towards the extremity, and slightly serrated on one side ; the thorax is short and semicircular ; the eyes are crescent-shaped ; the nails pectinated like the teeth of a comb. This structure of the nails is peculiar to some insects, which, in their perfect state, frequent flowers.

The larvæ are somewhat like those of tenebrio, but are much more flattened, and the apex of the body terminates in three minute spines, the central one of which is the most prominent. The anal

proleg, or part which performs the office of a posterior foot, is situated in a semicircular space at the base of the last segment. They are found under the bark of trees; the perfect insects, in June and July, in the same situation, and also upon flowers.

In the Coleopterous insects which follow, all the feet have but four articulations.

The genus *Bruchus*, appears to be chiefly appropriated to the Leguminous or Pea-flowering plants. The form of the body in this genus is short and convex; the head is produced or elongated before into a broad snout, and is suspended vertically below the thorax; the antennæ are composed of eleven nearly cylindrical joints, which gradually increase in size to the last; the elytra are short, and do not cover the posterior extremity, which is pointed; the posterior thighs are thick. The perfect insects deposit their eggs upon the pods of plants, the pulse of which affords nourishment to the larvæ. These are little whitish grubs, without feet, and one only is to be found within a single seed, the interior of which is perforated by a hole, which is covered only by the thin hull, on the outside, and through which the perfect insect gnaws a passage sometime before it makes its escape. This is not effected until about the time of the germination of the seed, so that the existence of the insect is extended through one year, during the winter months of which it remains, concealed in the seed, in a state of torpidity.

These insects are far more common than has generally been imagined. The *Gleditsia*, *Robinia*, *Mimosa*, *Cassia*, and various other native legumes have their distinct species. But the most remarkable is the *Bruchus pisi*, or pea-bug of North America. This insect has been introduced with American pease into England, and a part of Europe, but is not known in the North of Europe. Kalm, the Swedish traveller, tells us that he was greatly agitated on discovering some of these insects in a parcel of pease brought by him from America, lest he should be the instrument of introducing so fatal an evil into his beloved country. Nor was his agitation unfounded; for this noxious insect was at one time so destructive to the pea in our country as to put an end to its cultivation in many places. The pea-bug must originally have fed upon some of our indigenous vegetables allied to the garden pea, which, however, it has deserted in

preference for this more prolific and abundant foreigner. The female pea-bug deposits her eggs beneath the epidermis, or thin skin, which covers the pod of the pea, one egg, only, being left opposite to a single pea. This is effected during the night, or in cloudy weather, and the pods are attacked only when young, and when the pease are just beginning to swell.

The larva or grub, as soon as hatched, perforates the pod and pea by a very fine hole, which is soon closed, and is only to be discovered when the pea is fully grown by a small reddish spot on the pod, corresponding with a similar one on the pea. If this spot be carefully opened at this time a minute whitish grub or maggot, destitute of feet, will be found in the pea. The growth of the grub is rapid, and is completed by the time the pea becomes dry. It then bores a round hole in the pea, quite to the hull, which, however, is left untouched, as is also the rostellum or future sprout. In this hole it becomes a pupa and subsequently a perfect insect, when it has only to gnaw through the thin hull before it makes its exit.

It is a singular fact, and evinces the wisdom of Providence, that the germinating principle of pease is permitted to escape the insect destroyer, whereby abundant provision is made for a future supply of one of the finest of esculent vegetables. This insect is also limited to a certain period for depositing its eggs; late sown pease therefore escape its attacks. According to observations made by the late Col. Pickering, pease sown as late as the 20th May, in lat. $41^{\circ} 13'$ N., were entirely free from bugs. Deane recommends to keep buggy pease over one year before sowing them. This method would answer if generally adopted, but the pease themselves should be so secured that the bugs could not escape. Probably keeping them in boxes with a quantity of camphor, would destroy the bugs without injuring the pease. Latreille suggests submitting the pease to the heat of water at 30° Reaumer, or 90° of Farenheit, by which probably the same results might be obtained. A writer in the New England Farmer has adopted the following plan:—Immediately before being planted, the pease are put into a tub; very hot water (he does not state specifically how hot,) is poured on them, they are constantly stirred in this for two minutes, and then cold water is added, in such quantity as to render the mixture blood warm, and to cover the pease

one or two inches. In this they are allowed to stand an hour or two, when all the bugs will be found dead and floating, and the pease will be in a state for immediate planting. The Baltimore Oriole or hang-bird, is appointed to check the increase of this insect, by picking from the green pea the larva on which it feeds.

In the genus *Anthribus*, the head is elongated into a broad snout or rostrum. The body is short, thick, and obtuse, or truncated behind; the antennæ are straight, abruptly thickened at tip into a three-jointed mass or club; the thorax is transverse, broadest behind, and lobed; the posterior extremity is covered by the elytra.

Anthribus marmoreus lives in the larva state in the solid wood of the oak, where also it undergoes its metamorphoses.

The succeeding insects, which are furnished with snouts or rostra, belong to the family *Curculionidæ*, so named from a genus of Linnaeus in which they were included. They are popularly named weevils, and are widely spread through vegetation; almost every grain and seed having its peculiar species, and the trunks and leaves of a great number of plants are also infested by them. The larvæ are more or less oval or approach to a conical form. They are destitute of legs, unless we may call by that name certain fleshy tubercles at the sides of the body, besmeared in some species with a tenacious slime, which assist them in their motions. These motions are effected by the alternate contraction and extension of the segments of the body. They have a horny head, by which they are distinguished from the maggots of flies. The pupæ do not differ greatly from those of other coleopterous insects, exhibiting the rudiments of feet and wings through the thin pellicle which envelopes every part.

According to Kirby and Spence, several species of *Harpalus* (insects belonging to the *Carabidæ*) prey upon the perfect insects. The larvæ fall victims to several Ichneumon flies, to woodpeckers, and to other birds.

The habits of the genus *Brenthus* have not hitherto been described. Their characters are these. Antennæ straight, not tapering at the ends; body hard, elongated, somewhat cylindrical; head, rostrum or beak straight and porrected, in the female very slender and long, in the male short, robust, dilated at the end, and with large and dis-

tinct mandibles or jaws ; last joint but one of the feet divided into two lobes.

Brenthus septentrionis passes through all its metamorphoses in the trunks of trees, under the bark of which the perfect insect is, in summer, frequently found. The female perforates the bark with her slender beak, and deposits an egg in the hole thus made. The larvæ penetrate into the solid wood forming cylindrical passages, which they keep clear by constantly thrusting behind them and out of the hole their castings, as fine as saw-dust. A full grown larva measures above an inch in length. It is of a whitish color, and is very much elongated and cylindrical ; each of the first three segments is furnished beneath with a pair of legs, and there is a fleshy prop or proleg beneath the hinder extremity of the body ; the last segment is dark chestnut colored, of a horny consistence, and hollowed above so as to form a kind of gouge or scoop, the edges of which are furnished with little notches or teeth. It is by means of this singular scoop that the larva shovels the minute grains of wood or castings out of the orifice of its burrow. On the dorsal segments of the pupa are transverse rows of minute spines or teeth, and the tail is surmounted by two distinct spines much larger than the others ; the beak is inflexed under the breast.

In the genus *Curculio* the antennæ are geniculated or bent at right angles in the middle, the first joint being very long, inserted near the mouth, and usually received into a groove at the side of the rostrum, which is short and thick ; the body is ovate, convex, narrower before, and in most species ornamented with minute scales ; the antennæ are situated near the extremity of the rostrum, and are composed of eleven joints, the three last of which are united into a mass or club.—The weevil tribes use their snouts for preparing the holes in vegetable substances and fruits in which their eggs are deposited..

Curculio hilaris lives in the solid wood of the oak. The perfect insect is developed in May, and may then be found on the trunks of trees *sub copula*.

The antennæ in the genus *Rhynchænus* resemble those of *curculio*, are eleven-jointed, but inserted near the middle of the rostrum, which is long and slender ; the body is more elongated than in *curculio*.

Rhynchænus pales inhabits the trunks of the pitch and perhaps other pines. The perfect insect is very common on palings, the trunks of pines, the sides of houses, &c. in May and June.

Rhynchænus Strobi was first described by the late Prof. Peck. It attacks the leading shoot of the *Pinus strobus*, or white pine. "The lofty stature of this tree depends upon the constant health of its leading shoot, for a long succession of years." If the leading shoot be destroyed, the tree becomes deformed, and the trunk rises no higher, until some one of the topmost branches assumes an ascending direction, and becomes an irregular kind of leading shoot. This accident is not uncommon, and is effected by this insect. Its eggs are deposited on the leading shoot, probably immediately under the epidermis. The larvæ, when hatched, immediately commence feeding on the wood. "It is probable," says Prof. Peck, "that they remain in the wood more than one year, and the shoot dies the second year after the eggs are placed in it. The larva is a soft white grub, with only the head shelly, and armed with strong mandibles." "When the feeding state is passed, and before the pupa state comes on, it prepares an exit for itself by opening a passage outwards, but leaves the exterior skin of the bark untouched, so that it is perfectly secured from any injury by rain. The pupa remains quiet for a time, and the perfect insect has only to cut away the epidermis to escape. The perfect insects begin to come out early in September, and continue to leave the wood through that month and a part of October. The shoot at that time is pierced on all sides with small round holes; sometimes thirty or forty may be counted in one shoot." "But an unlimited increase is not permitted to this destructive insect; if it were, our forests would scarce produce a single mast." One of the means appointed to restrain the increase of the white-pine weevil, is a species of ichneumon fly endued with sagacity to discover the retreat of the larva, the body of which it perforates with its sting, and therein deposits an egg. From the egg of the Ichneumon is hatched a grub which devours the larva of the weevil, and then transforms to a perfect insect in its habitation. The most effectual remedy against the increase of these weevils is to cut off the shoot in August, or as soon as it is perceived to be dead, and commit it with its inhabitants to the fire. Such is

the substance of Prof. Peck's communication respecting this insect. I would observe that these insects are very abundant in the perfect state during the months of April and May, from which it is to be inferred that they secrete themselves somewhere during the winter, and deposit their eggs in the spring, or perhaps do not usually leave the trees before spring.

Rhynchænus Nenuphar, was scientifically described and figured by Herbst in the year 1797. Its history has been investigated by several American writers, particularly by Prof. Peck, who called it *R. cerasi*. The plum and cherry trees have, for a long time, been annually disfigured by irregular swellings on the young branches. These swellings or warts are diseases of the bark, caused by the punctures of the weevil and the residence of the grubs. The sap-vessels being wounded and irritated by the insects, throw out an increased quantity of fluid, this is re-absorbed by the bark, which is consequently swollen and thickened in substance; the over-stretched cuticle bursts, and the swelling becomes irregular, granulated, and full of fissures. The local exhaustion of sap, and the pressure of the tumors, compress the wood, and the limb gradually perishes above the seat of the disease. From one of the warts of the cherry tree Prof. Peck obtained the weevils in their perfect state, which proved to be the same insects whose larvæ were known to cause the premature ripening and fall of peaches, apricots, and plums. From the latter fruit I bred the same insect, differing in no respect from that described by Prof. Peck. A paper by Mr. Tilton on this insect was published by Dr. Mease, in his Domestic Encyclopedia, from which it has been repeatedly republished in the various horticultural treatises of this country.

Melsheimer, in his catalogue, observes, that the larva lives under the bark of the peach-tree. We have Prof. Peck's authority for the fact that it is the cause of the excrescences on the cherry-tree, and further observation has proved that the same insect deforms the limbs of the plum-tree. According to several memoranda the perfect insect is found during most of the spring and summer months. Its first appearance is in May, when it begins puncturing the small fruit with its rostrum, and deposits in the puncture thus made an egg, which in a short time becomes a larva or maggot. This worm eats into

the kernel before the fruit is half grown ; and thus causes it to fall prematurely. The maggot then easily escapes into the earth, becomes a pupa, and returns to the surface in about three weeks. In order to account for the occurrence of these insects in the limbs of the trees, I will venture to give the following explanation, although, at present, it rests only upon hypothesis. The final transformation of the grubs, living in the fruit, appears to take place at various times during the last of summer and the beginning of autumn, when the weevil, finding no young fruit, is probably obliged to lay its eggs in the small branches. The larvæ live in the branches during winter and are not perfected till near the last of the ensuing June. Should the fall of the fruit occur late in autumn the development of the perfect insects will be retarded till the next spring ; and this I *suppose* to be the origin of the brood which oviposits in fruit. It is a singular circumstance in the history of this insect, and one of which, hitherto, no explanation has been offered, that some broods should attack the limbs and others the fruit. In this is manifest the wisdom of the Author of nature in providing for a continuation of the species in various contingencies. By this wonderful compensating contrivance in its economy, this little entity is secure of an appropriate nidus for its future progeny in sterile regions and unfruitful seasons.

Such, in brief, are the habits of this insect, and these being known, the way for successful experiment is opened. Not having made any myself, it must be left to the ingenuity of others to devise and point out a remedy against the injuries of this depredator. The following, among others which have been suggested, may succeed.

1. The diseased excrescences should be extirpated before the last of June and be burned.

2. All immature or wormy stone fruit should be collected as soon as it falls, and should be boiled or steamed to kill the enclosed larvæ, after which they may be given to swine.

The moose plum-tree, which grows wild in Maine, is never attacked by this insect, even when in the immediate vicinity of diseased foreign trees. It, therefore, would be the best of stocks for budding or engrafting upon. The fruit can be easily obtained from Maine, and the trees grow rapidly from the stones.

From the genus *Rhynchænus* have been separated those insects

which have the rostrum or snout as long as the body, very slender, and curved ; the antennæ are also long and slender, and are inserted rather beyond the middle of the rostrum. The name of this subgenus is *Balaninus*, which signifies inhabiting a nut, (*βαλανος*, a nut, and *ενειμι*, I am in,) and the insects are called *nut-weevils*. The European *Balaninus nucum* inhabits the hazel-nut. The female, with her long rostrum, pierces the nut when young and soft, and then deposits in the hole an egg, from whence is hatched a small maggot that preys upon the kernel. The nut, not apparently injured by the slight perforation, continues to increase in size, and thus furnishes an abundant supply for its inhabitant. When this has finished eating, it forms in the shell with its teeth a regular, circular orifice, through which to make its exit. The fruit itself, as if aware of the necessities of the insect, now falls to the earth ; the grub quits “ the dark chambers of the caverned nut,” enters the soil, is transformed to a pupa, and remains at rest till the succeeding summer, when it emerges from its case to provide for the continuation of its species. Our most common nut-weevil, *Balaninus rectus*, is found from July to October. I have one specimen which was captured in a chestnut grove ; but I have usually found this species in the vicinity of hazel-bushes, and believe that it inhabits the nut of that shrub, though I have never witnessed its metamorphoses.

The most pernicious of the weevil tribes are those insects which belong to the genus *Calandra*. The antennæ are inserted at the base of the rostrum, are geniculated, apparently eight-jointed, the last or eighth joint forms the club, and contains at its apex a minute, spongy, retractile mass which really constitutes another joint ; the body is oblong, plane or flat above, and the tip is naked or not covered by the elytra. By these characters it is easy to recognize these insects.

With the exception of a few large species, the genus *Calandra* is appropriated to the farinaceous grains, such as wheat, maize, rice, and various other cereal productions. There are several insects called weevils, some of which do not belong to the order *Coleoptera*, but the *Calandræ* are the only true corn or grain weevils of scientific writers.

Calandra oryzae, the rice weevil, is very injurious to this useful grain, consuming its nutritious parts, and materially lessening its

weight. It is not confined to rice, but also attacks maize. I have seen stored maize literally alive with them; and should the evil be propagated and extended in this section of our country, it will prove a serious injury to one of our most valuable staple productions.

The insect inserts only a single egg in each grain, but, as she is very prolific, one female may produce a numerous progeny. The eggs are deposited when the grain begins to swell, and while it is yet very tender. The maggot lives securely and unsuspected in the centre of the rice; when it has attained its full size it has formed a cavity from which it gnaws a small passage through one end, which it stops up with some of the flour or particles of the rice, and then becomes a pupa, and subsequently a perfect insect before leaving its habitation, which takes place in the spring. This weevil does not, to my knowledge, attack rice or maize after it has become dried and is stored for consumption. The wheat weevil of this country is unknown to me. I have a large species of *Calandra* which I am informed was found in southern maize, and which has continued to be propagated in the corn-house where it was first introduced.

The family of wood-eaters or Xylophages, called also *Bostricidæ*, includes the notorious *Scolytus Pyri*, and many other insects which feed upon wood. When these abound, they are productive of much mischief, particularly in forests, which are often greatly injured by them, and the wood rendered unfit for the purposes of art. In the year 1780, an insect of this family made its appearance in the pine trees of one of the mining districts of Germany. Three years afterwards whole forests had disappeared, and for want of fuel, an end was nearly put to the working of the extensive mines in this range of country.

A distinguished British naturalist, in the year 1824, was requested to investigate the cause of an alarming decay of the noble elms which ornament St. James' and Hyde Parks. He discovered that they were infested by numerous insects belonging to the genus *Scolytus*, whose ravages had loosened the bark of many of the trees, causing it to fall off in large flakes, and threatening their total destruction. An abstract of the account given by Mr. Macleay, the naturalist just mentioned, and some additional information on destructive insects, was published, with the signature of Indagator, in the fifth volume of the New Eng-

land Farmer. Its perusal is earnestly recommended to all who take an interest in the history of the contagious diseases of plants.

The insects of this family have the body cylindrical or globose ; the antennæ with not more than ten distinct joints, terminated by a thickened, solid, or perfoliate mass, composed of two or three joints ; the joints of the tarsi or feet are not spongy beneath, and the anterior legs are dentated or toothed.

Their larvæ are small, short, white grubs with horny heads, and six small feet attached to the three anterior segments. Their jaws are very hard, and formed for cutting woody substances, which they reduce to fine powder. They remain one or two years in the larva state, and do not quit the trees which they inhabit until they have become perfect insects. The places of their exit are perfectly cylindrical holes.

In *Hylurgus*, the body is cylindrical and is obtuse behind ; the antennæ are short, composed of ten joints, the three last forming a rounded mass. The last joint but one of the feet is divided into two lobes.

Hylurgus terebrans, is a large insect, apparently capable of doing much mischief. It is very common during the months of April, May and June, on newly made board-fences, and on lumber wharves ; but I have not been able to ascertain upon what tree it resides ; though probably it inhabits some of the pines, hemlocks, or cedars employed as lumber.

Hylurgus dentatus is found in October, on the trunks and under the bark of the red cedar. The bark of this tree is perforated by thousands of small holes, from which have escaped these little beetles. The female forms a cylindrical passage beneath the bark, where she deposits her eggs. The larvæ proceed from this path, in feeding, at right angles, forming on each side numerous parallel furrows, smaller than the central tube of the female. The larvæ live between the bark and the wood, and by their ravages loosen the former, and arrest the formation of new wood.

In the insects, referred by Prof. Peck to the genus *Scolytus*, the body is short and cylindrical ; the thorax is arched so that the head is situated beneath its anterior part ; the antennæ are ten-jointed, the first joint is long, and thickened at the end, the second cup-shaped, the third to the seventh, inclusive, are minute, but gradually increase in size,

the eighth, ninth and tenth are united into a knob ; the palpi or feelers are conical. These insects cannot be retained in the genus *Scolytus*, as now defined, because in this genus the antennæ have the club composed of only two joints. Not having seen these insects in a living and entire state, I cannot certainly determine from my specimens, or from Prof. Peck's description and figures of them, to which of the modern genera they belong.

For many years past the pear-tree has been found to be subject to a peculiar malady, which shows itself during midsummer by the sudden withering of the leaves and fruit, and the discoloration of the bark of one or more of the limbs, followed by the immediate death of the part affected. In June, 1816, the Hon. John Lowell, of Roxbury, discovered a minute insect in one of the affected limbs of a pear-tree ; since that time he has repeatedly detected the same insects in blasted limbs, and his discoveries have been confirmed by Mr. Henry Wheeler and the late Dr. Oliver Fiske, of Worcester. Mr. Lowell submitted the limb and the insect contained in it to the examination of Prof. Peck, who gave an account and figure of the latter, in the fourth volume of the Massachusetts Agricultural Repository and Journal. From this account, and from a subsequent communication by Mr. Lowell, in the fifth volume of the New England Farmer, it appears that the grub or larva of the insect eats its way inward through the alburnum or sap-wood into the hardest part of the wood, beginning at the root of a bud, behind which probably the egg was deposited, following the course of the eye of the bud towards the pith, around which it passes, and part of which it also consumes ; thus forming, after penetrating through the alburnum, a circular burrow or passage in the heart-wood, contiguous to the pith which it surrounds. By this means the central vessels, or those which convey the ascending sap, are divided, and the circulation is cut off. This takes place when the increasing heat of the atmosphere, producing a greater transpiration from the leaves, renders a large and continued flow of sap necessary to supply the evaporation. For the want of this, or from some other unexplained cause, the whole of the limb above the seat of the insect's operations suddenly withers, and perishes during the intense heat of midsummer. The larva is changed to a pupa, and subsequently to a little beetle in the

bottom of its burrow, makes its escape from the tree in the latter part of June, or beginning of July, and probably deposits its eggs before August has passed. This little beetle, which is only one-tenth of an inch in length, was named *Scolytus Pyri*, by Prof. Peck; it is of a deep brown color, with the antennæ and legs rather paler, or of the color of iron-rust. The minuteness of the insect, the difficulty attending the discovery of the precise seat of its operations before it has left the tree, and the small size of the aperture through which it makes its escape from the limb, are probably the reasons why it has eluded the researches of those persons who disbelieve in its existence as the cause of the blasting of the limbs of the pear-tree. It is to be sought for at or near the lowest part of the diseased limbs, and in the immediate vicinity of the buds situated about that part. The remedy, suggested by Mr. Lowell and Prof. Peck, to prevent other limbs and trees from being subsequently attacked in the same way, consists in cutting off the blasted limb *below* the seat of injury, and burning it *before* the *perfect* insect has made its escape. It will therefore be necessary, carefully to examine our pear-trees daily, during the month of June, and watch for the first indication of disease, or the remedy may be applied too late to prevent the dispersion of the insects among other trees.

In examining the leading shoot of the white pine, Prof. Peck found another insect which he called *Scolytus strobi*. Half a dozen were obtained from the terminal bud. This insect is exceedingly minute, being only six hundredths of an inch in length, and two hundredths of an inch in diameter. It is black and polished, the feet are pale brown, and the antennæ dusky. The wing-cases have longitudinal rows of short bristles, the thorax is densely covered with shorter ones, and is rough in front with minute tubercles.

In the genus *Bostrichus*, the body is cylindrical, the thorax globose, generally rough with tubercles, the elytra or wing-cases are arched so as to cover nearly two-thirds of the body, are often obliquely truncated or cut off behind, and armed with teeth at the apex; the antennæ are terminated by a pectinated or serrated club.

Bostrichus basillaris, is appropriated to the shagbark tree. Its larvæ frequently abound in the trunk, the solid wood of which is per-

forated diametrically through with their cylindrical passages. Mr. Say has described three insects of this family which are very injurious to the pines.

Among the insects which facilitate the destruction of old trees are those belonging to the family *Cucujidae*. They are found beneath the bark, and in the bodies of trees upon the wood of which their larvæ subsist. They are of an oblong form, the body is more or less flattened, the thorax is square, the antennæ are eleven-jointed, of moderate length, and often taper at the end; the feet are not spongy beneath, and the joints are entire.

In *Parandra*, a genus peculiar to America, the antennæ are moniliform, or bead-like, and shorter than the body; the feet are of moderate length; the jaws (mandibles) are strong, prominent, and toothed; the body is more convex than in the other genera of the family. *Parandra brunnea* is not uncommon in decayed trees. It flies abroad in the night. This insect might readily be mistaken for a small *Lucanus*, and its habits are similar.

In *Cucujus*, the body is quite flat, the head is broad behind the eyes; the triangular plate, covering the mouth and extending forwards, with the prominent jaws, give to the mouth the appearance of a short beak. The antennæ are short, and granulated or moniliform.

Cucujus clavipes is our largest and most beautiful species. The larva feeds under the bark of trees. When fully grown it measures about three quarters of an inch in length, and seventeen hundredths of an inch at its broadest part. It is very much flattened; the head resembles that of the perfect insect in shape; the antennæ are three-jointed and longer than the head; the first three segments of the body are each furnished with a pair of robust feet; there is no thoracic shield, and no anal proleg; the posterior margin of the eleventh segment is armed with four teeth, a small one on each side, and two larger ones beneath; the last segment merely constitutes a small base to support an anal recurved fork; each tyne of this fork has a small spine just above its base. When the insect becomes a pupa, the skin of the larva is left entire, except a small longitudinal fissure on the back of the first three segments. The perfect insect is developed about the middle of May.

The next insects to be described belong to the family of *Ceram-*

bycidae, or capricorn beetles. The larvæ, in common language called *borers*, are eminently wood-eaters, and exceedingly injurious to vegetation. These insects, which are very numerous, are distinguished by their long and tapering antennæ inserted into a notch of the eyes, which are kidney-shaped; the body is elongated; the thorax cylindrical or quadrate; the feet are formed for standing securely; the first three joints dilated, and covered with spongy cushions beneath, the third being also divided into two lobes, between which issues the fourth joint, which is terminated by two strong, curved and simple claws. They fly well, and usually by night. During the day they remain in concealment. When annoyed or taken into the hands, they make a querulous noise. By nodding its head, the insect causes the base of the thorax to rub against the base of the abdomen, and these parts being corneous emit a squeaking sound, whence one of these insects is, in Germany, called the fiddler. The antennæ of the females are usually shorter than those of the males; many of the former also have a tubular, jointed, retractile apparatus at the posterior extremity, which is capable of being drawn out like the joints of a telescope, and which serves to conduct the eggs into the place where they are to be deposited. The larvæ constitute the principal nourishment of wood-peckers.

In *Prionus* the body is flattened, and the thorax is broad, square, and toothed at the sides. The female lays her eggs in crevices of old trees. The eggs are oblong and many in number. The larvæ have the body divided into twelve segments, and are white, except the head, which is horny and yellowish; the diameter of this part also is somewhat greater than that of the body. They have three pair of minute feet near the head; but the motions are principally effected by the contractions and dilatations of the body, aided by the little projections or tubercles which cover the seven terminal segments. The metamorphoses of the insects of this genus, as well as of all the other *Cerambycidae*, occur in the places where the larvæ reside.

Prionus brevicornis is found in the perfect state during the month of July. Its larva feeds upon the trunks of the Lombardy poplar, the balsam poplar, or balm of Gilead, and probably upon other species of poplar.

Prionus cylindricus inhabits the pine. The perfect insect fre-

quently enters houses at night, from the middle of July to September.

In *Lamia*, the head is vertical, or forms a right angle with the thorax; the antennæ are longer than the body; the thorax is generally cylindrical, and tuberculated or spined at the sides; the last joint of the palpi or feelers is not much thickened, or is nearly cylindrical.

The larvæ are white and elongated; their bodies are composed of thirteen segments, each of which is distinct and swollen; the head is horny; and they have six small feet. They remain two or three years before becoming pupæ.

Lamia titillator is one of our largest species; the habitat of the larva is unknown to me; the perfect insect occurs in woods.

The genus *Saperda* has the head and antennæ like those of *Lamia*, but the thorax is smooth, perfectly cylindrical, and destitute of spines or tubercles.

Saperda calcarata inhabits the poplar, and greatly resembles, in size, form and color, a European species, appropriated to that tree. This insect, together with *Prionis brevicornis*, has almost destroyed the Lombardy poplar of this vicinity, which is perforated in various directions by their larvæ. The perfect insect is disclosed in August.

The full-grown larva measures nearly two inches in length, and is of a yellowish white color, except the upper part of the first segment which is of a deep buff. Its body is nearly cylindrical, rather thicker before than behind, and consists of twelve segments, separated from each other by deep transverse furrows; the first segment is covered above by a broad buff-colored plate or thoracic shield; the second segment is very narrow; on the upper and under sides of each of the following segments, from the third to the tenth inclusive, is a transverse space, rendered rough like a rasp by minute projections. These rasps, on the upper and under sides of the body, serve instead of legs, which are entirely wanting.

The most notoriously noxious insect of this genus, is the *Saperda bivittata*, the parent of the apple-tree borer. The trees and shrubs principally attacked by this borer, are the apple-tree, the quince, mountain ash, hawthorn, medlar, and several species of *Aronia*. Indigenous plants of this genus, called *June-berry* and *choke-berry*

bushes, seem to be its natural food ; and the perfect insects are frequently found on the leaves of these plants during the months of June and July. It is at this time that the eggs are deposited, being laid upon the bark near the root. The larva is elongated, nearly cylindrical, rather larger towards the head, and is destitute of feet. It cuts, with its strong jaws, a passage through the bark into the wood, and the place of its operations is known by the castings which it thrusts backwards out of the hole. The larva state continues two or three years, at the expiration of which time the insect has extended the channel several inches in length up the trunk of the tree, at its termination approaching the bark and covered only by it. In this channel its final transformation takes place. The pupa does not differ greatly from other pupæ of the Coleoptera ; but it has the tail armed with short spines, and a transverse series on each of the dorsal segments. These spines probably assist the insect in its movements when the pupa coat is to be cast off. This occurs about the first of June ; the perfect insect penetrates the thin covering of bark which was left over the upper extremity of its channel, and emerges from its place of confinement during the night.

Various means have been tried for destroying the borers in the apple tree. An ingenious mechanic, Mr. Hersey, was very successful in cutting them out with a gouge ; he then covered the wounds with composition, and, in vigorous trees, the bark soon closed over them. Where great numbers of borers infest one tree this method is injudicious ; such an extensive removal of the bark, as nearly to girdle the tree, interrupts materially its healthy functions. Instead, therefore, of a free use of the gouge and knife, it will be more prudent to introduce a wire so as to destroy the larvæ in their holes. Plugging the external orifice has been practised by some persons, and, as they assert, with success. Others have recommended putting camphor in the hole and then plugging it. The latter promises to be more effectual, but experiments are wanting to confirm its expediency.

There are several small species of *Saperda* in this State, distinguished by the extreme slenderness of the body, which is almost or quite cylindrical. Such are the insects named *Saperda plumbea* and *tripunctata*. The larvæ of these species are not, strictly speaking, wood-eaters, for they consume the pith only of plants. They are

much more slender than the other larvæ of this genus, and are found in the stems of the tall blackberry and other species of *Rubus*. Roesel has described and represented the transformations of an European insect closely resembling these, which also lives in the interior of the stems of some kind of bramble.

In *Stenocorus* the body is slender, the head nutant, or forming an oblique angle forwards; the antennæ are long and spiny; the thorax approaches to an orbicular form, and is frequently armed at the sides with spines or tubercles; the apex of the elytra is emarginated or notched, and toothed or terminated with spines.

Stenocorus cinctus, our largest species, is said to inhabit the hickory, in which the larva perforates long galleries in the direction of the fibres.

Stenocorus putator, or the oak-pruner, so named by Prof. Peck, inhabits the white and black oaks. The egg is laid at the origin of a bud or small twig, near the extremity of a branch; the larva penetrates at that spot to the pith, and then continues its course towards the body of the tree, thus forming a cylindrical perforation several inches in length in the centre of the branch. Having reached its full size, which it does towards the close of summer, it divides the branch at the end of its burrow, nearest the body of the tree, by eating it off transversely from within, leaving only the ring of bark untouched. It then retires backward, stops the end of its hole near the transverse section with fibres of the wood, and awaits the fall of the branch, which is usually broken off and precipitated to the ground by the autumnal winds. The leaves of the oak are rarely shed before the branch falls, and thus serve to break the shock. The pupa state takes place in the branch, and the perfect insect is disclosed from the middle of May to the first of July. These insects are nocturnal, like most of the capricorn beetles, and frequently enter houses in the evening. I have repeatedly seen branches lopped by the larvæ, which were nearly an inch in diameter, and five or six feet in length, the transverse section being almost as regular as if made by a saw. It is evident that this kind of pruning must be injurious to the trees, and should be guarded against if possible. By collecting the fallen branches in autumn, and consuming them before spring, we prevent the development of the perfect insect, while we derive some benefit from the branches as fuel.

From the regularity of its form and noble size, the sugar maple is accounted one of the most beautiful, while, from its many useful properties, it is esteemed one of the most valuable of our forest trees. This fine tree suffers much by the attacks of a borer belonging to the genus *Clytus*, which in some cases produces its entire destruction.

The genus *Clytus* is characterized by having the head nutant ; the body flattened ; the thorax globose, or orbicular, and convex, without spines or tubercles ; the antennæ usually shorter than the body ; and the palpi or feelers terminated by a triangular joint.

The species which has been discovered in the sugar maple, is the *Clytus speciosus*, scientifically described by Mr. Say, and accurately represented by the pencil of Lesueur, in the American Entomology. But for its habits we are indebted to the investigations of the Rev. L. W. Leonard, of Dublin, N. H. In the summer of 1828, he discovered the perfect insect under the loosened bark of some young maples in Keene, and traced the recent track of the larva three inches into the solid wood. These trees, on the cultivation of which much care had been bestowed, were nearly destroyed by this large insect. Specimens of the perfect insect have been repeatedly captured in the vicinity of Boston, which were undoubtedly brought here in maple logs from the State of Maine. They have been taken in the month of July.

Many species of *Clytus* are found during the day upon flowers, and do not therefore seem to be nocturnal insects. During the month of September, *Clytus pictus* is often seen in abundance, feeding upon the blossoms of the golden-rod. If the trunks of our common locust tree, *Robinia pseud-acacia*, are examined at this time, a still greater number of these insects will be found upon them, and most often paired. The habits of this insect seem to have been known, as long ago as the year 1771, to Dr. John Reinholdt Forster, who then described it under the name of *Leptura Robinia*, the latter being derived from the tree which it inhabits. Drury, however, had previously described and figured it under the specific name which I have adopted, and which, having the priority, in point of time, over all the others which have subsequently been imposed, must be retained. The female deposits her eggs in the crevices of the

bark, the larvæ bury themselves beneath it before winter, and in the spring attack the solid wood, which they perforate deeply in various ways, but most usually in the direction of the fibres. The places of their operations are known by the oozing of the sap intermixed with the castings of wood, which are every now and then thrust backwards by the insects out of the external apertures. According to the observations of Gen. Dearborn, who has given an excellent account of this insect, the larvæ attain their full size by the 20th July, soon become pupæ, and appear in the perfect state early in September. Thus the existence of this species is limited to one year.

White-washing, and covering the trunks of the trees with grafting composition, may prevent the female from depositing her eggs on them ; but this practice cannot be employed to any extent. Perhaps it will be useful to head down young trees to the ground, with the view of destroying the larvæ contained in them, as well as to promote a more vigorous growth. In nurseries and plantations, much evil might be prevented, by employing children to collect the perfect insects while in the act of providing for the continuation of their species. A common black bottle, containing a little water, would be a suitable receptacle for them, and should be emptied into the fire in order effectually to destroy the insects. The gathering should be commenced as soon as the insects first appear, should be continued daily as long as any are found on the trees, and furthermore should be made a general business for several years in succession. I have no doubt, should this be done, that, by devoting one hour every day to this object, we may in time rid ourselves of this noxious insect.

The genus *Callidium* is nearly allied to that of *Clytus*. The head nods forwards ; the body is flattened ; the antennæ are proportionally longer than in *Clytus* ; the thorax is orbicular, not convex above, and is depressed or indented on the disc, and the thighs are much more swelled in the middle. I have never found any species upon flowers, though they are not uncommon in the day-time upon wooden buildings and fences. The larvæ do not differ much from other borers of this family ; they live in the trunks of trees, and in timber ; their passages are more or less tortuous, and are filled with castings of the wood as fast as the insects advance. The larva state is said to continue two years.

Two species are common both to this country and to Europe. One of them is *Callidium bajulum*. It appears to inhabit pine wood and timber, whence it is frequently met with on buildings in the months of July and August. We are informed by Kirby and Spence, that the larva sometimes does material injury to the wood-work of houses in London, piercing in every direction the rafters of the roofs, and, when arrived at its perfect state, even penetrating through sheets of lead which happen to cover the place of its exit. One piece of lead, only eight inches long and four broad, exhibited twelve oval perforations made by these insects; and lead was discovered in the stomachs of the larvæ.

The other species is *Callidium violaceum*, which Prof. Peck said he believed to have been introduced into Europe in timber exported from this country. It is exceedingly injurious to the sapling pines of Maine. The perfect insect makes its appearance about the last of May or the first of June.

Nearly allied to the family of capricorn beetles, is another which is called *Lepturiada*. The insects contained in it were included formerly in the genus *Cerambyx*, and many, if not all of their larvæ, are wood-eaters. In this family the antennæ are of variable length, and inserted between the eyes, which are not kidney-shaped, but are nearly round; the body is elongated, and more or less attenuated behind; the thorax is trapezoidal or contracted before, and resembles a truncated cone; the feet are like those of the capricorn beetles.

The only genus in this family to be noticed is called *Rhagium*, in which the antennæ are short, the eyes large and prominent, and the thorax has a large spine on each side.

The bark of the *Pinus rigida*, or pitch-pine, is often extensively loosened by larvæ at work beneath it, so that it falls off in large flakes, and the tree perishes. These larvæ feed between the bark and wood, and when they are about to become pupæ surround their bodies with a ring of woody fibres, and in this little cavity pass through their transformations. The perfect insect is fully formed before winter, and eats a passage through the bark in the ensuing spring. It is the *Rhagium lineatum*, of Olivier, which was thought by Mr. Say to be the only American species of the genus. There

is another species, however, closely allied to *Rhagium salicis* of Europe, and which was obtained by Mr. Leonard from the sill of an old door. This species does not appear to have been described, and I, therefore, would call it *R. decoloratum*, the elytra appearing as if their original color had faded away. It is highly probable that the other sex may have elytra of a blue color.

The *Crioceridæ* have some resemblance to the capricorn beetles. Besides some minute differences, they are distinguished by their short antennæ, composed of cylindrical or globose joints, which are of the same size or even larger towards the extremity ; the eyes do not surround the base of the antennæ ; the thorax is cylindrical ; and the body is of an oblong quadrate form ; the feet are shorter, but are furnished, like those of the cerambyx family, with cushions beneath.

In the genus *Crioceris*, the eyes are prominent, globose, with a minute notch in the anterior margin ; the joints of the antennæ are very short ; and the thorax is abruptly contracted in the middle. When held between the fingers, they make a sound like that of the capricorn beetles. They deposit their eggs in parcels of eight or ten together, on the leaves of plants. The larvæ are hatched upon these leaves. Their bodies are short and cylindrical ; their heads are horny ; and they have six feet. The vent is situated at the upper part of the posterior extremity, so that their excrement falls on the back, and, by the contraction and dilatation of the segments, is pushed forwards towards the head ; this process is repeated until the back is entirely coated with it. This covering shields their soft and tender bodies from the heat of the sun, and probably serves to secure them from the attacks of their enemies. When the mass accumulated becomes too heavy or too dry, the insect throws it off, but replaces it again in the course of two or three hours. In eating, the larvæ move backwards, never devouring the portion of leaf immediately before the head, but that which lies under it. In about a fortnight the larva attains its full size, crawls from the plant, enters the earth, and forms a little cell of grains of earth which are cemented and lined by a glutinous fluid emitted from the mouth. Fifteen days afterwards the perfect insect throws off its pupa skin, ruptures its cocoon, and ascends from the earth. The pupæ of the

second brood, which appears towards the end of summer, remain without change, till the ensuing spring, and then become perfect insects. Thus, in every year, there are two broods, the larvæ from which, when numerous, often do considerable injury to vegetation.

Crioceris trilineata is found on the leaves of the potato-vine. The parent insects, which have survived the winter in the pupa state, make their appearance early in June. The eggs are oblong oval, and of a yellow color, and are fixed on the leaves by a glutinous substance, which cements them securely in packets of six or eight in number. The larvæ soon appear, and begin their depredations. Their numbers are sometimes immense, and the leaves are then covered and nearly consumed by these filthy grubs. After they have passed through their metamorphoses, which are such as were stated in the account of the genus, the perfect insects again appear. This occurs during the month of July, and the eggs for the second brood are then deposited, from which a continuation of the species in the following year, is secured, the larvæ entering the earth before autumn, and the pupæ remaining quiescent till spring.

The insects belonging to the family of *Cassidada* have the feet spongy beneath as in the three preceding families ; but the eyes are oval ; the antennæ are short, and situated near each other at a distance from the mouth, or between the eyes ; the nails are simple at the points, and not much curved.

In the genus *Hispa*, the antennæ are very short, and are thickened towards the ends ; the thorax is trapezoidal, its anterior edge being the shortest ; and the body is rough or spinous. The habits of this genus are very peculiar, and no account has as yet been given of them by any European naturalist. The perfect insect is found in the spring on the leaves of trees. It deposits from one to four or five eggs on the upper surface of the leaf. The larva, when hatched, penetrates under the cuticle and devours the parenchyma or pulpy part of the leaf, so that the cuticle over its retreat turns brown and dies. The larvæ of those species which are known to me are about one-fifth of an inch in length, when fully grown. The body is oblong, flattened very much, rather broader before than behind, of a whitish color, except the head and first segment, which are of a darker color and horny consistence. It has three pairs of feet, and the segments

of the body project at the sides, being there surmounted with minute tubercles. The pupa state takes place in the leaf, and continues about one week, when the perfect insect bursts from its confinement and escapes into the air.

Hispa rosea devours the tender leaves of the apple tree, and its larvæ are found also in the leaves of that tree in July. *Hispa suturalis* attacks the leaves of the *Robinia pseudacacia*, or locust.

The genus *Cassida* is distinguished for its shield-shaped body, whence it derives its name. The head is covered by the semicircular thorax ; the antennæ are about the length of the thorax ; the body is convex above and flat beneath. The larvæ live on the leaves of plants. They have three pairs of legs ; their body is oval, and flattened, or but slightly convex above, and armed at the sides with spines, and the tail is terminated by two considerably longer than the rest, forming a kind of fork. This fork serves to retain the excrement when voided, and a mass is often thus accumulated which equals half the body in magnitude. The tail, with the loaded fork, is recurved over the back, and thus protects the insect from the sun, and probably also from its enemies. When the pupa state approaches, the larva fixes the hinder part of its body firmly to the leaf, the skin over the anterior extremity is longitudinally rent, and is gradually slipped backwards. The pupa has some spines near the tail which secure it to the cast-skin ; its body also is furnished with four long teeth-like projections on each side. The pupa state continues only a few days.

Cassida aurichalcea appears to be appropriated to different species of *Convolvulus*, though it is occasionally found on *Solanum dulcamara* ; it occurs in great abundance on the *Convolvulus sepium*, and on the sweet potato-vine. The leaves of these plants are devoured both by the larvæ and perfect insects. The latter appear first during the months of May and June, having probably survived the winter in the perfect state, in some place of concealment. The first brood of larvæ arrive at their growth and are metamorphosed into pupæ, and subsequently into perfect insects, early in July, when a second brood is produced, from which proceed the insects found in spring. In June, 1824, Mr. Lowell sent me specimens of this little beetle, which he found to be injurious to the sweet potato-vine,

by eating holes through the leaves. When living it has the power of changing its hues, at one time appearing only of a dull yellow color, and at other times shining with the refulgence of polished gold. To ascertain the immediate source of this voluntary and evanescent brilliancy, we must examine the structure of the insect. The elytra or wing-cases, the parts which exhibit the phenomenon, are lined beneath with an orange-colored paint, which seems to be an organized substance. On examining it with a microscope, several large vessels may be perceived running to the tip from the base of the elytra, where they appear to communicate with the abdomen. These vessels ramify in the orange-colored substance, and seem finally to terminate in numerous points with which the elytra are studded. It may be remarked, that the external margins of the elytra never exhibit any change of color; they are, in fact, destitute of the paint, and are nearly transparent. The disc of the elytra appears also quite diaphanous when this colored substance is removed by a knife. And further, the color of the paint is most vivid when the insect is most effulgent, more faint when the lustre is temporarily withdrawn, and quite dull when the insect is dead. This organized substance, then, is the immediate source and seat of the corruscation. Those insects which shine in the night are provided with a set of organs which secrete a luminous fluid. This insect, however, is brilliant during the day, and its internal structure is so delicate as to defeat any attempt to investigate it. The remote cause, therefore, is at present obscure. It may, perhaps, be referred to a secreted fluid, which the insect at will propels into the vessels that ramify in the pigment, which, when thus injected, would become more opaque, and would produce a different reflection of light. If such a fluid really exists, which is very probable, it must have its appropriate glands or secreting organs within the abdomen. How extremely minute and how wonderful then must be their organization, since it is not perceptible by the microscope, and is known only by its beautiful effects. These undoubtedly answer some important end, as they are closely connected with the existence of the insect, and evidently appertain to the functions of vitality.

The last family of Coleopterous insects which will be examined may be called *Galeruciadæ*. It is characterized by having the feet

spongy beneath ; the eyes oval or globose ; the antennæ of moderate length, approximated at their base, and inserted before the middle of the face, near the mouth ; the thorax transversely quadrate, or but slightly narrowed in front ; and the nails divided at their points, or toothed beneath.

In the genus *Galeruca*, the antennæ are rather shorter than the body, and composed of obconical joints ; the posterior thighs are not formed for leaping ; the nails are bifid at their points ; the body is oblong quadrate, and slightly flattened above : and the thorax is most often uneven or indented. Many of these insects, both in the larva and perfect states, devour the leaves of plants. They often occur in great numbers, and then commit devastations as extensive and injurious as those of any other noxious insects. Some of the species are known to metamorphose on the plants which they inhabit ; others become pupæ in the earth.

The cucumber-bug belongs to this genus. It is called *Galeruca vittata*. At first sight it appears much like the potato-insect (*Crioceris trilineata*,) being nearly of the same shape and size, with the stripes similarly disposed. On examination, however, it will be seen that it is of a paler color, and that the thorax is differently formed. This bug, or more properly beetle, makes its first appearance on the cucumber, squash, and melon vines, about the last of May and first of June, or as soon as the leaves begin to expand. Its injuries are often very great, and various means have been tried to prevent its attacks. Dr. Barton recommended sprinkling the vines with a mixture of tobacco and red pepper, which he says is more beneficial than any other method. Others have advised watering the vines with a solution of one ounce of Glauber salts, in a quart of water. Mr. Gourgas, of Weston, has found no application so useful as ground plaster ; and a writer in the American Farmer extols the use of charcoal dust. The Rev. Dr. Harris, some years since, advised making fires in the night in gardens and orchards for the purpose of attracting and consuming noxious insects, and this plan has proved successful in destroying the cucumber-bug. The staves of old tar-barrels, or pit - pine knots, split into small pieces are the best materials for making these fires. Many cover the vines with millinet, stretched on small frames. Such an exterminating war has been

waged with these insects, that I have had no opportunity of learning their history or metamorphosis. The eggs and larvæ, although frequently sought for, have escaped my researches. But the habits are presumed to be similar to those of *G. puncticollis*, which is found in profusion on the common *Salsola*. The larvæ of this species live in the earth, and feed on the roots of the *Salsola*, and do not leave the earth until they become perfect insects.

In the genus *Haltica*, the antennæ are about half the length of the body; the posterior thighs are thickened and very robust, being formed for leaping; the nails are very much curved at their points, with a strong blunt tooth extending from beneath the base to the middle; the body is oval and convex. These insects infest the oleraceous plants, perforating their leaves with innumerable small holes. At the approach of the finger they leap with surprising agility. Many of them are minute.

Their eggs are deposited on plants on which the larvæ are destined to feed. The larvæ are elongated and furnished with six feet. When about to become pupæ they fix themselves upon the leaves by means of a tubercle at the posterior extremity. The larva-skin is then thrown off, and remains in a mass beneath the tail of the pupa; and in about fifteen or twenty days more the last metamorphosis takes place, and the perfect insect makes its appearance. It conceals itself during the winter in some secure place, and survives the cold.

The most destructive species in this vicinity is that which attacks the cucumber as soon as it comes from the ground. Supposing this to be an undescribed insect, I formerly named it *Haltica cucumeris*; but Mr. Say subsequently informed me that it was the *pubescens* of Illiger.

Another species, *Haltica striolata*, is found on cruciferous plants, such as the cress, the horse-radish, the mustard, turnip, &c. It is first seen early in May. During the night, and in rainy weather, it lodges itself in the ground. It is very pernicious to young plants, attacking them as soon as the seed-leaves or cotyledons expand.

Dusting the plants with air-slacked lime, is useful in preventing the attacks of this and the preceding species. Watering plants, infested by them, with strong alkaline solutions, will kill the insects

without injuring the plants. The solution may be made by dissolving one pound of hard soap in twelve gallons of the soap-suds left after washing. This mixture should be applied twice a day with a water-pot.

The insects, whose habits I have now attempted to describe, are but a very small number of those, belonging to the order *Coleoptera*, which are injurious to vegetation. I have selected chiefly such as are the most remarkable, and as would best serve to illustrate the different families and genera to which they belong. Seven more orders remain to be treated in the same way, to carry out the plan upon which this report has been begun. Probably none of them will require to be considered so much in detail as this order, which presents a greater variety in the forms and habits of the individuals included in it, as well as a much greater number of species, than all the other orders. If, however, you take into consideration the devastations of grasshoppers, bugs, plant-lice, locusts or cicadæ, slugs, caterpillars, and maggots, you will readily perceive, that ample materials for another report are still left.

It is well known, that there is no work, in our language, on this branch of natural history, either scientific or popular, which will serve as a manual or introduction to the knowledge of *our own insects*. Detached descriptions there are, it is true; but they are available only to a few persons, and not to the great body of the people. Most of the works on Entomology, in America, consist of short treatises, compilations, or abridgments, originally published in England, and adapted exclusively to that country. Many of the most valuable publications on this subject are very expensive, and are wholly beyond the means of persons of moderate income; many, also, are printed in languages which are not generally understood by us. Even these, valuable and essential as they are to the professed Entomologist, would not supply the particular wants of our own countrymen. It is greatly to be regretted, furthermore, that our public libraries are so deficient in works on this branch of science. In these repositories of learning, we ought to find all the larger, more expensive, and general works, which are necessary for the illustration of every department of science. A scholar can no more labor in his peculiar vocation without books, than a mechanic can without tools;

and, if his own resources are not sufficiently ample to provide him with all that he wants, he ought to be able to find them in those public institutions where they properly belong. The father of physic has said that “life is short and art is long;”^{*} why, then, should the student of nature spend the better portion of his life in making investigations and discoveries, which, were the means within his reach, he would find already recorded? Why should he be compelled to keep back the result of labors, upon which he had hoped to establish a reputation, for the want of the proper aids to enable him to put them into a scientific shape, until he shall have the mortification to find, that he has been anticipated in the publication of his discoveries by the more favored votaries of science in another land? America has been overrun by foreign naturalists and collectors, in almost every direction; it seems to have been looked upon by them, as common ground, open and free to every laborer; they have already reaped a glorious harvest from it, and only the gleanings remain to reward our toils.

I have no wish to overstate the difficulties and obstacles, which, individually, I have encountered; and only advert to them now in order to call attention to the subject, and in the hope that they will be received as some apology for the very imperfect manner in which I have performed the duty assigned to me. Should the commission, under which you, Sir, have acted in calling upon me for a report on the insects of this Commonwealth, be renewed, and should my services again be required, I shall cheerfully respond to the call. To Massachusetts belongs the credit of having been the first to procure an investigation of the animal, vegetable, and mineral productions of a whole state, at the public expense; and the various surveys and reports, which have been made during several years past, are a gratifying proof of the wisdom, public spirit, and liberality of the government by which they have been authorized. To develop the internal and natural resources of our country, to promote the diffusion of knowledge, and to render science popular and available in contributing to the comfort and happiness of the people, are objects deserving all the encouragement which can be given to them. It

* Hippocrates. Aphorism 1.

will be a source of satisfaction to me, if my own humble efforts can contribute any thing towards so great an object; and, with this assurance, I beg leave to submit the foregoing report;

And subscribe myself,

Sir,

Very respectfully,

Your friend and servant,

T. W. HARRIS.

CAMBRIDGE, MASS.,

April, 1838.

ERRATA.

Page 58, line 16, for chord read cord.
 " 61, " 23, " appeared " appear.
 " " " 35, " *Virginiensis* " *Virginiana*.
 " 64, " 27, " *Melonontha* " *Melolontha*.
 " 72, " 18, " prays " preys.

DR. GOULD'S REPORT.

BOSTON, April 10, 1838.

TO GEORGE B. EMERSON, ESQ., *Chairman of the Commission for the Botanical and Zoological Survey of the Commonwealth:*

DEAR SIR:—On receiving my appointment in June last, I commenced with redoubled effort to collect and study the animals assigned me, and which had already for a long time engaged my attention, viz., the Crustacea, Testacea and other Mollusca, Annelides, and Radiata. So large a portion of the Animal Kingdom, inhabiting even so circumscribed a field as the coast and territory of Massachusetts, would be but imperfectly examined by the entire labors of a long life. Most of these animals inhabit the sea; and consequently, very few persons ever have opportunity to examine, or even to see them. As therefore very little attention has been given to them, scarcely a step has been taken which has not presented something before unnoticed.

It cannot be expected, that much that is interesting can be said, of an economical or commercial nature, of such objects as Lobsters, Oysters, Shells, and Worms. Being aware of this, I undertook this part of the survey, on the presumption that the State was desirous of contributing to general science by causing to be collected, described, and illustrated, any objects not hitherto named; and that known species which might be discovered within the limits of the Commonwealth, should be added to our very imperfect catalogue. In this view alone is an examination of these families important. The scientific man alone is capable of appreciating the observations and discoveries made in this department. The theories of the geologist, and the practice of the agriculturalist, are however, in-

timately connected with a knowledge of the nomenclature, sources, and properties of these lower animals ; and thus, every fact regarding them is, ultimately, of advantage to the community at large.

I have, therefore, made it a point to compare every object which I have observed with scientific descriptions and figures, where I could find them, that I might verify or correct them ; or else to describe and figure them myself. The number of objects which have come to hand has been so great, that in many of the families the catalogue has been more than doubled, and in all greatly augmented, within the few months since my commission was received. These scientific details would of course be too dry to interest any but professedly scientific men. But they have been collected with the hope that when our labors shall end, they may be embodied, published, and properly illustrated, as a contribution to science.

There are some facts, however, connected with the objects of my study, which are of interest to the citizens generally ; and to these particular attention has been directed. The Lobster, Oyster, and Clam trade, is an item of no inconsiderable importance in our statistics. Numerous vessels and many hundred men are constantly employed in it. Measures have been taken to obtain an accurate statement concerning this branch of industry ; but as an entire year has not yet revolved, no complete view can at present be given.

Attention has also been directed to the different kinds of Leeches which are found in our waters, with the hope of aiding their introduction in place of the foreign Leeches, which have become of such extensive use among us, although commanding a high price.

As I have been more particularly engaged in the study of the Shells during the last year, I would subjoin the following list of species which may now be added to the last catalogue published by the State two years since, besides at least twenty species yet undetermined ; and I may state that additions to the other classes have been proportionally numerous.

Above all, I am striving to collect a complete series of all the objects which can be preserved, so that they may all be viewed and examined in a body. Such a collection I deem to be of great value, and certainly demands much labor.

<i>Mya truncata</i> , Penn.	<i>Bullina canaliculata</i> , Say.
<i>Thracia Conradi</i> , Couthouy.	<i>Bulimus lubricus</i> , Penn.
<i>Tellina sordida</i> , Couthouy.	<i>Physa elongata</i> , Say.
“ <i>tenera</i> , Say.	<i>Valvata tricarinata</i> , Say.
<i>Cryptodon flexuosa</i> , Turton.	<i>Paludina canaliculata</i> , Gould, MS.
<i>Mesodesma Jauresii</i> , De Joannis.	“ <i>lustrica</i> , Say.
<i>Venus fluctuosa</i> , Gould, MS.	<i>Oxinöe glabra</i> , Couth.
<i>Cardium pubescens</i> , Couth.	<i>Scalaria Nov-Angliæ</i> , Couth.
<i>Nucula thraciæformis</i> , Storer.	“ <i>subulata</i> , Couth.
“ <i>lævigata</i> , Gould, MS.	<i>Natica immaculata</i> , Totten.
“ <i>myalis</i> , Couth.	“ <i>consolidata</i> , Couth.
“ <i>tenuisulcata</i> , Couth.	<i>Actæon trifidus</i> , Totten.
<i>Modiola pectinula</i> , Gould, MS.	“ <i>convoluta</i> , Gould, MS.
“ <i>discors</i> , Lin.	<i>Jaminia exigua</i> , Couth.
“ <i>discrepans</i> , Montagu.	<i>Lacuna neritoidea</i> , Gould, MS.
<i>Terebratula septentrionalis</i> , Couth.	<i>Turbo incarnatus</i> , Couth.
“ <i>thalassina</i> , Gould, MS.	“ <i>cinereus</i> , Couth.
<i>Chiton fulminatus</i> , Couth.	“ <i>obscurus</i> , Couth.
“ <i>sagrinatus</i> , Couth.	“ <i>aculeus</i> , Gould, MS.
“ <i>Emersonii</i> , Couth.	<i>Turritella erosa</i> , Couth.
“ <i>pectinatus</i> , Gould, MS.	<i>Pyramis striatula</i> , Couth.
<i>Patella candida</i> , Couth.	<i>Cancellaria buccinoides</i> , Couth.
<i>Rimula Noachina</i> , Lin.	<i>Trichotropis costellatus</i> , Couth.
<i>Galericulum ovatum</i> , Brown.	<i>Pleurotoma bicarinata</i> , Couth.
“ <i>lævigatum</i> , Brown.	<i>Fusus pleurotomarius</i> , Couth.
<i>Bulla insculpta</i> , Totten.	“ <i>harpularius</i> , Couth.
“ <i>triticea</i> , Couth.	<i>Murex turriculus</i> , Montagu.
“ <i>lineolata</i> , Couth.	“ <i>scalariformis</i> , Gould, MS.

Presuming that a final report would not be expected of us at this time, I have thus reported progress ; and unite in what I know to be the desire of all engaged in the survey, in wishing that yet another year may be granted us, during which we may hope to observe all the prominent objects in the State.

Very respectfully, your ob't. servant,

AUGUSTUS A. GOULD.



REPORTS

ON THE

FISHES, REPTILES AND BIRDS

OF

MASSACHUSETTS.

PUBLISHED AGREEABLY TO AN ORDER OF

THE LEGISLATURE,

BY THE COMMISSIONERS ON THE ZOOLOGICAL AND BOTANICAL

SURVEY OF THE STATE.

Boston:

DUTTON AND WENTWORTH, STATE PRINTERS.

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1839. .

INTRODUCTION.

ON the 3d of March, 1830, a resolve passed the Legislature of Massachusetts, authorizing a general Trigonometrical Survey of the Commonwealth. This was followed, on the 5th of June of the same year, by a Resolve, introduced at the suggestion of Governor Lincoln, authorizing him to appoint a "suitable person to make a Geological Examination of the Commonwealth, in connexion with the General Survey."

Under this Resolve Prof. Hitchcock was appointed, and the manner in which he accomplished its objects is shown by his admirable Report, published in 1833.

In conformity with a Resolve of the Legislature, of February 2d, 1831, he was directed "to cause to be annexed to his report, a list of the native Mineralogical, Botanical and Zoological productions of the Commonwealth, so far as it may be practicable to ascertain the same, within the limits of the appropriation already made."

In the execution of this part of the commission, he received and acknowledged the "assistance of several gentlemen distinguished for their acquaintance with particular branches of natural history." The catalogues which were formed, were, in almost every instance, the first complete catalogues of the productions of the State, which had been attempted. In Botany, very full ac-

counts had previously been given of the plants of particular districts ; of the plants about Boston, by Dr. Bigelow ; of those in the vicinity of Amherst, by Prof. Hitchcock ; of the plants of Berkshire, by Prof. Dewey. In Ornithology, very much had been done by Audubon, Wilson and Bonaparte, and still later by Nuttall. The catalogues in these departments are consequently vastly the most full and satisfactory. Many of the shells had been described by Say, and of the quadrupeds by Godman and others. But in most of the departments scarcely any thing had been done towards the formation of a complete list.

It was an important step to collect together and publish the catalogues, such as they were. Although, as Prof. Hitchcock had anticipated, they were far from being perfect or complete, they led immediately to inquiries amongst the naturalists in various parts of the State. And many names were soon added to the catalogue by members of the Boston Society of Natural History, and by others.

A view of these facts, and of the great importance of a full acquaintance with the natural productions, of all kinds, of our State, led to the desire, on the part of many intelligent citizens, that a more full survey should be attempted. Agreeably therefore to the suggestion of Governor Everett, on the immediate occasion of a letter from Professor Hitchcock to him, recommending that the geological survey should be prosecuted, and a more full botanical and zoological survey be made, the subject was called up in the House of Representatives, and a very respectable committee appointed, to take it into consideration. This committee, after conferring

with a committee of the Boston Society of Natural History, reported in favor of a more full survey, and a resolve to the following effect was adopted :

“ *Resolved*, That his Excellency the Governor, with the advice and consent of the Council, is hereby authorized and requested to appoint some suitable person, or persons, to make a further and thorough Geological, Mineralogical, Botanical and Zoological Survey of this Commonwealth, under his direction, particularly in reference to the discovery of Coal, Marl, and Ores, and an analysis of the various soils of the State, relative to an Agricultural benefit. And he is hereby authorized to draw his warrant, from time to time, upon the treasurer of this Commonwealth, for any sum not exceeding two thousand five hundred dollars, for the foregoing purposes. Approved 12th April, 1837.”

For the execution of this Resolve, Prof. Hitchcock of Amherst, was appointed by Gov. Everett, to continue the Mineralogical and Geological Survey ; and Geo. B. Emerson of Boston, President of the Boston Society of Natural History, Chester Dewey, Professor of Botany, Materia Medica, &c. in the Berkshire Medical Institution, Ebenezer Emmons, M. D., Prof. of Natural History, &c. Williams College, Rev. Wm. B. O. Peabody of Springfield, T. W. Harris, M. D., Librarian in Harvard University, D. H. Storer, M. D., and A. A. Gould, M. D. of Boston, Curators in the Boston Society of Natural History, were commissioned to take charge of the Botanical and Zoological Survey.

In the letter of Governor Everett, accompanying the commission for the latter survey, the chairman was instructed to confer with the other gentlemen on the commission, that separate portions of the work might

be distributed, by mutual agreement, according to the preference of the individuals associated in the Survey.

A hope was expressed that, inasmuch as many portions of the Natural History of the Commonwealth had already been so well explored, the Survey might be completed within one year. And the following instructions were given, explanatory of the view taken by the Executive, of the precise object of the Survey.

“ It is presumed to have been a leading object of the Legislature, in authorizing the Survey, to promote the agricultural benefit of the Commonwealth, and you will keep carefully in view the economical relations of every subject of your inquiry. By this, however, it is not intended, that scientific order, method, or comprehension should be departed from. At the same time, that which is practically useful will receive a proportionally greater share of attention, than that which is merely curious ; the promotion of comfort and happiness being the great human end of all science.”

The commission for this part of the Survey bore the date of June 10, 1837. As soon after this as it could conveniently be accomplished, an arrangement was agreed upon, by which Prof. Emmons undertook to report upon the Mammalia, Dr. Storer upon the Fishes and Reptiles, Mr. Peabody upon the Birds, Dr. Harris upon Insects and Araneides, Dr. Gould upon the Mollusca, Crustacea and Radiata, Prof. Dewey upon the Herbaceous Plants, and Mr. Emerson upon the Trees and other Ligneous Plants.

Agreeably to a plan proposed by the Chairman, and cordially assented to by every member of the Commission, it was agreed that, instead of confining themselves to completing the catalogue of the objects in the seve-

ral departments, each commissioner should endeavor, as far as possible, to study and describe every new object which should present itself in his own department, and where the descriptions already given were incomplete, or unsatisfactory, or contained in books not of easy access to the public, to re-describe, or make additions or changes, such as should seem best.

It was immediately seen that no final reports, that would be satisfactory, in this view of the work, could be made within the limits of a single year. Partial reports were therefore made by the five Commissioners on the Zoological departments, which, with a letter from the Chairman, were ordered to be printed; and leave was asked and obtained, by all the Commissioners, to defer their reports for another year.

The Legislature, with that liberality which had given rise to the original Survey, and which is the best and most lasting distinction of enlightened governments, ordered the Survey to be continued, and appropriated to it such a sum as was thought sufficient to carry it into effect.

It is a gratifying reflection to the sons of Massachusetts, that this liberality has, from the beginning of its history been its distinguishing characteristic. In those early days, when, as a feeble colony, it was struggling for existence, it made what, considering its means, were magnificent appropriations for the education of its children; for the developement of its intellectual resources. And, at every period, acting in the same spirit, it has made its schools and colleges, prominent and favored objects of legislative patronage.

It is but recently that the *physical* resources of a country have, any where, been an object towards which

the attention of its government has been directly turned. In most of even the farthest advanced of the monarchies of the old world, the earth and its mineral treasures, and the animal and vegetable productions of its surface, and of the sea, have been left to the unfostered attention, or to the unrebuked neglect of private intelligence or ignorance. In a few favored spots, a different and wiser course has been pursued. In France, in some of the northern kingdoms, in several states of Germany, and especially in Great Britain, large sums have been expended, and already very much has been done, to ascertain and bring to notice the advantages and wants, the peculiarities of every kind, of the land and sea, and their productions. And the resources developed have uniformly seemed to increase in proportion to the extent and minuteness of the investigation. New objects have been presented to the industry, and new sources of wealth opened to the enterprise of the inhabitants. So that, if we look through the world, we find that it is not those countries whose natural resources are apparently greatest, which support the most wealthy and advanced population, but those in which the natural resources, whatever they may be, have been explored, and laid open to the greatest extent.

It need not be repeated, that this truth, of such acknowledged importance under all governments, is of still more weighty consideration in a republican country than in any other. In free states like Massachusetts, as every where else, and still more than any where else, the fountains of the wealth and advancement of the people lie in their intelligence, skill, and industry, applied to the resources of the country. In them, therefore, every possible resource for their present and prospec-

tive welfare, should be laid open. And the facts presented by a full survey of the natural productions of the State, can hardly fail to bring direct advantages, for the present and for the future.

The survey of the forests of Massachusetts, making known to the whole community the important fact that a greater variety of valuable trees is to be found within its limits than are known as native in the whole of Europe; that it is wastefully and wantonly destroying a forest, which any enlightened country in Europe would willingly bestow a treasure to create; that its climate and soil are well suited to many of the most valuable trees of other temperate countries, and that already there are thousands of acres lying barren and unimproved, which might easily be clad with a flourishing growth of trees, cannot but excite the attention of some of those who have it in their power to arrest this evil and to avail themselves of these truths.

The survey of the shrubs, and herbaceous and other plants, may, in like manner, be of great use, by showing that there exist materials for improvements in agriculture, and for use in many of the arts and in medicine, which might be substituted for others now imported from abroad. If, for example, it should appear that the wild rice, so valuable to the native indians of the western lakes, and which, without being known, occurs in many parts of the State, is capable of being cultivated in intervalles now overflowed and producing only sedge and worthless grasses, and of being used as a substitute for oats as fodder, the fact would not be lost upon an agricultural community like ours. So the statement of the fact that lichens exist, similar to those which are much employed and highly valued in dying, and that our sea walls

are covered with the same fuci which have converted barren rocks in Scotland into sources of immense wealth, might lead to important results.

The great resources of our State in its fisheries are already known. It cannot, however, be without its use, even in an economical point of view, at the moment when, by the opening of new markets, they are becoming still more valuable, to review their extent and examine the details. There are those now living, who remember the time, when, along a great portion of the New England coast, the halibut, when taken, was thrown away; and the use of the flesh of the swordfish and skate, is of recent introduction. Several kinds of fresh-water fish are rejected in some parts of the country which are considered good eating in others.

The examination of the habits of birds has led intelligent persons to the conclusion, that it is doubtful, at least, whether a single one is found in Massachusetts which does not more good than harm to the farmer; and has made it certain that many, now looked upon as enemies, are friends, of such importance, that without them the business of husbandry could not go on.

How many groundless fears will be removed from the minds of anxious parents by a knowledge of the fact that only a single venomous serpent is known to exist in Massachusetts, and that one confined to certain districts; and that all newts, tortoises, and other reptiles are perfectly harmless.

The examination of the insects is held by all to be a matter of the greatest moment. There are multitudes whose habits are known so imperfectly, that we can do absolutely nothing towards their extermination, and which, were it not for the birds and reptiles, would

probably increase to such a degree as not only to render the labors of the cultivators wholly unavailing, but to cut down and destroy the native forests. It is surely good policy to secure the cooperation of men of science against enemies so formidable and so irresistible. The observations of Linnæus saved the timber, in the dock-yards of Sweden, from ruin. It is not impossible that living or future observers may show us the means of protecting the locust from the borer and the apple tree from the canker worm.

The reports contained in the present volume were presented to Governor Everett, during the session of 1838-9, and ordered to be printed and distributed by the following Resolve of April 9th, 1839 :

“ *Resolved*, That the governor is hereby authorized to procure the publication of fifteen hundred copies of the reports which he has received, or may hereafter receive, under the resolve of the twelfth of April, in the year one thousand eight hundred and thirty-seven, providing for a further geological, mineralogical, botanical and zoological survey of the Commonwealth ; and to draw his warrant, with the advice and consent of the council, upon the treasurer of the Commonwealth, for such sums as may be necessary for that purpose.

“ *Resolved*, That the said copies, when published, be delivered to the Secretary of the Commonwealth, to be distributed in the following manner : twelve copies to the governor ; six copies to the lieutenant governor ; one copy to each member of the council, senate, and house of representatives ; one copy each to the secretary, treasurer, and to each clerk and chaplain of the two houses ; one copy to the secretary and one to each member of the board of education ; twenty copies to the

geological surveyor, and ten to each commissioner appointed under the resolve of April 12, 1837; five copies to be deposited in the library of the State; one copy to each town in the Commonwealth; two copies each to Harvard, Amherst, and Williams colleges; one copy each to the theological seminaries of Andover and Newton; one copy to each incorporated atheneum, lyceum and academy in the Commonwealth; one copy to the American Academy of Arts and Sciences; one copy to the Antiquarian Society at Worcester, and one to the Pilgrim Society at Plymouth; one copy to the Massachusetts Historical Society, and to every other incorporated historical society in the Commonwealth; one copy to the State Lunatic Hospital at Worcester; one copy to the Boston Society of Natural History; one copy to the Essex County Natural History Society; one copy each to the Massachusetts and Salem Charitable Mechanic Associations; one copy to the library of the East India Marine Society, in Salem; two copies to the library of the United States; one copy to the executive of each state in the Union; one hundred copies to be placed at the disposal of the governor, and the remainder to be subject to the further order of the Legislature. [April 9, 1839.]”

G. B. E.

Boston, Aug. 13, 1839.

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REPORTS
ON THE
ICHTHYOLOGY AND HERPETOLOGY
OF
MASSACHUSETTS.

BY D. HUMPHREYS STORER, M. D.

FELLOW OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES; MEMBER
OF THE BOSTON SOCIETY OF NATURAL HISTORY; CORRESPOND-
ING MEMBER OF THE ACADEMY OF NATURAL SCIENCES
AT PHILADELPHIA, &c. &c.

TO GEORGE B. EMERSON, ESQ.,

Chairman of the Commissioners for the Botanical and Zoological Survey of the Commonwealth.

DEAR SIR :

In presenting the accompanying Report upon the Fishes of Massachusetts, I will offer no apology for the manner in which the duty has been performed, conscious that all available opportunities have been improved, and every effort has been made to render it worthy the approbation of those by whose suggestion it was undertaken. I must, however, be allowed the privilege of showing why more has not been done—why a larger number of species has not been collected and described—why, in a word, a nearer approach has not been made to a perfect catalogue of our Ichthyology. In June, 1837, I received, with several other gentlemen, an appointment as Commissioner to prosecute the Zoological Survey of the State. So trifling were these tasks considered,—so much was supposed to have been already done by the gentlemen who had furnished the previous catalogues, that the Commissioners were expected to perform their respective duties in a single season. To prepare a catalogue of our Fishes in a single year, I felt was impossible—but, at the same time, was willing and ready to do all in my power towards the accomplishment of so desirable an object. I at once commenced my labors, by writing to all parts of the State from whence I could hope for the slightest aid, and by engaging upon the spot the services of intelligent fishermen. I had thus labored for months, almost despairing of accomplishing any thing satisfactorily, when, in the latter part of that year, it was intimated that another season would probably be allowed the Commissioners for a continuance of their investigations. Having found the previous catalogue, upon examination, so exceedingly erroneous and defective that no reliance could be placed in it, and consequently that no reference could be made to the fishes therein contained, I at once determined to attempt the formation of another, entirely independent of it. To make a catalogue, however, without at the same time furnishing some characters by which species could be recognised, would be presenting a

mere list of names—perfectly useless. I had then no alternative left me save to collect and minutely describe every individual species. Many of the species described by Mitchell, in his “*Fishes of New York*,” and by Le Sueur, in his various papers, inhabit our waters; but as the *history* of the former is contained in the volume of a Society’s Transactions, which is very difficult to obtain—and the *contributions* of the latter are distributed through the pages of scientific journals equally inaccessible to the general reader, I have described anew, without regarding the previous accounts, every species which has fallen under my observation. Since December, 1837, but a little more than a year, all the descriptions have been written. Could I have known, at first, that two seasons would have been allowed us for the prosecution of our labors, better specimens might in many instances have been procured for description—and the hurried manner, in which several of the descriptions have been necessarily written, would have been avoided.

Want of sufficient time, then, is my only excuse for not having done what time alone could accomplish. Without the assistance of kind and attentive correspondents and friends, I could have done literally *nothing*. Constantly confined by professional avocations, you will at once perceive that I have depended entirely upon others to collect and preserve the materials—endeavoring myself only to distinguish, arrange and describe them. To each and every individual who has aided me, I have given credit in his appropriate place—and I trust, the name of no one, through inadvertence, has been omitted.

To the following gentlemen I feel under peculiar obligations :

Thomas Kidder, Esq., of the General Inspection Office, Boston, for his polite attentions in furnishing me with all the statistical information in his power, regarding the quantities of fish inspected in the State ;

C. R. Vickery, Esq., of Taunton, for his very acceptable remarks respecting the fisheries of Taunton river ;

Hiram Hosmer, M. D., of Watertown, for his numerous and valuable facts concerning the fisheries of Charles river ;

Elisha Bartlett, M. D., of Lowell, for his interesting account of the fisheries of the Merrimack river ;

J. B. Forsyth, M. D., of Sandwich, for much useful information respecting the fishes taken along “the Cape ;”

Jonathan Johnson, Esq., of Nahant, for several very rare species—and many useful observations concerning more common fishes.

To Capt. Nathaniel Blanchard, of Lynn, and Leroy M. Yale, M. D.,

of Holmes' Holc, I am most deeply indebted; to the *former*, for his constant and unwearied efforts to serve me amid the fatigues of his arduous profession, during the entire period I have been engaged in this survey, and for many judicious remarks and valuable details imparted to me;—and to the *latter*, for his *invaluable aid*—for which I am not only obliged for specimens of nearly *one fifth* of all the species I have described, and which, but for him, I could not have procured, but also for many specimens of more common species, and much valuable information respecting them.

My friend Jeffries Wyman, M. D. has kindly enriched my pages with very accurate plates of the *Aspidophoroides monopterygius*, *Syngnathus Peckii*, *Platessa ferruginea*, *Orthogoriscus mola*, and *Lamna punctata*.

Inasmuch as unavoidable errors, of greater or less importance, may be detected by the scientific critic in this report, you will excuse me, when I add, that in *its preparation* I have been entirely unaided. Not knowing a single ichthyologist in New England to whom, in cases of doubt, I could refer for advice and instruction, I have been compelled to rely wholly upon myself.

The small number of new species here presented may surprise you. Disgusted with the mania so common among naturalists to form species out of mere varieties, thus casting confusion upon their favorite pursuits, and bringing odium upon themselves, I have endeavored to avoid this error—and may have carried the feeling so far, that some of the species, catalogued here as having been previously known, may, at a future period, be considered new. If, in this respect, I have erred, my descriptions will in themselves correct me.

Throughout the whole of this report I have avoided all reference to a "*Natural History of the Fishes of Massachusetts*," published in Boston, in 1833—and also, to the "*Catalogue of the Marine and Fresh water Fishes of Massachusetts*," prepared by the same author, and contained in *Professor Hitchcock's Report*, published in 1835. Were I to pass these by in perfect silence, I might be accused of neglecting the labors of my predecessor. To prevent such an imputation, I am reluctantly compelled to explain. Besides, in the *Catalogue* above referred to, 108 species are registered—while your Commissioner has been able to distinguish with accuracy, but 107 species. Rev. Leonard Jenyns, in his "*Report on the recent progress and present state of Zoology*," contained in the "*Fourth Report of the British Association for the advancement of Science*," makes the following observation,

which is so perfectly appropriate to the "*History*" and the "*Catalogue*," that I cannot refrain inserting it here:—"Faulty catalogues, or even works of a more elaborate kind, if merely compiled from other authors, are utterly worthless." The "*Catalogue*" was drawn up two years after the "*History*" was published—if, therefore, the following remarks should show numerous and glaring errors to pervade the former, the value of the latter may from it be inferred.

The catalogue of our fishes in "*Hitchcock's Survey*," purports to contain 57 genera and 108 species. Of these, I have *seen* but 33 genera, and *heard* of 4 more, making 37 genera.

Of the 108 species there detailed, I know of but 29, which are correctly catalogued—and in several instances *varieties* of a fish are registered as *species*. Thus, the *Gadus morrhua*, *rupestris*, and *arenosus*, are *three* species; and the *Labrus tautoga*, *tautoga fusca*, and *tautoga alia*, are also *three* species.

That other species here catalogued may not be yet found in our waters, I will not pretend to assert; but, when we find here indicated three species of the genus "*Scorpaena*," which could not have been seen; and the "*Uranoscopus scaber*," which Richardson, in his "*Fauna Boreali-Americana*," says has not been detected in the Atlantic ocean, we are inclined to believe that many others there noticed will never be found here.

The report now presented contains 75 genera, specimens of which I have seen. Of these genera, 42 were not noticed in the catalogue, of which I have spoken above. I have here described 107 species, 78 of which are not mentioned in that paper.

In my classification, I have followed the arrangement of Cuvier, as established in the "*Règne Animal*."

The *generic characters* are generally given in the language of Yarrell.

All which is most respectfully submitted by

Your friend and servant,

D. HUMPHREYS STORER.

FISHES OF MASSACHUSETTS.

ORDER I.

ACANTHOPTERYGII.

FAMILY I.

PERCOIDES.

PERCA. CUV.

Generic characters. *Two dorsal fins, distinct, separated; the rays of the first, spinous; those of the second, flexible: tongue smooth: teeth in both jaws, in front of the vomer, and on the palatine bones: preoperculum notched below, serrated on the posterior edge: operculum bony, ending in a flattened point directed backwards: branchiostegous rays 7: scales rough, hard, and not easily detached.*

P. flavescens. Mitchell. *The Common Perch.*

Trans. of the Literary and Philosophical Society of N. Y. i. 421.

Cuv. et Valenc. Hist. Nat. des Poiss. t. ii. p. 46.

Richardson's Fauna Boreali Americana, pt. 3d, p. 1, et fig.

In the ponds of many portions of the State, this is quite a common species, and in the spring and autumn is not unfrequently met with in the markets. Specimens are seldom taken more than 12 or 15 inches in length.

This beautiful fish is of a greenish yellow *above*—with golden yellow sides crossed by seven transverse dark bands, those upon middle of body broadest: *beneath*, white. The length of the head compared to the length of the body, is as

one to three. The *preoperculum* is margined with strong teeth, projecting forwards, those on posterior edge are the smaller. The bony *operculum* is serrated below, and terminated at its posterior angle by a spine. A membranous prolongation extends from the margin of the *suboperculum*. Humeral bones grooved. The portion of the head between, and in front of, the eyes, smooth—portion back of eyes, bony. Eyes of moderate size—pupils black, irides golden. The anterior nostrils much in advance of the posterior, which are larger. The *lateral line* commences high above the posterior angle of the operculum, and assuming the curve of the body, is continued to the base of the tail. The first Dorsal fin is as long again as high: the second Dorsal is one third shorter than the first.

The Pectoral fins commence on a line with the posterior angle of the operculum, and are one third as long as high.

The Ventral fins arise about four lines back of pectorals.

The Anal fin is higher than long: anus is situated three lines anterior to it.

The Dorsal and Caudal fins are brownish. The Pectoral, Ventral and Anal fins are scarlet.

The fin rays are as follows: * B. 7; D. 13. 2-14; C. 17; P. 15; V. 1-5; A. 2-8.

LABRAX. CUV.

Generic characters. *Two dorsal fins, distinct, separated; the rays of the first, spinous; those of the second, flexible: branchiostegous rays 7: tongue covered with small teeth: teeth on both jaws, on the vomer and palatine bones: checks, preoperculum and operculum, covered with scales: suborbital bone and suboperculum without serrations: preoperculum notched below, serrated on its posterior edge: operculum ending in two points, diverted backwards.*

* The letters indicate the different fins: B. the branchial rays. D. those of the Dorsal fin; C. Caudal; P. Pectoral; V. Ventral; A. Anal.

L. lineatus. Cuv. *The striped Basse.*

Trans. Lit. et Philosoph. Society of N. Y. p. 413.

Mc Murtrie's Cuv. v. ii. p. 98.

Cuv. et Valenc. Hist. Nat. des. Poiss, t. ii.

This fine species, which sometimes weighs 75 pounds, is taken in considerable numbers upon our coast. Large quantities of small basse are caught with nets near Chelsea and Nantasket beaches. It is generally found upon shoals near the land, where frequently a dozen or more may be seen at a time beneath the water, quietly lying upon the rocky bottom. In the winter, this fish goes up into the rivers and arms of the sea. Oftentimes basse of considerable size are taken in Boston harbor. I saw in Boston market, on the 26th of July, 1837, a specimen 3 feet and 10 inches long, weighing 36 pounds, which was taken from one of the bridges leading out of the city. The flesh of this species, particularly of the larger ones, is rather coarse, but meets with a ready sale in a fresh state : in 1836, a small number of barrels, (sixty-seven,) were packed and inspected.

The upper part of the body is silvery brown : lower part of sides and abdomen a beautiful clear silver color ; eight or more longitudinal black bands on each side, commencing just back of opercula ; the upper bands running the whole length of the fish, the inferior ones terminating directly above the anal fin. Length of head to length of entire fish as 1 to 5. *Head* covered with scales throughout its whole extent, save the frontal and suborbital bones. *Eyes* moderate in size, pupils black, irides golden : diameter of eye, equal to about half the distance between eyes. Opercula in portions, cupreous. *Teeth* in jaws numerous, teeth also upon palatine bones : *tongue* rough. *Lower jaw* the longer. *Nostrils* double ; the posterior larger. *Preoperculum*, at its posterior margin, finely serrated throughout its whole length ; at its inferior margin, denticulated. *Operculum*, at its posterior margin, furnished with two spines, the lower of which is the larger. *Lateral line* very distinct, arising above the superior spine of the operculum, and running through the centre of one of the longitudinal bands.

The first Dorsal fin is two thirds the length of the head : the third and fourth rays are the longest.

The first ray of the second Dorsal is spinous ; the height of this fin is equal to more than half its length.

The Pectoral fins arise beneath and behind the inferior spine of the operculum ; their length to their height is as 1 to 4.

The flesh-colored Ventrals arise just back of pectorals : their first ray is spinous. These fins are rather longer than pectorals.

The Anal fin arises opposite the middle of the second dorsal ; its first three rays are spinous : this fin is one third shorter than first dorsal : its length to height is as 1 to 3.

The fin rays are as follows : D. 9. 1-12 ; P. 18 ; V. 1-4 ; A. 3-11 ; C. 18.

L. *mucronatus*. Cuv. *The small American Basse.*

Cuv. et Valenc. Hist. Nat. des Poiss. t. ii. p. 86.

In the spring and autumn, this species is brought to Boston market, from the mouths of the neighboring rivers and the ponds to which the sea has access. It is commonly called *white perch*. Its usual weight is about half a pound. The largest specimen I have met with, was procured in Quincy market, Dec. 22, 1837 ; it measured 15 inches in length, and weighed 1 3-4 pound, and its stomach contained a specimen of the *Leuciscus crysoleucas* more than five inches in length.

The color is a silvery gray : in very large specimens, all the upper part of the body, as well as the head and fins, are of a rusty black. Length of head, compared to that of body, as 1 to 4 : depth of body across base of pectorals, four inches and two lines. *Upper jaw* protractile : very fine teeth, thickly set in both jaws. *Eyes* large, pupils black, irides silvery. *Nostrils* double, posterior nearly as large again as the anterior. Operculum, preoperculum and maxillary bones covered with scales. Head back of, and between eyes, scaly. The space between nostrils, and in front of eyes to maxillary bones, destitute of scales. *Preoperculum*, denticulated behind and

below ; denticulations much smaller upon the upper portion of posterior edge. The lowest edge of operculum very slightly serrated ; a spine at its posterior angle, and above this an obtuse point. The *lateral line* commences at the upper posterior portion of the operculum, and inclining a little upward, is lost on the membrane connecting the middle rays of the caudal fin.

The first Dorsal fin commences about six lines back of the base of the pectorals, and is about half as high as long.

The second Dorsal fin is rather more than two thirds the length of the first dorsal : its first ray is spinous.

The Pectorals commence on a line with the posterior angle of the operculum : length equal to one third their height.

The Ventrals arise back of the pectorals, and are two lines shorter than those fins.

The Anal fin commences on a line with the fifth ray of the second dorsal : the height and length of this fin are equal.

The Anal and Dorsal fins terminate on the same plane.

The fin rays are as follows : D. 9. 1-12 ; P. 15 ; V. 1-5 ; A. 3-9 ; C. 17.

CENTROPRISTIS. Cuv.

Generic characters. *A single dorsal fin : branchiostegous rays 7 : all the teeth small and crowded : no canini : preoperculum dentated, and operculum spinous.*

C. nigricans. Cuv. *The Black Perch.*

Trans. Lit. et Philosoph. Soc. N. Y. p. 415, et fig.

Mc Murtrie's Cuv. v. ii. p. 107.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iii. p. 14.

I have never heard of this species, the *Perca varia* of Mitchell, having been taken north of Cape Cod. The only specimen met with, Dr. Yale kindly sent me from Holmes Hole, where it is called *black fish* and *black basse* : he informs me that it has been taken there in great numbers in May,

June and July, and carried to the New York market—and adds, “it is perhaps the most delicious fish that is caught.”

The body of the specimen before me is elongated—compressed—of a dark brown, almost black color *above* :—lighter *beneath*. Color of head, sea or bronze green—scales large. Length of fish, 1 foot : greatest depth $3\frac{1}{2}$ inches. Length of head to posterior angle of operculum, one third the length of the fish : head between, and in front of eyes, smooth. *Eyes* one half inch in diameter—less than the distance between eyes. *Nostrils* double—just anterior to anterior superior angle of eye—posterior, the larger. *Jaws* equal in length, armed with a great number of minute sharp teeth. Lips fleshy. Whole posterior edge of preoperculum, denticulated :—inferior edge serrated—scales upon preopercle smaller than those upon body. A small spine at posterior angle of *operculum*, below which is a broad fleshy elongation projecting beyond it. Humeral bone denticulated. The *lateral line* arises at the lower edge of the humeral bone, and assumes the curve of the body.

The Dorsal fin arises about a line back of the humeral bone—its first ten rays are spinous, each having a fleshy tentaculum suspended from its extremity. The first ray is shortest—the third ray is longest. The eleven fleshy rays are higher than the spinous ones :—the membrane of the whole fin is white, crossed by dark bars.

The Pectoral fins arise just below the fleshy projection of the operculum—their length to their height is as 1 to 4.

The Ventral fins are in front of pectorals—the middle rays are longest :—the rays are nearly black, while the connecting membrane is white.

The Anal fin commences back of soft rays of dorsal :—the first two rays are spinous. Fin higher than long, and barred like the dorsal.

The Caudal fin is slightly convex in its middle :—its length equal to half its height : the connecting membrane of its rays black, blotched with white.

The fin rays are as follows : B. 7 ; D. 10, 11 ; P. 17 ; V. 6 ; A. 2-9 ; C. 18.

POMOTIS. Cuv.

Generic characters. *A single dorsal fin: branchiostegous rays 6: small and crowded teeth: body compressed and oval: a membranous prolongation at the angle of the operculum.*

P. vulgaris. Cuv. *Fresh water Sun Fish. Pond Perch.*

Shaw's Zoology, vol. iv. pt. 11, p. 482.

Lit. et Philosoph. Trans. N. Y. i. p. 403.

Mc Murtrie's Cuv. vol. ii. p. 108.

Cuv. et Valenc. His. Nat. des Poiss. t. iii. p. 91.

Jardine's Naturalist's Library, vol. i. Ichthyology, p. 162.

Fauna Boreali Americana, p. 24 et fig.

This very common species in the numerous ponds of our State is taken with the *Perca flavescens*—*Leuciscus crysoleucas*—*Esox reticulatus*, &c., and is generally known by the vulgar name of *Bream*. It rarely exceeds eight inches in length. Though seldom brought to market, it is considered by many, an excellent edible fish. In the Naturalist's Library, it is said to be "of unobtrusive colors," while, in truth, it is one of our most beautiful species—vieing oftentimes in the brilliancy of its coloring with tropical fishes.

The specimen before me, measures seven inches in length: length of head to outer angle of operculum nearly two inches: depth of body, on a line with base of pectorals, three inches. General color greenish brown with spots of blue and yellow upon each scale: longitudinal, undulating deep blue lines across preoperculum and operculum, with rusty yellow blotches interspersed. Scales upon body, large—smallest at base of fins. Head, between eyes, naked, and of a darker color than the body generally. *Nostrils* double—anterior tubular: teeth in jaws very minute and sharp: upper jaw protractile. *Eyes* large, nearly half an inch in diameter. At posterior angle of operculum, a large black spot embracing a portion of the operculum, and a fleshy prolongation having a bright scarlet col-

ored margin. Just above this spot, arises the *lateral line*, which assumes the curve of the back, and is lost at the base of the tail. The back curves very gradually as far as the posterior extremity of the dorsal fin, then abruptly gives place to the fleshy portion of the tail. All the fins more or less colored with black. Length of the pectoral fins nearly two inches. Anus large, corrugated—two lines anterior to the anal fin.

The fin rays are as follows: D. 10–12; P. 13; V. 1–5; A. 3–10; C. 17.

I am induced to believe, from the remarks of several anglers with whom I have conversed and corresponded, that another species of *Pomotis* inhabits our waters.

FAMILY II.

BUCCÆ LORICATÆ.

PRIONOTUS. Lacep.

Generic characters. *Head nearly square, covered with bony plates: gill-cover and shoulder-plate ending in a spine directed backwards: body elongated, nearly round: two dorsal fins, the rays of the first, spinous; those of the second, flexible: teeth in jaws, in front of vomer, and upon palatine bones, pointed, small and numerous: gill-opening large: three detached rays at the base of each pectoral fin.*

P. strigatus. Cuv. *Sea Robin. Gurnard. Grunter.*

Trans. Lit. et Philosoph. N. Y. p. 430 et fig.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv., p. 86.

This species which is very well described, and tolerably figured by Mitchell as the *Trigla lineata*, is frequently taken in the vicinity of Holmes Hole, while fishing for other species, but is not used.

A beautiful specimen received from Dr. Yale enables me to offer the following description:

Body above *lateral line* of a slate color, with a few black spots irregularly distributed; sides lighter, with a reddish tint; abdomen, white. Besides the lateral line which is very obvious, a broader brownish line runs parallel to it beneath, arising under the humeral spine, and running the greater part of the length of the body, broken at its posterior extremity into interrupted points or spots.

Length of specimen, nine inches:—length of head, nearly three inches: head broader than the body; its depth equal to half of its length. Head is made up of seven distinct bony plates covered with sparse small black points, which form a perfect helmet of defence. The whole upper part of head—occiput, space between eyes, and anterior portion to snout, composed of one plate—this portion is roughened throughout its whole extent by irregular corrugations, and terminates posteriorly in two strong spines;—minute spines are seen also above eyes, at their upper anterior and posterior angles: this plate is anteriorly widely but not deeply truncated. The operculum is a separate plate, of an irregular triangular form, having two spines at its posterior extremity—the lower larger, and pointing directly back; the upper pointing upwards: operculum covered with striæ, radiating from the anterior portion on each side of the spine towards the circumference. Opercle separated from preopercle, by a membrane, which enables it to be quite moveable: a wide membrane also borders its whole margin. The preoperculum is rather small and triangular—slightly moveable—divided at its lower portion by a horizontal serrated bony ridge which terminates in a naked spine;—beneath this ridge, the inferior portion is corrugated and granulated: from base of preopercle, radii diverge to its upper portion. Suborbital bones roughened like top of head: cheek bones covered with elevated striæ, slightly serrated upon their whole lower margin, and strongly serrated anteriorly on each side of snout.

Snout half of an inch wide—four lines long—naked—situated in front of emargination of frontal bone. *Eyes* located towards upper part of head—oblong—longest diameter equal to the distance between eyes. *Nostrils* small—situated half way

between eyes and extremity of snout, in the membranous division between the bony plates. *Jaws* armed with very numerous small teeth: upper jaw projecting beyond the lower. *Tongue* colorless, fleshy, naked. A strong ridge upon humeral bone serrated on its under edge, terminating in a naked spine.

The first Dorsal fin arises on a line with the termination of the occipital spines—is situated in a groove which partially receives it, when closed—light colored, with a black blotch upon the upper portion of the membrane between the fourth and fifth rays: first ray spinous, and serrated upon its entire front: second and third serrated at their upper anterior portion: third and fourth rays longest. Fin one third longer than high.

The second Dorsal is one third longer than the first.

The Pectoral fins are one third the length of the body—nearly black, with very numerous narrow transverse bars. On a line with the base of the pectorals, beneath them, three fleshy appendages are seen, somewhat similar in their appearance to the fin rays: the upper, which is the longest, is half the length of the pectorals.

The Ventrals are situated beneath the pectorals—white: their longest rays are equal to two thirds the length of the pectorals. The first ray shortest, spinous.

The Anal fin equal in length to second dorsal.

The Caudal fin is nearly straight at its extremity.

The fin rays are as follows: D. 9-13; P. 12; V. 6; A. 11; C. 15.

P. *Carolinus*. Cuv. *The Web-fingered Grunter*.

Trans. Lit. et Philosoph. Soc.—p. 431, et fig.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 90.

Under the name of *Trigla palmipes*, this pretty species is described and figured by Mitchell, in his "*Fishes of New York*." I have seen but one specimen, for which I am indebted to Dr. Yale. This specimen, as it lies before me, presents the following characters:

Body *above*, of a reddish brown color, with irregular blotches and shadings of a darker brown: *beneath*, nearly white. Branchial membrane, fuliginous. The *lateral line*, arising between the occipital spine and the posterior superior edge of the operculum, is conspicuous throughout its whole length, but more so at its origin, and is continued in a straight line to the middle of the base of the tail.

Length of specimen thirteen inches: length of head three inches: head slightly broader than the body: greatest width of head two inches. The description of the bones of the head, and situation of the eyes, of the "*strigatus*," answers perfectly to the species before me. *Nostrils* of moderate size, situated half of an inch back of the extremity of the snout; sides of snout deeply serrated. *Jaws* armed with numerous teeth—upper jaw, the longer.

The first Dorsal one third longer than high—situated in a conspicuous groove: the rays are spinous—the whole anterior of the first three, serrated, and the upper portion of the fourth. The connecting membrane is transparent, slightly dusky, marked by oblique white lines, and has a large dark brown spot between the fourth and fifth rays.

The second Dorsal is as long again as the first.

The Pectorals are large, broad, rounded—reddish brown above—slate-colored beneath, with the exception of the posterior two rays, which are white. These fins are more than one third the length of the body. Just in front of, and beneath the pectorals, are three yellow fleshy appendages, widened at their extremities—the longest of which, is one inch in length; the shortest, half of an inch long.

The Ventrals are reddish white.

The Anal commences upon a line opposite to, and terminates upon the same plane as the second dorsal.

The Caudal fin is but slightly arcuated.

The fin rays are as follows: D. 9-13; P. 14; V. 6; A. 12; C. 14.

Both these species are called "*grunter*," from the peculiar noise made by them.

COTTUS. Lin.

Generic characters. *Head large, depressed: teeth in both jaws and in front of vomer, small, sharp; none on the palatine bones: preoperculum or operculum armed with spines, sometimes both: branchiostegous rays 6: gill-openings large: body attenuated, naked, without scales: two dorsal fins, distinct, or very slightly connected: ventral fins small.*

C. *Groenlandicus*. Cuv. *The Greenland Sculpin.*

Cuv. et Valenc. *Hist. Nat. des Poiss.* t. iv. p. 185.

Fauna Boreali Americana, p. 46 et 297, et fig.

This beautiful species, which is a favorite food of the Greenlanders, I have seen in large quantities in the small coves at Nahant, and often taken, while fishing from the rocks there, for the *Sea-perch* or *Conner*. It is undoubtedly common along our whole coast. The specimen before me was taken from one of the wharves in Boston.

Length of my specimen thirteen inches, being a few lines only shorter than Richardson's specimen, which he so clearly and minutely describes, and accurately figures. Upper part of body dark brown, with large clay-colored blotches on top of head and upon gill-covers—with a few smaller ones on back and sides, and small circular yellow spots on sides towards abdomen. Large circular perfectly white spots upon abdomen, beneath the pectorals. The sides above and beneath the *lateral line* roughened by granulated tubercles. Length of head four and a half inches: width across occiput three inches; greatest depth two inches. Head protected by several spines; those upon its top, blunted; those on gill-covers longer, with projecting sharp points. The *nasal spines* are about three inches in length, recurved: at posterior superior angles of eyes a strong slightly recurved spine, stouter than the nasal. Upon the occiput are situated two spines still stronger, and erect; between these and the former, is a quadrangular depression.

The *preoperculum* has three spines, two of which are situated at its superior angle; the upper of these spines is much the largest, and points upwards; the second is smaller and nearly straight; the third and smallest, at its inferior angle, points directly downwards. The *operculum* is armed with two spines, the larger, at its superior angle; the second, much smaller, at its inferior angle. A scapular spine is prominent. *Eyes* circular, six lines in diameter. Gape of mouth very large; distance between tips of jaws, when distended, two inches two lines. Upper jaw the longer: jaws armed with numerous very small, sharp teeth. *Nostrils* tubular, three lines in front of eyes. Throat yellowish white, sprinkled with minute fuliginous specks.

The Dorsal fin commences on a line anterior to scapular spine, rounded, of a dark brown color, variegated with yellow: length to height as three to two.

The second Dorsal arises at termination of first, appearing to be a continuation of that fin, brown, with several transverse yellowish bars.

The Pectoral fins are very broad, arising in front of the first dorsal: rays orange-colored: length of fin, less than height of first rays. Upon the under side of several of the rays of this fin, are roughened granulations.

The Ventrals are small, white, with three transverse black bars. These fins are two inches in length.

The Anal fin is situated back of second dorsal, and barred like that fin: its height half of its length.

The Caudal fin is half as high as long, rays black, the connecting membrane of the rays yellowish.

The fin rays are as follows: D. 10-18; P. 17; V. 3; A. 13; C. 16.

This species is exceedingly voracious; in the stomach of one, I found three entire specimens of the *Portunus pictus*, of considerable size: in others, I have seen large quantities of the *Echinus granulatus*, and several species of *algae*.

C. *Virginianus*. Willoughby. *The Common Sculpin*.

Trans. of the Lit. et Philosoph. Soc. N. Y. p. 380.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 181.

Fauna Boreali Americana, p. 46.

Our most common species of *Cottus*,—the pest of the numerous boys and idlers who are constantly fishing from the wharves and bridges for “*tom cod*,” “*flounders*,” and the other fishes usually taken at such localities,—Mitchell described under the specific name of *octodecimspinosus*, and Cuvier retains this name, although he acknowledges the species had been previously described by Willoughby, from a specimen sent him from Virginia, by Lister. Even if the specific name distinguished it from the “*C. Scorpius*,” which is not the case, both species having the same number of spines, I should not have hesitated to pursue that course which is generally acknowledged to be the most honorable, and to have preserved the name proposed by its first describer.

Specimen before me, eleven inches long. Body much more elongated than that of the “*Groenlandicus*,” of a light brown color above, with darker irregular blotches, looking, when carefully examined, somewhat like transverse bands. *Lateral line* very prominent, commencing at scapular spine and running a straight course to tail, being less marked at its posterior extremity. A few small tubercles upon sides near lateral line. *Throat* pure white. *Abdomen* white, slightly tinged in portions with fuliginous stains.

Length of head, one third the length of body; greatest width equal to its greatest depth. *Twenty spines* upon and about head; ten on each side: all naked at their extremities. *Nasal spines* small, recurved. *Post-orbital spines* slightly longer than nasals, pointing directly backwards, being hardly raised from the top of the head. *Occipital spines* erect, but slightly recurved, stouter than those just spoken of. Three spines upon *preoperculum*; that at posterior angle, ten lines long, naked throughout its greatest extent, very stout, extend-

ing back in a straight line as far as extremity of opercular spine; directly below the base of this spine, a very small one, only two lines in length, pointing obliquely backwards and downwards: at inferior angle of preopercle, a spine nearly half an inch long, pointing downwards and forwards. Two spines upon *operculum*; the larger, nearly two inches long, passes from its upper anterior portion to posterior angle, pointing obliquely backwards; the other, quite small at inferior angle, pointing directly downwards. *Scapular spine* three lines long. Humeral spine strong, one half inch in length.

Eyes six lines in diameter; pupils black, irides golden: distance between eyes, four lines. *Nostrils* small, tubular. *Jaws* armed with numerous sharp, compact teeth. Upper jaw, the longer.

The first Dorsal fin is of a dark brown color, irregularly banded with yellow: the rays are much stouter than those of the same fin in the "*Groenlandicus*;" the extremities of the first five rays project beyond the connecting membrane. Length of fin greater than its height.

The second Dorsal commences at the termination of the first, and is one third longer than that fin; and is of a greenish yellow color, with three transverse black bands.

The Pectorals are large, rounded; the rays of a dirty white color, much smaller than those of this fin in the "*Groenlandicus*;" the connecting membrane of fin, white, crossed transversely by four regular transverse black bands.

The Ventrals commence just back of the second dorsal. Its length to its height as 3 to 1; white, irregularly barred.

The Caudal fin is even at its extremity: yellowish, with three regular transverse dark bars; its height to its length as 2 to 1.

The fin rays are as follows: D. 9-16; P. 17; V. 3; A. 14; C. 12.

C. *aeneus*. Mitchell. *The brazen Bullhead.*

Lit. et Philosoph. Soc. Trans. N. Y. p. 380.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 189.

This species is taken from our wharves with the "*Virginia-nus*." Like that fish, it is very voracious, catching at almost any kind of bait offered to it, and distending itself immensely with food.

My description is drawn up from a specimen twelve inches in length. All upper part of body, of a yellowish brown color, shaded throughout with fuliginous blotches, which upon the head prevail over the yellow : on sides of abdomen, beneath the *lateral line*, lighter : beneath, and covered by pectorals, a broad band of very minute black points extends even beyond the anus, along the edge of the anal fin ; the portion in front of anus, contains one or more rows of well marked large, circular, yellow spots. Entire under surface of head also sprinkled over with similar black points. Greatest depth of specimen equal to one fourth its length : greatest width across back of head equal to one third its length. Length of head to whole length of fish, as five to twelve : upon each side of head, nine more or less prominent spines, those on the gill-covers the largest : one, just above nostrils, three lines in length and incurved ; a second, resembling a blunted tubercle at the upper posterior angle of eyes ; a third, rather sharper than the second, forms the posterior boundary of the head. A strong, sharp spine, half an inch in length, is situated upon the supra scapular bone. The *operculum* has two spines ; the largest, one quarter of an inch in length, at the posterior angle : the second, quite small at the inferior angle, almost concealed in the flesh, pointing downwards. The *preoperculum* has three spines ; the largest, nine lines in length, is sharp, naked at its posterior portion, and pointing upwards ; the second, much smaller, is also naked, and situated at the base of the first, appearing as if a bifurcation of it, pointing backwards ;

the third, is placed at the inferior angle, and, like the similarly situated spine of the operculum, is concealed. A [small spine upon infra scapular bone. A large depression on the top of head ; bounded, between eyes, by orbital ridges ; back of eyes it is broader, and bounded on sides by a longitudinal ridge. *Mouth* very large ; lower jaw the shorter ; both jaws armed with numerous, small, sharp, recurved teeth, compactly placed together : when mouth is closed, the intermaxillary bone forms a protuberance between the two anterior spines. *Nostrils* small, tubular. *Eyes* large, pupils black, irides reddish yellow ; distance between eyes eight lines.

The *lateral line*, which is quite prominent, commences just above the humeral spine, and continues a straight course to the middle of the base of the tail. One or two irregular rows of very obvious roughened tubercles *above*, and quite a number of smaller tubercles scattered over the sides, *beneath* the *lateral line*.

The fins are yellowish, with black bands.

The first Dorsal is rounded, and connected with the second dorsal by a membranous prolongation.

The second Dorsal is about one third longer than the first.

The Pectoral fins, when expanded, are rounded : the rays large and stout.

The Ventrals are composed of three rays : yellowish white, with two transverse dark bands.

The Anal fin is shorter than the first dorsal, with three or four oblique black bands.

The Caudal fin is in length equal to half of its height.

The fin rays are as follows : D. 10-15 ; P. 16 ; A. 13 ; V. 3 ; C. 12.

ASPIDOPHOROIDES. Lacepede.

Generic characters. *Body octagonal, covered with scaly plates ; head thicker than the body, with points and depressions above, flattened below ; teeth in both jaws only, none on the*

vomer ; *snout with recurved spines* ; *branchiostegous rays 6* ; *body tapering to the tail* ; *but one dorsal fin, distinct.*

A. *monopterygius*. Cuv. *The Bullhead.*

Plate I. Fig. 1.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 224.

Fauna Boreali Americana, p. 50.

Early in May, 1838, I received three specimens of this fish from Mr. Jonathan Johnson, Jr., of Nahant, who took them from the stomachs of *haddock* he had just captured within two miles of that place. They were each more or less mutilated ; one of them, however, is sufficiently perfect to allow me to present the following description, and to enable my friend, Dr. Wyman, to figure it.

Length of specimen, four inches. Color *above*, a light brown, with six transverse dark bands, extending from head to tail, those near the head broader : *beneath*, lighter. Body elongated, gradually tapering to tail, divided longitudinally by eight rows of scaly plates. Those just back of head much the largest. Upon top of head, two rows of these scales : two rows on sides : two beneath, in front of dorsal, and but six rows back of that fin. The body is four-sided in front of the dorsal fin. The angles of the large scales on the back, form prominent ridges, and between them is thus formed a groove, which extends to posterior extremity of dorsal fin : back of that fin is a dorsal ridge, instead of a furrow, which passes to the tail. The same distribution of these scaly rows exists *beneath* fish as upon *upper part* of body. Length of head equal to one fifth length of body : width of head greater than that of body. *Eyes* very large : orbital bones prominent : whole head bony. A longitudinal furrow extends from before eyes, between them to occiput. A transverse depression exists back of eyes, and also another at occiput. The *snout* has two recurved spines at its extremity, and a third, smaller one, back of them, curving forwards. *Mouth* small ; numerous minute teeth in both jaws. The operculum terminates in a spiny process.

The Dorsal fin is situated upon the posterior half of the body, at the extreme portion of the dorsal furrow.

Owing to the imperfect state of specimen, it is impossible to be entirely accurate with regard to the number of the fin rays: they are, however, very nearly as follows: D. 5; P. 10; V. 4; A. 4; C. 16.

This species is unquestionably the fish which was first described by Bloch as the "*Cottus monopterygius*," and minutely described as the "*Aspidophorus monopterygius*" by Cuvier, in the fourth volume of his "*Histoire Naturelle des Poissons*." Lacepede formed the genus "*Aspidophoroides*," to receive the species above described, it being the only known "*Aspidophorus*" with a single dorsal fin. At the time this genus was formed, the species of which we have been speaking was supposed to have been brought from the East Indies. Cuvier, however, in his description, says he has not received it from the East Indies in any of his numerous collections from that quarter of the world; and finally, Richardson, in his "*Fauna Boreali Americana*," observes, "that it has lately been discovered to be an inhabitant of the Greenland Seas, so that this sub-genus belongs entirely to the northern hemisphere, and chiefly to the higher latitudes."

HEMITRIPTERUS. Cuv.

Generic characters. *The head depressed, and two dorsals, as in the Cottus; no regular scales on the skin, but teeth in the palate. The head is bristly and spinous, and has several cutaneous appendages. The first dorsal is deeply emarginate, a circumstance which has led some authors to believe they had three.*

H. *Americanus*. Gmelin. *The Sea Raven*.

Trans. Lit. et Philosoph. Soc. N. Y. p. 382.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 268.

Fauna Boreali Americana, p. 50.

The *Sea raven*, or *deep water sculpin*, as it is generally called by our fishermen, is the only known species of the genus "*Hemitripterus*." It was considered a "*Cottus*" by Pennant, and a "*Scorpena*" by Gmelin and Mitchell.

It is taken in deep water, in the neighborhood of ledges, by the cod fishers, and grows to the length of two feet. This species varies exceedingly in its color. Thus of *three* fine specimens lying before me, one is of a deep blood red color; a second, of a pinkish purple; the third, of a yellowish brown, darker on the back; each, however, variegated on the head and sides and fins with irregularly defined markings: body, *beneath*, yellowish. The coloring matter of the surface tinges the fingers when rubbed upon it. Surface of body destitute of scales, granulated, and studded with innumerable tubercles, which are quite large high up on the back, and very small or almost entirely disappearing beneath the *lateral line*. *Head* large, spinous, hideous in appearance. Length of head to entire length of body, measuring to posterior extremity of operculum, nearly as one to four: width of head across opercula equal to its length. Twelve, more or less prominent, blunted spinous tubercles on each side of median line of head, the sharpest pointed, just back of nostrils: the largest, at posterior angles of eyes, and just in front of dorsal fin. Fleshy cirrhi are suspended from several portions of the head, such as anterior and posterior angles of eyes and about snout: those hanging from over eyes appear like a broad fringe. Orbital cavity large. *Eyes* moderate in size, pupils black, irides yellowish brown. Distance between superior angle of eyes rather less than one fourth the length of the head: space between eyes deeply depressed. *Operculum*, at its posterior angle, armed with two strong spines, similar to those of the "*Cottus*." *Jaws* about equal in length: twelve digitated cirrhi are suspended from under jaw. *Mouth* very large. *Teeth* in jaws and palate numerous, sharp, recurved: teeth also in pharynx. The *lateral line*, which is tubercular, commences just above posterior angle of operculum, and curv-

ing with the body, terminates at the base of the caudal rays. A strong spinous tubercle arises from humeral bone.

The first rays of the first Dorsal are longest; the seventh, eighth and ninth rays are next in length: in other words, this fin at first sight appears as if divided, or as two fins. Delicate tentaculæ are suspended from the extremities of the rays of this fin.

Just back of the first Dorsal arises the second, appearing as if connected, and hence described by Mitchell as *one fin*; height of this fin to its length as one to three.

The Pectorals are very large, when expanded resembling a wing; the rays are uncommonly distinct. These fins arise from the entire lower edge of the branchial aperture: height to length as four to two and a half.

The Ventrals arise just back of the first rays of the pectorals; they are composed of three rays—the first ray shorter than the second, and exceedingly stout.

The Anus is situated equally distant from the ventral and anal fins.

The Anal fin commences and terminates on the same plane with the second dorsal: the rays of this fin are deeply divided at their extremities: length of fin to its height as three and a half to one and a half.

Length of Caudal fin to its height as two to three:—the color of rays similar to that of the body. The fin rays are as follows: D. 16, 13; P. 18; V. 3; A. 15; C. 19.

SEBASTES. CUV.

Generic characters. *Body oblong, compressed, covered with scales; all the parts of the head also covered with scales; eyes large; preoperculum and operculum ending in three or more spines; branchiostegous rays 7; teeth small, numerous, equal in size, placed on both jaws, the vomer and palatine bones; a single dorsal fin, part spinous, part flexible; inferior rays of the pectoral fin simple.*

S. Norvegicus. Cuv. *The Norway Haddock.*

Pennant's British Zoology, p. 226 et fig.

Mc Murtrie's Cuv. vol. ii., p. 122.

Cuv. et Valenc. Hist. Nat. des Poiss, t. iv. p. 327.

Yarrell's British Fishes, vol. i., p. 73, et fig.

Fauna Boreali Americana, p. 52.

With us, this is not a common species ; it is taken while fishing near shoal ledges contiguous to deep water. Although seldom offered for sale in our market, it is readily eaten by the Norwegians, and is a very palatable dish, as I learned from an epicure of this city, who, having met with a specimen, and thinking it to be the "*Scienia gigas*" of Mitchell, had it carefully cooked, and was much delighted with his rarity. By our fishermen it is known by the names of "*Rose fish*," "*Hemdurgan*," and "*Snapper*." It attains the length of two feet. The following description is drawn up from a beautiful recent specimen, ten inches in length.

All upper of the body of a reddish color:—darker upon head and back, lighter upon sides: nearly white beneath. A brown blotch upon posterior portion of operculum. All the fins red. Length of the head, from tip of lower jaw when closed, to posterior angle of operculum, one third the length of the fish ; top of head, flattened. Operculum armed with two spines. Suboperculum and interoperculum, have each one spine: posterior edge of operculum has five spinous processes. Supra scapular and subscapular bone, have each one spine ; a second, scarcely perceptible spine upon supra scapular bone : two spines upon suborbital bone : a small, exceedingly sharp pointed spine on each side of base of intermaxillary bones. Four spines upon upper orbital edge ; one, at upper anterior angle of eye ; a second, with its base continued along the greater portion of upper edge ; and two smaller ones, behind. A very minute spine upon the lower orbital edge, beneath centre of eye—and two spines projecting backward upon occiput. *Eyes* very large ; pupils black ; irides yellow : diameter of eye equal to

one third length of head: distance between eyes equal to five eighths the diameter of the eye. *Jaws* armed with numerous, minute, sharp teeth: upper jaw very protractile—an emargination in its centre, into which the extremity of the lower jaw shuts, when the mouth is closed. Chin prominent. *Teeth* in vomer and palatine bones.

The *lateral line* arises above the operculum, and taking the curve of the body, terminates at the caudal rays: about thirty-six sharp points are seen in the course of the lateral line.

The Dorsal fin commences on a line with the upper opercular spine, its anterior half composed of spinous rays; the length of its highest rays equal to about one third the length of the fin: posterior half of fin composed of membranous rays; length of this portion equal to one half the length of spinous portion.

The Pectorals commence on a line with the third Dorsal ray:—length of fin equal to one third its height: the middle rays the longest.

The Ventrals arise just back of the pectorals; the first ray is spinous: the second ray, the longest.

The Anal's first soft ray is equal to the length of the fin: the first three rays spinous.

The length of the Caudal fin is one third less than its height.

The fin rays are as follows: D. 15, 15; P. 18; V. 1-5; A. 3-7; C. 19.

CRYPTACANTHOIDES. Nobis.

Generic characters. *Body elongated, and very much compressed, gradually tapering to tail, destitute of scales: head broad, with no projecting spines, but the angles of the gill-covers;—the scapular and humeral spines, and the inferior edge of the preoperculum prominent to the touch. Numerous depressions in frontal, suborbital, inferior maxillary and preopercular bones: brachiostegous rays 7; mouth oblique; a single dorsal fin composed of strong spinous rays enveloped*

by a common membrane, runs nearly the entire length of the fish, and unites as well as the anal with the tail. No ventral fins.

C. *maculatus*. Nobis. *The spotted Wry-mouth.*

Three specimens of a fish evidently belonging to the *Buccata Loricata* have fallen under my observation, for the reception of which I know of no established genus. I am compelled therefore to constitute a genus in which it may be placed.

This I do with no slight reluctance; and, anxious only to throw more light upon this branch of study, I shall feel highly gratified, should it be received and retained by succeeding Ichthyologists.

The first specimen met with, was purchased by the "Boston Society of Natural History" some years since, with several other species, and was said to have been taken in the outer basin of Boston harbor: this specimen is still in the cabinet of that society; it is about twenty-one inches long, and will serve for my description. It is of a dirty reddish white color, the cuticle having been removed before it was purchased. The second specimen, larger, of a reddish brown color sprinkled over with dark brown blotches, was sent me by Mr. Jonathan Johnson Jr., of Nahant, who took it while fishing in the vicinity of that place. The third specimen was taken from the stomach of a *haddock*, and kindly sent me by Mr. Holbrook, fishmonger in Quincy Market. This last specimen was twelve inches in length, of a dull flesh color, covered with innumerable very minute black dots, and above and beneath the lateral line, an interrupted row of dark brown blotches extended from pectoral fins to tail; these blotches larger at anterior portion of body, and more numerous towards the tail. Top and sides of head, snout, and anterior portion of underside of lower jaw marked with moderate sized spots of a deeper brown than those of the back.

The specimen before me is twenty-one inches in length: its greatest width two and a half inches. On each side of top of head, two prominent bony ridges run directly back from pos-

terior angle of eyes to occiput. At posterior angle of operculum; at same angle of preoperculum; the whole lower edge of preopercle; the scapular bones; all seem like sharp points and edges concealed by the skin. The *operculum* is of a triangular form, one inch in length, bony beneath skin, with its posterior angle acute, united to the preoperculum by its anterior superior angle by means of a membrane. *Preoperculum* large; its superior and posterior angles obvious to the touch;—its lower edge sharp, and feeling as if it was divided into two ridges. *Eyes* circular; diameter of eye equal to half the distance between eyes. *Nostrils* tubular, situated on each side of snout, just at the edge of the intermaxillary bones. *Lips* fleshy; jaws equal; numerous minute teeth in jaws and upon palatine bones—*mouth* situated obliquely; *Lateral line* straight, looking like interrupted dots.

The Dorsal fin arises on a line above the middle of the pectoral fins, and is continued to, and united with the caudal: all its rays are spinous, strong, distinct, and concealed by a common membrane: the first few rays are shortest.

The Pectorals arise beneath the membrane of the branchiæ, as it is connected with the body: their length and half their height rounded.

The Anal fin arises upon the anterior half of body, and is similar in its form and the character of its rays and their enveloping membrane, to the dorsal fin.

The Caudal fin appears almost like the prolongation of the dorsal and anal fins. It is rounded at its extremity.

The fin rays are as follows: B. 7; D. 77; P. 13; A. 50; C. 19.

The flesh being removed from the smallest of the three specimens above spoken of, the following appearances are presented. The longitudinal ridges upon top of head; the sub-orbital, inferior maxillary and preopercular bones, with deep excavations or cavities. The angles of gill-covers quite acute, as also those of scapulæ; humeral spine very prominent. A single row of teeth, in jaws; on sides, double, in front; those

in front, much smaller and straight ; those behind, recurved. Number of vertebræ, eighty-nine.

My generic name is derived from *κρυπτος*, concealed—and *ακαραθωδης*, spine.

GASTEROSTEUS. Cuv.

Generic characters. *Body without scales, more or less plated on the sides : one dorsal fin, with five spines before it : ventral fin with one strong spine, and no other rays : bones of the pelvis forming a shield, pointed behind : branchiostegous rays 3.*

G. *Noveboracensis*. Cuv. *The New York Stickleback.*

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 502, pl. 98, fig. 3.

I have seen but three specimens of this fish, and therefore conclude it cannot be as common as the two following species of "*Stickleback*." One of these specimens was brought me from Provincetown, by Dr. Gould ; another, was taken from the stomach of a *codfish*, in our market, by Mr. E. Freeman ; and the third was found at Boston, by Master Henry Parker.

The specimen before me is two and a half inches in length ; all its upper portion, to the *lateral line* on each side, is of a very dark brown color, almost black ; beneath, silvery. Sides, armed with strong, vertical bony plates, upwards of thirty in number, diminishing in size towards the tail ; those at posterior portion of the body, with a lateral crest, terminating at the base of the caudal fin. *Head*, half an inch in length. Diameter of *eye*, half a line. Lower jaw slightly projecting beyond upper. *Gill-covers* silvery. Outer edge of Ventral spine, serrated throughout its whole extent ; serrations of the inner edge scarcely discernible. The second Dorsal spine much larger than either of the others. The posterior Dorsal spine very small.

The fin rays are as follows: D. 3-11; P. 10; V. 1-1; A. 1-8; C. 12.

At first sight, this resembles the "*G. trachurus*." It differs, however, in having the *dorsal plates narrower*; the *lateral keels of the tail more prominent*, and the *lateral line nearer the back*.

G. apeltes. Cuv. *The bloody Stickleback*.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 505.

Several specimens of a species which I suppose to be Cuvier's "*apeltes*," were brought me by my friend Rev. J. L. Russell, from Salem, where he found them in large numbers in creeks, to which the sea had access. Cuvier's description is very concise, and no reference is made to the color of the species; his specimens were undoubtedly preserved in spirits. From living specimens, I annex the following account:

Of eight specimens before me, the largest is two inches in length, and two and three quarters lines in its greatest depth. All above *lateral line*, of a greenish brown color—beneath this line, which is very perceptible, the color is darker, and is broken irregularly by the extension of whiteness of abdomen. In young specimens, the color is distributed in four or five bars, which disappear in distinctness in the mature fish.

Four moveable spines in front of the dorsal fin; the first, one half a line in length; the second, the same length; the two last, shorter; the last, shortest.

The Ventral spine, one line and three quarters in length, is serrated on its outer margin: from base of ventral spine, a lateral spine passes almost to the anus. To the under portion of the ventral spine is attached a reddish membrane, which makes this part appear as if covered with blood, when the fish is suddenly darting through the water, with this spine projecting.

The fin rays are as follows: D. 3. 1-4; P. 11; V. 1; A. 10; C. 13.

G. *pungitius*. Lin. *The ten-spined Stickleback*.

Cuv. et Valenc. Hist. Nat. des Poiss. t. iv. p. 506.

Yarrell's British Fishes, vol. i, p. 85.

This species I also received from Mr. Russell, who found it with the preceding. The general description of the "*pungitius*" answers to this species—but the appearance of the two varies in some particulars.

Length of species two inches and three lines; *greatest depth* two lines. Color grayish, with from six to ten transverse dark bands, very distinct in some specimens, in others scarcely visible. In the same specimen, these bands are much more apparent at some moments than at others, as the fish is excited by fear or other causes. Body *beneath*, silvery. *Eyes* nearly a line in width; pupil, of a deep black; iris, metallic-colored. The upper edge of Ventral spine serrated.

The fin rays are as follows: D. 10–11; P. 11; V. 1; A. 1–9; C. 13.

After death, this and the preceding species become much lighter-colored; the bands in a great measure disappear, and the careless observer would scarcely believe he beheld the same fishes as those he had lately admired in their native beauty.

In a paper read before the Boston Society of Natural History, in 1836, I noticed the "*Gasterosteus quadratus*," Mitchell, as being found in our waters. The specimen upon which I founded this belief, was in a mutilated state, and is still in the cabinet of that Society. Having met with no species of "*Gasterosteus*" since that time, with *four dorsal spines*, save the "*apeltes*"—and being therefore inclined to think that that specimen *may be* the *apeltes*, I am unwilling to assert that the "*quadratus*" is found in our State.

FAMILY III.

SCIENOIDES.

OTOLITHUS. Cuv.

Generic characters. *Head gibbous, supported by cavernous bones: two dorsal fins: anal spines weak, and no cirrhi: some of the teeth are elongated hooks, or true canini: the natatory bladder has a horn on each side, which is directed forwards.*

O. *regalis*. Cuv. *Squeteague*. *Weak Fish*.

Trans. Lit. et Philosoph. Soc. N. Y., p. 396, et fig.

Cuv. et Valenc. Hist. Nat. des Poiss. t. v. 67.

Fauna Boreali Americana, p. 68.

This species, which, some years since, was found in large numbers about Nantucket and Martha's Vineyard, has of late entirely disappeared. During the two seasons that my attention has been directed to our fishes, I have not been able to procure a single specimen. Dr. Yale writes me in October, 1837;—"The *squeteague* has deserted these waters, there has not been one taken for three or four years about here; they left about the time that the *blue fish* came." Hon. Hezekiah Barnard, of Nantucket, in a letter to me, dated July, 1838, remarks;—"The *squeteague*, or *weak fish*, have disappeared since the return of the *blue fish*, who are their avowed enemy. I have conversed with our fishermen, they say they have scarce seen one for six years." Thus it appears, that while the *blue fish* was absent, *they* were abundant—and at the appearance of the *blue fish*, *they* left us.

Mitchell's description of the "*Labrus squeteague*" is as follows:—"Size commonly from a foot to fifteen inches, but often grows much larger. I weighed one, that measured twenty-seven inches in length by seven in depth, and found him heavier than six pounds. He never goes into fresh streams

or ponds, but, within the limits of the salt water, is taken in almost all the places where *rock-fish* is caught. The *weak fish* is so much the companion of the *basse*, that I once gave him the specific name of *comes*. Head and back brown, with frequently a tinge of greenish. The spaces towards the sides faintly silvery, with dusky specks. These gradually disappear on the sides, until, on descending to the belly, a clear white prevails from the chin to the tail. *Mouth* wide. *Jaws* toothed, and, in the upper mandible one, two, or three teeth in front, larger and stronger than the rest, and resembling the fangs of serpents. *Throat*, in front of the œsophagus, armed above and below with collections of small teeth. Eight softish rays in the foremost Dorsal fin. Pectoral, Dorsal and Caudal fins, light or pale brown, inclining sometimes to yellowish. Anal and Ventral fins, pale yellow. *Tail*, even. Lower jaw longer than the upper. *Lateral line* arched upwards, and after its descent runs quite to the extremity of the caudal fin. *Tongue* yellow, with minute black dots around the fore part; concave, with a soft and flexible margin; has a froenum. The swimming bladder is convertible to good glue. I have eaten as fine blancmange from it, as from the isinglass of the *sturgeon*. He is a fish of a goodly appearance, and is wholesome and well tasted, though rather soft. Is brought to market in great numbers during the summer months. He is taken by the line and the seine. He is called *Weak fish*, as some say, because he does not pull very hard after he is hooked; or, as others allege, because laboring men, who are fed upon him, are *weak*, by reason of the deficient nourishment in that kind of food.

Certain peculiar noises under water, of a low, rumbling or drumming kind, are ascribed by the fishermen to the Squeeteague. Whether the sounds come from these fishes or not, it is certain that during their season, they may be heard coming from the bottom of the water; and in places frequented by *weak fish*, and not in other places; and when the *weak fish* depart, the sounds are no more heard.

Rays : B. 7 ; P. 16 ; V. 5 ; D. 8-28 ; A. 13 ; C. 17."

UMBRINA. CUV.

Generic characters. *The Umbrina, besides the characters common to the Sciana, has a barbule, or cirrhus, at the angle of the lower jaw; the spines of the anal fin strong and sharp; the teeth smaller and more numerous.*

U. *nebulosa*. Mitchell. *The King Fish.*

Trans. Lit. et Philosoph. Soc. N. Y. p. 408.

A single specimen of this species, which Mitchell states to grow to a larger size than a foot and a half, has been met with eight inches and a half in length, taken in a lobster pot at the Boston light-house. From this specimen, which has belonged to the cabinet of the "Boston Society of Natural History" for several years, and is at the present moment in a state of fine preservation, I have drawn up the following description.

Body elongated, slightly arched over pectorals, gradually tapering towards tail, of a dull gray color, with silvery reflections upon sides, ornamented with irregularly disposed dark bars; some, passing obliquely forwards from the dorsal fin; others, passing obliquely backwards from nape of neck; and one broader one, pursues a straight course backwards through the middle of the body, from extremity of pectorals to the tail. Body beneath, yellowish.

Length of head two inches, covered with scales smaller than those upon body: head slightly flattened between eyes; rounded upon occiput; somewhat depressed back of snout. *Snout* blunted, projecting two lines beyond upper jaw. *Eyes* of moderate size: their diameter equal to one half the distance between eyes. *Nostrils* directly in front of eyes: the posterior larger, situated obliquely beneath, and in front, of anterior inferior angle of eye: at the anterior inferior angle of this orifice, is situated the anterior nostril, which is very small and circular. *Mouth* of moderate size: lips fleshy: jaws filled with numerous, very small teeth: upper jaw the longer: a

small fleshy cirrus is suspended from chin. *Preoperculum* serrated at its posterior margin : more sparsely so, *beneath*. A small concealed spinous point is observed at posterior portion of *operculum*. *Lateral line* very distinct, curving with the body.

The Dorsal fin arises just back of the pectorals ; its first ray is a minute spine : the second fleshy ray is much the longest of all ; this ray is nearly twice as high as the length of the fin. The extremities of the rays are black.

The second Dorsal is of the color of the abdomen ; of equal height throughout its entire length ; one sixth less high than long. It extends to within half an inch of caudal rays.

The Pectorals are *above* black ; *beneath*, color of abdomen ; length less than one third their height.

The Ventrals arise in front of posterior half of pectorals ; their general color like the pectorals ; extremities margined with white.

The Anal fin is situated in the middle of the body ; longer than high ; color of abdomen.

The Caudal is lunated ; a little higher than long.

The fin rays are D. 9. 26 ; P. 19 ; V. 5 ; A. 10 ; C. 17.

FAMILY IV.

SPAROIDES.

SARGUS. CUV.

Generic characters. *Trenchant incisors in front of jaws, almost similar to those of man.*

S. *ovis*. Mitchell. *The Sheep's Head*.

Trans. Lit. et Philosoph. Soc. v. i. p. 392.

This species, so elaborately described and eulogized by Mitchell, is occasionally taken in our waters south of Cape Cod. Thomas A. Greene, Esq. of New Bedford, informs me

it is sometimes sold in that market. Not having met with a specimen, I copy the description of Mitchell :

“ With smutty face, banded sides, pale complexion, prominent eyebrows, and grooved spinous dorsal fin. Weighs fourteen or fifteen pounds. One that weighed four pounds and a half, measured twenty inches in length, eight in depth, and three in thickness. The form of the mouth, and a certain smuttiness of the face, have a distant resemblance to the physiognomy of the sheep. Thence comes the name by which he is usually distinguished. Teeth covered by the lips which are large and distinct. Four *incisors* in each jaw, and two other teeth situated next to them, one on each side, that may be considered as *canine*. The former are straight, the latter are rather turned inwards. Within, and beyond these, two or three rows of round topped grinders, making a bony pavement as it were, inside of the mouth. No cirrus or roughness of any kind on the head, neck or snout. Lower jaw shorter than the upper. Nostrils double. *Eyes* large, vertical, brown, and connected by a prominent brow. *Head* united to the body without any proper neck. *Gill-covers* broad and smooth; opening ample. From a scaly spot a little above the branchial aperture, proceeds a colored and curved streak to the withers. A single dorsal fin, strong and spinous, lowering into a deep furrow the greatest part of its course. The expanded tail measures six inches across, and is nearly concave, or almost lunated. A scaly process near the insertion of the ventral fin. *Lateral line* almost corresponds with the arch of the back, and radiates prettily on the scales over which it passes. General color of the sheep's head a white, or obscure silvery, with a smutty daubing over the face and chin, a greenish tinge above the brow, and six or seven dark bands or zones, of an inch or more in breadth, regularly slanting from back to belly; the latter a dull white, approaching in some places and individuals to cream color. Scales large, horny, distinguished by radiated and concentric lines, and somewhat like a square rounded a little at the corners. They are deeply inserted into the skin ;

adhere with remarkable firmness; and when they are separated, there is discoverable, on the edges of the skin, which enclosed them, a sort of tarnished argentine or brightish leaden hue. Rays of all the fins coarse. The pectorals are long and pointed. Tongue white and smooth.

The intestines of the individual I last dissected were lengthy, convoluted, and filled with the fragments of several sorts of *crabs*. Swimming bladder capacious and thick. Peritoneum, on opening the abdomen, blackish. Two patches of teeth in the upper part of the throat, and two smaller corresponding patches on the lower part, a short distance in front of the entrance of the gullet. But all of these are very inferior in strength and size to those of the mouth.

Rays : B. 4 ; V. 6 ; P. 6 ; D. 24 ; A. 13 ; C. 19.”

PAGRUS. CUV.

Generic characters. *Body deep, compressed : dorsal fin single, the rays partly spinous, the posterior flexible : four or six strong conical teeth in front, supported by smaller conical teeth behind them, with two rows of rounded molar teeth on each side of both jaws.*

P. argyrops. Lin. *Big Porgee. Scapaug. Scup.*

Trans. Lit. et Philosph. Soc. N. Y. vol. i, p. 404.

Cuv. et Valenc. Hist. Nat. des Poiss. t. vi. p. 164.

This species, which Mitchell describes in his “*History of the Fishes of New York*,” as the “*Labrus versicolor*,” Cuvier considers the same as the “*Sparus Argyrops*.” L. It is taken in large quantities in Buzzard’s Bay and the Vineyard Sound, but has not been met with in Massachusetts Bay until within the last five or six years. At New Bedford and Holmes Hole, it is one of the most common species in the harbors, and is used more than any other fish when fresh. At the latter place, it is taken, from the first of June until the middle of October, with

the hook ; after that date, in the ponds, with spears and nets. Within a few years, small numbers have appeared north of the Cape, and are now yearly captured at Wellfleet and Sandwich. Mr. Newcomb, Jr., fishmonger in Quincy market, informs me, that about six years since, a fishing-smack brought from New Bedford a cargo of these fishes alive to Boston market : a portion of them were purchased by subscription among the fishermen in the market, and thrown into the harbor : the next season, two specimens were caught from our wharves : in the summer of 1835, one specimen was captured at Nahant, and was considered a *very strange fish*, no specimen having been known to have been seen there before : in the summer of 1836, Mr. Johnson, of whose kindness I have had occasion frequently to speak, sent me another specimen taken at Nahant. As no specimens had ever been taken so far north before, and as the few taken would lead to the inference that those which had been transplanted from Buzzard's Bay had not bred in the cold waters of this portion of Massachusetts Bay, we are led to believe the specimens, *taken immediately around Boston*, were of the number of those originally brought from the south.

The length of this fish is from eight to twelve inches ; length of head, one fourth the length of the entire fish ; depth of body across from base of pectorals, equal to one third its length ; width of body at base of tail, equal to one twelfth its length.

Body very much compressed at sides ; back gibbous, gradually curving towards tail. General color, a beautiful silvery, varying with brown, reddish and blue. Abdomen white. Head destitute of scales, and of a purplish color from the commencement of the gibbosity just over the eyes, to upper and outer angle of eyes on each side, and thence within a line drawn from this part to the outer angle of jaws. *Eyes* large ; irides silvery. *Lower jaw* shorter than the upper. Two rows of blunt teeth in back of jaws—those in front, sharp and prominent. *Lips* large and loose. *Nostrils* double—the anterior, smaller and circular ; the posterior, larger and vertical. Preoperculum and operculum covered with scales. A large

semicircular scale of a beautiful purple color, at the commencement of the lateral line: between this scale and the outer angle of the naked space, at the posterior angle of the eye, a band, half an inch or more in width, of smaller scales than those of the body, passing obliquely upwards to the anterior portion of the ridge of the back. The *lateral line*, commencing at the upper angle of the operculum and passing obliquely up to a point on a line with the fifth spine of the dorsal fin, curves with the body to the base of the tail.

The Dorsal fin, composed of twenty rays, twelve spinous, twelve membranous, is received into a deep groove at its base; when this fin is not erect, the spines are scarcely visible, so completely do they shut into this groove. Of the spines of the dorsal fin, the third is the longest; delicate filaments are suspended from the extremities of the first three spines. Less than two lines in front of the first dorsal spine when erect, lies a strong spine projecting forwards, almost entirely enveloped by the skin.

The Pectoral fin, one fourth the length of the body, commences on a line with the dorsal fin.

The Ventral fin with six rays.

The Anal fin shuts into a groove like the dorsal, and like that fin is clouded with black spots. The three first rays of anal, spinous.

The Caudal fin forked.

The fin rays are as follows: D. 24; P. 15; V. 6; A. 15; C. 17.

Mitchell describes this species as having twenty-six rays in the dorsal fin: the specimens I have seen, had each but twenty-four.

FAMILY VII.

SCOMBEROIDES.

SCOMBER. Lin.

Generic characters. *Scales on the body small and smooth ; vertical fins not bearing scales ; two dorsal fins widely separated ; some of the posterior rays of the second dorsal and the anal fin free, forming finlets ; sides of the tail slightly carinated ; one row of small conical teeth in each jaw ; the parts of the gill cover without denticulations or spines ; branchiostegous rays 7.*

S. vernalis. Mitchell. *The Spring Mackerel.*

Trans. Lit. et Philosoph. Soc. N. Y. p. 42.

Cuv. et Valenc. Hist. Nat. des Poiss. t. viii. p. 48.

Fauna Boreali. Americana, p. 80.

Mitchell describes under the specific names of "*grex*" and "*vernalis*," the common mackerel of our coast. Cuvier, although he admits both in his great work, considers them as the same ; and Richardson remarks, "the only differences between *S. grex* and *vernalis*, seem to be in their size and color, and they are very probably different ages of the same species." I have examined with much care the mackerel which are brought to our market, and the differences are too slight between them to constitute distinct species.

This species is taken on our coast, from the latter part of May, in nets, in small numbers, until about the tenth of June, when it readily takes the hook, and is brought to market the remainder of the season in large quantities. Although, as fresh fish, *mackerel* are sold in the markets along our whole coast, for several months in the year, and are considered by *all*, excellent food, (from 6 to 8000 barrels being sold annually in Boston market alone,) their great value to this people, arises from the means of employment afforded to an immense number, by the process of salting and packing.

Those packed in 1836, were furnished by the following towns :

Boston, - - - - -	40,559 barrels.
Gloucester and Manchester, - -	43,937
Newburyport and Newbury, - -	21,463
Wellfleet, - - - - -	17,500
Provincetown, - - - - -	14,139
Hingham, - - - - -	13,882
Cohasset, - - - - -	11,700
Barnstable, - - - - -	4,115
Scituate, - - - - -	3,782
Yarmouth, - - - - -	2,446
Salem and Beverly, - - - - -	2,394
Plymouth, - - - - -	1,477
Lynn, - - - - -	1,400
Duxbury, - - - - -	1,000
Charlestown, - - - - -	822

At the prices these fish were worth in November, 1836, the value of the year's fishing amounts to 1,534,012 dollars.

The whole number of barrels of mackerel inspected in Massachusetts for the five years, from 1832 to 1836 inclusive, are as follows :

1832,—224,000 barrels ; 1833,—225,000 ; 1834,—253,000 ; 1835,—197,000 ; 1836,—180,616.

Although it would seem, from the above table, that a smaller quantity of mackerel had been packed in 1836, than the several years immediately preceding it, yet it cannot be inferred from this circumstance that fewer vessels were engaged, or that the business was considered less important than before. In some years, immense shoals of these fishes are readily met with, and the vessels return in a few weeks with full cargoes ; while the same localities may be visited at other seasons, and the efforts of the fisherman prove fruitless, and his fare meagre.

So peculiar are the habits of this genus, that oftentimes weeks may pass, the fishing smacks be surrounded by millions

sporting upon the surface of the ocean, and scarce one allow itself to be taken, while again, the success of a few days will retrieve the disappointments of nearly a season.

Thus a fisherman informs me, that the last season, (1837) having been at the bay of Chaleur, and taken but few fish, the vessel to which he belonged, was returning home, when, off Cape Cod, the fish were so numerous and voracious, that the crew, consisting of ten men, captured in two hours, nearly thirty barrels of them. At this time about two hundred smacks were together, and they were all equally successful, some of them taking even forty barrels of fish.

After being carefully inspected, these fish find a ready market in Philadelphia, New York, Baltimore and New Orleans, and from this last port they are sent over the entire western country. Those of inferior quality are shipped to the West India islands.

I have not been able to learn with accuracy the number of vessels engaged exclusively in this fishery; in many towns, the same vessels are used at different seasons of the year for the cod as well as the mackerel fishery. I have ascertained, however, that there were two hundred and two vessels employed in this fishery, in 1836, in the county of Barnstable, and that of this number, ninety-eight belonged to Provincetown, which were valued at \$147,000.

Several of our most intelligent fishermen inform me, that the difficulty of taking mackerel is yearly increasing, from the barbarous custom prevailing of gaffing them, — of collecting them around vessels by means of throwing out bait, and then suddenly drawing up an instrument armed with numerous sharp iron points, by which many are captured, and greater numbers are cruelly maimed without being taken.

By the “Statistical Tables,” drawn up by the Secretary of State, from the reports of the assessors of the different towns upon the various branches of industry, it appears, that the number of barrels of mackerel taken in the year 1837, with their prices, were as follows:—Whole number of bbls. 234,059; value, \$1,639,042. Taken by the following Counties:—

Barnstable Co., 76,036—valued at \$490,638; *Essex Co.*, 69,599 = \$518,663; *Suffolk Co.*, 43,266 = \$320,165; *Plymouth Co.*, 25,258 = \$179,748; *Norfolk Co.*, 18,450 = \$120,528; *Middlesex Co.*, 1000 = \$6000; *Bristol Co.*, 450 = \$3300.

My description of the species is from a specimen seventeen inches in length. Upper part of body of a dark green color, marked throughout its whole extent, from occiput to tail, with beautiful transverse, undulating bands of a deeper hue, commencing on side of dorsal ridge and extending below the lateral line. *Sides* white, with cupreous reflections. *Abdomen* white. The very narrow *lateral line* commences directly back of humeral bone, on a line above the origin of the pectoral fin, and pursues a gently undulatory course to the base of the tail: this line is very distinct, being slightly prominent. Beneath the lateral line on the side, is a fuliginous line, much wider than the lateral line, which arises at the pectoral fin, and traverses the length of the fish; the space between these two lines, of a duller color than the side beneath.

Length of entire fish to length of head, as 17 to 3½. Top of head, of a dark, almost black color, produced by longitudinal, broad, broken bands, passing backwards from the snout, and a large black blotch extending backwards towards the gill-covers, from the occiput. *Eyes* large, their diameter equal to three fourths the distance between eyes: pupils black; irides silvery. Eyes protected by a nictitating membrane. The portion of head directly back of eyes, cupreous. *Gill-covers* and maxillary bones, silvery. Intermaxillary bones dark fuliginous—angle of jaws dusky. Inferior margin of preoperculum, marked by a row of minute mucous pores. Gape of mouth, moderate. *Jaws* and palatine bones armed with a single row of very minute teeth. The whole interior of lower jaw, and anterior portion of upper jaw, fuliginous. *Tongue*, a dull silvery color.

The first Dorsal fin, composed of strong rays, of which, the second and third are the longest, arises on a line opposite the posterior half of the pectoral fins: the length of this fin is

hardly greater than its height. When unexpanded, it is entirely concealed in a groove at its base.

The second Dorsal, situated upon the posterior half of the body, is of a fuliginous color, margined with white; its length to its height is nearly as 3 to 1; back of this second dorsal, occupying the space between it and the tail, are five finlets, the fifth, longest.

The Pectoral fins of a dark color, having beneath them a black blotch, arise back of upper third of operculum—their length to their height as 1 to 3.

The Ventral fins arise back of pectorals, and likewise have beneath them a black spot at their base; save the tinge given them by this spot, they are of a flesh color. The first ray is very strong; all the rays are subdivided at their middle, and again divided into smaller portions at their extremities.

The Anal fin arises directly back of the anus, which is situated opposite the origin of the second dorsal. At the commencement of this fin, is a short spine; this fin is shorter than the second dorsal, and of the same color as the abdomen. Back of this fin are six finlets; that next the anal fin, appearing at first sight to be a portion of the fin.

At base of Caudal, two longitudinal carinæ, extending the whole length of the fleshy portion of the tail: the outer rays of the caudal fin, much the longer; their articulations very obvious; fin deeply forked; extremities margined with white; distance between extremities of caudal rays, between three and four inches.

The fin rays are as follows: D. 10–12; P. 17; V. 5; A. 12; C. 20.

S. colias. Gmel. *The Spanish Mackerel.*

Cuv. et Valenc. Hist. Nat. des Poiss. t. viii. 39, pl. 209.

Yarrell's British Fishes, vol. i. 131 et pl.

This is a rare species upon our coast; some seasons they are scarcely seen at all. It is generally known by our fishermen as the "*Spanish Mackerel.*"

Length of specimen before me, eleven inches: depth two inches. *Form elongated*, very round and plump, tapering towards tail at the origin of which it is very small. Upper part of body of a light green color, with numerous contiguous beautifully undulating lines of a darker green passing down the sides and just crossing the lateral line, immediately beneath lateral line, of a dull bluish color, with indistinct circular brown blotches. *Abdomen* lighter colored, but as well as the sides, presenting cupreous reflections. *Head*, two and a half inches in length; flattened above; compressed on sides; rather pointed at snout. *Eyes* large; full; pupils black; irides silvery. *Nostrils* double; the posterior, vertical, just in front of eyes; anterior, circular, in front of posterior, equal to the distance between posterior and eye: diameter of eye, rather less than the distance between eyes. Superior portion of preoperculum cupreous; inferior portion of it, as of operculum and maxillaries, silvery. *Tongue* pointed, greenish with a metallic tint. *Jaws* equal; crowded with minute teeth.

The first Dorsal fin arises opposite the posterior third of the pectoral fins; transparent; its first ray upon its outer edge, and the spaces between the tips of the rays margined with black; the second ray longest; the tips of all slightly projecting beyond the membrane.

The second Dorsal commences back of the first, at a greater distance than the length of first dorsal: fin shorter than preceding; rays short, covered by a thick membrane: five finlets back of second dorsal; the fifth, deeply divided, appearing like two.

The Pectorals just beneath, and on a line with the lateral line: length about one half their height: slightly dusky: at base above, a small black blotch which is hardly perceived, unless fin is raised.

The Ventrals just in front of first dorsal; elongated; reddish white.

At origin of Anal fin a small spine is observed. The Anal fin is opposite the second Dorsal, and, like it, has five finlets, resembling those of the back.

The Caudal fin is yellowish, deeply forked ; two lateral carinæ at base.

The fin rays are as follows : D. 9-12 ; P. 19 ; V. 5 ; A. 13 ; C. 22.

THYNNUS. Cuv.

Generic characters. *Form of the body like that of the Mackerel, but less compressed ; numerous scales surrounding the thorax : first dorsal fin extending nearly to the second : second dorsal and the anal fin subdivided posteriorly, forming numerous finlets ; sides of the tail decidedly curved ; a single row of small pointed teeth in each jaw ; branchiostegous rays 7.*

T. vulgaris. Cuv. *The Common Tunny.*

Pennant's British Zoology, vol. iv. 234 et fig.

Mc Murtrie's Cuv. ii. 144.

Cuv. et Valenc. Hist. Nat. des Poiss. t. viii. p. 58.

Yarrell's British Fishes, v. i. p. 134 et fig.

This must be a very rare species in the waters of this State. I have met with only one specimen ; this was taken September 4th, 1838, near Kettle Island, between Marshfield and Cape Ann, with a large sized cod-hook, baited with a "*menhaden*," while fishing for the "*codling*," or, as it is improperly called, "*hake*." The Portsmouth Journal noticed another individual taken the last season, at Pigeon Cape, near Cape Ann, fifteen feet in length, and weighing about one thousand pounds. With respect to this specimen, the writer remarks : "after preparing two barrels of the fish for Boston and New York, the remainder was sold in our market, and many of our citizens were enabled to feast themselves on its most delicate meat, resembling much in appearance lean pork, and the best of mackerel in taste." This species is taken in large numbers in the Mediterranean ; and its flesh has been long celebrated for its delicacy. Occasionally specimens are taken upon the coast of Great Britain, upon the Cornish Coast, upon the

islands west of Scotland ; and it has been taken at the mouth of the Thames. That it is not every where held in the same estimation as by the Sicilians or even our Portsmouth friends, is evident from the following extracts from "*Alexander's Narrative of a Voyage of Observation among the Colonies of Western Africa*," 1838. Visiting the Market at Funchal, the capital of Madeira, he remarks, "in the market I observed some large *tunny*, junks of which, resembling red beef, were cut up with huge knives, like small scythes, and sold for a mere trifle." On the coast of New England, this fish is called "*horse-mackerel*" and "*albicore*." It is seldom seen ; never noticed in shoals, as in the Mediterranean.

The specimen I had an opportunity of examining was publicly exhibited here, and was visited by several of my scientific friends.

Entire length nine feet and three inches : two feet deep across base of pectorals : fifteen inches in depth across base of anal fin ; and four inches deep at base of caudal fin. Form elongated ; gradually sloping from beginning of dorsal to snout, and tapering from dorsal to tail. Color of whole upper part nearly black : sides silvery : beneath white. Scales on back, in front of first dorsal, at base of, and beneath pectorals, very large.

Length of head, two feet three inches ; jaws equal when closed ; tongue large, broad, black ; all inside of mouth dark colored ; gape of mouth very large ; eyes circular ; pupils black ; irides golden, with greenish reflections : distance between eyes, one foot. Gill-covers, very large, perfectly smooth, of a silvery gray color.

The first Dorsal fin commences two feet three inches back of tip of snout ; its rays are very strong ; the first ray nine inches long ; they gradually diminish in length ; the last being scarcely perceptible. The rays are of a fuliginous color ; while the connecting membrane is nearly black. This fin shuts entirely into a groove, which, at its origin, is one and a half inches deep ; when the fin is unexpanded, it is perfectly invisible.

The second Dorsal is of a reddish brown color ; twelve

inches in height ; five in length : this fin resembles a very strong membrane, similar to the fins of the Sharks, it being almost impossible to count the rays : nine finlets between this and the tail, of a bright yellow color, dark at base, and upon anterior edge.

The Pectoral fins are falciform ; of the same color as gill-covers ; five inches long ; sixteen inches high.

The Ventral fins are composed of very strong rays, situated in a groove at their base just beneath pectorals ; above, black ; beneath, white ; eleven inches high ; two inches long.

The Anal fin commences six inches back of the second dorsal ; and is similar in appearance to that fin : the rays cannot be counted on account of their compactness : fin fifteen inches high ; five inches long : nine finlets, color of the dorsal ; and, like them, the middle longest.

The Caudal fin is lunated : seven inches high in its middle ; measuring two feet five inches across its extremities. At its base, a lateral carina, which is continued on to tail, seven inches long ; one and a half inches high. On each side of the portion of it which is upon tail, two smaller carinæ are situated, three inches in length, between these and the former, depressions are thus produced.

The fin rays so far as practicable to be counted, are about as follows : D. 14-13 ; 9 finlets ; P. 34 ; V. 1-5 ; A. 2-12 ; 9 finlets ; C. 19.

PELAMYS. CUV.

Generic characters. *Distinguished from the Tunnies solely by their separate, pointed, and strong teeth.*

P. sarda. Bloch. *The Skip Jack.*

Trans Lit. et Philosoph. Soc. N. Y. 428.

Cuv. et Valenc. Hist Nat. des Poiss. t. viii. p. 149, pl. 217.

This species is by our fishermen incorrectly called "*Bonito*." The true "*Bonito*" is a "*Thynnus*," Cuv. I have examined

two fine specimens of this fish ; one, nineteen inches long, was sent me by Dr. Yale, from Holmes Hole. He informs me, that for the last six or eight years, this species has been frequently met with at the Vineyard, and is readily taken with trailing bait. The second specimen I have seen, measured twenty-one inches in length. It is at once distinguished from any other of the family in our waters, by its ash-colored abdomen ; dull greenish back, and oblique and transverse dark bands.

From the latter specimen, I draw up the following description : color of head and upper part of body, a greenish brown : sides, lighter ; abdomen, silvery white. Body smooth ; a broad oblique patch of minute scales is observed just above the pectoral fins, commencing at posterior extremity, and widening towards occiput : minute scales situated along the sides of dorsal ridge, looking like small papillæ longitudinally arrayed. Ten or twelve dark colored bands pass obliquely downwards and forwards from the dorsum towards abdomen : the first of these bands commence at the posterior extremity of the dorsal fin ; the last, at the origin of the caudal fin. Some of these bands pass very low down upon sides, even to abdomen. Besides these, several indistinct lighter colored bands cross the body transversely. *Lateral line* arises high up on the back, and pursues a pretty undulatory course, until about on a line with anal, from whence it goes straight to caudal fin. Length of head, four inches and three quarters : top of head, dark greenish brown : gill-covers silvery, marked with fuliginous. Gape of mouth large. Tip of upper jaw scarcely projecting beyond the lower : jaws and palatine bones with a single row each of sharp, recurved, prominent teeth : upon the middle of lower jaw are four teeth ; the anterior two quite small, the posterior the largest in the jaws : the palatine bones are very small. Diameter of eye equal to one third the distance between eyes : pupils black ; irides, silvery.

The first Dorsal fin commences on a line just back of posterior angle of operculum ; its second ray is highest ; color of

fin light, with dull patches; the posterior short rays almost concealed in a groove upon the back, when unexpanded.

The second Dorsal is longer than high; back of this fin are eight finlets, the third and fourth of which are longest.

The Pectoral fins arise just in front of first dorsal—of a dark color above, lighter beneath; as high again as long.

The Ventrals commence back of pectorals; are darker colored next to abdomen. When unexpanded, these fins shut into a depression, partially formed upon abdomen.

The Anal fin arises on a line opposite the first dorsal finlet; is a little longer than high, white, with fuliginous. Back of anal, seven finlets; the posterior, smaller. Anus small, directly in front of the anal fin. A thick, fleshy carina on each side of the fleshy portion of tail; on each side of posterior part of this, two quite small, obtuse carinæ run directly back across the middle of caudal fin, causing quite a depression between them.

The Caudal fin lunated, of a dirty bluish color; length of exterior rays, compared to distance between extremities when expanded, as 3 to $5\frac{1}{2}$.

The fin rays are as follows: D. 20–14; P. 24; V. 6; A. 14; C. 24.

XIPHIAS. Lin.

Generic characters. *Body fusiform, covered with minute scales; a single elongated dorsal fin; ventral fins wanting; tail strongly carinated; upper jaw elongated, forming a sword; mouth without teeth; branchiostegous rays 7.*

X. *gladius*. Lin. *The Sword Fish.*

Pen. British Zoology, vol. iii. 141.

Strack's plates, 21. 1.

Mc Murtrie's Cuv. ii. 148.

Cuv. et Valenc. Hist. Nat. des Poiss. t. viii. p. 255.

Yarrell's British Fishes, vol. i. 143.

Although this species is not included by Richardson, in his "Fauna," on account of its presence on the American coast not having been ascertained with certainty by those who had referred to it, it is frequently met with in our waters, and is becoming quite an article of commerce with us. It is generally discovered by the projection of its dorsal fin above the surface of the water, as it is pursuing shoals of mackerel, upon which it feeds, about 15 or 20 miles from the shore of Martha's Vineyard. The fishermen capture it by means of an instrument called a "*lily iron*," from the form of its shafts or wings, which resemble the leaves of a lily. This instrument is thrown like a harpoon with great force into the fish, the attempt always being made to wound the animal in front of the origin of the dorsal fin. When wounded, it sometimes frees itself from the iron by its struggles; and has been known to dive with so much force towards the bottom of the sea, as to drive its sword throughout its whole extent into the sand or mud, which was proved by its appearance when taken. When unmolested, it not unfrequently is observed to spring several times its length forwards, several feet above the surface of the water.

The flesh of this fish when salted is eaten, and preferred by many to that of several other species. The *cod-fishers* at Norman's Land, being disappointed the last season in their usual avocation, directed their attention to the taking of the *sword fish*, and were quite successful in their efforts. About 200 barrels are annually taken at Martha's Vineyard, which are either sold fresh, or cut into slices and pickled or salted, and kept for sale in that state throughout the year. It sells for from three to four cents per pound.

From a specimen kindly sent me by Dr. Yale, which was taken August 29, 1838, between Gay Head and Block Island, by Mr. Warren Cleaveland, I have drawn the following description:

Back and upper part of sides, of a sky-blue color; beneath, silvery gray. Surface smooth. Entire length, twelve feet five inches; depth across, from origin of anal fin, fifteen inches. Length of head, from posterior edge of operculum to point of

lower jaw, twenty-two inches; length of upper jaw or sword, beyond the point of lower jaw, three feet five inches. Jaws without teeth. Gill-covers silvery brown. Upper part of sword, dark brown, almost black, having a dorsal ridge, within which is a groove. Under portion of sword, lighter colored, smooth, with a velvety feel. The two anterior feet of sword have a bony, perfectly smooth edge. Widest portion of upper jaw, five and a half inches; jaw gradually terminates in a point. *Eyes* very moveable in their orbits, three and a half inches in diameter; distance between eyes, eight inches. Branchiæ composed of four pairs of large parallel laminae, and one smaller one.

The Dorsal fin commences nearly on a line with the posterior edge of the operculum. It is strongly falciform; twenty-two inches high, eighteen inches long. But eighteen rays are obvious; the whole dorsal ridge between them and within six inches of base of tail, destitute of fin rays; and in their place, a shallow groove the whole extent, supporting a slight membranous elevation. Six inches in front of base of tail, a small fin four inches high, one inch long, composed of three rays, looking like the adipose fin of the "*Salmonides*," or the finlets of many of the "*Scomberoides*."

The Pectoral fin, also, is falciform, eighteen inches high, six inches long; above, almost black; beneath, color of abdomen.

The Anal fin is, like the preceding, falciform; sixteen inches high, ten inches long. The extremity of this fin terminates on a plane with the termination of dorsal, and is formed like that. This small portion is three inches high, and one long. Fin, color of the abdomen.

At base of tail, a transverse furrow three inches long and two thirds of an inch wide. On each side of base of tail, a lateral carina three inches high, eight inches long, three inches back of dorsal, extending three inches on the caudal fin.

The Caudal fin deeply forked; twenty-nine inches high, eight inches long, six inches high in its middle.

The fin rays are as follows: D. 18-3; P. 15; A. 11-3; C. 17.

The common size of this fish is from 12 to 15 feet in length, and weighing from 300 to 400 pounds, although it sometimes is taken considerably larger.

Although a species of "*Xiphias*" has been known for many years to frequent our coast, I am not aware that it has been examined by any of our scientific men, save by my friend John B. S. Jackson, M. D. of this city, who kindly loaned me his rough notes of a specimen exhibited here in 1833. From these notes it appears, that the "specimen was taken by cod-fishers, from a small dory, about twenty miles from Boston, not far from Marshfield, and near the Western Banks. It was drawn up with much difficulty with cod hook and line, and then speared. Whole length, 11 feet 4 inches. Length of sword, 4 feet. Weight, 650 pounds."

In looking over the plates of this fish, one is surprised at the great dissimilarities between them; and could he think that each plate had been drawn from a recent specimen, he would be compelled to conclude there must be more than one species. But, as in many other instances, they are probably poor copies of each other; those points only being particularly attended to, which seem to the copier most important. In Pennant's "*British Zoology*," the whole interval between the commencement and extremity of the dorsal fin is occupied by an immense number of minute rudiments distinct from each other. While the figure of Strack exhibits but seventeen prominent rays between the extremities, connected by a membrane. The anal also, differs much in the two figures. In the specimen I have just described, it will be remembered that not the slightest rudiment of a ray was distinguishable upon the dorsal ridge back of the eighteenth ray, until within six inches of the base of the tail. Yarrell figures a young specimen, showing that there is but one dorsal fin, which occupies the whole length of the back, from the gill-covers to within a short distance of the tail. If the reason offered by Cuvier for the disappearance of the greater portion of the dorsal fin be true, viz., "the middle of it being worn with age, gives it the appearance of being double,"—and of Yarrell, "but the portion of the fin interme-

diate between the two ends is so slight that it is easily torn, or even entirely worn away by use during life,"—if this explanation be correct, it is not a little singular, that the appearance of the entire dorsal ridge should, in my specimen, have been so uniform: *no rays partially worn or broken in the interval between the extremities*, as we should suppose would be produced by a gradual change, but *an entire absence of rays*, from the eighteenth, which is perfect, to the posterior rays, which are also all perfect.

Yarrell observes, that the edges of the sword are "finely denticulated." In that portion of the edge of the sword before me which is perfect, it is *entirely smooth*; the greater portion of the edge is broken at intervals irregularly, unnaturally, evidently by use.

TRACHINOTUS. Lacepede.

Generic characters. *Free spines on the back, and two others, also free, before the anal; body elevated, and the tail without the lateral carinæ; profile vertical; and the dorsal and anal fins tapering to points more or less long.*

T. argenteus. Cuv. *The Rudder Fish.*

Cuv. et Valenc. Hist. Nat. des Poiss. t. viii. p. 413.

Dr. Yale sent me from Holmes Hole, three specimens of a fish, generally known at the Vineyard by the name of "*rudder fish*," which, after considerable hesitation, I have concluded to be the "*T. argenteus*," Cuv. The smallest specimen, two inches in length, answers perfectly to the figure, in Mitchell's "*Fishes of New York*," incorrectly called by him "*Coryphæna hippurus*." This small specimen was taken at a wharf at Holmes Hole. The two large specimens were caught about fifteen miles from land. Dr. Yale writes me, that "this fish is generally found at sea, but is common in our waters. It follows vessels, or keeps near old casks or plank that are float-

ing, and sometimes is found about the wharf logs in our harbor.”

Of the specimens lying before me, the largest is eight inches in length. Body oblong, compressed upon sides; back arching abruptly over the eyes; of a bluish white upon sides, looking as if covered with black dots, owing to the dark outline of the scales; body beneath, of a dull white color. (In the smallest specimen, which must be quite a young fish, the color is a dark brown, variegated with yellow patches.) Head, one fourth the length of body; diameter of eye, one fourth the length of head. A bony ridge over eyes. Operculum large, naked, of a horny texture, margined by a membrane. Preoperculum strongly serrated throughout. A depression upon top of head, between eyes; distance between eyes, rather greater than diameter of eye. Nostrils directly in front of eyes; the posterior, much the larger. The upper jaw at snout descends abruptly; jaws of equal length, with small, sharp teeth. The *lateral line* commences high above operculum, and curving over pectorals to their extremities, pursues a straight course to tail.

The Dorsal fin commences back of a line opposite posterior angle of operculum, and is continued to fleshy portion of tail. Seven spines precede the fleshy rays of the dorsal; the posterior is connected, throughout almost its entire height, to the membrane of the dorsal; the preceding ones are nearly free, or rather have a membrane attached to their lower portion, but which does not pass high up the spines.

The Pectorals are beneath the posterior angle of the operculum; less than one third as long as high, of a dark brown color.

The Ventrals are one fourth of an inch long; their outer ray, spinous.

The Anal fin arises just in the middle of the body, and is nearly as long again as high; color of the dorsal. This fin is preceded by three spinous rays, the first of which is free.

The Caudal fin is quite deeply lunated.

The fin rays are as follows: D. 5. 2-22; P. 19; V. 1-5; A. 1. 2-17; C. 20.

Although there are three spines before the anal, but *one* of these can be said to be free; of the remaining two, the second is more free than that next the fin.

TEMNODON. CUV.

Generic characters. *Tail unarmed; a small fin, or free spines before the anal; the first dorsal is very slight and low, the second and the anal covered with small scales; but their principal character consists in a range of separate, pointed and trenchant teeth in each jaw; behind these, above, is a row of small ones, and the vomer, palatine and tongue are furnished with others, very small and crowded. The operculum terminates in two points, and there are seven rays in the branchiæ.*

T. saltator. Cuv. *The Blue Fish.*

Trans. Lit. et Philosoph. Soc. N. Y. p. 421, et fig.

Cuv. et Valenc. Hist. Nat. des. Poiss, t. ix. p. 231.

This species described by Dr. Mitchell as the "*Scomber plumbeus*," and called the "*horse mackerel*" by the vulgar, is better known in those portions of our state where it is taken, as the "*blue fish*." Many years since it was held in high estimation by the aborigines of our country. For about fifty years it disappeared from our coast, as may be learned from the following passages, extracted from a journal of the first settlement of the island of Nantucket, written by Zaccheus Macy, in 1792, and contained in the third volume of the "Massachusetts Historical Collections." In this account, notice is taken of a great pestilence which attacked the Indians of that Island in 1763 and 1764, with such mortality, that of the whole number 358, 222 died. He adds: "Before this period, and from the first coming of the English to Nantucket, a large fat fish called the *blue fish*, twenty of which would fill a barrel, was caught in great plenty all round the island, from the 1st of the 6th till

the middle of the 9th month. But it is remarkable that in the year 1764, the very year in which the sickness ended, they all disappeared, and that none have been taken since." Occasionally, for the last twenty years, a few straggling specimens, very small, have been taken, but they were rarely seen until within the last ten years; during this latter period they have gradually increased in number, and, generally speaking, have been of a much larger size than when they were first observed. Now, they visit the coast south of Cape Cod, at Nantucket, and New Bedford, and Holmes Hole, in large numbers, and are occasionally captured weighing fourteen pounds. It is caught from shore by throwing a drail—a hook fixed into a piece of bone or ivory, and sometimes pewter, something in the form of a fish, with brass wire around the line next it, to prevent its being bitten off by the strong jaws of the fish; they are also caught in a boat under sail with a good breeze, the line dragging behind; and they have been taken with a seine—thus in a number of the Nantucket Enquirer, July 8th, 1837, I find the following: "a few days since, there were caught at one haul, 241 blue fish, 108 scuppaugs or poggies, 28 basse and 19 shad, in all 396 fish, weighing about half a ton." On the 25th October, 1837, a specimen of this species, weighing about three pounds, was taken at Green Island, by Mr. Morgan, of that place, and sent to Mr. Newcomb, Jr. of Quincy Market; this is the only specimen I have known to be taken in Massachusetts Bay. In its flavor, this fish resembles the mackerel, and is highly esteemed by many as an article of food: but it is excessively fat, and cannot always be borne by the stomach. In the early part of summer it is very lean: towards the latter part of summer and the commencement of autumn, it is in a state of perfection for the epicure. By the kind attentions of the Hon. Hezekiah Barnard, of Nantucket; George B. Emerson, Esq., President of the Boston Society of Natural History; and Dr. Yale, I have had an opportunity of examining several specimens. To the first of these gentlemen, I am indebted for much of the information obtained respecting this species.

The following description, I have drawn up from a specimen fifteen inches in length. Depth of body across on a line with base of pectorals, three inches. Length of head three inches six lines. All upper part of body of a bluish color; lower part of sides, as well as of abdomen, whitish. A large black spot at base of pectoral fins. Head above, naked. *Nostrils* double, terminating in the same cavity; anterior orifice circular, and situated directly in front of posterior, which is larger and placed horizontally. *Jaws* with prominent, sharp, lancinated teeth; the lower jaw has but one row of these; the upper, besides a similar row with the under jaw, has a row of very small teeth, back of these. A row of very minute teeth at base of tongue; also small teeth upon vomer and palatine bones. *Eye*, five lines in diameter; irides yellowish. Operculum terminated in two points, which do not amount to spines. The *lateral line* commences just above posterior angle of operculum, and curving with the body, terminates at the base of the rays of the caudal fin. Fins covered with scales.

The first Dorsal fin is composed of seven spinous rays; these, when not erect, are received into a groove at their base.

The Anus is one half inch in front of Anal fin.

Width of tail when expanded, is more than five inches.

The fin rays are as follows: B. 7; D. 7-26; P. 17; V. 6; A. 28; C. 19.

PEPRILUS. CUV.

Generic characters. *Form compressed; small and slightly apparent scales under a satiny epidermis; snout obtuse and non-protractile; a single dorsal fin, preceded, as well as the anal, by a horizontal, partially concealed spine. The pelvis forms a trenchant and pointed blade, before the anus, that might be taken for a vestage of ventrals. Besides the ordinary lateral line, there is a stria on the flank, which has been considered as a second one.*

P. triacanthus. Peck. *The Three-Spined Peprilus.*

Memoirs of the American Academy of Arts and Sciences, v. ii. p. 48, et fig Mitchell, Trans. Lit. et Philosoph. Soc. N. York, p. 365, et fig.

Cuv. et Valenc. Hist. Nat. des Poiss.

In 1794, Peck read a description of this fish, which he accompanied with a very fair figure, to the "American Academy," under the name of "*Stromateus triacanthus.*" This paper was published in the year 1804. In 1814, Dr. Mitchell read his paper upon the "Fishes of New York," to the "Literary and Philosophical Society" of that state, and the next year this paper was published in that society's Transactions: in his paper, he describes the species under consideration, with the specific name of "*cryptosus.*" Mitchell's name is retained by Cuvier in the Notes to his "Regne Animal." Dr. Mitchell would never thus have neglected Peck had he been aware of the existence of his paper. Our duty is clear; and we cheerfully prefix the name given it by its first describer: his description is very accurate, and his name is equally appropriate.

This species is not uncommon in our waters: it is generally taken in nets, and is considerably used as bait for the "*striped basse*" by our fishermen: being a very oily fish, it is found serviceable as manure, for which purpose it is used upon some portions of Cape Cod. I have known a single specimen to be taken from one of the wharves in this city.

From a specimen before me nine and a half inches long, and three inches deep across from anus, I make the following description. *Body* ovate, very much compressed; being more so towards tail. Of a lead color upon back; lighter on sides; silvery upon abdomen. Length of head two inches, gradually arched from snout above: arch of back continued to spine at origin of dorsal fin. *Eyes* circular, one half inch in diameter; pupils black; irides silvery. *Nostrils* small, three lines in front of eyes; anterior, circular; posterior, a vertical fissure. *Mouth* moderate in size; jaws equal in length, at their edges presenting a large number of very minute, equal, compact serrations

or teeth ; tongue, spotted with brown. *Gill-covers* silvery, with cupreous reflections. The *lateral line* which is very well marked, commences just back of the posterior angle of operculum, and, arching backwards, curves with the back to the upper part of the fleshy portion of the tail. A slight, depressed, straight line, destitute of scales, is seen passing from the origin of the lateral line to the middle of the fleshy portion of tail ; and another line, similar in its appearance to the last, passes from inferior base of pectorals, curving with the abdomen to the lower part of fleshy portion of tail, corresponding in its course with the lateral line. These lines gradually disappear after death. At the side of the dorsal fin, commencing at its origin, and terminating towards its posterior half, are situated between twenty and thirty small circular black punctures, which give it a very characteristic appearance : these orifices are mucous ducts. At the origin of the dorsal fin a small naked horizontal spine points forwards.

The Dorsal fin of the same color as the sides of the body commences half of an inch back of the pectorals, and is continued to the fleshy portion of the tail : the rays, posterior to the eleven first, are considerably shorter, and are continued to the extremity of about equal length.

The Pectorals are slightly lighter than the dorsal : length to height as 3 to 19.

The Anus is a small fissure just in front of anal spine. Three lines in front of anus, is a small horizontal spine pointing backwards, the posterior point of the pelvis.

The Anal fin has, at its origin, a horizontal naked spine also, pointing forwards like that before the dorsal : this fin arises just back of a line opposite the origin of dorsal, and terminates upon the same plane with it : it is formed like the dorsal, but is not so high.

The Caudal fin is of the color of the pectorals, and is deeply forked : height of rays two and a half inches : length of fin, one half inch ; depth of fins, when the extremities are expanded, two inches.

The fin rays are as follows : D. 45 ; P. 21 ; A. 43 ; C. 20.

FAMILY XI.

MUGILOIDES.

ATHERINA. LIN.

Generic characters. *Body rather elongated ; two dorsal fins widely separated ; ventral fins placed far behind the pectorals ; sides with a broad, longitudinal, silver band ; teeth minute ; branchiostegeous rays, 6.*

A. *Boscii*. Cuv. *The small Silver Side.*

Trans. Lit. et Philosoph. Soc. N. Y. 1. 446, et fig.

Cuv. et Valenc. His. Nat. des Poiss. t. x. p. 465.

The several species of foreign Atherinæ, are known by the names "*Atherine*," "*Sand Smelts*," and "*Anchovies*," and are much valued as articles of food. This species was described by Mitchell, in his "*Fishes of New York*," under the name of "*notata*." I have seen but two specimens: one, was sent me from Holmes Hole, by Dr. Yale; the other was found by Dr. Gould, at Provincetown.

The specimen lying upon my table, is four inches in length: its greatest depth is one inch and a half. Body elongated, of a reddish brown color, with a broad silvery band arising at base of pectorals, and continued to caudal rays. Length of head five lines, flattened on top. *Eyes* circular, one line in diameter; pupils black, irides golden; distance between the eyes rather more than one line. *Jaws* equal in length, armed with very small teeth; gill-covers golden.

The first Dorsal fin arises six lines back of the pectorals.

The second Dorsal is lighter colored than the body, and distant three lines from the first dorsal.

The Pectorals commence directly back of the upper part of the operculum; length less than one third of height; color of back; upper rays double the length of the lower.

The Ventrals arise on a line with posterior extremities of the pectorals, and are five-rayed.

The Anal fin is situated just back of the origin of second dorsal ; as long again as high.

The Caudal fin is quite deeply forked ; lighter colored than the other rays.

The fin rays are as follows : D. 4-9 ; P. 12 ; V. 5 ; A. 25 ; C. 17.

FAMILY XII.

GOBIOIDES.

PHOLIS. Artedi.

Generic characters. *Long, equal, and closely set teeth, forming but a single and regular range in each jaw, terminated behind, in some species, by a longer and hooked tooth. The head is obtuse, the muzzle short, and the forehead vertical ; the intestines broad and short.*

P. subbifurcatus. Nobis. *The subbifurcated pholis.*

I have seen but a single specimen of this fish ; it was found at an unusually low tide among the sea-weed at Nahant, and brought to me by my brother-in-law, Thomas M. Brewer, M. D.

Specific characters. *Dorsal fin extending to the tail ; filaments upon the nostrils ; three dark colored bands passing from the eyes ; lateral line subbifurcated.*

Length, including tail, five inches five lines ; depth across, on a line with the anus, one inch ; body much compressed. General color of body, reddish brown ; several lighter colored circular patches along its upper part, at the base of the dorsal fin ; the spaces between the rings darker than the rest of the body, giving the appearance of bars. Body beneath the lateral line, lighter colored ; abdomen yellowish white. Body smooth, scales very minute. Length of head, from tip of snout to posterior angle of the operculum, is to the whole

length of body as 1 to 3 ; above, brownish ; operculum and preoperculum yellow ; entire surface destitute of scales ; jaws somewhat protractile, armed with prominent, sharp teeth ; lips large and fleshy ; over nostrils a minute filament one third of a line in length ; circumference of eye, two lines ; from beneath eye, a broad black band, wider at its base, crosses obliquely the operculum ; two other bands of the same color extend from behind eye backwards, in nearly a straight line, the distance of from one to two lines. The *lateral line* commences just above the angle of the operculum, and, having extended two lines, subbifurcates ; passing down in a gradual curve a little more than a line, it is continued in a straight course to the base of the caudal fin ; while the upper portion abruptly terminates opposite the fourteenth ray of the dorsal fin.

The Dorsal fin, commencing on a line with the posterior angle of the operculum, is continued to the caudal fin ; the first five rays of this fin are shorter than the sixth ; the rays become again shorter as they approach the tail ; numerous black spots upon this fin : those larger upon the first five rays.

The Pectorals three lines long, of a light color, with some darker shades, are rounded ; they arise on a line with the posterior angle of the operculum, and also the commencement of the dorsal fin.

The Ventrals are situated two lines in front of pectorals ; rays are united throughout the greater portion of their extent ; extremities free.

Anus situated two and a half inches from extremity of jaws.

The Anal fin commences just half way between tip of snout and extremity of tail ; its edge is dark colored.

The Caudal fin is rounded : small dark-colored spots upon this fin, as well as upon pectorals.

The number of fin rays as follows : D. 43 ; P. 13 ; V. 3 ; A. 30 ; C. 14.

MURAENOIDES. Lacepede.

Generic characters. *Head small, muzzle obtuse; body elongated, smooth, scales minute, covered with a mucous secretion; dorsal fin extending the whole length of the back, the rays simple; ventral fins very small; teeth small, pointed, detached.*

M. *guttata*. Lacepede. *The spotted Gunnel.*

Pennant's British Zoology, vol. iv. p. 183.

Mc Murtrie's Cuv. vol. ii. p. 176.

Yarrell's British Fishes, vol. i, p. 239, et fig.

This pretty little species, which is also called abroad "*butter fish*," from the slime with which it is covered, is found at low tide upon the beaches, beneath stones and sea-weed; it is exceedingly difficult to retain in the hand after it is captured, on account of its slipperiness and agility. It is common at Nahant, Holmes Hole, and probably along our entire sea-coast. I have found it in the stomach of the "*Anarrhicas lupus*," and "*Cottus Virginianus*," and it is undoubtedly eaten by many other fishes.

This fish is sometimes met with, twelve inches in length. It is of a yellowish brown color, presenting a waved appearance, with twelve or more ocelated black spots along the base of the dorsal fin, surrounded with a lighter circle. The *lateral line* pursues a straight course. Length of head, to whole length of body, as 1 to 5. *Eyes* small; pupils black; irides bluish, with a beautiful red ring within. *Mouth* oblique when jaws are closed. Minute sharp teeth in each jaw. Back of angle of mouth, a brown band descends from eyes to throat.

The Dorsal fin, which is but slightly raised above back, commences on a line above posterior angle of operculum, and is continued to tail, being composed of spinous rays entirely concealed, save their points, by the membrane.

The Pectoral fins are reddish, arising back of posterior inferior angle of gill-covers.

The Ventrals are very small, situated in front of pectorals ; their outer rays spinous.

The first two rays of Anal fin are spinous.

All the fins rather lighter colored than the body of the fish.

The fin rays are as follows: D. 76 ; P. 11 ; V. 1-1 ; A. 42 ; C. 15.

This fish is said to be eaten by the Greenlanders, but I have never heard of its being used for food in New England.

ZOARCUS. CUV.

Generic characters. *Body elongated, covered with a mucous secretion ; head smooth, muzzle blunt ; ventral fins situated before the pectorals ; dorsal, anal and caudal fins united ; all the fins very thick ; vent anterior to the middle of the body, its situation marked by a tubercle ; teeth conical, placed in a single row ; branchiostegous rays 6.*

*Z. anguillar*s. Peck. *The eel-shaped Blenny.*

Memoirs American Academy, vol. ii. et fig.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 375, et fig.

Mc Murtrie's Cuv. vol. iii. p. 177.

Although Dr. Mitchell called this species "*labrosus*," in his paper on the "*Fishes of New York*," read before the "*Literary and Philosophical Society of New York*," in 1814, and Cuvier has retained this specific name in his "*Regne Animal*," still, as Peck, in 1794, wrote a good description of this fish under the name of "*Blennius anguillar*s," and published his account, accompanied by a very respectable figure, in the 2d part of the 2d volume of the "*Memoirs of the American Academy of Arts and Sciences*," in 1804, I should be doing injustice to the memory of a distinguished naturalist, were I not so regardful of his honor as to acknowledge the priority of his description, and to attempt the establishment of his specific name.

This species, which is incorrectly called by our fishermen "*ling*," sometimes attains the size of three and a half feet. It is seldom met with in Boston market. When young, its flesh is very sweet and palatable; I have repeatedly had it upon my table.

I improve the opportunity presented by the possession of a fine specimen, taken at Provincetown, thirty-one inches in length, to draw up the following description:

Color, a yellowish brown or fawn, sprinkled with darker patches; beneath, paler; front and top of head, of a livid color; gill-covers lighter, but rather dull, having a distinct dirty white band nearly two lines in width, running obliquely from under and outer angle of eye to posterior edge of operculum. Whole surface of fish, with the exception of head, covered with innumerable minute cup-like depressions. *Head*, large, resembling in its aspect that of a "*Cottus*"; body gradually tapering, and terminating in a pointed tail. Length of head to whole length of body as 1 to 5; width of back of head, greater than greatest depth of body. Upper lip projecting beyond lower, very large and fleshy; projecting over jaw nearly two thirds of an inch: under lip also quite fleshy, but much less so than the upper. *Teeth* in jaws, large; those situated in back of jaw, sharper; a single row from the outer angle of upper jaw the extent of four teeth; then a double row of three teeth; then, to the middle of jaw, a row of three teeth deep; the front teeth of this triple row are the largest in the jaw. A single row of eight teeth from outer angle of lower jaw towards the middle; then a double row of from four to six teeth to the middle of jaw. Numerous large teeth in throat; tongue large, fleshy, smooth. *Nostrils* tubular, about half the distance between eyes and snout; distance between eyes, equal to about one sixth the length of head. Pupils of eye black; irides golden. The *lateral line* commences above operculum, at a distance in front of its posterior angle, equal to the distance between the eyes, and passing just beyond posterior angle of operculum, makes a slight curve downwards, and then passes on towards posterior extremity of the body, in a straight

course ; a portion of this line is scarcely visible. All the fins are enveloped in a fleshy membrane.

The Dorsal fin, commencing on the same plane with ventrals, is continued to the tail ; previous to reaching the tail, however, about seventeen of its rays lose their fleshy portion, and exhibit only their spinous bases. At the termination of these spinous rays, commences the tail.

The Pectorals are broad, round at their extremities, and of a yellow color, inclining to brown at their base.

The Ventrals are situated in front of pectorals, composed of two rays, but, being enveloped by a tough membrane, appear as if but one.

Anus large, situated just in front of anal fin.

The rays of the Anal and Caudal fins cannot be distinguished from each other. About one hundred rays can be counted of the anal fin, but the rays of the fleshy tail cannot be distinguished. Both dorsal and anal fins are of a greenish color, tinged with yellow.

The fin rays, as far as practicable to be counted, are as follows: B. 6 ; D. 120 ; P. 19 ; V. 2 ; A. 100.

In a living specimen of this species, received March 27, 1838, twenty-one inches in length, the color was a light salmon, mottled with irregular olive-colored blotches, darker towards the head. *Head* lighter colored than in larger specimens: the two oblique bands on operculum, narrow and rather indistinct. In upper jaw, the row of single teeth is six in number; in lower jaw, the single row contains six also. Irides salmon colored. A considerable number of mucous glands are quite obvious upon head, back of, and beneath eyes. The *lateral line* is more perceptible than in mature specimen. Body beneath, white ; neck, flesh colored.

The Dorsal fin almost white, salmon colored at its edge.

The Pectorals of a true salmon color, lighter at their origin.

The Ventrals, salmon colored.

The Anal is salmon colored at its edge, flesh colored at its base, with seven distinct white blotches in its extent.

The dorsal, pectoral and anal fins are perfectly transparent.

In the stomach of this fish I found specimens of the following shells, viz.: *Buccinum undatum*, *Fusus corneus*, and *pleurotomarius*; *Turbo inflatus*, *Natica triseriata*, and *consolidata*; *Bulla tritacea*, and *Tellina sordida*.

ANARRHICHAS. Lin.

Generic characters. *Head smooth, rounded in form, muzzle obtuse; body elongated, covered with minute scales; dorsal and anal fins long, distinct from the caudal; no ventral fins; teeth of two kinds; those in front elongated, curved, pointed; the others on the vomer, as also on the jaws, truncated, or slightly rounded: branchiostegous rays 6.*

A. *lupus*. L. *The Wolf Fish. Cat Fish.*

Pennant's British Zoology, vol. iii. p. 133, et fig.

Strack's plates, 21, fig. 2.

Mc Murtrie's Cuv. vol. ii. p. 177.

Yarrell's British Fishes, vol. i., p. 247, et fig.

Richardson's Fauna, p. 95.

This ferocious species is captured about rocky ledges at all seasons of the year, although greater numbers are taken in winter than at any other time. The *cusk rocks*, between Boston and Cape Ann, are a favorite resort of this fish. Its hideous appearance renders it an object of such disgust, that it is not unfrequently thrown away as soon as caught. By many of our fishermen, however, it is regarded as excellent food, and thought to be scarcely inferior to that of any of our fishes; specimens weighing from five to ten pounds are very delicate when fried or boiled. I have had this fish upon my table: few fish are superior to it when broiled.

My description is drawn up from a specimen three feet in length, weighing fifteen pounds. Entire body covered with a slimy secretion. Color, a purplish brown, with transverse nearly black bars, passing from abdomen high up on the dorsal fin; beneath, lighter. *Head* large, flattened on top, blunt at snout. Length of head to entire length of body, as 10 to 36;

depth of head, nearly equal to its length. *Eyes* moderate in size; irides yellow; distance between eyes equal to one fifth the length of head. *Jaws* equal, armed with long, strong, pointed teeth; in the back part of lower jaw, these teeth are very large and blunted tubercles; on each side of roof of mouth, teeth are large and prominent; in the middle of roof a double ridge of tubercles similar to, but larger than those on jaws, extending some distance back, looking like single teeth divided in their centre. *Tongue* large, fleshy, fuliginous. Lips loose, fleshy.

The Dorsal fin, which is about the same height throughout its whole extent, arises on a line with the base of pectorals, and extends near to tail, appearing as if almost united to it, by the prolongation of the membrane of fin.

The length of Pectorals to their height as 3 to 5; rays very large; when expanded, these fins are rounded in their outline.

The Anal fin arises immediately back of the anus, which is very large, and terminates on a plane with the dorsal; in height, this fin is about one third that of dorsal.

The Caudal fin in length less than one third its height.

The fin rays are as follows: D. 74; P. 20; A. 46; C. 16.

FAMILY XIII.

PECTORALES PEDICULATI.

LOPHIUS. Lin.

Generic characters. *Head very large, depressed; body slender, smooth, without scales; two dorsal fins separated; pectoral fins broad and thick, somewhat resembling feet; ventral fins small, placed considerably before the pectorals; teeth differing in size, numerous, conical, sharp, curving backwards; tongue broad; branchial cavities large, with only a small opening behind the pectoral fins; branchiostegous rays 6.*

L. piscatorius. Lin. *The Angler*. *Frog Fish*. *Sea Devil*.
Goose Fish. *Wide Gab*.

Pennant's British Zoology, vol. iii. 105, et fig.

Shaw's Zool. vol. ii. 379, et fig.

Strack's Plates, x. 1.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. 464.

Mc Murtrie's Cuv. vol. ii. 184.

Yarrell's British Fishes, i. 269, et fig.

Specimens of this species are yearly taken in Massachusetts Bay by our cod fishers; with whom, it is generally known as the "*Goose fish*," although sometimes incorrectly called the "*Monk fish*."

A perfect specimen of this loathsome looking fish was brought me by my old friend, Capt. Nathaniel Blanchard, which he captured September 6th, 1837, in Boston Bay. It measured forty-four inches in length, and thirty-five in breadth, with the gape of the mouth nine inches in extent. As, at that time, I did not think of minutely describing each of our species, I was satisfied to compare it with several descriptions, with which I found a perfect correspondence. Since then, I have been unable to procure another specimen for description, and therefore copy Yarrell's account, which is concise and very clear.

"The number of fin rays is D. 111-12; P. 20; V. 5; A. 8; C. 8.

The head is wide, depressed; the mouth nearly as wide as the head; lower jaw the longer, bearded or fringed all round the edge; both jaws armed with numerous teeth of different length, conical, sharp, and curving inwards; teeth also on the palatine bones and tongue; three elongated, unconnected filaments on the upper part of the head; two near the upper lip, one at the nape, all three situated in a depression on the middle line; eyes large, irides brown, pupils black; pectoral fins broad and rounded at the edge, wide at the base; branchial pouches in part supported by the six branchiostegous rays.

Body narrow compared with the breadth of the head, and tapering gradually to the tail; vent about the middle of the body; the whole fish covered with a loose skin.

Color of the whole upper surface of the body uniform brown; fin membranes darker; under surface of the body, ventral, and pectoral fins white; tail dark brown, almost black."

By the motion of the filaments with which the head of this species is furnished, it is supposed to allure within its reach smaller species upon which it voraciously feeds. That it however sometimes seizes large and powerful fishes, we learn from Pennant, who says it is so highly regarded by the fishermen on the coast of *Scarborough*, being supposed by them to be a great enemy of the *dog fish*, that it is set at liberty whenever taken: and he adds in a note, "the bodies of these fierce and voracious fish are often found in the stomach of the Fishing frog."

CHIRONECTES. CUV.

Generic characters. *Four rays on the head, as in Lophius; the first of which is slender, and frequently terminating in a tuft; the succeeding ones, augmented by a membrane, are sometimes much enlarged, and at others, united into a fin. The body and head are compressed; the mouth cleft vertically: the only opening of the branchiæ, which are furnished with four rays, is a canal, and a small hole behind the pectorals; the dorsal occupies nearly the whole length of the back. The entire body is frequently provided with cutaneous appendages; there are four branchiæ; the natatory bladder is large, and the intestine moderate, and without coeca. These fishes, by filling their enormous stomachs with air, are enabled to expand their belly like a balloon; on land, three pairs of fins enable them to creep almost like small quadrupeds, the pectorals, from their position, performing the functions of hind feet, and thus they live out of water for two or three days.*

C. *laevigatus*. Cuv. *The smooth Chironectes.*

Trans. Lit. et Philosoph. Soc. fig. ix. pl. iv.

Several specimens of this fish were sent me from Holmes Hole, by Dr. Yale; all of them very small. From the largest individual, I have drawn up the following description:

Length one and a quarter inches. *Body* very much compressed upon the sides, tapering from the head, where it is highest, to the tail. Color a dull white, with irregularly distributed dark brown blotches, or partially formed longitudinal bands, which are margined with a clear white: clear white spots upon the abdomen. *Mouth* vertical, very large. *Eyes* moderate in size. *Jaws* with numerous very minute teeth. A dark-colored flexible ray in front of, and between the eyes, with a slight filament suspended from its extremity; back of this, a larger, stouter ray, with a membrane attached posteriorly; this ray also supports a filament. Very slight cutaneous appendages beneath the lower jaw.

The Dorsal nearly half an inch long, variegated by the continuation upon it of the black blotches upon the body.

The Pectorals stout, about one fourth of an inch long, color of the dorsal.

The Ventrals in front of the pectorals, colored like the other fins.

The Anal straight at the extremity.

The fin rays are as follows: D. 11; P. 8; V. 4; A. 6; C. 6.

BATRACHUS. Bloch.

Generic characters. *The head horizontally flattened, broader than the body; the mouth well cleft; operculum and suboperculum spinous; six branchial rays; the ventrals narrow, inserted under the throat, and formed of but three rays, the first of which is elongated and widened; pectorals supported by a small arm, the result of the elongation of the carpal bones. The first dorsal short, and supported by three spinous rays;*

the second is soft and long, as well as that of the anus, which corresponds to it. The lips are frequently furnished with filaments. Those which have been dissected, present a stomach resembling an oblong sac, and short intestines, but there is no coecum. The fore part of the natatory bladder is deeply bifurcated. They keep themselves hidden in the sand, to surprise their prey, like the Lophius, &c.; the wounds inflicted by the spines are reported dangerous.

B. *variegatus*. Le Sueur. *The Toad Fish.*

Journal Academy Nat. Sciences, Phil. vol. iii. p. 398.

To Dr. Yale, I am indebted for two fine specimens of this species, from Holmes Hole. He informs me, they are generally found in ponds and lagoons connected with the sea in muddy water: in winter, they are captured through the ice in spearing *eels*; and are not used for food. Each of these specimens was eleven inches in length. Color yellowish; entire surface of the head, sides and abdomen marbled with black; the head so closely dotted as to appear almost black; sides irregularly undulated; abdomen less closely marked. All the fins banded with black lines. Whole of the body enveloped with a copious viscid secretion, which flows from numerous mucous pores every where distributed: beneath each eye, are eight very distinct glands: they are also observed upon the opercula. *Head* very much compressed: its length and breadth equal. *Body* much narrower than the head; gradually tapering from the base of the pectorals to a short distance back of the anus, beyond which it becomes very much compressed. *Operculum* armed with three distinct spines, the upper most prominent: cheeks protuberant. Diameter of the eye three lines; pupils black; irides golden: over the middle of each eye is situated a large fleshy appendage which hangs down over the eye, and, just before this, a very small appendage. *Mouth* very large; lips fleshy; on the chin four small fleshy appendages; directly beneath these, two smaller ones; on a line with these latter, three larger appendages on each side, with a still larger one at the angle

of each jaw. Lower jaw longer than the upper : a single row of strong conical teeth in each jaw upon its sides ; with more than one row in front of the jaw. *Teeth* on the vomer. *Tongue* small. Branchial aperture as wide as the base of the pectorals. The *lateral line*, which is studded with very distinct mucous pores throughout its whole extent, arises just back of the upper spine of the operculum, and runs in nearly a straight course high up on the back to the tail.

The first Dorsal fin is quite small, and arises just back of the head : it is composed of three spinous rays, of which the second is longest.

The second Dorsal commences directly behind the first, and terminates just in front of the tail ; it is beautifully marked with seven broad, oblique black bands : this fin, at its posterior extremity, is one third less high than at its middle.

The Pectorals originate at the lower edge of the branchial opening. The fleshy portion of their base is sprinkled with irregular markings like the head : the rays of these fins are crossed transversely by six interrupted black bands, those at the base being the narrowest.

The Ventral fins originate some distance in front of the pectorals ; they are composed of three rays ; the centre is large, externally fleshy, falciform.

The Anal fin commences rather further back than the dorsal : it is marked with seven oblique black bands. The fleshy extremities of this fin, like those of the second dorsal, are free, and present a digitated appearance.

The Caudal fin has five uninterrupted transverse dark bands, the two at base, narrower than the others.

The fin rays are as follows : B. 3 ; D. 3, 25 ; P. 16 ; V. 3 ; A. 24 ; C. 14.

The specimens from which Le Sueur described this species, as being found at Egg Harbor, N. J., were much smaller than those I have seen, being less than six inches : in some unimportant respects, his description differs from the appearance of my specimens, an account of which is here presented : the ichthyologist will at once perceive that they might very naturally be produced by difference of age and locality.

FAMILY XIV.
LABROIDES.

LABRUS. Lin.

Generic characters. *Body elongated, covered with large thin scales: a single dorsal fin, extending nearly the whole length of the back; part of the rays spinous, the others flexible; behind the point of each spinous ray a short membranous filament: lips large and fleshy; teeth conspicuous, conical, sharp; cheek and operculum covered with scales; preoperculum and operculum without serrations or spines.*

L. *Americanus*. Bloch. *The Tautog. Black Fish.*

Trans. Lit. et Philosoph. Soc. N. Y. p. 399, et fig.

Although a very few years only have passed since this species was brought into Massachusetts Bay, it is now taken along a large portion of the coast. At Plymouth and Nahant, at some seasons, it is found in no inconsiderable numbers, and is frequently caught from the bridges leading from Boston. From one of these bridges, a specimen was taken a few years since, weighing eleven pounds and three quarters. The Boston market is for the most part supplied, however, by Wellfleet. I am informed that in 1836 three smacks were constantly employed in the harbor of South Wellfleet, in the *tautog fishery*, from April to November, and that it was a profitable occupation to those engaged in it. Large numbers are carried from this latter place to New York. At New Bedford, 300 pounds of *fresh tautog* have been sold by a single market-boat in a day. This fish is also pickled at the last place, and may be kept in a weak brine for a long time. In this state, they are considered by epicures a great delicacy. Mr. Henry Blood, of New Bedford, informs me, that a specimen of this fish was taken in Rochester harbor, which weighed fourteen pounds and three ounces. The largest individual of which I have any knowledge, weighed sixteen pounds.

This species varies considerably in its markings ; generally, however, it is of a bluish black above, diversified with bands and blotches, mottled with darker spots towards the abdomen. *Abdomen* whitish.

Body regularly arched from the tip of the snout to the extremity of the dorsal fin. Length of the head to the posterior angle of the operculum, about one fourth the length of the body, including the tail. *Head* naked, save a patch of small scales upon the upper part of the operculum, and a vertical band of similar scales upon the preoperculum, just back of the eyes. Lips large and fleshy : *jaws* with a single row of strong conical teeth, those in front, largest ; teeth in the pharynx. *Nostrils* double, small, above and in front of the anterior angle of eye. *Eyes* circular ; pupils blue black ; irides silvery, dusky after death ; diameter of the eye equal to half the distance between eyes. The *lateral line* arises just above the operculum, and curves with the body.

The Dorsal fin arises on a line with the pectorals ; the first seventeen rays terminate in naked spines, at the base of which are small floating, fleshy tentacula ; the posterior fleshy rays of this fin are nearly as high again as the spinous rays ; fin extends to within a short distance of the tail. Base of the rays with scales.

The Pectorals commence just in front of the posterior angle of the operculum ; of the color of the abdomen, rounded at the extremity. Length to height as 1 to 3.

The Ventrals are situated a short distance back of the pectorals ; above, dark colored ; beneath, white ; length about one third their height. The outer ray spinous.

The Anal fin arises opposite the sixteenth spinous ray of the dorsal fin, and terminates on the same plane with that fin ; the three first rays are spinous ; fin longer than high.

The Caudal fin is even at its extremity ; length of the fin one third greater than its height.

The fin rays are as follows : D. 28 ; P. 15 ; V. 6 ; A. 11 ; C. 15.

CRENILABRUS. Cuv.

Generic characters. *The Crenilabri have all the external and internal characters of the true Labri, but are distinguished from them by the denticulation of the edge of the preoperculum. They are generally a little deeper also in the body compared with their length.*

C. burgall. Schoepp. *The Conner. Blue Perch. Chogset.*

Trans. Lit. et Philosoph. Soc. N. Y. p. 402.

From the middle of June until September, this is a very common species in our waters. It is taken along our whole *sea-board*, not only by the fishermen's nets in myriads, but by the needy and destitute from our wharves and bridges, and is an excellent fish for the table.

The colors of this species vary exceedingly; thus, in the same sweep of the net, some are taken of a deep bluish color; others, spotted over their entire surface with yellowish spots; and others, almost of an uniform rust color.

My description is drawn up from a specimen nine inches in length. *Body* above, rusty; sides, spotted over their whole surface with lighter colored spots than the ground of the back; *abdomen* of a bluish white color, with sparse spots. Lower part of the *gill-covers*, together with the throat, and ventral and anal fins, blue. Depth of the body across the base of the ventrals, exclusive of the dorsal fin, rather more than two inches. Length of the head two inches, slightly flattened on its top; a perceptible convexity back of the neck, in front of the dorsal fin. Preoperculum finely denticulated upon its posterior edge; a fleshy prolongation at the posterior angle of the operculum. Between, and in front of the eyes, irregular bluish lines, appearing like hieroglyphics, more strongly marked than on the neck. Diameter of the eye, one line less than the distance between the eyes; pupils black; irides silvery. *Jaws* equal, and with numerous teeth; those in front larger, recurved; teeth

also on the pharynx. The *lateral line* distinct, of a darker rust color than the sides, curving very slightly with the body until just before the termination of the dorsal fin, when it suddenly curves downwards two lines, and then passes straight to the tail.

The Dorsal fin arises on a line with the posterior angle of the operculum, and terminates within about an inch of the tail. It has about eighteen strong rays, the spines of which project at their tips; the upper portion of their connecting membrane is free, giving the appearance of filaments; the eleven last rays are membranous. The spinous rays gradually increase in height to the membranous rays, which are still more elevated.

The Pectorals arise on a line with the dorsal; their height to their length is as 2 to 1.

The Ventrals are situated back of the pectorals; the first ray spinous.

The Anal fin has its first three rays spinous; its length to its height as 2 to 1.

The Caudal fin is nearly even at the tip; its rays one third longer than high.

The fin rays are as follows: B. 5; D. 18-11; P. 15; V. 6; A. 12; C. 16.

FAMILY XV.

FISTULARIDAE.

FISTULARIA. Lin.

Generic characters. *A single dorsal, most of which, as well as of the anal, is composed of simple rays. The intermaxillaries and the lower jaw are armed with small teeth. From the two lobes of the caudal proceeds a filament which is sometimes as long as the body. The tube of the snout is very long and depressed, the natatory bladder excessively small, and the scales invisible.*

F. *serrata*. Bloch. *The Tobacco-pipe Fish*.

Although Richardson, in his "*Fauna*," observes that the "*Fistularia tabaccaria* frequents the coast of the United States," it must be exceedingly rare in the waters which border New England; as I have neither met with one myself, nor heard of one's being seen by any individual whose accuracy could be relied upon. Richardson also remarks, that the "*F. serrata* frequents the West Indies and the sea of Brazil." Cuvier, in the notes to his "*Regne Animal*," refers to Catesby's plates for a figure of this species; he could not infer, from this figure, that the species was the "*serrata*," unless he had also received a specimen of the fish, and concluded it was the only *Fistularia* found upon the coast of the United States. Catesby's figure is represented with two dorsal fins.

The specimen before me was sent several years since to this city by Dr. Yale, who procured it at Holmes Hole. It is still in a state of fine preservation, and belongs to the cabinet of the "Boston Society of Natural History." It has not the spots upon its sides which are possessed by the *tabaccaria*: nor does it agree with the figures of that species in Rees' Encyclopedia; Somnini's Buffon; Strack's Plates; or Shaw's Zoology: but in the fifth volume of Shaw's Zoology, the author observes, "a variety has been described by Dr. Bloch, in which this part" (referring to the tail) "was double, and the snout serrated." A figure of the tail of this variety; as he calls it, is also represented by Shaw. This is undoubtedly our fish; and, although I have no means of ascertaining what the "*serrata*" is, having neither Bloch nor any other work on ichthyology, which speaks of it, yet, looking at its serrated intermaxillaries, and lateral line, I have no doubt that the species before me is that fish. Dr. Yale writes me it is not often found.

My specimen is ten inches in length. Upper part of the body, of a reddish brown color; a narrow bluish band upon the sides, through the centre of which, runs the *lateral line* which commences just above the posterior portion of the operculum, and runs obliquely backwards about an inch, then approximat-

ing that of the opposite side, runs a straight course an inch and a half; then passes down upon the side. At first, this line is quite indistinct, but more prominent towards the posterior half of the body; it becomes a sensible ridge, which, back of the dorsal, is quite strongly serrated. *Abdomen* lighter colored than the back: throat white. Entire length of the head, from the tip of the snout to the posterior extremity of the intermaxillaries, nine inches. *Tube* of a hard, horny consistence, strongly serrated laterally upon its upper portion, and less distinctly above and beneath: wider than deep: width just in front of the eyes, three quarters of an inch; at the angle of the jaws, half an inch. Vertical gape of the mouth, half an inch: *jaws* armed with numerous small teeth; lower jaw longer than the upper, with a protuberance at the chin. *Gill-covers* perfectly smooth, with a serrated portion above them, three quarters of an inch in extent.

The Dorsal fin is triangular, same color as the abdomen; situated upon the posterior third of the body.

The Pectorals are situated a quarter of an inch back of the operculum; their length to their height is about as 1 to 3.

The Ventrals are two and a half inches back of the pectorals, very small; half of an inch long; color of the abdomen.

The Anal, similar in form to the dorsal, is directly opposite that fin.

The Caudal is deeply forked, being nearly an inch wide between the lobes at the extremities, when they are expanded. Directly from the centre of this fin, as if it were a continuation of the lateral line, proceeds a strong filament nine inches in length, jointed at its commencement like some of the *Gorgoniae*, which becomes exceedingly delicate at its termination. From its base, another very minute filament arises.

The fin rays are as follows: D. 14; P. 16; V. 6; A. 14; C. 16.

ORDER II.

MALACOPTERYGII ABDOMINALES.

FAMILY I.

CYPRINIDÆ.

CYPRINUS. Lin.

Generic characters. *Body covered with large scales ; a single elongated dorsal fin ; lips fleshy ; mouth small ; teeth in the pharynx, but none on the jaws ; branchiostegous rays 3.*

C. auratus. Lin. *The golden Carp.*

Pennant's British Zoology, vol. iii. p. 327.

Yarrell's British Fishes, vol. i. 315 et fig.

This species is so well known that, did not this report contemplate a description of every fish known to inhabit our waters, I should pass it by, after having merely included it in my catalogue. It is found in quite a number of ponds in the vicinity of Boston, connected with the country seats, bearing perfectly well the rigors of our winters, and breeding in great numbers. I have seen them at Brookline, Cambridge and Brighton ; from the latter place, the specimens before me were received, through the politeness of my friend Samuel Downer, Jr.

The following appearances are presented : Form oblong ; body slightly arched from the occiput to the commencement of the dorsal fin, and then gradually curved to the termination of that fin. Color, a bright orange on the upper part of the body ; lighter upon the sides ; white beneath. Scales large, exhibit-

ing several striæ, and, under the microscope, a great number of very minute points or granulations, giving a rough feel to their surface. The number of the scales in an oblique direction, from the origin of the dorsal fin to the abdomen, is ten. The *lateral line*, which is very distinct and nearly straight, passes through the seventh row of scales. Length of the head, one fifth the length of the body, flattened between the eyes: *eyes* moderate in size; pupils black; irides silvery; diameter of the eye equal to half the distance between the eyes. *Mouth* small; *jaws* toothless; upper jaw the longer. *Nostrils* large. Sub-orbital and opercular surfaces, golden; the latter covered with delicate striæ.

The Dorsal fin arises on the anterior half of the body, as long again as high: the first two rays are spinous; the first, very short and slightly roughened behind; the second, large and strongly serrated behind.

The Pectorals arise in front of the dorsal fin, at a distance equal to half their length; their length equal to one sixth their height.

The Ventrals are situated under the anterior portion of the dorsal fin, at the posterior third of the pectorals; their length to their height as 2 to 7.

The Anal fin is higher than long; its first two rays are spinous, serrated behind, resembling those of the dorsal.

The Caudal fin is lunated, its depth at the base to its length as 6 to 9.

The fin rays are as follows: D. 15; P. 15; V. 9; A. 17; C. 18.

The appearances of this species in color, forms of its fins, and many other particulars, vary exceedingly by domestication.

CATOSTOMUS. Le Sueur.

Generic characters. *Back with a single fin: gill membranes three rayed; head and opercula smooth; jaws toothless and retractile; mouth beneath the snout; lips plaited, lobed, or carunculated, suitable for sucking. Throat with pectinated teeth.*

C. *Bostoniensis*. Le Sueur. *The common Sucker*.

Memoirs of American Academy of Arts and Sciences, vol. xxi., et fig.
Journal Academy Nat. Sciences, Phil. vol. i et fig.

This species was first described by Peck, in the "*Memoirs of the American Academy of Arts and Sciences*," and quite well figured as the "*Cyprinus catostomus*" of Foster. In the excellent monograph of the genus "*Catostomus*" contained in the first volume of the "*Journal of the Academy of Natural Sciences*," Le Sueur describes and figures this fish with the specific name of "*Bostoniensis*." In the spring and autumn, it is not unfrequently found in the Boston market; and in a mild winter, they may be met with at almost any time. They are generally taken in Charles River at Watertown, and sometimes attain the weight of five pounds. But little value is attached to them by the fishermen, and not unfrequently they are thrown away for want of demand. They are occasionally brought into the city by the cartload, and palmed off upon the ignorant, as the *mullet*.

The specimen before me is fifteen inches in length. Body subcylindrical. Color of the back a slight brown, darker towards the head, which is nearly olive colored; sides of a reddish brown, presenting a beautiful metallic lustre; beneath, white. Scales on the anterior portion of the body much smaller than upon the posterior. Length of the head to the entire length of the body including the tail as 1 to 5; head perfectly smooth; rows of mucous pores are seen on the back of the head, and above and beneath the eyes. *Eyes* moderate in size, circular; pupils black; irides golden; distance between the eyes equal to one quarter the length of the head, when the jaws are closed. *Mouth* small; lips corrugated; jaws destitute of teeth. *Opercula* golden. *Nostrils* just in front of the eyes; double; anterior, larger and circular; posterior, narrower and transverse. The *lateral line*, which is composed of sixty-four scales, commences back of the anterior portion of the operculum, and curving

slightly downwards, assumes nearly a straight course, which is continued to the base of the caudal rays.

The pectoral, ventral and anal fins are reddish. The dorsal and caudal are of a dark brown.

The Dorsal fin arises back of the middle of the body, and is rather longer than high.

The Pectorals commence just behind the branchial opening; their height to their length as 2 to 1.

The Ventrals arise on a line opposite the middle of the dorsal fin, and are in length to their height as 1 to 3.

The Anal fin, which is rather rounded than pointed, is in length to its height as 1 to 2. The anus is at the origin of the anal fin.

The Caudal fin is deeply forked; and its depth at extremity is to its depth at its base as 2 to 1.

The fin rays are as follows: D. 13; P. 18; V. 10; A. 9; C. 18.

C. *tuberculatus*. Le Sueur. *The horned Sucker*.

Journal Academy Nat. Sciences, Phil. vol. i. p. 93.

Of this species, described by Le Sueur from specimens obtained in Pennsylvania, I have seen but two individuals, which were taken at Watertown with the preceding species. I am informed it is not an uncommon fish in the ponds of various parts of this State and New Hampshire, and that it is called, very incorrectly however, the "*Barbel*."

A specimen, fourteen inches in length, presents the following appearances. Greatest depth rather less than one and a half inches; width across the body from the commencement of the dorsal fin about three inches. This species is readily distinguished from the C. "*Bostoniensis*," our most common sucker, by its being less elongated, and deeper; and by the gibbosity of the nape of the neck; and from all other species, by the tubercles on its snout. Color above, dark brown; sides yellowish; beneath white. Scales large, with golden reflections, and distinct radii. Length of the head, two inches four lines;

above livid; sides, of a dull white. Between the eyes and the snout, four prominent horns on each side; the upper anterior the largest, being two lines in height; the upper posterior the smallest. Beneath the first tubercle, a smaller is seen, and directly behind it, a third, nearly as large as the first: these three first form a triangle. Just above the third tubercle, and in front of the upper anterior angle of the eye, and between the nostrils and the eye is a fourth tubercle smaller than the others. *Eyes* very small; pupil black, surrounded by a red ring. *Nostrils* double. *Mouth* small, lunated. *Back* rises suddenly on the nape of the neck, leaving a sensible depression before it.

The Dorsal fin arises upon the anterior half of the body; its height one third less than its length.

The Pectorals are reddish, with brown tips; length equal to one third their height.

The Ventrals of the same color, and same length as the pectorals.

The longest rays of the Anal fin more than one third higher than the length of the fin.

The lower lobe of the Caudal fin slightly longer than the upper.

The fin rays are as follows: D. 15; P. 16; V. 9; A. 10; C. 22.

I have no doubt that this is the "*tuberculatus*" of Le Sueur. He describes his specimen as having but *three* tubercles. This was owing undoubtedly to the smallest tubercle having fallen off, which I find is the case with one on one side of the specimen before me, without leaving the slightest mark to point its location.

C. *nigricans*. Le Sueur. *The black Sucker*.

Journal Academy Nat. Sciences, vol. i. p. 102.

By the kindness of Mr. H. Erastus Clap, of Walpole, I received, in May, 1838, eight beautiful fresh specimens of this species, which enabled me to test its goodness at my own ta-

ble, besides supplying several of my friends, who agreed with me, that, although its flesh was rather dry, it was much preferable to that of the "*Bostoniensis*." The largest of these specimens was twenty inches in length, and weighed three and a half pounds. From a specimen fifteen inches in length, the following description is made, as being more nearly like the specimen from which Le Sueur drew up his description, than the larger specimens.

Color of the back, black; sides reddish yellow, with black blotches; beneath, white, with golden reflections. Scales moderate in size. *Head* quadrangular, one fifth the length of the fish; top of the head of a deeper black than the body. *Eyes* moderate, oblong; pupils black; irides golden. *Mouth* large; corrugations of the lips very large, particularly those of the lower lip. The *lateral line* arising back of the operculum, on a line opposite the centre of the eye, makes a very slight curve downwards, and then pursues nearly a straight course to the tail; it is composed of sixty scales. *Back*, between the head and dorsal fin, rounded.

The Pectoral, Ventral and Anal fins are reddish.

The Caudal and Dorsal, blackish.

The Dorsal fin in height is equal to two thirds its length.

The third and fourth rays of the Anal fin, which are longest, extend a little on to the rays of the caudal fin.

The fin rays are as follows: D. 13; P. 18; V. 9; A. 8; C. 18.

In two of the eight specimens, there were but twelve rays in the dorsal fin.

In larger specimens than that just described, the back is not black, but, together with the sides, is of an olive brown color; in others again, the back is neither black nor olive brown, but reddish, like the sides; in some specimens, a longitudinal band of a deeper red than the rest of the side, runs the whole length of the fish, just beneath the dark-colored back. The golden tints reflected from the opercula, and the scales along the entire sides of this species, give it a very brilliant appearance. It is known by the common name of "*Black Sucker*."

C. *gibbosus*. Le Sueur. *The gibbous Sucker*.

Journal Academy Nat. Sciences, vol. i. p. 92, et fig.

I have never met with this species, which Le Sueur "discovered in the river Connecticut, near Northampton, where it is called *Chub Sucker*," and therefore extract his description, from the "*Journal of the Academy of Natural Sciences of Philadelphia*."

"Back elevated in front of the dorsal fin, which is almost as high as broad, and rounded; anal fin bilobated. *Head* nearly as high as long; snout short, roundish; tail straight; caudal fin semi-lunated, lobes roundish, the inferior one longer than the upper; *scales* very much crowded transversely a short distance from the opercula, but more developed on the rest of the body; the color of the back is a deep blue, with golden reflections; *pectoral, ventral* and *anal fins* of a fine reddish orange color; *caudal fin* tinted with carmine and violet; *dorsal fin* bluish green; abdominal scales red at their base; *lateral line* hardly perceptible; body marked with four or five faint transverse bands. Length of specimen eleven inches.

P. 16; D. 17; V. 9; A. 9; C. 18 rays.

Dr. Mitchell's description of the '*Cyprinus oblongus*' approaches to this; but there are important characters in my species, not noticed in that of the former, which preclude a conclusion that they are the same; therefore, as the matter now stands, I must consider the above a nondescript."

LEUCISCUS. Klein.

Generic characters. *The anal fin short, as well as the dorsal, but without strong rays at the commencement of either; no barbules at the mouth.*

L. *crysoleucas*. Mitchell. *The New York Shiner*.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 459.

Fauna Boreali-Americana, p. 122.

This quite common species in the ponds throughout the State, is taken with the "*Pomotis vulgaris*," "*Perca flavescens*," "*Esox reticulatus*," and "*Pimelodus nebulosus*." It has been described by Mitchell, who does not, however, mention its general size, nor the proportion of its several parts compared to each other. The following description is drawn up from a *living specimen* of average size: Length of the fish, from the tip of the snout to the extremity of the tail, six and a half inches; width across the body, on a line with the base of the ventrals, two inches; length of the head to the posterior angle of the operculum, one inch and three lines. General color, a beautiful golden; top of the head and back, black; gill-covers a brighter yellow than the sides; preoperculum less brilliant than the operculum. *Head* above somewhat depressed; eyes, two and a half lines in diameter; pupils black; irides yellow; jaws without teeth. The *lateral line*, consisting of about fifty-six scales, commences just back of the superior angle of the operculum, half an inch above the base of the pectoral fin, and passing obliquely down over about eighteen scales, opposite the posterior extremity of the pectoral fins, very gradually passes up again towards the posterior extremity of the body, assuming a straight course, which is pursued to the base of the tail.

The Dorsal fin is of a light brown color; it commences about three lines back of the ventral fins, is five lines wide at the base, and partially shuts into a groove.

The Pectoral fins commence on a line with the posterior angle of the operculum; they are an inch long; yellowish, except the upper rays, which are nearly black.

The Ventrals are reddish.

The Anal fin, which is slightly tinged with reddish, commences on a line opposite the termination of the base of the dorsal, and, like that fin, is received into a groove.

The Caudal quite deeply forked; of the same color as the dorsal.

The fin rays are as follows: D. 9; P. 17; V. 9; A. 13; C. 19.

This fish is taken at all seasons, even through the ice in winter. It is seldom found in Boston market, but is generally taken for pickerel bait, and is considered the best bait for that fish.

L. *argenteus*. Nobis. *The silvery Leuciscus*.

By the name of "*Dace*," this species, which I suppose to be undescribed, is generally known in those portions of the State where it is found. The specimen before me I received from Worcester county. The following are its characters:

Entire length of the specimen, six inches two lines; depth of the head, half an inch; depth of the body across from the origin of the dorsal fin, one inch one line. Body elongated, but very slightly arched over the neck, and at the dorsal fin. Whole surface of the body, silvery; rather darker upon the back; head above, bluish; operculum cupreous; preoperculum rather inclined to a flesh color; exterior to the operculum, a narrow dark band encircles the head, from the base of the pectorals, separating the head from the body. *Scales* on the body moderate in size,—*nine*, in an oblique line, from the origin of the dorsal to the lateral line; and *four* in an oblique line beneath. Entire head destitute of scales; head above, flattened; diameter of the eye, one quarter of an inch; distance between the eyes, half an inch. *Nostrils* double; the anterior, circular; the posterior, oblique and larger. *Jaws* toothless; upper jaw the longer. The *lateral line* commences on the side of the snout, and passing back under the eyes, and up over the posterior angle of the gill-covers, curves downwards for the extent of eight scales, to opposite the middle of the pectorals, and then pursues a straight course to the caudal rays.

The Dorsal fin commences upon the anterior half of the body, including the tail; rays higher than long, color of the back; the first ray half as high as the second.

The Pectorals commence beneath, and on a line with the posterior angle of the operculum, elongated, lighter colored

than the dorsal; length to height as 1 to 4; same height as the dorsal fin.

The Ventrals are directly beneath the dorsal fin, three quarters the height of the pectorals; color of the abdomen.

The Anal fin is one quarter of an inch back of the ventrals; its length to its height as 2 to 3; color of the ventrals.

The Caudal fin is deeply forked; as high again as long.

The fin rays are as follows: D. 9; P. 16; V. 8; A. 9; C. 20.

This species agrees in many particulars with the "*L. dobula*," but its *naked head*, and the *origin of its lateral line* prevent it from being considered that species.

L. *pulchellus*. Nobis. *The beautiful Leuciscus.*

This fine species answers in some particulars to the description and figure of the "*L. rutilus*," and this is undoubtedly the reason why it is often called the "*Roach*." In some portions of the State it receives the name of "*Cousin Trout*."

For the beautiful specimen which enables me to draw up the following description, I am indebted to Mr. H. Erastus Clap, of Walpole.

Entire length, fourteen inches; depth across, in front of the ventrals, three inches; depth of the fleshy portion of the tail, one inch and a quarter. Length of the head, three inches. Back slightly arched, of a dark brown color; sides and abdomen of a beautiful flesh color, tinged with golden reflections. Head bluish on the top; gill-covers silvery, with cupreous and flesh-colored tints, and edged with a brown membranous prolongation. *Head* naked; arch on the top of the head very slight; diameter of the eye rather more than one twelfth the length of the head; distance between the eyes equal to one third the length of the head. *Nostrils* situated higher than the eyes, and in front of them; the posterior, the larger; the anterior, tubular. *Jaws* without teeth; upper jaw juts slightly over the under. Scales upon the body large, transparent,

rounded at the summit, truncated at their base, exhibiting numerous striæ; at the base of each scale, a fleshy, dark-colored membrane exists, which, projecting as far as the apex of the preceding scale, gives the appearance of indistinct oblique bands across the fish; scales smaller upon the back, and smallest upon the throat. The *lateral line* commences at the superior angle of the operculum, and curving downwards nine scales, pursues nearly a straight course to the tail. The lateral line is composed of fifty-one scales; nine scales are situated above the lateral line in an oblique line from the origin of the dorsal fin, and six below the lateral line.

The Dorsal fin arises on the anterior half of the body; is nearly as high again as long; the first ray is one fourth the height of the second; the general color of the fin like the back; the firmest portion of the rays, reddish.

The Pectorals arise beneath, and one line anterior to the posterior angle of the operculum; above, brownish; beneath, lighter, rounded at their extremities; length to height as 1 to 4.

The Ventrals are situated beneath the dorsal; above, color of the abdomen; shorter than the pectorals.

The Anal arises opposite a line about three quarters of an inch back of the dorsal fin, and is higher than long. The first ray bears the same proportion to the length of the second, as the first ray of the dorsal to the second ray of that fin.

The Caudal fin is large; height of the rays in the middle of the fin, one inch; width at the extremities, when expanded, three inches.

The number of the fin rays is as follows: D. 10; P. 17; V. 8; A. 10; C. 22.

L. *atronasus*. Mitchell. *The brook Minnow*.

Trans. Lit. et Philosoph. Soc. p. 460.

This beautiful little species is seen in our brooks in large numbers. From a specimen an inch and six lines in length, I draw up the following description: Greatest depth, four lines.

Upper part of the body greenish; a broad black band passes from the snout across the eye longitudinally through the middle of the fish to the caudal rays; body beneath this band white, with cupreous reflections. Upon the upper edge of this band, runs the *lateral line*. Above this, a golden parallel band narrower than the darker colored; from the anterior portion of the head, along the dorsal ridge, a narrow band, similar to that last spoken of. When the fish is swimming, the three bands give it a very pleasing appearance. Length of the head about one fifth the length of the fish; the top of the head darker colored than the rest of the fish, flattened. *Jaws* destitute of teeth; the upper jaw the longer, semi-circular; lip corrugated; the lower jaw elevated to a point in its middle, forming a triangle. *Eyes* moderate in size; pupils black; irides golden. *Gill-covers* silvery, with golden reflections. Scales on the body small; nine scales in an oblique line from the origin of the dorsal to the lateral line.

The Dorsal fin arises just in front of the ventrals; brownish; transparent; higher than long.

The Pectoral fins yellowish; arising on a line with the posterior angle of gill-covers.

The Ventrals of the color of the abdomen, are situated under the middle of the dorsal fin.

The Anal is situated just in front of the caudal fin; its length equal to one third its height.

The Caudal fin is forked.

The fin rays are as follows: D. 13; P. 10; V. 9; A. 7; C. 18.

HYDRARGIRA. Le Sueur.

Generic characters. *Ventral fins 6 rayed; teeth in the jaws and throat; those of the jaws conic and recurved; none in the palate; jaws protractile; lower jaw longer than the upper one: dorsal fin one, situate nearer the tail than the head, opposite to the anal fin: scales on the opercula and body: head flat, shielded above with large scales, the centre scale largest.*

H. *nigro-fasciata*. Le Sueur. *The banded Minnow*.

Journal Academy Nat. Sciences, vol. i. p. 133.

Several specimens of a beautiful little species answering in the important characters to Le Sueur's "*nigro fasciata*," were sent me by Dr. Yale. From the largest of these, I draw up the following description :

Length of fish two inches. Color above, a yellowish green ; beneath, silvery white, crossed transversely by from ten to fourteen black bars commencing upon each side of the dorsal ridge, and passing down towards the abdomen ; the bands cross entirely the fleshy portion of the tail ; in front of the ventrals, they reach only the lateral edges of the abdomen. Length of the head half an inch. *Head* flattened above. *Eyes* less than a line in diameter, which is less than the distance between the eyes. *Gill-covers* silvery, with a bluish blotch upon the operculum. *Jaws* very projectile ; the lower slightly in advance of the upper.

The Dorsal fin is just back of the middle of the body ; transparent ; greenish white ; height equal to its length.

The Pectorals are lighter colored than the dorsal ; length to height as 1 to 4.

The Ventrals are quite small, the color of the abdomen ; commencing on a line with the extremities of the pectorals.

The Anal fin the color of the ventrals ; length to height as 1 to 3.

The Caudal fin is yellowish ; length to height as 1 to 3.

The fin rays are : D. 12 ; P. 18 ; V. 6 ; A. 12 ; C. 17.

H. *ornata*. Le Sueur. *The ornamented Minnow*.

Journal Academy Nat. Sciences, vol. i. p. 131.

This species of *Hydrargira*, very common about the salt marshes in the vicinity of Boston, I suppose to be a variety of the "*ornata*" of Le Sueur. It may be taken in large num-

bers with small hand nets. I am not aware that it is often made use of; but I have seen a flock of the domestic duck swallowing it with the greatest avidity, when thrown to them in quantities, in the same manner as grain.

The specimen before me is three inches in length. Back dark brown; sides lighter; beneath white. Back depressed; sides in some specimens of a beautiful metallic tint, giving the appearance of an indistinctly defined yellow band. Length of the head, three quarters of an inch; flattened above; gape of the mouth moderate; teeth in the jaws small and sharp; the lower jaw curves upwards. *Eyes* of moderate size: irides yellowish; the circle immediately surrounding the pupil, a bright yellow. Preoperculum of a silvery white color; operculum, a bright metallic yellow.

The Dorsal, pectoral and caudal fins, color of the back; ventral and anal fins, lighter.

The Dorsal fin commences half way between the head and the tail: rather longer than high.

The length of the Pectorals is two lines; height, six lines.

The Ventrals are very small.

The Anal fin is situated under the middle of the dorsal fin.

The Caudal fin rounded.

The fin rays as follows: D. 12; P. 15; V. 6; A. 10; C. 18.

In the smaller specimens, a bright yellow spot is seen at the origin of the dorsal fin, while they are swimming; after death, this mark is not observed.

H. *flavula*. Mitchell. *The Basse Fry*.

Trans. Lit. et Philosoph. Soc. N. Y. p. 439.

Boston Journal of Natural History, vol. i. p. 418.

Meeting two years since with a fish belonging to the genus "*Hydrargira*," not described by Le Sueur in his paper upon that genus, under the name of "*trifasciata*," I published a description of it in the "*Boston Journal of Natural History*." I have before me at the present moment, (June 13th, 1838,) a

second specimen of this species, sent me by Dr. Yale ; and I am satisfied it is the same fish that Mitchell described as the "*Esox flavulus*," in his "*Fishes of New York*," and that Cuvier, in his notes to the *Regne Animal*, considers as the "*Cyprinodon flavulus*," Valenc. As the branchiostegous membrane has but five rays, it cannot be a "*Cyprinodon*," Lacep. the species of that genus having six rays. It is, however, evidently Mitchell's fish, incorrectly called by him an "*Esox*." Although placed by him in a family to which it did not belong, still, as Le Sueur's genus was formed three years after Mitchell's description was drawn up, and as Mitchell accurately described it, his specific name has the priority ; most cheerfully, therefore, is the specific name applied by me, relinquished. Mitchell calls it the "*New York Gudgeon*:" by our fishermen, however, it is known by the name of "*Basse Fry*," from its resemblance in the bands to the "*Striped Basse*." I have adopted this common name.

The following is my description, extracted from the *Journal of the "Boston Society of Natural History :*" Four longitudinal bands on each side of the body, and three transverse bands between the termination of the longitudinal bands and the base of the tail. The upper part of the body is of a yellowish green ; on each side are four dark colored bands, running almost the entire length of the fish ; the first of these is high on the back ; the second passes from the upper edge of the operculum, in a direct line to its termination ; the remaining two, commencing back of the pectoral fin, run obliquely upwards and backwards, to a point on a line with the centre of the ventral fin, then turn gently down, and are continued parallel with the two other bands.

At the base of the tail are three transverse bands of a similar color. All the under portion of the body is of a brilliant yellow. Snout elongated. Lower jaw straight. Length of specimen 5 inches 5 lines ; thickness seven and a half lines ; depth one inch and one and a half lines.

The fin rays are : D. 14 ; P. 18 ; V. 6 ; A. 12 ; C. 18.

This fish was taken with other species of this genus in the marshes of this vicinity.

The specimen now before me varies in some slight particulars. Its length is four and a half inches. Quite a number of black spots upon the back. Two longitudinal bands on the sides: the upper, unbroken throughout its entire extent; the inferior broken at the posterior half of the body; the anterior being higher than the posterior portion of the band. Four transverse lines between the extremity of the longitudinal bands, and the caudal rays; that next to the tail, longer than either of the others.

The fin rays are: D. 15; P. 17; V. 6; A. 11; C. 20.

FAMILY II.

ESOCES.

Esox. Lin.

Generic characters. *Head depressed, large, oblong, blunt; jaws, palatine bones, and vomer, furnished with teeth of various sizes; body elongated, rounded on the back; sides compressed, covered with scales; dorsal fin placed very far back, over the anal fin.*

E. *reticulatus*. Le Sueur. *The common Pickerel.*

Journal Academy Nat. Sciences, vol. i. p. 414.

This fish, one of our most beautiful species, is known throughout the state as the "*pickerel*." It is taken in most of the ponds and rivers, and is every where valued. Brought to Boston market in the spring and autumn, and frequently through the greater part of the winter, it meets with a ready sale. The largest specimens are received from Brewster, Cape Cod; individuals have been sold in Quincy market from that place, weighing seven pounds: and they are said to be taken there considerably larger even than this. Its color varies exceedingly in different localities; thus, while in some ponds it is of a greenish brown color, in others, the entire surface is of a brilliant golden; all however are more or less distinctly

marked with the irregularly distributed longitudinal lines. The fishermen have an idea that the oil of this species, carefully prepared, is a good application for ear-ache, and it is collected by some for that purpose.

The specimen before me is sixteen inches in length ; head about one fourth the length of the body ; width of the head in front of the eyes, equal to half of its length. Body above green ; sides of a beautiful golden yellow, marked over their whole extent with dark lateral lines about one third of an inch in width, which, by their irregular union, produce imperfect reticulations : beneath white. Snout obtuse : gape of the mouth great. Lower jaw longer than the upper ; teeth in front of the lower jaw small ; on sides large and pointed. *Eyes* moderate in size ; pupils black, irides yellow. *Nostrils* double. Fins greenish. The pectoral, anal and ventral fins become reddish after death ; this is more marked in the larger specimens.

The Dorsal fin from one to two lines longer than the anal.

The Pectorals commence on a line with the sixteenth branchial ray, (counting from the anterior portion of the head backwards.)

The Ventrals are situated two and a half inches in front of the dorsal fin.

The Anus is large ; two lines in front of the anal fin.

The commencement of the Caudal fin is about two inches back of the dorsal fin.

The fin rays are : B. 17 ; D. 18 ; P. 13 ; V. 11 ; A. 17 ; C. 19.

BELONE. Cuv.

Generic characters. *Head and body greatly elongated ; the latter covered with minute scales ; both jaws very much produced, straight, narrow, and pointed ; armed with numerous small teeth ; the dorsal fin placed over the anal fin.*

B. *truncata*. Le Sueur. *The Gar Fish.*

Journal Academy Nat. Sciences, vol. ii. p. 126.

To Dr. Yale I am indebted for a fine specimen of this species, taken at Holmes Hole, which enables me to offer the accompanying description. Length fifteen inches; greatest depth one inch. Above, of a light green color; beneath, a clear silvery white. Just above the base of the pectorals, a deep blue band arises and passes in a straight line to the origin of the dorsal fin. Length of the head, from the angle of the jaws to the posterior portion of the operculum, one inch six lines; flattened above, compressed on the sides. Length of the lower mandible, from the tip to the eyes, three inches five lines, and fleshy at its tip; three lines longer than the upper mandible; both mandibles armed with distant, very sharp, conical teeth, between which are numerous others, very minute; no teeth upon the upper mandible, for the extent of two lines from its extremity. *Eyes* circular, three lines in diameter; pupils black, irides silvery. Distance between the eyes about equal to the diameter of the eyes. *Gill-covers* silvery; at the posterior edge of the preoperculum, a vertical blue band, about four lines long. Immediately in front of the eyes, a triangular space, in which are situated the nostrils.

The *lateral line* arises at the inferior angle of the operculum, and passing gradually up to the posterior extremities of the pectorals, assumes a straight line, which is continued to the base of the caudal rays.

The Dorsal fin is situated upon the posterior fourth of the body; transparent, greenish, falciform, high anteriorly, very low posteriorly.

The whitish Pectorals are directly back of, and upon a line with, the posterior angle of the operculum; their length to the height of their longest rays, is as 2 to 8.

The Ventrals, of the color of the abdomen, are placed back of the middle of the body; their length to their height is as 1 to 4.

The Anal fin commences in front of the dorsal, and terminates upon the same plane as that fin; its longest rays are longer than those of the dorsal.

The Caudal fin is slightly truncated obliquely, the lower portion being the longer.

The fin rays are : D. 15 ; P. 12 ; V. 6 ; A. 19 ; C. 20.

I have no doubt of this being Le Sueur's "*truncata*:" he describes his specimen as being a "*deep blue on the back*;" it might have been a more recent specimen than mine ; or the color of the fish before me may have been impaired by the salt in which it was sent me. In all important characters it answers perfectly to the species under which I arrange it.

SCOMBERESOX. Lacepede.

Generic characters. *The species of this genus have the same structure of the jaws as those of Belone ; and are similar also in the form of body and scales, with a keel-like edge to the belly ; but the posterior portions of the dorsal and anal fins are divided, forming finlets, as in the mackerel.*

S. *equirostrum*. Le Sueur. *The Bill Fish.*

Journal Academy Nat. Sciences, vol. ii. p. 132.

Le Sueur described this species from a dried specimen in the cabinet of the Linnean Society, which formerly existed in Boston ; his description shows his specimen to have been an imperfect one. I have seen no specimen in which the jaws were of equal length ; the lower jaw was undoubtedly broken in the specimen seen by Le Sueur, as is very apt to be the case in dried specimens of this genus, else he could not have called it "*equirostrum*;" still, as some naturalists think a specific name need not point out any particular character, and as I have no desire to detract from the labors of another, I shall point out here the characters as they exist in the recent specimen, and leave Le Sueur's name to be changed, should it ever be thought advisable, by some succeeding ichthyologist.

This fish makes its appearance at Cape Cod, usually, in the month of October, sometimes earlier and sometimes later, however, depending upon the season. It is taken in immense numbers by the inhabitants of some of the towns upon the Cape, and considered by them very nutritious and grateful food.

From a fine specimen sent me by Dr. Yale, which was taken upon Nantucket Shoals, I have drawn up the following account: Entire length, ten inches; from the extremity of the lower jaw to the anterior angle of the eye, one and three quarter inches. *Body* quite thick, nearly of equal width and depth from the pectorals to the origin of the dorsal fin. Back, for the depth of a quarter of an inch, of an olive green color; directly beneath this, a silvery band half an inch wide, almost as strongly marked as in the "*Atherines*," runs the whole length of the body, divided in its centre by a narrow longitudinal line of the same color as the back. *Abdomen* silvery, with a cupreous tinge. *Head*, including the jaws, three inches long, quite narrow, compared with the body, of a deep green color above; *gill-covers* large, smooth, silvery; *jaws* at their origin armed with very minute teeth; the lower jaw one quarter of an inch longer than the upper; eye one quarter of an inch in diameter; distance between the eyes, rather greater than the diameter of the eye.

The Dorsal fin, of a greenish color, is situated upon the posterior half of the body, longer than high; back of it, five finlets, of the same color as the dorsal fin.

The Pectorals are situated at the posterior angle of the operculum, dark colored at their fleshy origin; the rays silvery; the first ray longer and much broader than the others.

The Ventrals are situated one inch and a quarter in front of the anal fin; color of the abdomen; triangular, half of an inch high.

The Anal fin commences directly opposite the dorsal, and terminates upon the same plane as that fin; between it and the tail, five yellow finlets.

The Caudal is equilobed, with transverse black lines upon the rays, resembling the joints of a reed.

On each side of the abdomen, commencing at the lower edge of the gill-covers, a longitudinal furrow, which passes along the whole length of the body, having between them a space of a quarter of an inch, the space wider at the ventrals.

The fin rays are as follows: D. 10; P. 14; V. 6; A. 12; C. 20.

Another specimen taken with the preceding, lies before me, agreeing in all important particulars,—*form, color, proportionate length of jaws, and number of fin rays*; but having, like the “*scutellatum*,” (which Le Sueur described from a specimen “found in the stomach of a fresh codfish, which had been brought to Boston from the Bank of Newfoundland,”) six dorsal finlets and seven anal; showing that the number of finlets cannot be relied upon for a specific character.

FAMILY III.

SILURIDÆ.

PIMELODUS. Lacepede.

Generic characters. *Body covered with a naked skin; no lateral armature; jaws and often palatine bones furnished with teeth, but there is no band of teeth on the vomer parallel to that on the upper jaw. The form of the head varies exceedingly, as well as the number of its barbules.*

P. *nebulosus*. Le Sueur. *The Horned Pout.*

Mémoires du Museum d'Histoire Naturelle, t. v. p. 149.

This species very common in our ponds and streams, in company with the “*Percu flavescens*,” “*Pomotis vulgaris*,” “*Labrax mucronatus*,” “*Leuciscus crysoleucas*,” &c. is known in the interior of the State by the vulgar names of “*Horn pout*,” and “*Minister*.” By many, it is highly esteemed as an article of food, and preferred to every species of our common fluviatile fishes, save the *pickarel*. It is generally fried, the skin having previously been removed. Specimens are occasionally met with, weighing three quarters of a pound.

From a *living specimen* seven inches in length, the following account is drawn up. Color fuliginous, darker upon the head and back, approaching to black; lighter upon the sides,

tinged with cupreous; white beneath, in front of the ventrals. Length of the head to the entire length of the fish, as $1\frac{1}{2}$ to 7. Greatest width of the head, equal to one seventh the length of the fish; greatest depth of the fish, more than equal to one seventh the length of the fish. *Head* flattened above; upper jaw longer than the lower; both furnished with numerous small teeth; eight cirrhi about the head. From the angle of the upper jaw on each side, one projects, one and a half inch long, tapering to a point; another, three quarters of an inch long, back of and above this; beneath the lower jaw, are also four cirrhi, two on each side of its middle; the outer, one inch long; the inner, three quarters of an inch long. All these cirrhi are of the same color. *Eyes* small, one line in diameter; the distance between the eyes equal to about half the length of the head. Two blunted spines on the humeral bone; the upper, much the smaller. The *lateral line* arises above the posterior angle of the operculum, and runs nearly a straight course to the tail.

The Dorsal fin arises about half an inch back of the pectorals; length to height as 1 to 2. A small adipose fin a short distance in front of the tail.

The Pectorals are situated a short distance in front of the posterior angle of the operculum; length to height as 3 to 12; their outer ray is spinous, and serrated upon its outer edge; it is marked at its point, and is three lines shorter than the first fleshy ray.

The Ventrals arise on a line just back of the dorsal fin; length to height as 4 to 9. Anus large, oblong, between the posterior half of the ventrals.

The height of the Anal fin equal to half its length.

The length of the Caudal almost equal to its height. All the fins are dark colored.

The fin rays are: D. 1-5; P. 1-8; V. 8; A. 21; C. 19.

In the dead fish, the dark coloring matter readily *rubs* off; and the specimen, if untouched also, rapidly becomes of a lighter color.

In one specimen I have seen, a large black blotch was situ-

ated just beneath the lower jaw, and the whole interior portion of the lower jaw, including the teeth and far back of them, was colored with a deep black pigment.

FAMILY IV.

SALMONIDES.

SALMO. Lin.

Generic characters. *Head smooth, covered with scales; two dorsal fins, the first supported by rays, the second fleshy, without rays; teeth on the vomer, both palatine bones, and all the maxillary bones; branchiostegous rays varying in number, generally from ten to twelve, but sometimes unequal on the two sides of the head of the same fish.*

S. *salar*. Lin. *The Salmon.*

Pennant's British Zoology, vol. iv. 249 et fig.

Mc Murtrie's Cuv. vol. ii. 222.

Yarrell's British Fishes, vol. ii. p. 1. fig.

The building of dams and manufacturing establishments, by preventing the fishes from going up the rivers to deposit their spawn, has almost entirely annihilated this species in our State. Forty-five years since, it was very abundant in the Merrimac river, so much so that nine individuals have been taken in an afternoon by one person with a dip net: and the usual price was *eight cents* per pound. About seventeen years since, two wagons, each bringing from 30 to 40 fine salmon from the Merrimac river, supplied the Boston market every week during the season of the fish. Now the few specimens taken are looked upon as rarities, and our market is supplied by the fishery of the Kennebec. The average weights of the Merrimac salmon are from 9 to 12, and from 16 to 22 pounds. The largest weigh from 30 to 40 pounds. They have been caught during every month in the year. The greatest run of *salmon*,

up the river, is about the first of June. The fishermen say the young salmon are never seen on their return.

The price of this species of late years in our market, varies exceedingly, from \$2 to 20 cents per pound. The largest specimen, so far as I can learn, that has been sold in Boston market, weighed 34 pounds; and the greatest price ever received for one fish, in the same market, was \$50.

The following description is drawn up from a specimen thirty inches in length, and weighing eighteen pounds: Its width across, from the commencement of the dorsal fin, is eight inches; its greatest depth three inches and a half. Of a beautiful, brilliant, bluish silver color above; lighter upon the sides; white beneath; black blotches upon the sides, much more numerous above the lateral line, for the most part surrounding the outline of the scales, leaving the color of the bodies unchanged; the spots upon the scaleless head are unbroken, and of a deeper color. Length of the head equal to one fifth the length of the fish. *Head* naked, sloping, darker colored above than the back of the specimen. *Gill-covers* light silver colored. *Eyes* small; pupils black; irides silvery. Diameter of the eye equal to one quarter the distance between the eyes. *Nostrils* placed vertically, much nearer the eyes than the extremity of the snout. Upper jaw the longer, receiving into a notch, at its middle, the prominent tip of the lower jaw; both jaws armed with a few sharp incurved teeth, as well as the palatine bones, vomer and tongue. Inside of the jaws and edges of the tongue, dusky. The *lateral line* is nearly straight.

The first Dorsal fin commences upon the anterior half of the body; its first rays are equal in height to the length of the fin. Fin rather darker colored than the back, and with one or two longitudinal rows of black blotches upon its base. The adipose fin is dark brown, situated a short distance in front of the tail; its length is equal to one third of its height.

The Pectorals arise in front of the posterior angle of the gill-covers; above they are dark colored; beneath lighter; length equal to one fourth their height.

The Ventrals are above dusky; beneath white; they begin

on a line opposite the middle of the dorsal fin, and have on their sides a large axillary scale.

The Anal fin is white; higher than long. The Anus is large, and edged by the extremities of the surrounding scales.

The Caudal fin is of a dark brown color; the fleshy portion of the tail extends considerably farther forward in its middle than on the sides, leaving the caudal rays much longer upon the sides of the tail; the length of the central caudal rays only one third the length of the lateral rays.

The fin rays are as follows: D. 12; P. 15; V. 9; A. 10; C. 19.

S. *fontinalis*. Mitchell. *The common brook Trout*.

Trans. Lit. et Philosoph. Soc. v. i. p. 435.

Richardson's Fauna, p. 176, et fig.

This is quite a common species in our market, and meets with a ready sale. Dr. Mitchell speaks of it as being highly esteemed in New York.

Of twelve specimens before me, the largest is eight inches in length. The upper part of the body is of a pale brown color, mottled with darker undulating, reticulating markings; the sides lighter, with a great number of circular yellow spots, varying in their size from a small point to a line or more in diameter; and many of them having in the centre a bright red spot; sometimes, the yellow color surrounding them having partially disappeared, they seem distinct from the circular spots, or are surrounded by a dull bluish halo; these red spots differ exceedingly in number; in some specimens, three or four only are observable, and these are situated below the lateral line; in others, twenty or more are seen scattered above and below the lateral line indiscriminately, presenting a beautiful appearance. *Body* beneath whitish, slightly fuliginous. Length of the head to the whole length of the body, as 1 and 1-2 to 7; top of the head slightly flattened; the snout obtuse. *Head* above, darker colored than the back. *Gill-covers* golden, with fuliginous. *Eyes* large, pupils black, irides silvery. Dis-

tance between the eyes, equal to one fifth the length of the head. *Jaws* equal in length; gape of the mouth large; teeth sharp, recurved; teeth on the tongue larger than those in the jaws; teeth also on the palatines and vomer. Scales very small; those on the lateral line, which pursues a straight course, larger than those on the rest of the body.

The Dorsal fin is situated upon the anterior half of the body; it is yellow, with irregular black transverse bands; longer than high; the adipose fin is quite small near the tail.

The Pectorals arise in front of the posterior angle of the operculum; its length equal to one quarter of its height. The first ray white; the second ray dark colored; the remainder of the fin red.

The Ventrals commence opposite the middle of the dorsal fin; when unexpanded, their extremities, together, form a sharp point. As in the pectorals, the outer ray is white; the second dark; the remainder red.

The Anal fin arises in front of the adipose fin, and is higher than long.

The Caudal fin is of a dirty reddish brown, mottled with black spots; slightly bifurcated.

The fin rays are as follows: D. 11; P. 13; V. 8; A. 11; C. 19.

November 5th, 1838. I have just received three beautiful specimens of *Trout*, from Dr. Forsyth, of Sandwich, which are commonly called "*Salmon Trout*," and, as such, are sought for with great avidity; they are taken there in considerable quantities; not less than 1000 pounds yearly. It is quite common to find them in the wells of the vicinity of Sandwich, living for years, and attaining a large size. These Sandwich fish are really delicious, as my good friend has given me an opportunity of testing at my table; still, upon a careful examination, they answer most perfectly to Mitchell's description of the "*fontinalis*," and do not at all correspond with the descriptions of the "*salmo trutta*," *salmon trout*. The largest of my three specimens is fifteen inches in length, nearly as large again as this species is usually met with in our market

from the neighboring brooks ; and they not only differ somewhat in appearance from the smaller specimens, but also from each other. Thus, in one of the specimens before me, the abdomen, between the origin of the pectorals and the ventrals, is a pure white ; in a second, it is a yellowish white ; and in the largest, the whole extent of the lower portion of the sides, is a beautiful orange color, and the abdomen a dark fuliginous.

OSMERUS. Artedi.

Generic characters. *Body elongated, covered with small scales ; two dorsal fins, the first with rays, the second fleshy, without rays ; ventral fins in a vertical line under the commencement of the first dorsal fin ; teeth on the jaws and tongue very long, two distinct rows on each palatine bone, none on the vomer, except at the most anterior part ; branchiostegous rays 8.*

O. eperlanus. Artedi. *The Smelt.*

Pennant's British Zoology, vol. iii. p. 273, et fig.

Yarrell's British Fishes, vol. ii. p. 75, et fig.

Journal Academy Nat. Sciences, vol. i. p. 230.

Fauna Boreali-Americana, p. 185.

This beautiful species is brought to our market in the spring and autumn in large quantities, and is highly esteemed as an article of food. In the spring, it is taken in nets up the rivers, and in winter, with the hook beneath the ice. In Watertown alone, about 750,000 dozen are taken annually in scoop-nets, from the *first of March to the first of June*, and sent to Boston market. It is generally taken from four to ten inches in length. The largest specimens I have seen were taken in Milton river, the latter part of December, 1837. Four specimens, taken without regard to size, weighed one pound and a half.

The length of the specimen before me is nine inches. Length of the head, one inch six lines. Color, above the lateral line, yellowish green ; all the body beneath the lateral line, a silvery

white; portions just beneath the lateral line presenting the appearance of a satin band, the length of the body. Lower jaw longer than the upper. *Mouth* wide. Maxillary bones toothed throughout their whole extent; teeth in the jaws strong, crooked. Three or more teeth on each side of the tongue; a tooth at the extremity of the tongue, much longer than the others. *Nostrils* very large. Diameter of the eye nearly three lines; pupils black; irides silvery. The *lateral line* commences at the posterior angle of the operculum, and passes on in a straight course to a line within half an inch of the dorsal fin, where it can be scarcely discovered.

The Dorsal fin is brownish; its length equal to half its height. The adipose fin is two inches back of the dorsal, slightly curved, two lines in length.

The Pectorals are six lines long, commencing on a line with the beginning of the lateral line.

The Ventrals commence two and a half inches back of the base of the pectorals.

The Anal fin is two inches back of the ventrals; height of the longest rays equal to rather more than half the length of the fin.

The Pectoral, Ventral and Anal fins silvery, like the abdomen.

The Caudal fin is six lines back of the adipose fin, somewhat forked.

The fin rays are: B. 8; D. 11; P. 14; V. 9; A. 15; C. 19.

In the first volume of the "*Journal of the Academy of Natural Sciences*," Le Sueur described this as a new species, under the name of "*viridescens*." Cuvier does not acknowledge this to be distinct from the European fish, and therefore "*Arctid's*" name has the priority.

SCOPELUS. CUV.

Generic characters. *Body long, slender; the principal dorsal fin over the interval between the ventral and anal fins; a*

second dorsal fin, so small as to be scarcely perceptible; the head short; the mouth and gill-aperture large; small teeth on both jaws; palate and tongue smooth.

S. Humboldtii. Cuv. *The Argentine.*

Pennant's British Zoology, vol. iii. p. 286, et fig.

Yarrell's British Fishes, vol. ii. p. 94, et fig.

The only specimen I have met with of this beautiful little species, which is neither mentioned by Mitchell in his "*Fishes of New York*," nor by Richardson in his "*Fauna Boreali-Americana*," was brought from Nahant, by Mr. Jonathan Johnson, of that place. He found it in December, 1837, *alive* on the beach; he had never seen a *living* specimen before, but had repeatedly found partially decomposed specimens in the stomachs of haddock.

The entire length of my specimen is two inches one line: length of the head, three lines. The back, to the depth of about a line, is of a dark green color; the sides, including the gill-covers, are of a beautiful silvery lustre. A row of brilliant circular metallic colored spots runs along the belly, from before the pectorals to the anus; higher up, on the sides, another row of dots parallel with these; behind the anus a single row of smaller dots of a similar character, is continued to the base of the tail. *Body* very much compressed. The *lateral line* almost imperceptible, nearly straight, commences at the upper third of the operculum. *Mouth* widely cleft; teeth small in both jaws. *Eyes* large, one and a half line in diameter; irides silvery.

The fin rays are: D. 10; P. 17; V. 8; A. 15; C. 19.

FAMILY V.

CLUPEÆ.

CLUPEA. Lin.

Generic characters. *Body compressed; scales large, thin, and deciduous; head compressed; teeth minute or wanting;*

a single dorsal fin ; abdominal line forming a sharp keel-like edge, which in some species is serrated ; branchiostegous rays 8.

C. *elongata*. Le Sueur. *The common Herring.*

Journal Academy Nat. Sciences, vol. i. p. 234.

This species which is known in our market as the "*English herring*," was described by Le Sueur in the "*Journal of the Academy of Natural Sciences*," under the specific name of "*elongata*." In some seasons this fish is taken in great numbers. The quantities of *herring* packed and inspected, according to tables kept at the general inspection office for five years, are as follows: 1832, 52 bbls. ; 1833, 36 ; 1834, 518 ; 1835, 963 ; 1836, 77. That a small quantity only of the *herring* taken, is packed, is obvious, from the fact, that in 1836, 500 bbls. were taken at Falmouth ; 400 bbls. at Duxbury, and 3000 at Martha's Vineyard.

Upon some portions of our coast, *herring* have been limited in quantity for the last few years, and during the years 1835-6 very few, comparatively speaking, were taken. Their scarcity has been attributed by the fishermen to *torching* them at night, by which the shoals are broken up, and the fish frightened away.

The specimen lying before me, is thirteen and a half inches in length. Color upon the back of a deep blue tinged with yellow ; sides paler ; opercula, yellow tinged with violet ; beneath, silvery. Scales large, silvery, deciduous. Abdominal ridge indistinctly serrated ; about thirty spines may be counted in front of the ventrals, and fifteen behind them. Depth of the specimen at the origin of the dorsal fin, one fourteenth the length of the body ; width at the commencement of the dorsal fin a little more than one seventh of the length. Length of the head when the mouth is closed, from the extremity of the lower jaw, about one seventh of the whole length of the fish. *Head* destitute of scales, a depression upon its top, between and back of the eyes, exhibiting numerous mucous pores. *Eyes* large and provided with a nictitating membrane ; pupil black, irides silvery ; distance between the

eyes double the diameter of the eye. *Nostrils* equidistant between the eye and the snout. Gape of the *mouth* large. *Jaws* furnished with teeth; palate and tongue also provided with teeth.

The Dorsal fin longer than high.

The Pectorals less than one third as high as long.

The Ventrals are situated opposite the middle of the dorsal fin.

The Anal is more than one third as high as long; its anterior half, the higher.

The Caudal fin is forked; at its base, width to the width of the expanded extremities as 1 to 2.

The fin rays are: D. 18; P. 19; V. 9; A. 18; C. 22.

Le Sueur describes the iris as "*reddish*;" he probably saw his specimens after they had been some time taken. The iris of most fishes changes to a *brown* very soon after death.

C. *fasciata*. Le Sueur. *The fasciated Herring*.

Journal Academy Nat. Sciences, vol. i. p. 233.

For a long time, I supposed I had seen specimens of this species in Boston market, with the "*Alosa vernalis*," but now think I may have been mistaken. Not having seen an individual, however, since the description of our fishes was undertaken, which answers to the species of Le Sueur, I have no alternative left me, but to copy his account.

"The species which I call *Clupea fasciata*, (fasciated Herring.) is known under the name of *alewife* by the fishermen of Sandwich, and appears only in the spring; but about the end of August, 1816, we still had a sight of several individuals, in length one, two, four, eight, and nine inches, all alike, except as to size. Body compressed; back straight; breast and abdomen forming a bow downwards as far as the tail; seven to eight lines of a blackish blue at the sides of the back, and a rounded notch at the bottom of the divisions of the tail, of which the lower lobe is the longest. The entire

length of the body is about six times that of the head, which is not equal to the depth of the body : snout short ; jaws equal ; maxillars of middling width, scarcely reaching beyond the centre of the eye, which is near the end of the snout, and round, its iris yellow, and pupil black. *Operculum* parallelogramiform, slightly oblique, and depressed at the lower edge ; *dorsal* as high as the width of its base ; *pectorals* acute, rather long ; *ventrals* somewhat behind the front of the dorsal, which is large and truncated ; *anal* long, subequal ; *lateral line* scarcely visible ; *color* blue on the back, lighter at the sides, and of a silver white under the abdomen, breast and tail ; yellow tints are reflected from the scales upon the opercula, base of the tail and fins. The *blue lines* are deeper towards the back than the abdomen, where they disappear.

These are salted, and taken with the seine.

B. 7 ; D. 18 ; P. 16 ; V. 9 ; A. 18 ; C. 22 6-6 rays."

C. *minima*. Peck. *The Brit.*

Belknap's History of New Hampshire, vol iii. p. 130.

This pretty little species, *named* but not described by Peck in "Belknap's New Hampshire," is found at some seasons of the year in incredible numbers upon our coast, and serves as food for several other species. It varies in its length from one to four inches. *Back* nearly black ; upper part of the sides dark green ; *sides* silvery, with roseate and golden reflections ; in the younger specimens, the dorsal ridge is a black line, and the distance between it and the lateral line, which is situated very high upon the sides, is of a light green sprinkled with darker points. The *lateral line* arises upon a line with the upper angle of the operculum, and runs along very near the back, the length of the body. The *abdominal ridge* is serrated. Length of the *head* one fourth the length of the body, gradually sloping from the occiput to the snout ; top of the head darker colored than the rest of the body. *Gill-covers* large, silvery,

seeming to form one large plate. *Lower jaw* rather projecting beyond the upper. Diameter of the *eye* equal to one sixth the length of the head. *Tail* forked.

The fin rays are : D. 10 ; P. 15 ; V. 5 ; A. 12 ; C. 18.

ALOSA. Cuv.

Generic characters. *Upper jaw with a deep notch in the centre ; in other respects like the Clupea.*

A. *vernalis*. Mitchell. *The spring Herring or Alewife.*

Although in several portions of the state where the *alewives* have heretofore been most abundant, the various encroachments of man have sensibly diminished them, they are still taken in some places in immense numbers. A larger quantity of *alewives* is packed than of any other species of this family. In 1832, 1730 barrels were inspected ; 1833, 2,266 ; 1834, 4,320 ; 1835, 5,600 ; 1836, 5000.

At Watertown, the average quantity of *alewives* for the last ten years, is 700 barrels. They are first pickled, then salted and barrelled, and sent to the West India Islands. They sell for from \$1.50 to \$2.00 per barrel. At Taunton, which for years was so celebrated for its fishery, the *alewives* are gradually lessening. There are two or more dams across the Taunton "*Great River*," so called, which impedes their progress very much ; and on the "*Little River*," where many dams and factories have been erected, and where, twenty years ago thousands were taken, not one now is to be seen. Twenty-five years since they were taken in such abundance at Taunton, that they sold for 20 cents per hundred, and a great business was carried on in barrelling and shipping them to the West India market. At the present time, when first taken, they sell for 100 cents per hundred, and, as the season advances, diminish gradually in price to 50 cents. Most of the fish are disposed of at the seines, (fresh,) and *cured* by the purchasers. In the Merrimack river too, they have been diminishing in number for the last five or ten years ; the fishermen think this

is because the small ponds emptying into the river have been dammed up. A pond in Manchester and Chester was formerly famous for its *alewives*.

The following characters are presented by a specimen of this species: Color on the back bluish purple; sides a light cupreous; beneath silvery; on the sides, four or five, and sometimes even more, indistinct greenish lines passing from the head to the tail; these lines are quite obvious when looked at from either extremity of the fish, the eye being placed on a line with the fish. Length of the fish to its width, about as 4 to 1; length of the head to the entire length of the body as 2 to 12. Depth of the body, in a specimen twelve inches long, across the anterior base of the dorsal fin, three inches; across the base of the pectorals, two and a half inches; across the anus, two inches. *Head* small; opercula golden, and marked with beautiful arborescent ramifications. *Eyes* large; pupils black; irides silvery. *Mouth* very large. Lower jaw slightly longer than the upper; upper jaw notched in its centre. Just back of the upper posterior angle of the operculum, a deep black blotch. Scales on the body very large and deciduous. The entire abdominal edge strongly serrated by projecting bony spines; these serrations are larger back of the ventrals, between them and the anus.

The height of the Dorsal fin equal to its length.

The width of the Pectorals at base, to the length of the fin, as 4 to 12.

The Ventrals darker colored than the abdomen, and of a moderate size.

The height of the first rays of the Anal fin to the length of the fin, as 5 to 15.

The Caudal fin deeply notched; width at the base when unexpanded, to the width at the extremities, as 1 to 2.

The fin rays are as follows: D. 17; P. 15; V. 9; A. 18; C. 21.

A. *vulgaris*. Cuv. *The common Shad.*

Mc Murtrie's Cuv. vol. iii. p. 235.

Yarrell's British Fishes, vol. ii. p. 136.

This excellent species is brought to Boston market from the mouths of the neighboring rivers, in considerable quantities, in the spring of the year, and meets with a ready sale. At first they sell for 50 cents a piece; as the season advances, for 25 cents; and at last may be bought for about 12 1-2 cents. Many of this species are also packed. In the year 1832, 100 barrels were inspected; 1833, 321; 1834, 3; 1835, 310; 1836, 527. The quantities taken in Charles river, at Watertown, for the five years preceding 1838, averaged about 6000 per annum. From 3000 to 4000 are yearly caught at Taunton. In the Merrimack river this fish was very scarce forty-five years ago, and remained so for about five years. At this time there were ten salmon to one shad. Very few were caught. Before that time they had been very abundant. It was said that 10,000 were caught at one haul. After the scarcity, they became plentiful, and continued so till about 1810, when they were scarce again for two or three years. They then became plentiful, and still continue so. They have not decreased for the last ten years. *Shad* and *alewives* go up the river during the whole of May. Their greatest run is when the apple trees are in full blossom. The *old shad* return in August; the *young*, three or four inches long, in September. These are very fond of flies. The Concord river water is said to be warmer than that of the Merrimack, and the Concord shad were caught a month earlier than those of the Merrimack above its junction with the Concord. The Concord shad have almost entirely disappeared, their ascent having been cut off by dams.

The usual weight of this species is from one to four pounds, although it sometimes attains six pounds. Color upon the top of the head and the back, bluish; the upper portion of the sides, including the opercula, cupreous; beneath silvery.

Whole body covered with large, deciduous scales, with the exception of the head, which is naked. *Eyes* large; pupils black; irides silvery; the diameter of the eye equal to the distance between the eyes. *Nostrils* nearer the anterior angle of the eye than the snout. Upper jaw notched in its centre; its lateral edges slightly crenated. Length of the head to the whole length of the body as 1 to 6; the greatest depth of the body equal to nearly two thirds the length of the head; the width across the body, from the commencement of the dorsal fin to the anal, nearly one fifth the length of the fish. Abdominal ridge serrated throughout, from the inferior angle of the operculum to the anus; the serrations more prominent back of the ventrals. At the posterior angle of the operculum, a black blotch of considerable size; in some specimens very indistinct until the scales are removed, when it is very obvious.

The Dorsal fin, which shuts into a groove, is situated on the middle of the dorsal ridge; the height of the first rays is equal to two thirds its length.

The Pectorals silvery; their length equal to about one third their height; all the rays, save the first, are branched.

The Ventrals are situated opposite the middle of the dorsal.

The Anal fin is also received into a groove; its fourth ray, which is highest, is less than one third the length of the fin.

The Caudal fin is deeply forked; its depth at the base is to the depth of the expanded extremities as 2 to 5; two membranous appendages on each side, near the centre of the fin.

The fin rays are: D. 19; P. 16; V. 9; A. 20; C. 20.

A. *menhaden*. Mitchell. *The Menhaden*. *Hardhead*,
&c. &c.

Trans. Lit. et Philosoph. Soc. v. i. 453.

This species, which is known by the names of "*Menhaden*," "*Pauhagen*," "*Hardhead*," &c. is met with in very great numbers, coming into Massachusetts Bay, about the middle of May, and leaving it in November, and is an exceedingly valuable fish.

It is taken in large quantities upon various portions of our coast, is used as *bait for other fishes*, and as *manure* ; and it is also becoming *an article of commerce*. As *mackerel bait*, it is worth from \$2 to \$4 per barrel, in proportion to the demand. At Lynn, in 1836, 1500 barrels were used as bait for other fishes, and as many more were thrown upon the land. At Provincetown, they are used only for mackerel bait. The fishermen who supply Boston market with cod fish, set their nets about the outer islands in the harbor, each night, as they come up to the city, and examine them in the morning, as they go out for the day's fishing. Large numbers are thus taken ; and such as are not used as bait, are sold to the poorer classes as food, for about 6 1-4 cents per dozen. It is also considered a very good bait for *halibut*. Being a very oily fish, it is valuable as *manure*. It is computed that a single menhaden of ordinary size, is equal, in richness, to a shovel-full of barn-yard manure. In some places they are taken for this purpose only, by trailing nets towards the shore. At Sandwich, where they are very abundant, the inhabitants strew them upon their lands by the cart-load ; and thus, for miles, immense quantities enrich the soil. From the following extract of a letter from my friend Dr. Forsyth, some idea may be formed of the numbers used. His letter is dated November 8th, 1837. "For two or three miles below me, on the Barnstable road, the stench from the decomposing fish was a great nuisance to travellers passing along the road, so much so that I feared they might be instrumental in the production of disease ; but whether they were so or not, I am not now prepared to say ; but certain it is, there have been more cases of *autumnal fever* and *dysentery* this season, in that district, than in all the rest of the town." Upon some portions of Cape Cod, *menhaden* are sold to the farmers for \$1 per thousand for manure ; they average about one pound each, and 2500 are considered a proper quantity for an acre. This species is getting likewise to be thought worthy of preservation as an article of *food*. In 1832, 300 bbls. were inspected ; in 1833, 480 ; 1834, 1008 ; 1835, 1443 ; 1836, 1488.

This fish attains the length of fourteen inches. My descrip-

tion is drawn up from a specimen eleven inches in length. Its width, at the commencement of the dorsal fin, three inches. All the upper part of the body of a greenish brown color; sides lighter, mottled with indistinct bluish ocellations; abdomen whitish, serrated; whole surface of the fish iridescent. A large black blotch just back of the upper posterior portion of the operculum. Length of the head three and a half inches. *Gill-cover* very large, all its portions more or less golden. Operculum marked with quite a number of deeply marked striæ, which commence just beneath a large green blotch, situated some distance back of the eye on a line with it, and pass obliquely backward and downward to its lower edge; sub-operculum and inter-operculum smooth; preoperculum presents an arborescent appearance of vessels upon its surface. *Eyes* moderate in size; pupils black; irides golden. Gape of the mouth very large; lower jaw shorter than the upper; the middle of the upper jaw presenting a deep emargination. Back slightly arched.

The Dorsal fin arises upon the anterior half of the body; it is nearly as long again as high; at its base is a membranous prolongation, by which it is partially covered when at rest.

The length of the Pectorals to their height is as 1 to 4; the upper four rays much longer than the remainder. Outside of the fin is an axillary plate more than two thirds the length of the fish; a broad scaly shield at the base of the pectorals covers more than an half inch of their inferior edge.

The Ventrals commence on a line opposite the origin of the dorsal fin; on each side of them is an axillary plate.

The Anal fin commences some distance back of the dorsal; its height to its length is as 1 to 3.

The Caudal fin is deeply forked; the depth of the fin at the base, when unexpanded, to the length of the outer rays, is as 1 to 3; the distance between the expanded extremities equal to the length of the outer rays.

The fin rays are: D. 19; P. 15; V. 7; A. 20; C. 27.

ORDER III.

MALACOPTERYGII SUBRACHIATI.

FAMILY I.

GADITES.

MORRHUA. Cuv.

Generic characters. *Body elongated, smooth, compressed towards the tail; back furnished with three dorsal fins; ventral fins pointed; abdominal line with two fins behind the anal aperture; the lower jaw with one barbule at the chin; branchiostegous rays 7.*

M. *Americana*. Nobis. *The American Cod.*

Whether the "*Morrhua vulgaris*," the common Cod, of European writers, is ever taken in the waters of Massachusetts, I am unable to decide. Dr. Mitchell says it is taken "in the sea near Nantucket, and beyond." Certain it is, I have never seen it in Boston market; and Mr. Newcomb, senior, the oldest fishmonger in our market, who has repeatedly been at the Banks of Newfoundland fishing, assures me, he never knew the *bank fish* to be caught in our waters. Our fish is the species which Mitchell considers the "*M. callarias*," Lin. Richardson thinks "this is probably a distinct species." From Richardson's guarded manner of speaking, I should judge he had never seen a specimen of our species. The *much larger size* of our fish, the length of the "*callarias*," according to Yarrell, being only "from twelve to twenty-four inches," which cannot be accounted for by mere difference of locality,

without dwelling upon points of minor importance, convinces me that our fish is a distinct species, for which I would propose the name of "*Americana*."

This species is taken along the whole coast of the State, throughout the year, leaving the vicinity of land in the month of February, and going off to deeper water. There are several varieties, differing in their color and markings, probably produced by difference of locality or food, which are known by the names of "*Rock Cod*," "*Shoal Cod*," &c. &c.

The cod grows to a very great size. Yarrell states, that the largest cod of which he has any record, weighed *sixty* pounds. Pennant refers to one weighing *seventy-eight* pounds. Mr. Jonathan Johnson, Jr., of Nahant, informs me he has seen taken a specimen weighing *eighty-eight* pounds; and Capt. Nathaniel Blanchard, of Lynn, tells me he has seen a cod weighing *eighty-six* pounds. Both these gentlemen are experienced fishermen, distinguished for their habits of accuracy and veracity; and I take much pleasure in here acknowledging the *great assistance* rendered me by them, in the prosecution of my task. The largest specimen of which I have ever heard, Mr. Anthony Holbrook, a fishmonger in Quincy market, informs me he saw taken in the spring of the year 1807, at New Ledge, sixty miles southeast of Portland, Me.; it weighed *one hundred and seven* pounds; and, to use his own words, "upon its head were barnacles the size of his thumb."

To Massachusetts, the cod fishery is exceedingly important, supplying our markets with an excellent food throughout the year, and giving employment to thousands. In some portions of the State, this fishery is entirely superseded by the taking of *whales*. Thus, while every town in the county of Barnstable is more or less engaged in this business, and collectively they exhibit an aggregate of 212 vessels, *but a single fishing-smack* was licensed in Duke's county, in 1836, and *not one* in the county of Nantucket; the attention of the inhabitants of the last two counties being entirely engaged in whaling. I have ascertained that in 1836, there were engaged in the cod fishery, from Gloucester, Marblehead, Provincetown, South Well-

fleet, Cohasset, Duxbury, Plymouth, Manchester, Salem and Beverly, being *ten* towns, 561 vessels, having crews of 3816 men; and that by these vessels there were taken 263,454 quintals of fish. To these may be added the towns of Newburyport, Lynn, Falmouth, Holmes Hole and Sandwich, (in which I have not been able to learn the number of vessels exclusively employed in this fishery,) which furnished, in 1836, 16,265 quintals; thus exhibiting 279,718 quintals of cod fish taken by the enterprise of the citizens of fifteen towns. When it is observed, that about 3500 of the cod fish from the Grand Bank, (which are generally much larger than those from the Straits of Belleisle,) constitute *one hundred quintals*, some conception may be formed of the immense number taken. At the usual price of these prepared fish, the above mentioned number of quintals would sell for \$839,154.

In 1837, according to the returns of the assessors of the several towns, it appears that there were taken 510,554 quintals of cod fish, which were valued at \$1,569,517. These fish were distributed among the following counties: *Essex Co.* took 159,424 quintals, valued at \$501,363; *Barnstable Co.*, 134,758 = \$392,930; *Suffolk Co.*, 127,250 = \$408,510; *Plymouth Co.*, 64,172 = \$193,664; *Norfolk Co.*, 15,950 = \$46,050; *Middlesex Co.*, 9000 = \$27,000.

Besides these *fishing vessels* which go to the *Banks* for the Cod and their bounty, a great number of *boats* are constantly employed in supplying the markets with *fresh fish*. Thus, at Duxbury, in 1836, there were ten market boats having forty men on board, which took from 38,000 to 40,000 fish. At Provincetown, there were *ten boats* thus engaged. Boston market is supplied with cod fish by about fifteen or twenty small schooners, and a large number of boats. By the kindness of Capt. Nathaniel Blanchard, of Lynn, master of one of these smacks, I am enabled to furnish the following table, by which some idea may be formed of the amount of *fresh cod fish* brought to our market. He has presented me the result of his labors with a vessel of 25 tons, and a crew of six men, for nearly five months, commencing October 24, 1836, and

terminating March 20, 1837. His account exhibits the number of fish taken, and the price obtained for the same, for each day during that period. From this minute statement I am able to ascertain that the *largest quantity* taken any one day, was 7124 pounds, December 13th, which sold for five shillings per hundred = \$59.39.

The *smallest quantity* taken any one day, was 337 pounds, January 16th, which sold for 12 shillings = \$6.67.

The *smallest receipts* were March 20th, when 359 pounds taken, sold for 10 shillings 6 pence = \$5.92.

The whole number of pounds taken during the period mentioned, was 194,125.

The entire receipts for the same, were \$3026.14.

Besides the value of the fishes themselves, in a fresh and dried state, large quantities of oil are extracted from their *livers*, which is sold for about \$15 per barrel.

The color of the cod of our market is exceedingly variable. In the same stall may frequently be seen specimens with equally obvious spots over their entire surface; or they may be much more perceptible on the sides; or they may be scarcely observed at all; and the entire fish appear of an uniform gray; or again of a beautiful bright red; and I have seen a single specimen which was of a lemon yellow.

The following description is drawn up from a specimen about 23 inches in length. Back ash colored; sides lighter; both back and sides covered with yellowish spots larger and more distinct upon the sides. Beneath, dusky white. Length of the *head* compared to the length of the body, with the exception of the tail, rather more than one third; depth over the base of the pectorals rather more than one fifth the length of the body, without the tail; depth over the anus equal to one fifth the length of the body. Top of the head darker colored than the gill-covers. The pupils of the *eye* black, irides a beautiful silvery. Diameter of the eye equal to one sixth the length of the head; the distance between the eyes nearly equal to one third the length of the head; the distance of the extremity of the *snout*, from a line on a plane with the anterior angle of the eye, equal to one third the length of the head.

Nostrils double, posterior lower and larger ; the *upper jaw* projects beyond the lower ; in the lower jaw is a single row of *teeth* ; those in the back part of the jaw, large, and incurved ; those in the fore part of the jaw much smaller ; in the upper jaw a row of large teeth in the back part, with a row of minute teeth back of them ; approaching the middle of the jaw, a triple row is observed ; at the middle of the jaw, four distinct rows are seen ; the front row uniformly large, those behind very small. A single barbule about an inch long at the chin. The *lateral line* commencing above the operculum, makes a very gradual slope upwards, and as gradual a curve downwards, until opposite the anterior third of the second dorsal fin it commences a straight course which is continued to the caudal fin ; this line is lighter colored in its whole extent than the body, it is wider and more conspicuous after assuming a straight course.

The first Dorsal arises just back of the pectorals ; the second Dorsal is much longer than the first ; the third is slightly longer than the first. All the dorsals are of a bluish color, spotted like the body.

The Pectorals are round ; their length is equal to half their height.

The Ventrals are situated in front of the pectorals, of the color of the abdomen ; the two outer rays of the ventral fins are free, the second ray is the longest.

The first Anal fin is shorter than the second dorsal ; the second anal, much shorter ; both anals the same color as the abdomen.

The depth of the Caudal fin at the extremities, to its length, as 2 to 1 ; spotted like the rest of the body.

The fin rays are : B. 7 ; D. 15-22-19 ; P. 19 ; V. 6 ; A. 22-19 ; C. 40.

M. *aeglefinus*. L. *The Haddock*.

Pennant's British Zoology, vol. iii. p. 158.

Trans. Lit. et Philosoph. Soc. vol. i. p. 370.

Strack's Plates, 26. 2.

Mc Murtrie's Cuv. ii. p. 244.

Yarrell's British Fishes, vol. ii. p. 153.

Immense shoals of this fish are found on our coast in the spring, and continue through the season until the autumn. Ten years since this species was comparatively rare at Cape Cod ; now, it is almost as common there, as in any part of our bay. It is estimated that in the *warm season*, about 12 cwt. of haddock are taken to 1 cwt. of cod fish in Massachusetts Bay ; and in the *winter*, about 12 cwt. of cod, to 1 cwt. haddock ; but as the haddock fishery is of longer duration, the quantities through the year, will average about the proportion of 3 haddock to 1 cod. Large numbers are sold in the market ; and during the entire summer it is generally eaten by the poorer classes, who are often able to obtain a fine fish weighing several pounds for one or two cents. When taken in larger quantities than they can be disposed of in the market, they are frequently strewed over the earth for manure.

The specimen before me is twenty four inches in length. Length of the head compared to the whole length of the body, exclusive of the caudal rays, as 6 to 20 inches ; depth of the body across from the anus, less than the length of the head. Color, above the lateral line, a dark grey, beneath this line, a beautiful silvery grey, with a large, and in many specimens nearly a circular patch, on each side, on a line with the middle of the pectorals, its upper portion generally extending above the lateral line, its larger portion usually beneath it. Back of the *head* very convex ; *gill-covers* much lighter colored than the top of the head and snout ; *upper jaw* projects beyond the lower ; teeth in the upper jaw longer than in the lower, and nearly vertical ; a very minute barbule at the chin ; posterior *nostril* much larger than the anterior. Longest diameter of the *eye*, more than one sixth the length of the head, pupils black, irides bluish ; the distance between the eyes equal to nearly one third the length of the head. The *lateral line* commencing at a distance above the posterior angle of the operculum, equal to the length of the head, assumes the curve of the body until on a plane with about the middle of the second dorsal fin, from which point it runs on in a straight line to the base of the caudal rays ; through its whole course, it is of a jet black color.

The first Dorsal fin commences on a line with the base of the pectorals, its length is three fifths that of the second dorsal.

The second Dorsal commences on nearly the same plane as the anus.

The third Dorsal, the same length as the first.

The Pectorals in length not quite equal to one third of their height.

The Ventrals commence in front of the pectorals; their first two rays free: the second ray, the longer.

The first Anal fin commences back of the second dorsal; the second Anal arises on a line with the third dorsal.

The Caudal fin is very slightly notched.

The dorsal, pectoral, and caudal fins are bluish; the anals the color of the abdomen; the ventrals rather lighter than the anal.

The fin rays are: D. 16-24-20; P. 21; V. 6; A. 26-21; C. 35.

M. *tomcodus*. Mitchell. *The Tom Cod*.

Trans. Lit. et Philosoph. Soc. vol. i. p. 68.

As Cuvier in his notes to the "*Regne Animal*," has introduced Mitchell's specific name, I retain it here. It is to be hoped that Valenciennes, in his continuation of the "*Histoire Naturelle des Poissons*," will assume the specific name "*polymorphus*," proposed by Mitchell himself, as being equally appropriate and more scientific.

This very common little species is taken in considerable numbers from our wharves and bridges with the hook, together with the "*Conner*," "*Flounder*," "*Sculpin*," "*Eel*," &c. &c., in the summer; and through the winter, the market is supplied from the mouths of the rivers, in the vicinity of Boston, where they are taken in dip nets. The amount of *Tom Cod* taken at Watertown alone is estimated at 2000 bushels annually; they are sent to Boston market, and readily disposed of there.

Specimens of this species are seldom obtained exceeding

twelve inches in length. The length of the head is to the length of the body, about as 1 to 6 ; the depth of the fish over the anus, exclusive of the dorsal fin, less than one sixth the length of the body. In color, this species varies exceedingly, generally it is brown, greenish, or yellowish brown, with deeper patches, spots, and blotches ; beneath, lighter. *Snout* blunt ; upper jaw projecting beyond the lower, a small barbule beneath the chin ; *teeth* in the jaws very compact, small, and sharp ; those in the upper jaw more apparent ; small teeth in the throat. Diameter of the eye equal to half the distance between the eyes ; pupils of the eye black ; irides golden. *Nostrils* double ; anterior the larger. *Fins* brown, tinged with red.

The *lateral line*, commencing above the operculum, curves gently upwards to the pectorals, and just beyond these fins commencing a straight course, terminates at the base of the caudal rays.

The first Dorsal fin commences opposite the middle of the pectorals ; its length is greater than its height. The second dorsal as long again as high. The length of the third dorsal, one fourth less than the length of the second, and less than the length of the first.

The length of the Pectorals is one fourth less than their height.

The Ventrals are situated in the front of the pectorals ; the first two rays are free at their extremities ; the second ray the longer ; the other rays are united.

The first Anal fin is more than as long again as high ; the second fin is shorter than the first.

The Caudal fin is convex.

The fin rays are : D. 13-18-19 ; P. 17 ; V. 6 ; A. 22-18 ; C. 39.

M. *Minuta*. Lin. *The Poor or Power Cod*.

Yarrell's British Fishes, vol. ii. p. 161 et fig.

Strack's Plates, 27. 1.

A single specimen only have I ever seen of this species, which was taken in Boston harbor ; it has been preserved for

several years in spirits in the cabinet of the "Boston Society of Natural History," and its colors have undoubtedly somewhat changed. Mitchell, it would seem from his silence, had never seen this species. And Richardson makes no mention of it in his "*Fauna*;" my specimen, however, agrees so well with Yarrell's description of the "*minuta*," that I cannot doubt its identity with that species.

My specimen is eight inches in length; length of the head, two inches; depth of the body across the base of the pectorals, rather less than the length of the head. The *lateral line* commences just above the posterior angle of the operculum, curves slightly over the pectorals, and a quarter of an inch back of these fins assumes a straight line, which is continued to the tail. *Snout* obtuse; a line of mucous pores along the intermaxillary bones from the tip of the snout to a line beneath the anterior angle of the eye. *Upper jaw* longer than the lower; jaws furnished with sharp teeth. A cirrus one fourth of an inch long is suspended from the chin. *Eye* half an inch in diameter, being equal to one fourth the length of the head. *Color* of the specimen above, of a reddish yellow; abdomen, of a dirty white, or rather a yellowish white covered with innumerable minute black points.

The first Dorsal fin commences just back of the origin of the pectorals; rather higher than long.

The second Dorsal, which is as long again as the first, begins and terminates on the same plane with the anal fin.

The third Dorsal, which is longer than high, is longer than the first dorsal, and shorter than the second.

The Pectorals are an inch long.

The Ventrals are fuliginous; their first ray is shorter than the second, which is the longest ray of the fin, and is separated from it or free at extremities.

The first Anal fin is directly back of the vent; longer than high. The second Anal is one third shorter than the first.

The Caudal fin is but slightly forked.

The fin rays are: D. 12-19-17; P. 17; V. 6; A. 22-17; C. 20.

MERLANGUS. CUV.

Generic characters. *The same as those of Morrhua, except that they have no barbule at the chin.*

M. *carbonarius*. Lin. *The Coal Fish.*

Pennant's British Zoology, vol. iii.

Mc Murtrie's Cuv. vol. ii. p. 245.

Yarrell's British Fishes, vol. ii. p. 169.

Fauna Boreali Americana, p. 247.

Strack's plates, 29. 1.

In Sir Edward Parry's first voyage, it is stated that this species was taken of a very small size on the west coast of Davis' straight. I am not aware that it has been noticed by any other naturalist, as inhabiting the American ocean. It is often met with in our market in considerable quantities, and, as well as the "*purpureus*," is called, by our fishermen, the "*pollack*." I have had it prepared in its *fresh state* for my own table, and found it an excellent fish. With the cod, it is salted in considerable numbers. From a specimen three feet in length, weighing thirteen pounds, obtained in Boston market in January, I have drawn up the following description. Length of the head compared to that of the body, exclusive of the tail, as 1 to 2 1-4; depth of the body over the base of the pectorals, rather less than the length of the head. All the upper part of the body and head, black; beneath the lateral line, the body of a bluish white; the abdomen lighter than the sides. The *lateral line*, which is of a beautiful silvery white color, commences just above the posterior angle of the operculum, and with the exception of a very slight inclination anterior to the space between the first and second dorsal fins, pursues a straight course to the base of the caudal fin. Scales on the head, smaller than those of the body; the lower jaw longer than the upper; the teeth in both jaws small and sharp; more numerous in the upper jaw; the lips purplish; the distance between the eyes less than one fourth the length of the head; the eyes large, prominent; the pupils blue; the irides silvery.

The first Dorsal fin commences at a distance back of the posterior angle of the operculum, equal to about one fourth the length of the head ; longer than high.

The second Dorsal has its first rays equal in their height to half its length.

The third Dorsal begins at a greater distance from the second, than the space between the first and second ; the height of the first rays of this fin, less than half the length of the fin. All the dorsal fins of a bluish black color.

The Pectorals commence on a line with the posterior angle of the operculum ; their color the same as the dorsals.

The Ventrals commence in front of the pectorals ; their depth equal to one third their height.

The first Anal fin commences on a line opposite the interval between the first and second dorsal fins, just back of the anus, and is the same color as the abdomen ; depth to its length as 3 to 8. The second anal commences on a line opposite the last dorsal, and terminates on the same plane with that fin.

The Caudal fin is large ; its width at base is to its width at the extremity as 2 to 7, being much forked.

The fin rays are : D. 13-20-20 ; P. 19 ; V. 6 ; A. 24-21 ; C. 32.

M. *purpureus*. Mitchell. *The Pollack*.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 370.

Until within a few years, the "*Merlangus purpureus*," "*pollack*," was but slightly prized ; and the fishermen had so little demand for it, that they not unfrequently gave it away from their boats. Its useful qualities are beginning to be known and valued, and in several of the interior towns of the state, it is now as readily sold as any other fish. When salted, it was formerly usual to throw it at once into *old brine*, to increase its weight, which it did at the expense of its goodness. It is ascertained that when prepared in the same way as the cod, when intended for dun fish, with proper care and good salt, this is really an excellent fish, and its value is in-

creased from nine shillings to from three to four dollars per quintal. Immense numbers of this species are found in our waters in spring and autumn. To Jeffries ledge, a fleet of 20 or 30 boats frequently go off in the fall of the year, and having fastened their craft together and thrown overboard a quantity of bait to entice the fish, capture in a single night from 30 to 40 quintals of *pollack* to a boat.

Length of the specimen described, two feet four inches. Depth of the body across from the anus, exclusive of the dorsal fin, as 1 to 4; upper part of the head and body, of a greenish brown color; sides lighter; abdomen white. *Lateral line* of a grayish color, commencing above the posterior angle of the operculum, and slightly curving over the pectorals to their extremity, pursues nearly a straight course to the middle of the caudal rays. Length of the head about equal to the greatest depth of the body; top of the head between the eyes slightly depressed; head somewhat pointed, when the jaws are closed. *Eyes* large; pupils black; irides silvery, with greenish reflections; diameter of the eye equal to half the distance between the eyes. *Lower jaw* longer than the upper; minute teeth in both jaws; gape of the mouth quite large; *mouth* within, bluish; *tongue* large, fleshy. Posterior nostril quite large. A line of mucous pores on both maxillary bones. *Gill-covers* silvery; the division between the opercle and preopercle, scarcely distinguishable at first sight; the posterior angle of the operculum obtuse. Body gradually arched to the origin of the first dorsal.

The first Dorsal fin arises opposite the middle of the pectorals, is one third longer than high, and of the same color as the back.

The second Dorsal fin is one third longer than the first; it arises back of the first, at a distance equal to less than one third the length of the first dorsal. The distance between the second and third dorsals, is to the distance between the first and second, as 3 to 1; height of the third dorsal to its length, less than 1 to 3.

The Pectorals arise on a line with the posterior angle of the

operculum, some distance beneath it; their length to their height, as 2 to 12; the color of the dorsal fins.

The Ventrals are very small, in front of the pectorals; the second and third rays longest; fins white.

The Anal fin at its base, the color of the abdomen; above, bluish; arises upon the same plane, and terminates with the second dorsal. The second anal about half the height of the first anal; a narrow white margin at its base, and, like the first, whitish at the tip.

The Caudal fin large, strong, forked; length of the outer rays equal to the distance between the extremities of the fin when expanded.

In smaller specimens, the color above is deeper; the abdomen, reddish.

In two specimens, the rays were as follows:

D. 14-22-21; P. 20; V. 6; A. 22-21; C. 40.

D. 14-19-18; P. 16; V. 6; A. 24-16; C. 36.

MERLUCIUS. Cuv.

Generic characters. *The head flattened; the body elongated; the back furnished with two dorsal fins; the first short, the second long; but one anal fin, also very long; no barbule at the chin.*

M. vulgaris. Cuv. *The Hake.*

Pennant's British Zoology, vol. iii. p. 168.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 371.

Mc Murtrie's Cuv. vol. ii. p. 245.

Yarrell's British Fishes, vol. ii. p. 177.

Strack's plates, 28. 1.

This fish is generally known by the fishermen of Massachusetts as the "*Whiting*." It is not a little singular, that while our species is really the "*European Hake*," the "*Phycis Americanus*," "*Codling*," is called with us "*old English Hake*;" and the "*Hake*" itself is called the "*Whiting*," which is a "*Merlangus*." This species is taken, not however,

in large quantities, in our bay in the summer, upon the cod fishery grounds. When perfectly fresh, it is very sweet and palatable, but so soon becomes soft, that it is kept with great difficulty, and on this account is not much valued.

The good specimen on my table was sent me by Dr. Yale. Length fifteen inches; depth of the body at the commencement of the second dorsal fin, two inches. *Body* elongated; top of the head and upper part of the body, of a dull lead color; sides and abdomen white. The *lateral line*, lighter colored than the upper part of the body, arises above the operculum, and curves slightly in its anterior half, then assumes a straight line to the tail. The scales upon the top of the head, much smaller than those upon the body of the fish. Length of the head equal to about one fourth the length of the body. Preoperculum and maxillary bones of a beautiful shining silver color; the inferior portion of the gill-covers naked; upper portion scaly; scales on the operculum reflecting a beautiful bluish tint. *Eyes* very large; pupils black; irides silvery. Diameter of the eye equal to three quarters the distance between the eyes. At the anterior angle of the eye a bony process is observed; just in front of this process are situated the *nostrils*, which are *double*, the posterior much the larger. A sensible depression on the top of the head between the eyes. Smaller furrows on other parts of the head. The lower jaw the longer; the jaws as well as the palatine bones armed with a row of prominent, sharp, recurved teeth, exterior to which, is a row much smaller. Tip or middle of the upper jaw without teeth. Outer edge of both intermaxillary bones, fuliginous. Jaws within, palatines, vomer, fuliginous. A deep furrow exists in the suborbital bones, extending from just exterior to the snout in the upper, to the posterior portion of the preoperculum; and beneath the lower, from the chin to the outer angle of the jaw.

The first Dorsal fin, which is short and of a triangular shape, arises just before the posterior angle of the operculum. The distance between the dorsals, equal to one third the length of the first dorsal. The second dorsal quite long; rays large, terminating a short distance in front of the caudal fin.

The Pectorals commence on a line beneath the posterior angle of the operculum ; the fourth ray is the longest ; length of the fin to its height as 5 to 32.

The Ventrals are yellowish ; their length to their height as 3 to 27.

The Anal fin arises on a line nearly opposite the commencement of the second dorsal fin, and terminates on the same plane with that fin.

The Caudal rays are nearly even.

The fin rays are : D. 12-38 ; P. 13 ; V. 7 ; A. 40 ; C. 30.

This species is very accurately described by Mitchell. The specimen which served for his description was of the same size as that from which the preceding account has been drawn up. The ichthyological student will perceive how much the number of fin rays differs in this species.

Thus, according to *Pennant*, they are : D. 9-40 ; P. 12 ; V. 7 ; A. 39—while *Yarrell* makes them thus : D. 10-29 ; P. 11 ; V. 7 ; A. 21 ; C. 19—and *Mitchell* : D. 12-38 ; P. 13 ; V. 7 ; A. 41 ; C. 27.

LOTA. CUV.

Generic characters. *In addition to the elongated body, with two dorsal fins and one anal fin, possessed by the species of Merlucius last described, may be added, chin with one or more barbules.*

L. *compressa*. Le Sueur. *The Eel Pout*.

Journal Academy Nat. Sciences, vol. i. p. 84.

This species was described by Le Sueur as being received from Northampton. The only specimen I have been able to see was sent me from Keene, N. H. Taken as it was in the Ashuelot river, one of the tributaries of the Connecticut, I do not hesitate to draw my description from it, rather than use that of Le Sueur. My specimen presents the following characters. Color of the back and sides a yellowish brown, varie-

gated with darker brown spots ; the gill-covers and snout much darker than the remainder of the body. Abdomen whitish. Length six inches ; length of the head one inch ; body in front of the first dorsal, cylindrical, beginning to be compressed at the sides at the extremity of the pectorals, gradually becoming more so towards the tail, so that the caudal rays appear a membranous prolongation of the body. The entire surface of the body is covered with very minute scales, looking like *cup-shaped depressions*. The lateral line arises above the operculum, and, quite conspicuous, extends in a straight course to the middle of the fleshy portion of the tail. *Head* very much compressed ; *eyes* circular ; distance between the eyes one quarter the length of the head. *Nostrils* double ; from the back of the anterior nostril, a very minute cirrus is suspended. *Upper jaw* the longer ; to the chin is attached a dark-colored cirrus, one fourth of an inch long. Jaws and palatines armed with numerous, minute, sharp teeth.

The first Dorsal fin, which is of a lighter color than the body, and variegated with black, is situated the length of the head back of the head.

The second Dorsal, arising one fourth of an inch back of the first, is continued to the tail ; upon the lower portion of this fin is a row of dark-colored spots, and its edge is margined with black.

The Pectorals are three quarters of an inch long, and dark colored at their extremities.

The Ventrals are small, color of the pectorals, terminating in a point.

The Anal fin is of the same length as the dorsal, and like it is joined to the commencement of the caudal fin.

The Caudal fin is rounded, colored, and margined like the dorsal and anal fins.

The fleshy texture of the membrane forming the several fins, prevents the rays from being counted.

BROSMIUS. CUV.

Generic characters. *Body elongated; a single dorsal fin extending the whole length of the back; one barbule at the chin; ventral fins fleshy.*

B. *vulgaris*. CUV. *The Cusk.*

Pennant's British Zoology, vol. iii. 178 et fig.

Yarrell's British Fishes, ii. 197 et fig.

Although Le Sueur's description of a "*Brosmius*," which he calls *flavescens*, from a specimen seen by him at Marblehead, published in the fifth volume of the "*Memoires du Museum d'Histoire Naturelle*," lies before me, I cannot think our common cusk a different species from the European. Our species is commonly taken upon the Middle Bank, with the hook, while fishing for deep-water cod. In the spring of the year it is not unfrequently met with in the Boston market, and does not sell as readily as the cod; in the winter season it is rare, and then sells readily for double the prices of that species. By many, as a *fresh fish* it is considered quite a delicacy; and when *salted*, is thought preferable to the Cod.

The *liver* of this species contains a large quantity of oil, which is sometimes preserved by the fishermen, who consider it an excellent application to a *burned surface*.

The following description is drawn up from a specimen twenty five inches in length, weighing between three and four pounds. *Color* of the body an uniform dark slate; head rather darker than the body. *Head*, one fifth the length of the body; width of the body across the commencement of the anal fin, exclusive of the dorsal fin, equal to one sixth the length of the specimen; width of the head across the posterior angle of the operculum, equal to two thirds its length; the scales on the head present a peculiarly corrugated appearance. *Mouth*, large. *Jaws*, filled with sharp, recurved teeth. *Upper jaw slightly longer than the lower*. A single barbule under the chin.

Diameter of the *eye* equal to one sixth the length of the head ; pupils black, irides silvery ; distance between the eyes nearly one half greater than the diameter of the eye. Extremity of the upper jaw, maxillary bones, and lower jaw, destitute of scales. The *lateral line* commences at a distance above the pectorals, equal to the length of the pectorals, and runs on in a straight line to opposite the thirty-second dorsal ray, then making a gentle curve downwards, passes on again in a straight course to the base of the caudal fin.

The Dorsal fin commences at a distance back of the pectorals, equal to about half the length of the head, and terminates just in front of the tail.

The Pectorals are about half the length of the head, round at the extremities, and as high again as long.

The Ventrals are situated just in front of the pectorals, of the same length as those fins, fleshy, and similar in color to the head.

The Anal fin, which is nine inches in length, is continued to the tail, and nearly joins it. Anus, two thirds of an inch in front of the anal fin.

The Caudal fin is round, and like the dorsal and anal fins, is margined with blue, and edged with white.

The fin rays are : D. 96 ; P. 23 ; V. 5 ; A. 73 ; C. 35.

In a specimen weighing twenty pounds, the color is brown upon the back, with yellowish sides and white abdomen. In this large specimen the *lateral line* is very indistinct ; the *ventrals* are yellow ; and the *anal* and *dorsal fins* do not extend so near the tail as in the smaller.

From an examination of a young specimen, this species might be considered as distinct from the European fish. A careful study of all its characters, however, must settle conclusively its identity. The difference between the number of the dorsal and anal rays of that species, as described in the works on ichthyology, and of the fish in our waters, arises undoubtedly from the great difficulty of counting them with accuracy, enveloped as they all are by a thick, fleshy membrane.

PHYCIS. Artedi.

Generic characters. *Body elongated ; two dorsal fins, the first short, the second long ; ventral fins with a single ray only at the base, afterward divided ; chin with one barbule.*

P. *Americanus*. Schn. *The American Hake.*

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 372.

I have no means of seeing the description of this species by Schneider ; but as Cuvier, in the notes to his "*Regne Animal*," observes that Schneider's "*Enchelyopus Americanus*," and Mitchell's "*Gadus longipes*," are the same fish, I do not hesitate to admit the priority of the specific name of the former. Deceived in my early investigations of our fishes by the plates of the "*Phycis furcatus*," a species taken in the ocean and pretty generally diffused, and the "*Gadus longipes*" of Mitchell, I had supposed the species I am about to describe, as the *Phycis*, and accordingly catalogued it as such in the first volume of the "*Boston Journal of Natural History*." At that time Mitchell's description was not at my command, to compare with the fish itself, and I was compelled to depend upon his plate. Further research has convinced me of the folly of relying upon plates alone in ichthyology, as well as in the other branches of natural history. Mitchell called it the "*Codling*." As it is generally known by our fishermen as the "*Hake*," I have prefixed that name.

Large numbers of this species are taken between the first of June and the first of September, on muddy bottoms, between Cape Ann and Boston light-house. They are generally taken in the night with the hook ; sometimes 2000 weight, varying in size from 3 to 30 pounds or more, are taken in a single night by one man, where scarcely a specimen was captured during the previous day.

From a fine specimen three feet in length, weighing nine pounds, I have made the following description : General color of the upper portion of the fish, grayish brown ; beneath,

lighter. Length of the head to the body, exclusive of the tail, as 9 to 32; depth of the body in front of the pectorals, six inches; depth across from the anus, exclusive of the dorsal fin, five inches; depth of the body beyond the termination of the dorsal and anal fins, one inch and a half. Top of the head flattened; sides somewhat compressed; *eyes* large, prominent; pupils black; irides silvery; diameter of the eye one inch and a half; distance between the eyes equal to about one fourth the length of the head; *upper jaw* projects beyond the lower; both jaws are armed with several rows of sharp, incurved teeth; *tongue* large and fleshy; a very minute barbule at the chin. The *lateral line*, which is quite obvious, commences above and just anterior to the posterior angle of the operculum, and continues nearly a straight course to the tail, being near the back throughout its whole extent.

The first Dorsal fin commences an inch back of the pectorals; its third ray is higher than the length of the fin, and is the longest ray.

The second Dorsal fin, which commences just back of the first, has its first rays longest; they gradually disappear as they approach the tail. This fin does not extend quite to the tail.

The Pectorals commence just back of the posterior angle of the operculum; their length is to their greatest depth as 5 to 20.

The Ventrals commence at a point just half way between the base of the pectorals and the angle of the lower jaw; composed of a single ray, which bifurcates about its middle; one of its divisions much larger than the other.

The Anal fin arises some distance back of the second dorsal, and terminates on the same plane with that fin; the ten or eleven first rays of this fin are the largest; they diminish as the fin approaches the extremity of the fish; this fin, as a whole, is not as high as the opposite dorsal.

The Caudal fin, in its length, from the extremity of the lateral line, is to its width at the extremity as 3 to 5.

The fin rays are: D. 10-54; P. 17; V. 1; A. 48; C. 21.

FAMILY II.

PLANI.

PLATESSA. CIV.

Generic characters. *Body rhomboidal, depressed; both eyes on the right side of the head, one above the other; a row of teeth in each jaw, with others on the pharyngeal bones; dorsal fin commencing over the upper eye, that fin and the anal fin extending nearly the whole length of the body, but neither of them joined to the tail; branchiostegous rays 6.*

P. plana. Mitchell. *The Flounder of Massachusetts.*

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 387.

This fish, which Mitchell calls the "*New York Flatfish*," is generally known by our fishermen as the "*Flounder*." It is taken in considerable quantities throughout all the warm season near the shore, from the wharves, bridges, &c., and in the winter is speared through the ice. Those taken about Deer Island are considered very fine, in the market. The largest specimen of the "*plana*," I have seen, measured in length twenty-one inches, and in width, seventeen inches.

The color is very variable; sometimes the right side, upon which are situated the eyes, is of a rusty brown; sometimes of a dark, blackish brown; at other times, of a dull slate color. Scales small. Surface of the fish, smooth. Left side colorless.

Length of the specimen before me, thirteen and a half inches; length, exclusive of the tail, ten and a half inches; length of the head, two and a half inches; depth of the fish across its middle, less than half the length of the fish, when the tail is included. *Head* covered with scales; *mouth* small; lips large and fleshy; a single row of compact, prominent, slightly incurved teeth in each jaw. The half of the jaw next to the eyes, without teeth. *Eyes* large; their longest diameter six lines; the shorter, four lines; pupils black; irides golden. Space between the eyes, two lines wide, covered with scales.

The *lateral line*, commencing at the anterior inferior angle of the under eye, curves backwards and upwards just behind the eyes, until it reaches the upper edge of the gill-covers, when it passes backwards in a straight line to the rays of the caudal fin, curving only very slightly over the pectorals. This lateral line is perfectly smooth.

The Dorsal fin commences anteriorly to the middle of the upper eye, and increasing in the height of its rays towards the middle, decreases from that point gradually towards the caudal fin, a short distance in front of which it terminates.

The Pectorals are situated just beneath the posterior angle of the operculum; their length to their height is as 1 to 4.

The Ventrals, of moderate size, arise on the same plane with the Pectorals.

At the commencement of the Anal fin, a projecting spine is situated, nearly concealed by the flesh.

The Anal fin arises back of the pectorals; its rays increase and diminish again in height like those of the dorsal fin, and the fin terminates on the same plane as the dorsal fin.

The Caudal fin, when expanded, is one third deeper than high.

The rays are: D. 65; P. 10; V. 6; A. 48; C. 17.

P. *ferruginea*. Nobis. *The Rusty Dab*.

Plate II.

This species is occasionally brought to our market, in the winter season only; it is taken in about thirty fathoms of water.

From a fine specimen caught at Cape Ann, and brought to Boston market, Dec. 30th, 1837, eighteen inches in length, and six and a half inches in its greatest depth, the following description is drawn up.

All the right side of the body is of a reddish slate-color, covered with a great number of ferruginous spots; these spots, irregular in their form and size, are scattered alike over the body and head and fins. The left side is without spots, margined at the base

of the dorsal, anal, and caudal fins with yellow ; this margin is wider and of a deeper tint at the posterior extremity of the body, and is continued on the caudal rays. Length of the head to that of the body without the caudal rays, as 1 to 4 ; depth, including fins, equal to half the entire length of the fish. *Mouth*, small ; *jaws* equal, with sharp teeth compactly set together ; *lips* tumid, making the mouth to appear somewhat like that of a "*catostomus*." *Nostrils*, double. *Eyes* situated exactly over each other, separated by a narrow bony ridge, destitute of scales ; longest diameter of the eye, nearly equal to one fourth the length of the head. The *lateral line* commences about the length of the ventral fin above the pectorals, and making a high arch over the pectorals, commences a straight course on a line opposite the twenty-fourth ray of the dorsal fin, and is continued to the extremity of the caudal rays.

The Dorsal fin commences over the anterior third of the upper eye, and increasing in the length of its rays, which are longest towards the middle of the body, and again diminish in their length, terminates about an inch anterior to the rays of the caudal fin.

The length of the Pectorals, one line more than one fourth the length of the head.

The Ventrals commence on a line with the base of the pectorals.

Anterior to the Anal fin is a strong spine which projects forwards, almost concealed by the flesh. The anal fin commences under the posterior third of the right ventral fin, and terminates on a plane with the dorsal fin ; the rays of this fin, like those of the dorsal, are longest towards the middle of the fin.

The length of the Caudal fin, one third more than its depth at the base.

The anal, dorsal, and ventral fins on the left side, white, tinged with yellow ; pectorals, on same side, white. Fins on the right side edged with white.

The fin rays are : D. 76 ; P. 10 ; V. 6 ; A. 55 ; C. 18.

The most careless observer would readily distinguish this from the "*Pleuronectes dentatus*," of Mitchell, by its small mouth, fleshy lips, closely set teeth, and arched lateral line.

It more nearly resembles the "*limanda*," Lin. than any other species; so great indeed is its similarity that a minute examination is necessary to decide its difference. In its color; the number of its fin rays; its general size; the curved lateral line; size of the mouth; ridge between the eyes, and several other minor particulars, it agrees pretty well with the description in the books of that species. But in other characters equally important, it differs. The "*limanda*" is very rough on its surface; our fish is perfectly smooth. The color of the former, an uniform pale brown; of the latter, a rusty color with spots of a deeper brown in the recent specimen; in the former, the teeth are separated; in the latter, they are very close to each other, striking when the mouth is closed, upon each other's tops; the length of the pectorals of the former, is nearly two thirds the length of the head; in the latter, it is one line only more than one fourth the length of the head. If we can judge from the figure of the "*limanda*" in "*Yarrell's British Fishes*," (and the figures generally are exceedingly accurate,) its dorsal fin commences back of the eye; in the "*ferruginea*," it commences over the anterior third of the upper eye.

P. *dentata*. Mitchell. *The Flounder of New York*.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 390.

This species known by the fishermen as the "*Sand-dab*" in the Boston market, is frequently taken in the winter season in deep water at Provincetown; and although a marketable fish, is considered inferior to the "*plana*." In the stomach of this species I found a new "*Nucula*," which has as yet been detected only in this species, and which I described and figured in the second volume of the "*Boston Journal of Natural History*." The largest individual I have seen of the "*dentata*," was twenty-one inches in length, eight and a half inches in width, and weighed three and a half pounds.

The eyes upon the right side of the body. All the right side of the body and the fins of a reddish brown color; the whole left side of the body and the fins perfectly white. Length of the *head* to the body, exclusive of the caudal fin, as 1 to 4; width of the *body* equal to half the length of the fish. *Mouth* very large; *upper jaw* slightly projecting beyond the lower; both jaws furnished with a single row of prominent, sharp teeth, separated from each other so that when the mouth is closed the teeth of one jaw shut into the space between those of the opposite jaw; the *lower jaw* has a blunt spine at the chin; *lips* small. *Eyes* placed over each other, separated by a bony ridge covered with scales similar to those over the whole head; *pupils* of the eye black, *irides* golden; longest diameter of the eye nearly equal to one third the length of the head. The *lateral line* makes a curve over the pectorals, so slight as to be scarcely observable.

The Dorsal fin commences just over the middle of the eyes, and terminates a short distance in front of the caudal rays.

The Pectorals are half the length of the head.

The Ventrals originate before the pectorals.

The Anal fin commences back of the middle of the pectorals, and terminates upon the same plane with the dorsal fin. The edges of the anal and dorsal fins on the right side fringed by the continuation of the whiteness of the left side upon them.

The fin rays are: D. 91; P. 11; V. 6; A. 70; C. 18.

HIPPGLOSSUS. CUV.

Generic characters. *Both eyes and the color on the right side, and fins similar to those of the species of the genus Platessa; the jaws and the pharynx are armed with teeth that are sharper and stronger, and the form of the body is more elongated.*

H. vulgaris. Cuv. *The Halibut.*

Pennant's British Zoology, vol. iii. p. 198.

Mc Murtrie's Cuv. vol. ii. p. 250.

Strack's plates, No. 51. 1.

Trans. Lit. et Philosoph. Soc., N. Y. p. 386.

Yarrell's British Fishes, vol. ii. 23. et fig.

This well known and excellent fish is taken in shoal water in large quantities during the summer months; at other seasons, it inhabits deeper water. Great numbers are taken upon Nantucket shoals, frequently weighing 200 pounds each. An unusual number of this species was brought to Boston market in the early part of 1837, which were all sold at considerable profit. Eighty large schooners of from 60 to 80 tons burthen, belonging to Cape Ann, were thus employed. The flesh of this species is rather coarse and dry, but is much esteemed by many; the fins are considered quite a delicacy. *Fresh*, this fish brings a higher price than the cod; large quantities also are *smoked*; and occasionally, the *dried flesh* is eaten. Mr. Newcomb, senior, informs me that about 40 years since, a *halibut* was taken upon the south shore, and brought to Boston market, which, after the head and bowels were removed, weighed 420 pounds; this specimen when perfect, undoubtedly weighed as much as 500 weight. The largest individual of which I have any certain knowledge, Mr. Anthony Holbrook, a fishmonger in Quincy market, a man of unquestionable veracity, and whose knowledge of our fishes is equal to that of any of our fishermen, tells me was taken at New Ledge, sixty miles S. E. of Portland, Me., in 1807; it weighed upwards of 600 pounds. The voracity of this species is proverbial. Pennant cites two examples of ships' sounding leads having been swallowed by them; one of these individuals was afterwards captured.

The following description I have drawn up from a specimen 4 feet and 10 inches in length, weighing 78 pounds:

Body elongated; smooth, of a dark brown color on the right side; left side without spots. Length of the head to the length

of the body as 1 to 4 ; lower jaw longer than the upper ; *jaws* furnished with two rows of strong, sharp teeth ; the inner row larger and incurved ; lips large and fleshy. Pupils of the eye black ; irides silvery ; largest diameter of the eye, two and a half inches ; shortest diameter, two inches ; distance between the eyes, two inches. *Nostrils* double ; anterior tubular, posterior larger.

The Dorsal fin commences above the anterior portion of the eye, and terminates a short distance in front of the caudal fin ; height of this fin in its middle, to the height of the rays on a line opposite the base of the pectorals, as 6 to 1.

The Pectorals arise just back of the posterior angle of the operculum ; length to height as $2\frac{1}{2}$ to 7.

The Ventrals commence on a line opposite the base of the pectorals ; the third ray is the longest.

The Anal fin arises from a line opposite the posterior portion of the pectorals, and terminates on the same plane with the dorsal. Two apertures anterior to the anal fin ; the anterior, the anus ; the posterior, the smaller, the urinary outlet.

The fin rays are : B. 7 ; D. 99 ; P. 17 ; V. 6 ; A. 73 ; C. 18.

Occasionally reversed specimens of this fish are met with ; during the last season, I saw in Boston market, a fish weighing 103 pounds, with left side colored, bearing the eyes.

RHOMBUS. CIV.

Generic characters. *Color and eyes on the left side ; teeth in the jaws and pharynx ; dorsal fin commences anterior to the upper eye ; dorsal and anal fins extending very nearly to the tail.*

R. *aquosus*. Mitchell. *The Watery Flounder*.

Trans. Lit. et Philosoph. Soc. vol. i, p. 389.

Boston Journal of Natural History, vol. i. p. 351.

This species which has not been noticed in any numbers in our waters, until within the last three or four years, is known among the fishermen as the "*Turbot*," and is sold by them as

the "English Turbot." It is oftentimes taken in fishing for mackerel, quite near the shore. Although it generally weighs but a few pounds, specimens have been caught the last season weighing twenty pounds.

A specimen purchased in the market August 6, enables me to furnish the following description :

Length of the fish, eighteen inches ; depth of the *body*, across the middle, exclusive of the fins, seven inches. Length of the *head*, three and a half inches ; depth from the origin of the dorsal fin, three inches. *Body* elongated, with small scales, perfectly smooth. Left side of a reddish gray color, with large circular, oval or oblong blotches of a darker color, surrounded with a lighter margin, and also numerous white spots, which are more obvious upon the fins. Right side white, without spots. Upper eye slightly back of the under, in a vertical line. *Eyes* moderate in size, oblong ; pupils blue black ; irides silvery ; distance between the eyes, equal to the longest diameter of the eye. Orbits, space in front of the eyes, jaws, spotted with dull bluish spots. Gape of the *mouth* large ; *jaws* equal in length, and armed with a single row of separated, quite large, sharp teeth ; the front ones much the largest. A protuberance at the chin. *Nostrils*, three lines in front of the eyes. *Gill-covers* extend back of the eyes, nearly two and a half inches.

The *lateral line* makes a high arch over the pectorals, previous to assuming its straight course to the tail ; the top of this arch, is more than one inch above the straight line.

The Dorsal fin arises over the anterior half of the orbit of the eyes, and extends to the fleshy portion of the tail ; of a lighter color than the body of the fish ; extremities of the rays free, and tipped with white ; the first rays are the shortest ; those at the middle and towards the posterior, longest ; those at the extremity, of moderate height.

The Pectorals are light colored, transversely barred with dark colored bands, having a white blotch, at their inferior base ; their length to their height as 1 to 3.

The Ventrals are very small, less than an inch high, of a light color, with darker spots; rays, deeply cleft.

The Anal fin arises just back of the ventrals, and terminates on a plane with the dorsal; similar in its form and color to the dorsal.

The Caudal fin is large and fleshy; the depth of the fleshy portion of the tail at the termination of the dorsal fin, one inch and a half; length of the caudal rays, two and a half inches; convex at the extremity; rounded when expanded.

The fin rays are as follows: D. 89; P. 12; V. 6; A. 68; C. 16.

The fish I have just described, is undoubtedly the "*Pleuronectes aquosus*," of Mitchell. No ichthyologist could mistake it for the "*Rhombus maximus*," "*Turbot*." The "*Turbot*" is *nearly round*, and *its left side is nearly covered with numerous tubercles*. Like the turbot it is said to be often taken with the trawl-net, and like that species it is a *Rhombus*. In a paper upon our fishes published in the first volume of the "*Boston Journal of Natural History*," I inadvertently remarked that, among other peculiarities, it differed from the *Turbot*, by the eyes of *that species* being on the *right side*.

In several points, this bears no slight resemblance to the "*Rhombus vulgaris*," "*Brill or Pearl*," but in the latter fish, the under jaw is the longer, and only a few of the first rays of the dorsal, extend beyond the connecting membrane.

ACHIRUS. Lacepede.

Generic characters. *Both eyes and color on the right side; the mouth distorted on the side opposite the eyes; small teeth in both jaws, but confined to the under side only, none on the same side as the eyes; form of the body oblong; dorsal and anal fins extend to the tail. No pectoral fins.*

A. *mollis*. Mitchell. *The New York Sole*.

The only specimen I have seen of this species was sent me by Dr. Yale, who writes me, it was taken Dec. 16, 1837, at Tashmou Pond, about a mile from the village of Holmes Hole. This pond is separated from the sea by a narrow beach, which is dry a portion of the year. It must be very rare at Holmes Hole, as Dr. Yale had never seen another specimen, although he had resided years there. The doctor remarks that, "it is said by common report to be very poisonous when eaten, but I do not *know* it to be such." Mitchell says, "it is delicate eating."

Entire length, six inches; length of the body, exclusive of the tail, four inches six lines; depth of the body two inches back of the snout, three inches, exclusive of the dorsal and anal fins. Form, oval. *Eyes* on the right side. Color of the right side, dark brown, marked transversely with rather indistinct irregular black bands; left side white, with circular dark brown blotches, scattered over its entire surface, also in a less marked manner upon the fins. Length of the *head* nine lines; *eyes* small, nearly circular, protuberant, and placed directly over each other; *mouth* small, and without teeth; on the left side, the mouth is scarcely discernible. *Nostrils*, large. *Scales* on the body quite small. On the lower anterior portion of the operculum, and on the back, just above the eyes, the scales are larger, and longest, at the base of the first two inches of the dorsal fin on the right side of the body. The left side of the head is covered with soft tubercles, which are continued along an inch or more of the base of the dorsal fin. The *lateral line* commences just above the operculum, and is continued in a straight course to the base of the caudal rays.

The Dorsal fin commences at the very anterior extremity of the back, which projects slightly beyond the upper jaw, and is continued to the tail, but is not united with it.

There are no Pectoral fins.

The Ventrals are situated just in front of the anal fin.

The Anal commences in front of the posterior angle of the operculum, and terminates on the same plane with the dorsal.

The Caudal fin is one third longer than the width of the base. The rays of each fin are covered by scales; and those projecting backwards, present a very beautiful serrated appearance, more strongly marked on the right side of the body, the scales of the fins on the left side being colorless. The interstices between the fin rays, are black.

The fin rays are: D. 52; V. 4; A. 40; C. 16.

Although Mitchell's description is generally correct, and might have been copied, had I not determined to describe each species, so far as possible, from recent specimens, one point requires correction. He says, "it is soft and mucous, without a spire or prickle about him." Whoever will carefully examine this species, will observe imbedded in the surrounding flesh, a strong compressed spine two thirds of a line in length, situated directly in front of the upper eye, and in a line with it, just back of the commencement of the dorsal fin, almost entirely concealed. This evidently escaped the notice of Mitchell, as in other respects, he is clear and satisfactory.

I cannot speak so well of his *figure*, for the dorsal fin, instead of commencing in front of the eyes, is represented as taking its origin some distance back of them; the anal is figured as beginning too far back; and the base of the tail appears as if distorted.

FAMILY III.

DISCOBOLI.

CYCLOPTERUS,—subgenus.

LUMPUS. Cuv.

Generic characters. *Head and body deep, thick, and short; back with an elevated ridge, the investing skin enclosing simple rays; pectoral fins uniting under the throat, and with the ventrals forming a single disk.*

L. *vulgaris*. Cuv. *The Lump sucker. Lump fish.*

Pennant's British Zoology, vol. iii. p. 117, et fig.

Strack's Plates, 11. 1.

Richardson's Fauna, iii. 260.

Trans. Lit. et Philosoph. Soc. vol. i, p. 480, et fig.

Mc Murtrie's Cuv. vol. ii p. 254.

Yarrell's British Fishes, vol. ii, p. 270, et fig.

This not uncommon species in Massachusetts Bay is frequently seen after severe storms washed upon our beaches. Occasionally, it is taken in fishing for cod, with the hook; generally, however, it is found attached to sea-weed and other floating substances near the shore. Richardson tells us that "The Greenlanders eat its flesh either cooked or dried, and its skin raw, throwing away only the tubercles;" and Dr. Neal observes "that it is purchased at Edinburgh for the table." With us, however, it is not used as an article of food. The common weight of this fish is from 3 to 4 pounds, and 6 to 12 pounds. Mr. Jonathan Johnson of Nahant sent me a specimen from that place weighing 15 pounds, being two feet in length. And Mr. Covell, fishmonger in Quincy market, presented me with another, weighing 17 pounds. The whole appearance of this fish is very forbidding, being, in young specimens, a soft, gelatinous, tremulous mass; in older specimens, it is much firmer; but in both, is covered entirely with firm, horny spines. My description is taken from a specimen 17 inches in length.

Length of the specimen, exclusive of the tail, 14 inches; length of the *head*, $4\frac{1}{2}$ inches; greatest depth, from the top of the ridge on the back to the abdomen, 8 inches. Color of all the upper part of the body, a bluish slate; beneath, yellowish. The whole surface of the fish is covered with an immense number of small stellated tubercles, studding even the rays of all the fins. Three rows of tubercles, much larger than those which are universally distributed over the fish, are observed projecting from either side. One row commencing at the upper anterior angle of the eye, curves slightly over the humeral bones, and then passes in nearly a straight line to the tail; a second row, com-

posed of much larger, wider, more prominent tubercles, commences just beneath the posterior angle of the operculum, and terminates on the same plane with the extremity of the first row ; the tubercles having diminished in size as they approached the tail, as in the first row ; a third row, composed of a small number of still larger tubercles, commences on a line with the posterior portion of the ventral disk, and terminates just in front of the anal fin, forming the outer boundary of the abdomen. The two upper rows of tubercles are of the color of the back ; the lower, colored like the abdomen ; the tubercles of all these rows are granulated upon their sides, and have a naked spine at their summit. *Head* covered with tubercles similar to those of the body ; those on the lower portion of the operculum larger than those on the other parts of the head ; diameter of the eye one inch ; irides red ; distance between the eyes, two and a half inches. *Nostrils*, tubular. *Teeth* in the jaws sharp, and compactly placed ; a greater number of rows of teeth in the upper, than in the lower jaw. Lips yellow. Just back of the top of the head, a compressed ridge rises abruptly, and as abruptly stops, after passing a short distance back ; its depth being in its middle equal to one third of its length ; and its length equal to one third the body of the fish ; this ridge is formed of distinct rays, which are very visible in the dried specimen ; the top of this ridge is covered with tubercles precisely similar to those which compose the middle row on the body ; directly back of this dorsal ridge is a small flat surface composing the space between it and the dorsal fin, whose sides are armed with strong tubercles projecting laterally. Immediately behind this space, commences the dorsal fin.

The Dorsal fin is rather longer than high.

The longest rays of the Pectorals equal to the width of the base of these fins.

The Ventrals, together with the anterior portion of the pectorals, form an oblong disk, of a bright yellow color, with six well marked lines on each side of its centre, by which it is enabled to attach itself very powerfully to foreign substances.

The Anal fin, commencing back of the beginning of the dorsal, terminates upon the same plane with it.

The Caudal fin, when not expanded, is a little longer than wide ; when expanded, one fourth wider than long.

The fin rays are : D. 11 ; P. 20 ; A. 10 ; C. 12.

The young fish is blue above, and almost entirely white beneath.

ECHENEIS. Lin.

Generic characters. *Body elongated, covered with very small scales ; a single dorsal fin placed opposite the anal ; the head very flat, covered with an oval disk formed by numerous transverse cartilaginous plates, the edges of which are directed backward ; the mouth wide, with numerous small recurved teeth on both jaws, the tongue, and the vomer.*

E. *naucrates*. Lin. *The Indian Remora.*

Sonnini's Buffon, vol. lxxii, p. 187.

Rees' Encyclopedia, vol. xiii.

Strack's plates, 45. 2. a poor figure.

I have seen a single specimen only of this species ; it was taken by a fisherman from the bottom of his smack, to which it was attached in Boston Bay.

Length of the specimen, twenty inches ; greatest depth, exclusive of the fins, two inches. *Body*, above, of a grayish slate color ; lighter upon the sides, with a dark band, which, commencing at the tip of the lower jaw, as a small black point, runs along its margin to the angle of the jaw, then assuming a band which passes to the tail, interrupted only by the eyes ; in front of the pectorals, this band is only two lines in width, at the pectorals it grows wider, is widest beneath them, and becomes gradually smaller as it approaches the posterior extremity of the fish. Top of the *head* flattened ; back, between disk and dorsal fin, nearly circular ; body, back of the dorsal, somewhat compressed. Length of the head, from the tip of the lower jaw to the posterior angle of the operculum, three

inches, five lines; depth of the head, at the posterior portion, one and a half inches; width over the same portion, two inches, two lines. *Eyes* situated just half way between the tip of the lower jaw and the extremity of the operculum, circular, between three and four lines in diameter. *Nostrils*, double, small, furnished with fleshy appendages. Branchial aperture very large; membrane 5 rayed. The lower jaw, which terminates in a point, extends six lines in front of the upper; both *jaws* crowded with numerous small teeth, resembling very much those of a card. Teeth also in the throat, and upon the palatine bones. Tongue, rough. Upon the top of the head, is an adhesive disk, four inches two lines in length, one inch one line wide, at the anterior extremity; one inch six lines at the widest part of the posterior extremity; extending from the tip of the upper jaw to the middle of the pectorals; this disk has 21 transverse plates, divided by a longitudinal median fleshy line; these plates are light colored; the entire disk is margined by a fleshy border of the same color as the back, from 1 to 4 lines wide; the under portion of the margin, surrounded by a white line.

The Dorsal fin arises just in front of the middle of the body; it is of a dark slate color; the first ray is margined with white; this edging is continued up to and upon its tip, and the tip of the other rays, gradually diminishing in its width at about the tenth ray, and becomes at last scarcely discernible. This fin is seven inches long.

The Pectorals commence on a line with the posterior, four laminae of the disk; the fins the color of the body; their length to their height as 1 to 3.

The Ventrals are just back of the pectorals; 5 rayed; their length, equal to one sixth their height.

The Anal fin arises on a plane with, and terminates upon the same plane as the dorsal; like it, it is dark colored and edged with white; its first rays, however, are higher than those of the dorsal. The anus is half an inch in front of the anal fin.

The Caudal fin is nearly even at its extremity; at its fleshy portion, anterior to the rays, it is four lines deep; at the com-

mencement of the rays, one inch ; at the extremity, when expanded, three inches. The upper and lower extremity of the tail, white.

The fin rays are : D. 29 ; P. 18 ; V. 5 ; A. 30 : C. 18.

I think this must be the "*naucrates* ;" it has but *twenty-one* plates ; but slight variations may undoubtedly occur in this, as well as in the "*remora* ;" in which, although it is described as having 18 plates, Yarrell's specimen had 17 ; and of two individuals from Cuba, lying before me, one has 18, and the other 19 plates.

E. *quatuordecimlaminatus*. Nobis. *The fourteen plated Remora.*

From the only specimen I have met with, which was kindly sent me by Dr. Yale, I am enabled to furnish the following description :

Entire length, five and a half inches. *Body* of a light reddish brown color, rather darker beneath. The *lateral line* commences at the origin of the pectorals, and making a slight curve over them to their extremities, is continued in a straight line to the tail. Length of the *head*, one inch three lines ; *gill-covers* large ; lower jaw two lines longer than the upper ; *jaws* armed with strong, sharp, recurved teeth ; teeth also in the pharynx, upon the palatine bones and the root of the tongue. Gape of the mouth moderate in size. *Eye*, one line in diameter. Top of the head entirely covered by an adhesive disk, which commences at the tip of the upper jaw, and extending on each side to the eyes, terminates on a plane with the posterior half of the pectorals, about three lines back of the posterior edge of the operculum. This disk is surrounded by a fleshy margin, which is tipped with a darker brown than the color of the body, and is divided in its middle by a longitudinal fleshy septum, on each side of which are *fourteen* distinct, strongly serated laminae.

The Dorsal fin commences about the middle of the length of the fish, nearly two inches long, two lines high. Its anterior

portion rounded, gradually diminishing in height, as it approaches the tail.

The Pectorals are somewhat rounded at the extremities ; one inch two lines high ; three lines long.

The Ventrals are narrow, five lines long ; attached to the belly by a membrane extending from the inner ray.

The Anal fin commences a short distance back of the dorsal ; of a similar form with that fin.

The Caudal fin is nearly straight at its extremity ; three lines long, six lines high ; the distance between the extremities of the fin rays, is equal to their height.

The fin rays are : D. 32 ; P. 24 ; V. 4 ; A. 30 ; C. 18.

This species is *smaller* and *lighter colored* than the "*Remora*," and differs in the *number of its laminae* in the disk. Without dwelling upon the less important distinctions, I conceive that the individual I have here described must be considered a new species.

ORDER IV.

MALACOPTERYGII APODES.

FAMILY I.

MURAENIDAE.

MURAENA. Lin.

Generic characters. *Body cylindrical, elongated, covered with a thick and smooth skin ; the scales very small ; lubricated with copious mucous secretion ; mouth with a row of teeth in each jaw, and a few on the anterior part of the vomer ; pectoral fins close to a small branchial aperture ; no ventral fins ; dorsal fin, anal fin, and caudal fin united.*

M. *Bostoniensis*. Le Sueur. *The common Eel of Massachusetts.*

Journal Academy Nat. Sciences, vol. i. p. 81.

This species which is the most common, or, I might say, the *only* eel brought to Boston market, is distinguished by its grayish brown color above ; and whitish, yellowish, or yellowish white color beneath, with a reddish tinge about the tail, which color also sometimes extends along the entire anal fin. *Le Sueur*, in the "*Journal of the Academy of Natural Sciences*," observes, "that it is sometimes brought to market," alluding to the Boston market, "but is not much valued as an article of food." He must have visited our market at a season of the year, when the species is seldom taken, and collected his information from an inexperienced fishmonger. It is taken along our whole coast, as well as in the rivers and ponds of the State. At some seasons, spring and winter, for instance, great

numbers are brought to market from the mouths of the neighboring rivers, upon the muddy bottoms of which they live, and meet with a ready sale ; so great even, is sometimes the demand in winter, that it cannot be answered. At this season it is speared ; holes having been cut through the ice for the purpose. The markets are usually supplied in spring from the rivers, where they are now taken in nets. At Medford, nets are stretched across the river, having in their middle a large bag capable of containing from fifteen to twenty bushels ; as the eels are going up or down the river, they are thus caught, and are kept alive for the supply of the market in large ditches, excavated near the river, which are supplied by the tide with water. About 3000 pounds are yearly taken at Watertown. Those taken in summer when able to procure the "*Brit*," and other fishes upon which they feed, are much larger and richer, weighing from one to nine pounds.

M. *argentea*. Le Sueur. *The Silver Eel*.

Journal Academy Nat. Sciences, vol. i. p. 83.

From Dr. Yale I have received two specimens of a "*Muraena*," which answers in all important particulars to the "*argentea*." Its general color is silvery gray, darker upon its upper portion, with a clear satiny white abdomen. The spiracles are as long as the base of the pectorals. This species is taken in pots in October, when it leaves the ponds, and seldom at other times. At Holmes Hole, it is called "*Neshaw eel*."

The following description of a specimen of each species, will show their different proportions. The specimens were each twenty-three inches in length :

M. *Bostoniensis*. From the tip of the snout to the base of the pectorals, eight inches ; body back of the head, at the commencement of the pectorals, three inches and five lines in circumference ; three inches and two lines around the *head*, at the distance of an inch and a half from the snout ; circumference of the head in front of the eyes, one inch seven lines

and a half; from the tip of the *lower jaw* to the anal fin, ten and a half inches; at the commencement of the dorsal fin, the circumference of the *body*, is three inches five lines; width of the body over the pectorals, one inch two lines; *pupil* of the eye black, iris golden; width between the eyes, four lines. *Lateral line*, indistinct.

M. argentea. From the tip of the snout to the base of the pectorals, seven and a half inches; body, back of the head, at the commencement of the pectorals, three and a half inches in circumference; three inches around the head, one and half inches from the snout; circumference of the *head* in front of the eyes, one inch four lines; from the tip of the *lower jaw* to the anal fin nine inches six lines; circumference of the *body* at the origin of the dorsal fin, three inches six lines; width of the body over the pectorals seven lines; width between the *eyes*, three lines. *Lateral line*, exceedingly distinct, appearing to divide equally the darker colored back from the beautiful lighter silvery abdomen. For the extent of six inches in front of the anal orifice, a well marked line or furrow resembling in appearance the lateral line.

FAMILY II.

ANGUILLIDAE.

AMMODYTES. Lin.

Generic characters. *Head and body elongated; gill-openings large; dorsal fin extending nearly the whole length of the back; anal fin of considerable length; dorsal and anal fins separated from the caudal fin.*

A. tobianus. Bloch. *The Sand Eel*.

Yarrell's British Fishes, vol. ii. p. 317, et fig.

Richardson in his "*Fauna Boreali-Americana*," observes, that as neither Pennant nor Mitchell has described the species of "*Ammodytes*" which they severally notice as being found

in Newfoundland and New York, it is impossible to judge whether it was the "*tobianus*" or "*lancea*," or either of them. I trust the following description, drawn up from the largest of a number of specimens sent me from Holmes Hole by Dr. Yale, will serve to settle the point with some approach to accuracy.

Length of the specimen six and a half inches. Greatest depth, half an inch; greatest width, less than three lines. *Back* of a dirty yellowish brown color. *Top* of the *head* and upper part of the opercula, slate colored; this slate or silvery blue color passes down over the opercula in a broad band to the tail, giving the fish a beautifully brilliant appearance; beneath this, the sides and abdomen are silvery. The distance from the extremity of the snout to the end of the gill-covers, is to the whole length of the fish as 1 to 5. Depth of the *body* equal to one third the length of the head. *Lower jaw* projecting beyond the upper, and terminated by a conical tip. *Gill-covers* silvery; from the anterior inferior portion of the operculum, a few slight striæ pass obliquely upwards, backwards, and downwards to the posterior margin of the operculum. *Nostrils* double, and situated half way between the eyes and the snout. *Pupil* of the eye black; iris silvery; diameter of the *eye*, one line. *Lateral line* indented and straight.

The Dorsal fin commences two lines back of the posterior angle of the gill-covers, on a line with the end of the pectorals; this fin is situated in a groove throughout its whole length, and terminates two lines from the base of the caudal fin.

The Pectorals arise under the posterior angle of the gill-covers; in length they are one third less than the head. From the base of the pectorals, a slight membrane extends along the whole lower part of the abdomen on both sides, scarcely perceptible towards the tail.

The Anal fin is just one third the length of the whole body.

The Caudal fin is forked.

The fin rays are: D. 61; P. 13; A. 28; C. 14.

This species is evidently not the "*lancea*." To mention no other character, the dorsal fin in the "*lancea*" commences

on a line with the middle of the pectoral fin. Although the "*tobianus*" attains the length of several inches more than any of the specimens before me, and differs somewhat in the number of its fin rays, yet the general characters of the foreign species and our fish coincide so nearly, that I am led to believe them to be the same.

On several portions of the coast of Great Britain, these fishes are readily eaten by the poorer classes. But as more palatable species are easily obtained with us, they are allowed to collect on the shore in large quantities, to be devoured by their numerous enemies, among which the Cuttle fish prey upon them voraciously.

Since writing the above description, I have received a fine specimen, five and a half inches in length, from Nahant, which satisfies me perfectly as to this species being the "*tobianus*." In this specimen the fin rays are as follows: D. 54; P. 13; A. 26; C. 17.

ORDER V.

LOPHOBRANCHII.

FAMILY I.

SYNGNATHIDAE.

SYNGNATHUS. Lin.

Generic characters. *Body elongated, slender, covered with a series of indurated plates arranged in parallel lines; head long; both jaws produced, united, tubular; no ventral fins.*

S. fuscus. Nobis. *The brown Pipe fish.*

I am strongly impressed with the belief that the fish noticed as the "*S. typhle*," by Mitchell, in his "*Fishes of New York*," is not that fish, but the same as the species before me, which I conceive to be a previously unnoticed species. I am indebted for my specimen to Mr. Jonathan Johnson of Nahant.

Body elongated, tapering exceedingly to the tail, covered with parallel horny plates, of an irregular dull brown color above; lighter beneath. Body, in front of the anal fin, heptangular, with three ridges on each side; above, in the middle, and below, and another in the middle of the abdomen terminating at the anus. Throughout the greater portion of the length of the dorsal fin, the body is hexangular. In front of the anus, are nineteen transverse plates; between the anus and the caudal rays, are forty plates. Length of the specimen six inches; the distance from the tip of the snout to the posterior angle of the operculum one eighth the length of the fish; the distance between the snout and the anterior angle of the eye, and that

between the same angle and the origin of the pectorals, equal. *Jaws* tubular, compressed, a slight ridge above; *lower jaw* rather the longer, passing obliquely upward to form the mouth; top of the head depressed; a furrow between the eyes; a crest on the neck; *eyes* circular, half a line in diameter. *Operculum* brown above, golden beneath; under the glass, exhibiting minute granulations, and radiating striæ.

The Dorsal fin arises two inches two lines from the tip of the snout; the height of the fin one seventh of its length, of a light brown color.

The Pectorals just back of the operculum, the color of the under part of the body; length, one half of the height.

The Anal fin is situated under the middle of the dorsal fin, and is very minute.

The Caudal fin is two lines in length, darker colored than the body, rounded at the extremity.

The fin rays are: D. 38; P. 13; A. 3; C. 9.

Since the above description was drawn up, I have received a specimen also from Dr. Yale.

S. *Peckianus*.* Nobis. *Peck's Pipe fish*.

Plate I. Fig. 2.

The specimen here described was received from Dr. Yale, who thus writes me from Holmes Hole: "The small pipe fish was taken in a pond, south side of the Island, which communicates with the sea."

Its length is six inches. Its whole surface is covered with horny striated plates; the *body* gradually tapering from the head to the tail, at which part it is nearly a point. On each side of the

* In the remarks which precede this Report, this species is called "*Peckii*." It has been suggested that this is incorrect, and that naturalists would do well to observe the following Linnean law relating to this subject: "When species are named after individuals, the rule of composition is this: if the individual is the discoverer or the describer of it, the specific name is then to be in the genitive case; but if the name is merely a compliment, without reference to either of these circumstances, the name should be rendered in an adjective form, with the termination, *anus, a, um*."

Lindley's Introduction to Botany, sec. ed. p. 458.

Agreeably to this suggestion, I have changed the name as above.

anterior portion of the body, are three ridges, and one passes from the neck through the middle of the abdomen to the vent; this ridge upon the abdomen does not exist back of the vent. In front of the posterior extremity of the dorsal fin, the body is hexangular; back of this fin, quadrangular. Color of the specimen very similar to that of the preceding species. The divisions of the abdominal plates marked on their outer edges by lines of a darker color; these are very obvious upon the plates of the posterior portion of the body; much less distinct upon the plates in front of the dorsal fin. Length of the *head*, from the extremity of the snout to the posterior angle of the operculum, nearly six lines; a depression between the eyes; and a ridge upon the occiput, which is continued on to the neck. Operculum pectinated; or, appearing to the eye of a conchologist, of the form of a Pinna; small at the anterior inferior portion; quite broad at the posterior, rounded beneath and behind, and covered with striæ radiating from its circumference; the upper part of the operculum of a dark brown color; beneath white; its anterior portion marked by an oblique vitta passing backwards and downwards from the posterior inferior angle of the eye. *Jaws* tubular; upper portion fuliginous; beneath, white. Greatest depth of the jaws, equal to about one third the greatest depth of the head. *Mouth* opens obliquely; lower jaw slightly projecting; the depth of the anterior portion of the body at its middle, to the middle of the posterior portion, as 3 to 1.

The Dorsal fin commences at two-sixths the whole length of the fish, with the anal aperture beneath its middle; fin one line longer than the head; length of the last rays to the length of the fin, as 2 to 9; length of the rays rather less than the greatest depth of the body. Color of this fin a light brown, with black vertical bands.

No Anal fin can be perceived.

The only description I have met with, answering at all to the species before me, is that drawn up by Delaroche, in the 13th vol. of the "*Annales du Museum*," accompanied by a beautiful figure, under the name of "*Syngnathus Rondeletii*,"

among the fishes of Ivica. In his description he says, "La nageoire anale est tres petite, et on ne la découvre qu'en la recherchant attentivement." Cuvier, in the notes to his "*Regne Animal*" includes this species among those in which the *anal is wanting*. Yarrell, in his "*British Fishes*," says "*the anal fin is minute*," and considers this species and the "*typhle*" synonymous. The "*Rondeletii*" differs in several prominent points from the fish I have above described. It has no ridge upon the head, which is flattened; the depth of its jaws are nearly equal to the depth of its head; its dorsal fin commences on a line opposite to the anus. In our species, a ridge exists upon the occiput; the depth of the jaws does not exceed in any portion one third the depth of the head; the anal aperture is opposite the middle of the dorsal fin.

Among the earliest cultivators of Ichthyology in our country, no name is more prominent than that of William Dandridge Peck. So early as the year 1794, while residing at the town of Kittery in Maine, he wrote a clear and accurate "description of four remarkable fishes, taken near the Piscataqua in New Hampshire." This paper was published in 1804, in the 2d part of the 2d volume of the "*Memoirs of the American Academy of Arts and Sciences*," accompanied with very good figures, when the early period of our country is considered. The manuscript of his Ichthyological Lectures also, afterwards delivered by him at Harvard University as Professor of Natural History, and kindly loaned me to examine by my friend, Thaddeus Wm. Harris, M. D., Librarian to the University, exhibit no inconsiderable degree of research. As the species described and first published by him as new, have, *three of them at least*, been described by other naturalists under other specific names, I feel that I am performing an appropriate duty, in connecting the name of our deceased countryman, whose merits have been unjustifiably overlooked, with one of a class of animals, whose history he so successfully endeavored to elucidate.

June 25th, 1839. By the kindness of my friend Samuel Cabot, Jr., I have received a living male specimen of this spe-

cies. It was taken at the swimming school in this city; and soon after its capture, numerous ova contained in its false pouches were hatched; so that when I came in possession of it, two days after it was caught, it was surrounded by one hundred and fifty young, about half an inch long; nearly colorless, with several narrow transverse black bands. From this specimen I am enabled to give the natural appearances more correctly than could be done from a preserved fish. This specimen is 7 1-2 inches in length; its general color is an olive brown with transverse darker colored blotches or bars, thirteen of which are seen in front of the dorsal fin. The posterior portion of the *body* is darker colored than the anterior. The under surface of the body anterior to the vent, is of a beautiful golden yellow; the portion back of the vent, for about two inches, is nearly white; this portion is much wider than the rest of the body, and presents two membranous flaps, which approach each other at the median line, thus forming pouches, or a false belly, in which are contained the ova of the female; the under surface of the posterior portion of the body, of the same color as the upper. The upper portion of the operculum olive colored; the lower portion, golden yellow. Color of the snout brown, having a darker line running through its centre from the eye to the mouth. The *eyes* are prominent and very moveable in their orbits; the pupils black; the irides golden.

The Dorsal fin has 45 rays.

The Pectorals are lighter colored than the body.

The Caudal fin is black, and rounded at its extremity.

The motions of this species, which is the only "Syngnathus" I have seen alive, are exceedingly rapid, resembling the gyrations of the "Colubers."

At the moment these pages are printed, I am enabled to examine several living specimens, all of which have been taken at the same locality with that last referred to. They have each, either their pouches crowded with ova, or are in the act of pretruding the young. And the accurate eye of my friend Dr. Wyman has detected, and he has pointed out to me, an exceedingly minute anal fin, which is scarcely discernible without the aid of a glass.

HIPPOCAMPUS. CUV.

Generic characters. *The jaws united and tubular, like those of the Syngnathi; mouth placed at the end; body compressed, short, and deep; the whole length of the body and tail divided by longitudinal and transverse ridges, with tubercular points at the angles of intersection; both sexes have pectoral and dorsal fins; females only have an anal fin; neither sex has ventral or caudal fins.*

H. *brevirostris*. Cuv. *The short-nosed Sea-horse.*

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 475.

Yarrell's British Fishes, vol. ii. p. 342, et fig.

A single line is devoted to the description of this species by Mitchell in his "*Fishes of New York.*" The only native specimen I have seen, was received in a dried state from my friend Dr. Yale, who found it on the shore at Holmes Hole. He says he "never knew one to be taken alive, yet they are frequently found on the shore." From this female specimen, I have drawn up the following description:

Color, yellowish brown; entire length five inches. Length of the *head*, one inch; *snout*, three lines long; diameter of the *eye*, half a line. Operculum covered with striæ radiating from the anterior part; a short spine, at the base of the snout in front of the eye; directly above each eye, a larger spine; at the posterior angle of the eye, a very short spine; beneath the eye, on the neck, two small spines. *Body* heptangular; on each side, three rows of prominent spines; on the under side, a single row. Tail quadrangular, gradually tapering towards the extremity. The body is divided into eleven segments, bounded by horny projections; greatest width of the body, seven lines. At the origin of the tail, the body presents a slight projection, for the length of three segments, upon which is situated the dorsal fin. Tail divided into thirty-six segments; at the base, two lines in width; at the extremity a mere point.

The Dorsal fin has twenty rays.

The Pectorals, directly back of the operculum, contain fourteen rays.

The Anal fin with about four rays ; the exact number difficult to be ascertained, on account of the dry state of the specimen.

This specimen is a *female*, as is proved by its having an anal fin, which Yarrell says is not found in the male ; and from the size of the trunk.

ORDER VI.

PLECTOGNATHI.

FAMILY I.

GYMNODONTES.

TETRAODON. Lin.

Generic characters. *Both jaws divided in the middle by a suture, producing the appearance of four teeth in front, two above and two below. The skin over part of the body, armed with numerous short spines. The branchial orifice small.*

T. turgidus. Mitchell. *The Swell Fish. Puffer.*

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 473, et fig.

This very curious fish, which receives its name from its power of inflating itself to a surprising degree with air, was first described by Mitchell. His description of the fish itself is rather indefinite, and his figure is not scientifically accurate. He says: "Length about 12 or 14 inches; depth less than two inches. and breadth about two inches; but the belly is loose and flabby; and it may be distended to a large size, apparently at the will of the fish." "With yellowish variegated back, white, rough belly, and a remarkable propensity to distend the abdominal sac with air, when he is out of water." The figure accompanying this description represents the species as having the back rough from just back of the eyes to the caudal fin; and the space between the eyes and the extremity of the snout, smooth. Of the two specimens I have had an opportunity of examining, one was eight inches in length; the other, nine inches. The former was taken in Boston harbor. From the

latter, sent me by Dr. Yale, from Holmes Hole, I would offer the following description :

All the upper part of the body yellowish white, with an immense number of minute black dots. Abdomen white. Several undefined black blotches on the back, which, as they approach the belly, assume the appearance of bars, six to eight of which are noticeable,—two in front of the pectorals, and the last at the base of the caudal fin : these bars vary, in their extent upon the abdomen, from two to five lines. The whole surface of the body, save the space between the dorsal and caudal fins, and the anal and caudal fins, roughened by innumerable small spines. Length of the fish, nine inches. Greatest depth, two inches. Width across the back, over the pectorals, two and a half inches. Distance from the snout to the anterior angle of the eye, one inch and two lines ; distance between the eyes half an inch. Greatest circumference of the specimen, when inflated, thirteen and a half inches.

The fin rays are : D. 6 ; P. 15 ; A. 6 ; C. 7.

Dr. Yale informs me that this fish is frequently taken when fishing for other species.

ORTHAGORISCUS. Schn.

Generic characters. *Jaws undivided, forming a cutting edge ; body compressed, deep for its length, short, truncated, without spines ; tail short, and very high vertically ; rays of the dorsal and anal fins long and pointed, both united to the caudal fin at the base.*

O. *mola*. Lin. *The short Sun Fish.*

Plate III. Fig. 1.

Turton's Linnæus, vol. i. p. 891.

Shaw's Zoology, vol. v. pt. 2d, p. 438 et fig.

Pennant's British Zoology, vol. iii. p. 115, fig. 54.

Trans. Lit. et Philosoph. Soc. N. Y. p. 471.

Strack's plates, No. 13. 4.

Mc Murtrie's Cuv. vol. ii. p. 272.

Yarrell's British Fishes, vol. ii. p. 350 et fig.

This is not a common fish in Massachusetts Bay. Occasionally, two or three years pass in succession without a single specimen being met with; at others, several may be taken. Its motions are very sluggish, and it swims near the surface of the ocean. On account of the great elasticity of its flesh, it is captured with great difficulty; it is generally gaffed at or near the branchial aperture. Its flesh is sometimes used for balls. Its *liver* is very oily, furnishing two or more quarts of oil, which is used by the fishermen to grease their masts with; and is also by many of them considered a valuable application in cases of sprains and bruises. To the kind attentions of Capt. Blanchard, I am indebted for a fine male specimen of this species, which he harpooned in Boston Bay, early in July. It presents the following appearances:

The body is oval; its whole surface a fine, unyielding, granulated cuticle, covered with a thick adhesive mucus; back, dark gray. Abdomen nearly white; the right side of the body rather darker than the left; both sides of a dirty white color, with silvery reflections. Length 54 inches; depth across, from the middle of the pectorals, two and a half feet; from the top of the dorsal to the extremity of the anal fin, six and a half feet. Weight about 200 pounds. Length of the head, from the tip of the snout to the base of the pectoral fin, 17 inches; flattened over the snout, which is obtuse, and projecting about an inch in front of the upper jaw. *Eyes* rather large, convex, very moveable in their orbits; pupils black; irides a dark brown, encircled within by a silvery ring; larger diameter of the eyes, $2\frac{1}{2}$ inches; smaller diameter, 2 inches. *Nostrils* double, just in front of the eyes. *Mouth* small. *Jaws* armed with a broad bony plate, sharp at the edges. Upon the top of the head, an arched ridge commences on a line with the anterior angle of the eyes, and is continued to a line above the origin of the pectorals, then a straight line is continued to the dorsal fin. The sides of the head project out from the body quite prominently over the eyes to the branchial aperture. Operculum directly in front of the pectorals, three inches in its greatest diameter.

The Dorsal and Anal fins are triangular, situated at the upper and lower posterior extremity of the fish. Length of the dorsal, 13 inches; length of the anal, 12 inches. Height of the dorsal, 21 inches; height of the anal, 21 inches.

The Caudal fin borders the extremity of the body, being connected with both the dorsal and anal fins; its general color is similar to that of the inferior portion of the sides; its outer edge is flesh colored. It is scalloped or divided into digitations, about 8 in number, of which the upper are smaller, and the sixth the largest. A broad, nearly black band commences at the origin of the dorsal fin, and, running along its base, is continued in front of the caudal and anal fins to the anus; this band is lighter colored along the base of the anal, and here it is also narrower, being about the same depth as at the dorsal; but along the base of the caudal it is considerably deeper, even equal to the least height of this fin.

The Pectorals are in height 7 inches; length 4 inches; greatest width $6\frac{1}{2}$ inches.

The anus is large and corrugated, situated two inches in front of the anal fin. Directly in front of the anus commences a very obvious carina, which is continued until opposite the origin of the pectorals. The very dense texture of the fins renders it almost impossible to determine with accuracy the number of their rays. As nearly as I have been able to distinguish them, they are as follows:

D. 13; P. 13; A. 15; C. 9.

Upon the exterior of this species, were attached several parasites; at the base of, or near to, the fins, a large number of the *Pennella sagitta* was found imbedded, with their pinnated extremities projecting like tentaculæ; and to them, were firmly fixed specimens of the *cineras vittata*. One beautiful specimen of the "*Tristoma coccineum*," very accurately figured by Yarrell, as being taken from this species, was found firmly attached to the posterior extremity of the fish. Closely attached to the branchiæ were a dozen or more specimens of the "*Cecrops Latreilli*." The thickness of the skin, where cut into, varied from 2 to 3 inches. The stomach and bowels contained no injesta;

but their inner coat was lined with a large quantity of very viscid mucus, in which was observed a large number of *taeniæ*. The *muscular coat of the intestines*, exceedingly thick; intestines 14 feet in length. The *liver*, was of a bright yellow color, weighing about 8 or 10 pounds, and exceedingly oily. Numbers of "*Cysticerci*" were imbedded in its substance. The edges of the branchiæ, and also their membrane, as well as the inner membrane of the operculum, were roughened like the cuticle.

A second specimen having been taken and carried into Nahant, during the last season, my friend Dr. Wyman visited it at my request, and besides furnishing the following notes, has very kindly enriched my account of this species, by the accompanying drawing:

"Length, 54 inches; diameter of the operculum, 3 inches; of the eye, 2 inches; greatest breadth of the fish, 30 inches; pectoral fins, 8 inches high, 6 long, composed of 10 rays; anal fin, 18 inches high, 10 long, composed of 18 rays; 9 scallops to the tail, 6 inches in their broadest part."

I am aware that the ichthyologist will think that the above description does not much coincide with Yarrell's account of the "*mola*." Still less does my figure agree with his; it will be remembered, however, that his plate was taken from a "preserved specimen," only fourteen inches long; and that his description is drawn up from the same specimen. From Pennant's description, I should judge he had never seen the fish. The description in Turton's Linnæus agrees pretty well with my specimen in all its important points. It will also be observed that Yarrell remarks, that "there is reason to believe this fish alters in appearance as it increases in age. In a much larger example, the skin was of an uniform dirty pale brown; the texture hard, rough, coarse and thick."

FAMILY II.

SCLERODERMI.

MONOCANTHUS. CUV.

Generic characters. *Very small scales, covered with stiff and thickly set asperities, like the pile on velvet; extremity of the pelvis salient and spinous as in the true Balistes; a single large serrated spine in the first dorsal, or at least the second one is almost imperceptible.*

M. *Massachusettsensis*. Nobis. *The Massachusetts File Fish.*

The only specimen I have seen was sent me by Dr. Yale, as having been found in Massachusetts Bay.

Its entire length is four inches; depth across, from the base of the dorsal spine, two inches; depth at the base of the tail, three lines. *Body* oblong, very much compressed; surface granulated, and exhibiting numerous minute white cilia suspended from its sides. Color, a yellowish brown, variegated over its entire extent with brownish markings and blotches, which are less obvious beneath. Length of the *head*, one inch; *jaws* of equal length; *teeth* stout. *Eyes* circular, one fourth of an inch in diameter; above, and just back of the eye, a strong, granulated, curved spine, half an inch long, is situated, with small sharp spines upon its posterior lateral edges, pointing downwards and backwards.

The Dorsal fin commences three quarters of an inch back of the spine; composed of colorless rays, roughened at their bases. The pectorals also, are colorless, and rounded when expanded.

The Pelvic bone projects, is quite moveable, and is connected by a dewlap to the abdomen.

The Anal fin is situated just back of the dorsal; the base of its rays are granulated like those of the dorsal; and it is of the same form as that fin.

The Caudal fin is darker colored than the other fins.

The fin rays are: D. 34; P. 12; A. 34; C.

ALUTERES. CUV.

Generic characters. *An elongated body covered with small, and scarcely visible granules; a single spine is the first dorsal; the chief character is in the pelvis, which is completely hidden under the skin, and is without that spinous projection observed in the other Balistes.*

A. *monoceros?* Bloch. *The Unicorn File Fish.*

Shaw's Zoology, vol. v. pl. II. p. 399, et fig.

To Dr. Yale I am indebted for the specimen before me; I have met with no other individual of this species.

Length, three inches; depth across, from the base of the dorsal spine, half an inch; depth at the base of the tail, one line. Color, a light brown, mottled by a darker brown, which is deepest above; neck, silvery. Surface of the fish, almost smooth to the touch; but presenting a granulated appearance under the glass. Length of the *head*, half an inch, gradually arching from the tip of the snout to the spine; *lower jaw* slightly projecting; *teeth* moderate in size. *Eye* circular; diameter of the eye, less than a line. Just over the posterior margin of the orbit of the eye, a slender, roughened spine, one fourth of an inch high.

The Dorsal fin arises half an inch back of the spine; composed of delicate, transparent, colorless rays.

The Pectorals arise on a line with the dorsal spine.

The Anal fin formed like the dorsal, arises on a line with, and terminates just back of that fin.

The Caudal fin, is dark brown; the upper and lower rays the shortest; the middle are the longest; and to the former, in length, as 6 to 1.

The fin rays are: D. 34; P. 10; A. 34; C. 12.

OSTRACION. Lin.

Generic characters. *Head and body covered with regular bony plates soldered in such a manner as to form a sort of inflexible shield, which invests them so that the only movable parts are the tail, fins, mouth, and a sort of small lip with which the edge of their gills is furnished, all passing through holes in this coat of mail. Jaws armed with ten or twelve conical teeth. A single dorsal and ventral fin.*

O. *Yalei*. Nobis. *Yale's Trunk Fish.*

Journal of the Boston Soc of Nat. Hist. vol. i. p. 353, et fig.

The only specimen which has been found of this species upon our coast, was discovered alive by Dr. Yale in 1833, among the sea-weed on the beach at Martha's Vineyard, and presented by him to the Boston Society of Natural History. In 1836, I read a description of this fish to the Society above mentioned, associating with it the name of the gentleman by whom it was discovered, as a deserved respect due him by the Society, for his frequent donations to their cabinet, and his zeal for natural science. My sense of personal obligation to him may, in some slight measure be conceived of from the numerous references made to his kind attentions throughout the pages of this Report.

The description from the "*Society's Journal*," I extract as follows :

"*Body* triangular ; all the upper portion, of a light lurid appearance, covered with hexagonal plates, each containing six raised lines ; two subcaudal spines, short and somewhat incurved ; back of the dorsal fin, a large isolated plate three quarters of an inch in length, composed of portions of the several plates, separated from the rest of the horny cuticle by a continuation of the ligamentary substance in which is imbedded the fin. Form of the *body*, very similar to the *bicandalis* ; the entire surface, as far back as the dorsal and ventral fins, is covered with hexagonal divisions or plates ; these are very large back of the eyes and ventral fins, and include an im-

mense number of small granulations, which are subdivided by six elevated lines of similar tubercles ; in front of the eyes and pectoral fins, these plates are smaller and less distinct ; the body beneath, white and covered with similar scales ; from the angle of the eye to the ligamentary substance at the base of the tail, are included ten plates in a direct line ; from the highest point of the back to the belly, nine similar rows of plates ; behind the dorsal fin is a surface of ligamentary substance, three inches in length, of a darker color than the rest of the surface, extending to the caudal fin, and containing, just back of the dorsal fin, one isolated plate. Subcaudal spines short, stout, smooth, and a little incurved. *Mouth* large, prominent, armed with large, strong teeth ; *eyes* large, and distant an inch and a half from the mouth ; *nostrils*, less than a quarter of an inch in front of the eyes.

The fin rays are: D. 10 ; P. 12 ; A. 10 ; C. 10.

The length of this specimen, in its present dried state, is fourteen inches. From the contracted and wrinkled appearance of the ligamentary portion at the base of the tail, it must vary considerably from the size of the living fish.

From observing the plates alone of the "*bicaudalis*," this might be mistaken by a careless observer for that species ; but a careful examination of both the figures and the descriptions, shows them to be distinct.

The number of the fin rays of the two species do not vary ; but the comparatively plane and immaculate surface of the one, corresponds but little with the very elevated striæ and numerous spots which cover the exterior of the other.

CHONDROPTERYGII.

ORDER I.

CHONDROPTERYGII BRANCHIIS LIBERIS.

FAMILY.

STURIONIDÆ.

ACIPENSER. Lin.

Generic characters. *Body elongated and angular, defended by indurated plates and spines, arranged in longitudinal rows; snout pointed, conical; mouth, placed on the under surface of the head, tubular, and without teeth.*

A. *oxyrinchus*. Mitchell. *The Sharp-nosed Sturgeon.*

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 462.

Trans. of Amer. Philos. Soc. new series, vol. i. p. 394.

In May 1838, I received of Mr. Freeman, fishmonger in Quincy market, a specimen of a *sturgeon*, which I suppose to be the "*oxyrinchus*," Mitchell; afterwards more minutely described by Le Sueur. This fish was taken in Charles river at Watertown, and measured 2 feet and 3 inches in length. All the upper part of the *body*, of a grayish brown color; inferior portion of the sides, silvery; beneath, white. Whole upper portion of the *head*, bony; irregularly marked upon its surface; five longitudinal rows of flattened plates, of the same structure as the covering of the head, but of a lighter color. The largest plates form the dorsal ridge; they are compressed at their sides, and terminate above, in strong sharp spines, which are

turned backwards; radiated lines are indistinctly seen running from the centre of these scales to their circumference; this row is composed of twelve plates; the first are the largest; that at the commencement of the dorsal fin, by far the smallest; between the dorsal and caudal fins, are situated 4 plates; two quite small, just back of the dorsal, forming a pair; next to these, a much larger one; and lastly, an elongated one at the commencement of the caudal fin. A second row of scales commences just back of the operculum, situated where the lateral line is usually observed, and is continued to the base of the tail; these plates, 28 in number, are placed obliquely; they are narrowed to a point at their extremities, widened in their centres, and like the former are crowned by a spine, from the base of which radii diverge; the plates at the posterior extremity of the body, much the smaller. Beneath this row commences just back of the ventrals a third row of plates, larger than those of the last row, eight in number, placed vertically.

The whole surface of the body not occupied by the plates, granulated throughout. *Head* flattened above, slightly depressed between the eyes; the back part of the head terminates in a pointed plate. *Snout*, blunted. *Eyes*, small; pupils, black; irides, yellow; diameter of the eye, equal to one fifth the distance between the eyes. *Nostrils* double, situated directly in front of the eyes, the inferior much the larger. The operculum consists of a single large plate with rays diverging from its centre. *Mouth* without teeth, situated on the under surface of the head, half as wide as long, capable of great protrusion; half way between the mouth and the extremity of the snout, are situated four cirrhi placed on a line across, nearly as long as the mouth.

The Dorsal fin is situated at the posterior extremity of the body; the first rays are higher than the length of the fin.

The Pectorals arise from a strong, triangular plate; the first ray is very large and strong; the seventh and eighth rays the longest; width of the fins at their base, less than half of their length.

The Ventrals are placed far back, width at their base, equal to two thirds of their height.

The length of the Anal fin is equal to half of its height ; the last rays equal in height to one third the height of the longest rays.

The Caudal fin is forked ; its upper lobe nearly double the length of the lower ; the membranous structure of this fin renders it extremely difficult to count the number of its rays with accuracy.

The specimen I have described is evidently a young fish. My friend, Thomas A. Greene, Esq. of New Bedford, writes me from that place under date of May 20th, 1838 : "On visiting the market a few mornings since, I saw two huge sturgeons more than six feet long ; they were taken in a seine the day before."

I learn from the fishermen that sturgeons are sometimes taken in our Bay, eight or ten feet in length, weighing as much as 300 pounds, and that their flesh is eaten by them, and considered very palatable. Mitchell says, it "grows seldom to a greater length than five feet ;" while Le Sueur observes that the largest specimen he had seen, was between three and four feet long.

ORDER II.

CHONDROPTERYGII BRANCHIIS FIXIS.

FAMILY I. SELACHII.

CARCHARIAS. CUV.

Generic characters. *Jaws and head depressed; nostrils pierced in front; teeth pointed and cutting, often serrated at the edges; first dorsal fin large and placed behind the pectorals and before the ventra's; pectoral fins large.*

C. *vulpes*. Lin. *The Fox Shark. Thresher.*

Turton's Linnæus, vol. i. p. 918.

Pennant's British Zoology, vol. iii. p. 97 et fig.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 482.

Mc Murtrie's Cuv. vol. ii. p. 285.

Yarrell's British Fishes, vol. ii. p. 379 et fig.

This species, which sometimes weighs 200 pounds, is called by the fishermen "*Thresher*," and "*Swingle tail*," from the motions of its tail, which is often used with great force in defence. It is met with in our waters in summer, not often however, pursuing *mackerel* and *menhaden*, upon which it feeds. Generally it is taken in nets with other fish; when taken with the hook, it is secured with much difficulty on account of the constant and powerful threshing of its tail.

On the 28th of July 1838, I was fortunate enough to see a very fine male* specimen of this shark, which was taken in

* Both Pennant's and Yarrell's plates are evidently taken from female specimens.

the vicinity of Nahant the previous day, which enables me to furnish the following description: Total length twelve feet; circumference of the body, at the origin of the dorsal fin, four feet; length of the tail, from its origin to its extremity, five feet six inches; the distance from the tip of snout to the origin of the dorsal fin, measuring over the curve of the back, two feet and a half; depth of the body, back of the first dorsal, about fifteen inches. Color of all the upper part of the body, together with the fins, a dark bluish lead; beneath, white, with light bluish blotches upon the outer edges of the abdomen. Surface of the skin smooth if the hand is passed towards the tail; rough, if it be reversed.

Length of the *head* thirteen inches from the tip of the snout to the first branchial aperture. Occiput slightly convex, an arch upon the back, opposite the branchial apertures. *Eyes* situated vertically, very moveable in their sockets, their longest diameter one and three quarter inches; pupils blue black, being a longitudinal fissure, edged with golden. *Snout* blunted, five inches from the mouth to its tip. Gape of the *mouth* six inches in extent, three rows of teeth in each jaw, smooth on their edges, widely separated from each other; the first two rows nearly perpendicular, back row recurved; teeth in the upper jaw, the larger; in the lower jaw, straighter. Five branchial apertures placed vertically; the first, smallest, just before the pectorals.

The first Dorsal fin is triangular, eleven and a quarter inches long, twelve and a quarter inches high.

The second Dorsal is eight inches in front of the tail, and twenty inches from the first dorsal; three and a half inches long; three quarters of an inch wide.

The Pectorals are twenty inches high, eleven inches long, falciform; at the posterior extremity of the fin is a small digitation.

The Ventrals are five and a half inches back of the dorsal fin; eleven inches long; nine inches high. Anus large, between the ventrals. The claspers are sixteen and a half inches long from the anus; depth at their base, one and a quarter inch.

The Anal fin is situated about four inches in front of the tail, four inches long, one inch high.

The Caudal fin is composed of two lobes; the lower lobe is seven inches long, nine high; the upper, falciform, its greatest depth eleven inches, six and a half inches in its middle, two and a half inches at the extremity; greatest depth across both lobes, sixteen and a half inches.

The body of the fish is terminated on the back, by a semi-circular ridge; a depression of two and three quarter inches in extent, is seen just back of this, between it, and the tail, at the origin of which is quite a concavity. At the termination of this depression, the caudal fin commences, exhibiting at its origin, a very abrupt prominence.

The ichthyologist will observe that I have made no mention of a triangular process which is found upon the inferior portions of the upper lobe of the tail, within a few inches of its extremity; the tip of the tail of my specimen had been removed, probably in some encounter; its upper edge had healed over, but a portion of a denuded vertebra was left exposed, and the lower edge of the wound was not healed. So that the tail was probably several inches longer previous to the injury.

In the ninth volume of the "*Medical Repository*," published in New York in 1805, is a very imperfect description, together with a rude figure of this species taken near Long Island. Dr. Mitchell when he wrote that description, supposed it to be a new species. He was afterward satisfied however that it was not a new fish, as we may fairly infer, by his extracting a portion of this description, into his paper upon the "Fishes of New York," and placing it under the head of "*Squalus vulpes*," without making any reference to his former remark "that it is evidently a different species from that figured and noticed by Pennant in his *British Zoology*."

C. *obscurus*. Le Sueur. *The dusky Shark*.

Journal Academy Nat. Sciences, vol. i. p. 223, et fig.

In a paper by Le Sueur upon "Several new species of North American Fishes," in the first volume of the "Journal of the Academy of Natural Sciences," a fish is described under the name of "*Squalus obscurus*," which I have little doubt he found in the waters of our state. Be that as it may, although he does not mention its locality, he furnishes us with a good figure of the species, and also of the upper and lower teeth. The only two species of shark with which this could be confounded upon our coast, even by a careless observer, are the "*Carcharias vulpes*"—*Fox Shark*, and "*Lamna punctata*"—*Mackerel Shark*; in both these species, the edges of the teeth are smooth. In the "*obscurus*" however, they are deeply serrated. In the winter of 1837, my brother-in-law, Thomas M. Brewer, M. D., brought me a triangular serrate tooth, he took from the jaw of a shark which had been cast ashore at Nahant; and in the summer of 1838, my friend Samuel Cabot, jr., sent me a dozen teeth which he procured from another shark at Nahant, evidently of the same species with the preceding. Inasmuch then, as these teeth are triangular and serrated, and the description of the specimens seen by these gentlemen, answers to the plate of Le Sueur, I feel authorized in admitting this species here. The following is Le Sueur's description:

"Tail with a carina undulated above, and slightly emarginated at the base; pectorals long, narrow, and falciform; dorsals and anals projecting backwards in a point; second dorsal opposite to the anal, the latter bilobed. A white spot on each side of the neck. *Head* flat and broad; snout sharp edged, rounded and wide at the end; *eyes* lateral, large, orbicular, pupil transverse; narrow, with a nictitant membrane originating below; *branchial* apertures five, unequal, the first very large, the last very small, and situate above the origin of the pectoral fins; *nostrils* oblique and partially covered by a short, pointed ap-

pendage on the margin, near the end of the snout; *tail* rounded, strong, with a falciform fin, terminating in a distinct, triangular, lanceolate lobe; lower lobe of the fin short and rounded; *ventrals* small subquadrangular, without posterior process; *teeth* triangular, serrate."

LAMNA. CUV.

Generic characters. *Point of the nose conical, nostrils pierced on its under surface; all the five branchial apertures in advance of the origin of the pectorals; the first dorsal fin placed much nearer the line of the pectoral than the anal fin; lobes of the tail nearly equal.*

L. *punctata*. Mitchell. *The mackerel Shark.*

Plate III. fig. 2.

Trans. Lit. et Philosoph. Soc. N. Y. vol. i. p. 483.

In the summer, this is quite a common species in our waters. The fishermen while fishing for Mackerel and Cod, are frequently much annoyed by having their hooks and lines bitten off by this intruder. It occasionally attains the length of eight or nine feet, and weighs between 300 and 400 pounds. No portion of it is used save the *liver*; this organ however furnishes a *valuable oil*. Seven gallons of oil are not unfrequently extracted from the liver of a single fish. And although it is generally used only by the *curriers*, yet, when carefully prepared by boiling the *fresh liver*, it is as good as *whale oil* to burn. As this species is generally seen following shoals of mackerel upon which it feeds, it is commonly known among the fishermen as the *Mackerel Shark*.

By the politeness of Messrs. Mc Loud and Dill, fishmongers, I was enabled to examine a fine specimen of this species, eight feet in length, taken the latter part of July, 1838, in a net at Marshfield; from this specimen, I drew up the following account:

All the upper part of the body, greenish ; lighter upon the sides ; white, beneath. *Head*, small ; snout blunted at its tip. *Eyes* circular, very moveable in their orbit ; pupils black ; irides dusky ; diameter of the eye, two inches ; distance between the eyes, five inches. *Nostrils* large, situated vertically under snout. On a line above the eyes, a series of mucous pores resembling black orifices, are seen running towards the snout ; another series, between the eyes, (on a line with them,) and the snout. Upon the entire under portion of the snout, these are also distributed. Three rows of small, sharp, triangular *teeth*, smooth at their edges, in each jaw, the two first straight ; the back row, recurved ; the three teeth on each side of the middle of the lower jaw, the largest. *Tongue* large, rough, fleshy. Five large branchial apertures, situated vertically ; the distance between the first, greater than between the posterior. Depth of the fish in front of the dorsal fin, fifteen inches ; distance from the extremity of the snout to the dorsal fin, thirty-four inches.

The first Dorsal fin is triangular, with a fleshy horizontal process pointing backward from its base posteriorly ; one foot one inch long ; one foot high ; between this and the second dorsal, twenty-three inches.

The second Dorsal is adipose, rhomboidal, four inches long, two inches high.

The Pectorals are quite strong, and somewhat lunated, ten inches long, eighteen inches high ; seven inches from the first branchial aperture.

Length of the Ventrals, eight and a half inches ; height, four inches. Distance between the pectorals and the ventrals, twenty inches. Anus large between the ventrals. Eight inches between the extremity of the ventrals and the origin of the anal fin.

Length of the Anal fin, four inches ; height two inches. On a line with the origin of the second dorsal, a wide carina runs on each side to the tail. The space between the second dorsal and the tail, four inches wide in its middle ; at the posterior portion of this space, a crescent-shaped ridge, three inches across ; distance from this to the middle of the tail, nine inches.

At the base of the fleshy portion of the Caudal fin, a deep groove on each side, running half the length of this portion. Caudal fin unequal in its lobes ; the upper, measuring along its curve, twenty-three inches ; the lower, eighteen. Depth of the caudal fin at its extremities, two and a half feet.

Near the anus, imbedded in the flesh, I found a specimen of the "*Anthosoma Smithii*"—Leach.

Large specimens of this shark, which is usually found only three or four feet long, have been mistaken for the "*Carcharias glaucus*"—Blue Shark—by our fishermen. Although the Blue Shark may exist in our waters, still as I have not been able to meet with it, nor with any one who has seen it, upon whose scientific accuracy I can implicitly rely, I have erased it from our catalogue, and substituted this species. The remarks made in my former report are applicable here, and are therefore introduced.

SPINAX. CUV.

Generic characters. *Two dorsal fins, with a strong spine at the anterior edge of each ; no anal fin ; temporal orifices present ; teeth in several rows, small and cutting.*

S. *acanthias*. Lin. *The picked Dog-fish.*

Pennant's British Zoology, vol. iv. p. 88.

Shaw's Zoology, vol. v. pt. ii. p. 33.

Mc Murtrie's Cuv. vol. ii. p. 288.

Yarrell's British Fishes, vol. ii. p. 400, et fig.

This species is known in Great Britain by the name of "*Picked* or *Piked Dog*," from the strong spine at the commencement of each dorsal fin. Our fishermen called it "*Dog-fish*." In the spring and autumn, the dog-fish appear in shoals in our bay ; they are frequently met with in immense numbers. At their appearance, smacks are fitted out at Truro and Provincetown for their capture, to the neglect of other

fishing, for the *oil* they furnish; and it is said to be quite a valuable business. The fishes themselves are dried for *food* for the cattle, and their *skin* is considerably used for polishing by the mechanic. They average about eight or ten pounds weight; sometimes they weigh fifteen pounds. They are readily caught with the hook. These shoals seldom remain in shallow water, or near the shore, more than three or four days; they feed upon the offal and garbage thrown upon the bottoms by the fishermen, and so perfectly do they clean the ground, that it is observed by old fishermen, that when the spring shoal of dog-fish has been unusually large, the cod fish are found in much larger numbers upon the same localities afterwards. In Scotland, the flesh of this fish is much eaten by the lower classes, and the refuse portions afford a valuable manure.

A fine specimen before me, thirty-four inches in length, presents the following appearances: All the upper part of the body of a slate color, which is deeper upon the head; lighter below the lateral line; beneath, white; just under the lateral line, a row of circular white spots; a few similar spots irregularly distributed upon the back. Length of the head to the whole length of the fish, nearly as 4 to 9; the head flattened above, tapering to a blunted snout. *Eyes* horizontally elongated; their longest diameter nearly equal to one fourth the length of the head; pupils small, black; irides silvery, with a cupreous tint. Orbit large, allowing great motion to the eye. The distance between the eyes equal to more than half the length of the head. Between the eyes, two longitudinal patches of numerous mucous glands, which are indistinctly continued nearly to the extremity of the snout. Temporal orifices back of the eye, and just above the line of the eye; their length is equal to the short diameter of the eye. All the lower portion of the head in front of the mouth sprinkled over with mucous orifices, which, like those between the eyes, exude, when pressed, a gelatinous secretion. *Nostrils* double. *Mouth* large; when expanded, nearly circular. In the upper jaw, three rows of teeth; in the lower jaw, two rows; these teeth have very sharp

edges, and their points are turned outwardly from the centre of the jaw. Branchial orifices five, directly in front of the pectorals. *Lateral line*, quite high up on the back, and running nearly a straight course to the caudal rays.

The first Dorsal fin arises from the anterior third of the body ; it is convex before, concave above and behind ; nearly one third higher than long ; arising from its anterior base, and concealed in nearly half of its height by the fin, is seen a strong triangular spine, nearly half the height of the fin.

The second Dorsal is situated back of the first dorsal, at a distance from it, equal to one fourth the whole length of the fish ; of the same form as the first, but much smaller. A spine, similar in its form and situation with regard to the fin, is seen here as in the first dorsal fin, nearly as high as the fin itself.

The Pectorals are large, commencing at the last branchial orifice ; their length, less than half their height.

The Ventrals are small, situated just before the second dorsal, with the anus between them.

The Caudal fin is very large and powerful ; its upper portion is broad, and twice the length of the lower portion.

The young of this species are much more spotted than the adults. A foetus before me, nine inches long, has several white spots on the top of the shoulders ; two in front of, and two just behind the first dorsal fin ; also spots on the sides, which, becoming confluent, form a white band extending almost the whole length of the body.

SOMNIOSUS. Le Sueur.

Generic characters. *Like Spinax they have no spiracles, no anal fins, five small branchial apertures, approximating, and near the pectorals, but they differ in having a short obtuse snout. Pectoral, ventral and dorsal fins very small ; dorsals without spines, caudal as in Spinax.*

S. *brevipinna*. Le Sueur. *The Nurse, or Sleeper.*

Journal Academy Nat. Sciences, vol. i. p. 222, et fig.

In a paper upon the "*Chondropterigious fishes*" contained in the first volume of the "Journal of the Academy of Natural Sciences of Philadelphia," Le Sueur observes, "Near Marblehead in Massachusetts, the fishermen take a kind of *shark* which they call *Nurse*, or *Sleeper*, doubtless from its inactive or sluggish habits. It is considered rare on their coast. From a skin recently prepared by them, I have been enabled to make the following observations :

Lateral line black, undulating at the head, and marked in its whole length with small transverse lines ; *tail* wide, emarginate ; the first dorsal midway between the pectoral and the anal fins, the second a little further than the ventrals, and both very near the tail. *Body* elongated, with a slight elevation, and narrow at the tail ; spiracles distant from the eyes, and more elevated ; *eyes* small, round, and situated laterally ; the pectoral fins, which were larger than the others, except the caudal, were four inches at the base, and at most five inches in length. This individual, from the end of the snout to that of the tail, was six feet five inches long ; and we may regard it as a shark with very small fins, whence its motion must be slow, and confined to the bottom, there sluggishly seeking its prey. Skin rough, beset with triangular, curved, striated and pointed asperities. Color of the entire body, a pale lead gray, somewhat darker on the back."

I have not had the good fortune to see a specimen of the *nurse*, or to meet with a fisherman who knew any thing respecting it. It is not, however, at all surprising, that it should be unknown ; with most of our fishermen, a shark is a shark, without regard to specific names. The "*hammer head*," and "*thresher*," and "*mackerel shark*," are, it is true, known to many of them ; but so little do they feel interested in any species of fish which is not marketable, that they take no notice of their distinguishing characters ; and a species might often frequent our waters without being known, unless it differed *exceedingly* from a common fish.

FAMILY II.

RAIIDAE.

RAIA. Cuv.

Generic characters. *Form of the body rhomboidal, very much depressed; tail long and slender, generally armed on the upper surface with one or more rows of sharp spines; two small fins near the end of the tail, and sometimes a small terminal or caudal fin; the eyes and temporal orifices on the upper surface of the head; nostrils, mouth and branchial apertures, beneath; teeth flattened, lozenge-shaped, the inner angle elongated in old males.*

R. *ocellata*. Mitchell. *The ocellated Ray*.

Trans. Lit. et Philosoph. Soc. vol. i. p. 477.

This species, described by Mitchell in his "Fishes of New York," is sometimes met with in our waters weighing 200 pounds. The following description is drawn up from a female specimen *thirty-one* inches in length :

Body above, of a light brown color, thickly sprinkled over its entire surface with circular black spots, varying in size from half a line to two lines in diameter. Width across the pectorals, thirty inches; width of the *head*, directly back of the eyes, twelve inches; distance between the eyes, about two inches. *Eyes*, situated horizontally, two thirds of an inch in diameter; pupils black; irides yellowish, beautifully radiated with golden, resembling slips of gold leaf; orbital ridge covered with very small spines. *Snout* slightly projecting. On each side of the snout, a slight marginal excavation. Temporal orifices directly back of the eyes, situated obliquely, one inch in length. *Mouth* measures from outer angle, three inches across; *teeth* placed in quincunx. *Nostrils* directly in front of the mouth, large and protected by fleshy prolongations. From the tip of the snout to a point opposite the first branchial opening, the margin of the pectorals on each side, are rough to the touch. The branchial openings, five in number,

situated at equal distances from each other. Body beneath, white; in front of, and at the sides of the mouth, and at the anterior portion of the pectoral fins, are seen a great number of minute black points, which are mucous pores. All the space directly in front of the eyes, save the extremity of the snout, naked and reddish, appearing as if abraded. Skin between the eyes destitute of spines, as well as a space on each side of the spines, commencing in front of the eyes, of two or more inches in width, and continued to the extremity of the ventral fin; space between the eyes also, and the upper part of the entire length of the tail, spineless. The remainder of the upper surface of the body, save the margin of the pectorals and ventrals, is covered with sharp recurved spines, of which the largest are seen on the sides of the tail. The anterior portion of the pectorals, reddish at the edges; posterior portion bordered with white; rays very numerous, and easily distinguished. Ventrals quite large, containing about twenty-four rays; those next to the pectorals very strong, with their extremities lobed; these fins resemble very much the posterior wings of some of the "Phalenæ." The tail, measured from the anus, is fifteen inches in length; on each side of it, are three rows of strong spines; these spines commence high up on the back, but are at first quite small, and gradually increase in size; at the lower or under edge of the tail, is a fleshy border or fringe. Two small dorsal fins are situated upon the tail, near its extremity; the anterior, is nearly as long again as high; it is united at its base posteriorly to the smaller fin. At the origin of each of these fins, is a fleshy tubercle. Anus large.

In another specimen of this ray, I found the stomach filled with a species of the genus "*Talitrus*" *Beach fleas*.

The sexes are readily distinguishable by the ventral fins. From the ventral fins in the male, extends a cylindrical appendage about half the length of the tail, measuring from the anal orifice, which is called the *clasper*; at its posterior, outer portion, it is fissured, and contains on its lower division a large falciform bony hook, and on the upper a small projecting tooth,

somewhat like a shark's tooth ; the ventrals of the female have not these appendages. Besides this *sexual character*, in the female, there are fewer spines upon the surface of the body generally, and particularly upon the fleshy portions of the pectorals. The anal orifice of the *male*, is circular ; of the *female*, a simple incision ; the teeth of the female are more prominent, and sharper ; the male has fewer spots.

R. *batis*. Lin. *The Skate*.

Pennant's British Zoology, vol. iv. p. 72, et fig.

Mc Murtrie's Cuv. vol. ii. p. 293.

Yarrell's British Fishes, vol. ii. p. 421, et fig.

This species sometimes attains the weight of 200 pounds. From a female specimen, three feet three inches in length, and two feet in width from the extreme points of the pectorals, brought me by my brother in law, Thomas M. Brewer, M. D., I have made the following description :

Above, of a light ash color, sprinkled over its entire surface, with blackish ocellated spots, more or less large. Margin of the pectorals, reddish. Upon the anterior angle of the eyes, upon the upper orbital margin, and also at the posterior margin, a number of very small spines ; the last situated, smallest. A few spines are also observed upon the anterior margin of the pectoral fins ; the remainder of the pectorals naked, with the exception of a small number of very minute spines at the posterior base, just in front of the ventral fins. A single row of spines, larger than are found upon any other part of the body, arm the dorsum of the tail, commencing a short distance before the origin of the ventrals, and continue to the second dorsal fin, with the exception of the space occupied by the first dorsal. A row of rather smaller spines are situated on each marginal edge of the tail, commencing on a line with the posterior angle of the ventrals. Length of the *head*, to the entire length of the fish, nearly 1 to 4. *Eyes* moderate in size, oblong ; pupils black ; irides silvery, with a beautiful golden fringed curtain

suspended from above. Distance between the eyes, nearly one fourth the length of the head. A slight depression on the top of the head extending a considerable distance forwards towards the snout. Top of the snout covered with small flexible spines; extremity of the snout, naked. Anterior portion of the body tapering from the lateral angle of the pectorals to nearly a point at the snout; snout slightly blunted. Width of the head, across the humeral orifices, thirteen inches; width directly in front of the eyes, ten inches; across the top of the snout, one inch. Humeral orifices directly back of the eyes; and in their transverse diameter equal to the length of the eye. The ventrals lighter colored than the rest of the body; the rays digitated at the extremities. The dorsal fins equal in length; the anterior a little higher than the posterior; both rounded; separated about half an inch; the posterior terminates within an inch of the extremity of the tail, by a membranous prolongation, which is more elevated at the posterior extremity. All the under portion of the body, of a dingy white color, perfectly smooth, with the exception of a very few spines hardly perceptible except by the touch, on each side of the commencement of the caudal fins, and a small patch of equally minute spines upon the middle of the tail, just in front of the termination of the ventral fins. Mucous pores are scattered over the greater portion of the under surface, appearing like black dots, in most instances distributed in a regular manner, although a longitudinal line of them is seen towards the middle of the pectorals, and another transverse one at the base of the ventrals. Gape of the mouth, large. Jaws composed of compact, hexaedral teeth, forming almost a plane surface, the inner angle of the innermost middle ones beginning to become acute. Nostrils, a short distance in front of the mouth; this distance is equal to half the length of the mouth. Five branchial apertures, situated obliquely; the anterior largest, the posterior much the smallest. Pectoral rays, very obvious beneath. Anal opening, oblong.

A *male* specimen lying before me, 54 inches long and 36 inches wide, kindly sent me from New Bedford, by Wm. H.

Taylor, Esq., presents some dissimilarities to the above. The ocellated spots do not exist, but the individual is of an uniform light brown color. On the margin of the pectorals, on a line opposite the eye, are from four to six longitudinal rows of strong recurved spines; on the back of the pectorals towards the lateral angle, are four or five longitudinal rows of spines directed towards the dorsum of the fish. All the under surface of the snout to the nostrils, and exterior to the nostrils to the angle of the jaws, roughened with innumerable small tubercles. The teeth have become very sharp; their middle portions present an acute angle; they are recurved, and exhibit regular rows passing backwards, with a space of a line or more between them. The bony process contained in the claspers, is four inches long, and half an inch deep at the posterior extremity. The outer margin is festooned, and naked, about two lines of its depth; the inner half of the width, is covered with corrugated flesh.

FAMILY.

SUCTORII.

PETROMYZON. Lin.

Generic characters. *Body smooth, elongated, cylindrical, like that of an eel; the head, rounded; the mouth circular, armed with hard tooth-like processes; the lip forming a continuous circle round the mouth; seven apertures on each side of the neck, leading to seven branchial cells; no pectoral or ventral fins; the skin towards the tail extending in a fold from the body both above and below, forms dorsal, anal, and caudal fins.*

P. *Americanus*. Le Sueur. *The American Lamprey.*

Trans. of Amer. Phil. Soc. new series, vol. i, p. 382.

This species, which is far from being common in our Bay,

is taken in deep water attached to pieces of drift wood, and the bottoms of boats and vessels. In its spawning season, it ascends the numerous rivers. It is taken in large quantities in the Merrimack river, at Lowell. Dr. Elisha Bartlett writes me that "they ascend the rivers a little earlier than the shad, and move mostly in the night. It is not known, by the fishermen, when they return, as they are never seen. There is a notion that they all die. They are often seen, in the summer, in pairs, at work together, constructing a little mound of stones. They build this about three feet in diameter at the base, and about two feet high, of stones from the size of an ounce bullet to that of the fist. They often aid each other in carrying the same stone. This is pretty evidently a *labor of love*, as they copulate once in five minutes, or so, during the whole time. The young go down the river, when the water begins to freeze. They are then from six to eight inches long."

It occasionally attains the weight of four pounds. From a beautiful specimen 27 inches in length, brought me by Capt. Samuel Andrews of Charlestown, the following description is drawn up :

Color, olive brown ; all the upper portion of the *body*, mottled with dark brown, almost black, confluent patches ; beneath, of an uniform dull olive. Anterior portion of the body, cylindrical ; posterior, compressed. A slight keel upon the back. *Head* rounded, somewhat flattened on the upper portion in front of the eyes. *Eyes*, moderate in size ; pupils, black ; irides, golden. Distance of the eyes from the snout, two inches. A tubular orifice is seen in front of, between the eyes, a line in its longest diameter. Seven large branchial apertures back of each eye, passing backward in nearly a straight line ; the first, smallest. When this species is unattached, the mouth is a longitudinal fissure. When attached, it is circular, the lip forming a ring ; within, furnished with hard, horny teeth, of a yellow color. *Teeth* on the roof, larger than those upon the sides of the mouth ; lower margin of the mouth furnished with a semicircular row of compact teeth ; teeth on the lip, small ; mucous pores obvious in front of the

eyes, passing towards the snout, and almost back of the eyes. Two dorsal fins ; the first, commencing back of the middle of the body, three inches long, nine inches high. Between this and the second dorsal, one inch. Second dorsal, six inches long ; more than an inch high, in its highest part. Anal fin, a mere fringe. Caudal fin, appears like the extremity of the solid portion of the body, very much compressed.

P. *nigricans*. Le Sueur. *The bluish Lamprey*.

Trans. of Amer. Phil. Soc. new series, vol. i. p. 385.

This species is generally found attached to other species of fishes ; it is frequently affixed to *mackerel* ; less often to *cod* ; and the three specimens I have met with, were taken adhering to *haddock*. From the largest of these, seven inches in length, the following description is made : Upper part of the *body*, of a deep blue color ; beneath, bluish white. Anterior third of the body, cylindrical ; back of this, compressed ; very much so towards the tail. *Head* oval, flattened on the top ; length of the head, from the snout to the posterior angle of the eye, to the length of the fish, less than one seventh. Seven branchial orifices, running obliquely backwards and downwards from the eyes. *Mouth*, circular ; half an inch in diameter ; surrounded by a fleshy margin ; armed within, with numerous incurved teeth, or horny spines, projecting from widened bases, resembling the spines with which the *Raiæ* are armed. There are three teeth in the throat ; two higher up than the third, which is in front of and between the others. In the general appearance of the teeth, there is great resemblance between those of this species and the preceding. *Eyes* moderate in size ; pupils black ; irides silvery. Between the eyes, on the top of the head, a small white spot ; in front of this spot, a spiracle.

The first Dorsal fin commences back of the middle of the fish ; its posterior portion is rounded ; its height to its length,

as 2 to 8. The distance between the dorsals, is equal to half the length of the first dorsal.

The second Dorsal is considerably higher than the first ; before reaching the caudal fin, to which it is continued, it is depressed.

The Caudal fin is a simple membrane, triangular at its termination, and uniting with the anal fin, which is very small. Anus small.

Le Sueur dwells upon the "*white dorsal fins*;" his specimen was six inches long. My three specimens, one, five inches, a second, six inches in length, have both dorsals perfectly white ; in the specimen just described, seven inches long, the margin of the second dorsal is of the same color as the back of the fish.

AMMOCOETES. Dumer.

Generic characters. *Form of the body, the branchial apertures and fins, like those of the Lampreys ; upper lip semicircular, with a straight, transverse under lip ; mouth without teeth, but furnished with numerous short membranous cirrhi.*

A. *bicolor.* *The Mud Lamprey.*

Trans. of Amer. Phil. Soc. new series, vol. i. p. 386.

I have never been able to procure this species, and therefore extract Le Sueur's description, drawn up from a specimen sent him from Northampton, by Dr. Hunt, which was taken in the Connecticut river :

“Dorsal fins low, separated ; the second united with the caudal fin, which is rounded ; back and sides, reddish ; abdomen white ; the color separated by an undulating line. Anterior part of the body subcylindric, posterior part compressed, and tapering to the tail ; nape of the neck elevated ; head declivous, prolonged into a snout furnished with a lip having two short rounded lobes ; these lobes, when the mouth is

closed, embrace and conceal the lower lip which is very short ; the nostrils are small, and placed in the centre of a white oval, pellucid disk, easily moveable ; on the inside of the upper lip, there are small granules, and at the opening of the throat small ramified papillae ; the branchial apertures are placed in a longitudinal depression, oblique and a little curved, the first aperture is above the angle of the mouth ; on each side of the head there is a whitish spot, which should seem to indicate the position of the eyes, that this species is deficient of, in common with the "*P. ruber*"* of Europe. The annular or ribbed appearance of the sides of this fish is owing to the muscles, which are endued with great strength, in order to enable it to burrow in the muddy sands of rivers, where it penetrates in a serpentine manner, by means of its snout, the large lip of which performs the functions of a terrier. The European species is generally taken, when the small rivers are cleansed of the superabundant sand and mud which obstruct their channels. This last is much sought after for food ; but the American species is commonly rejected, as is almost every animal that either has a real or fancied resemblance to a snake. This fish is used for bait."

Besides the species above described, several others are known to be found in our waters, but they have not been described, and I have not met with them myself. I shall but cursorily notice them.

A second species of "*Pomotis*"—*Pond perch*, is occasionally taken in the neighboring ponds, with the "*vulgaris*."

Another species of "*Esox*"—*Pike*, is taken with the "*reticulatus*," it differs from that fish, in being transversely barred. It is rarely brought to our market. My friend, Dr. Holbrook, of Charleston, a very accurate naturalist, tells me he has frequently caught it at Wrentham.

* "*Lampetra caeca* ; Willughby, p. 107, c. 3, fig. 1. Pet. rouge ; La Cèpede, tome ii. page 100."

A species of "*Exocetus*," is sometimes taken upon our coast; this may prove to be one of the species, described by Le Sueur, in the second volume of the "Journal of the Academy of Natural Sciences."

Another species of "*Salmo*"—*Trout*, is, I am satisfied, from the representations of correspondents and fishermen, found in our state. I have repeatedly seen a splendid large trout from Winnipiseogee Lake in New Hampshire, and two beautiful species at least, from Sebago Pond in Maine, in our market; but have met myself with but one species taken in our waters.

A larger "*Eel*" than the species I have described, is found at Holmes Hole. Dr. Yale writes me that "a *Sea eel*, weighing from twelve to fifteen pounds, is not unfrequently taken about Noman's Land, by the fishermen, and is considered good eating." He has seen but one specimen, and that was taken some years ago in the Vineyard sound.

Dr. Yale tells me that a species of "*Zygoena*"—*Hammer-headed shark*, is common at Holmes Hole.

A species of "*Trygon*" is met with also, at Holmes Hole. Thus Dr. Yale writes me, "I have seen frequently in this harbor and have assisted in taking them, but owing to their poisonous nature when wounded by their sting, we have been rather cautious about taking them into the boats; so that we seldom see one on shore. One or two individuals in this vicinity have come well nigh losing their lives by a wound from them. In July and August they are abundant on the flats in the harbor here." In the first volume of the "Journal of the Academy of Natural Sciences," Le Sueur describes three species of "*Raia*," one found at Newport, R. I., and two at Egg Harbor, N. J. These all evidently belong to the genus "*Trygon*," Adans; and as the species belonging to this genus are commonly called "*Sting rays*," this species spoken of by Dr. Yale, is much more likely to be one of these, found in neighboring waters, than one known to exist at a distance of thousands of miles; therefore I shall not allow the "*pastinaca*"—the European species—is our fish, until some naturalist may have settled the matter satisfactorily.

Another species of "*Raia*" is common in our waters. It is known among fishermen, as the *Thornback*. Several years since, I had an opportunity of examining one, which, at the time, I supposed to be the "*radiata*" of Don. This specimen was two feet in length, and twenty inches across the pectorals; and in its stomach, I found the head of a *menhaden*, measuring three inches in length. The fisherman who brought it to me, assured me he had caught specimens very much larger than this. This species is undoubtedly the "*clavata*," *thornback*, or "*radiata*," *Starry ray*.

That a species of "*Torpedo*" is found upon the coast of Cape Cod, is, I think, satisfactorily settled by the following testimony.

In Whitman's description of *Wellfleet*, in the third volume of the "Massachusetts Historical Collections," he says, "cramp fish have been caught on our shores." In a description of *Truro*, in the same volume, we read, "the cramp fish has sometimes been seen on the beach." "This fish, which resembles a *sting ray* in size and form, possesses the property of the *torpedo*, being capable of giving a distinct electrical shock." Dr. Davis writes me from South Wellfleet, under date of Oct. 24, 1837: "Cramp fish are occasionally seen upon our shores." Mr. E. Freeman, fishmonger in Quincy market, tells me that forty years ago, two or three specimens of this fish were frequently found dead upon the beaches at Wellfleet in a single day, also at Griffin's Island, near Wellfleet. They were taken for their *livers*, which are thought beneficial in cases of cramp. He has not, however, heard of any one having been taken for several years past. Mr. Covell also informs me that he has repeatedly seen them, and been electrified by them at Wellfleet; but has not met with one for ten or twelve years. Mr. Newcomb, sen., relates an anecdote, which proves the electrical power of this fish beyond a doubt. His father, who resided at Wellfleet, had a dog which frequently waded into the shallow water of the coves, and brought out flounders, which he had seized with his mouth. In one of his fishing excursions, he attacked a *torpedo*, which perfectly convulsed him;

he dropped the fish, and ran away howling most piteously, and could never afterward be persuaded to resume his fishing. The last three gentlemen I have had occasion to refer to before. They are men of unimpeachable veracity, and I take great pleasure in acknowledging my obligations to them.

These are all the species found in our waters, of which I have any knowledge. Many of the species, however, described by Le Sueur, as found on the coast of Rhode Island; and by Mitchell, as inhabitants of the waters of New York, will undoubtedly be discovered in and about Buzzard's Bay. And even in the cold waters north of "the Cape," rich acquisitions may reasonably be expected by the ichthyologist, who has the leisure and the zeal for minute and accurate observation.

REPTILES OF MASSACHUSETTS.

TO GEORGE B. EMERSON, ESQ.

My Dear Sir :

MOST reluctantly do I offer you the accompanying Report upon the Reptiles of Massachusetts. Having devoted the greater part of the leisure time I could claim, since the commencement of my duties as a Zoological Commissioner, to an investigation of our Fishes, as being the more extended and far more important branch, I have, without neglecting any opportunity which could be presented by friends and correspondents, been unable to give our reptiles that careful attention and study, which can alone satisfy the searcher after facts. Descriptions of every species of reptile of which I have any knowledge in the State, having however been prepared as they were received, although with very different degrees of diffuseness, I now collect together and present them, conscious that, knowing the untoward circumstances under which I have labored, my scientific friends, at least, will overlook many imperfections.

The catalogue of our reptiles contained in Professor Hitchcock's Survey, prepared by Dr. Smith, of Sutton, contains most of our species, and was evidently drawn up with care; but as he has given no descriptions by which we may judge of his accuracy, I have felt at liberty, when a species has been catalogued which clearly should not be, or which the best herpetologists in our country, well acquainted with the reptiles of New England, have never seen in our latitude, to omit it.

Thus we find catalogued the "*Testudo scabra.*" This error may have been produced by Say's incorrectly including this species in a paper "*On the fresh water and land Tortoises of the United States,*" published in the fourth volume of the *Journal of the Academy of Natural Sciences*. The species he considered the "*scabra,*" is the "*insculpta.*"

The "*Testudo Pennsylvanica*" is plainly confounded with the "*Sternotherus odoratus,*" a widely-distributed species.

The "*Coluber striatulus*" of that catalogue, I have also omitted; not merely because I have not met with it myself, but because my friend Dr. Pickering, an accomplished naturalist, thoroughly versed in the herpetology of New England, assures me, he not only never met with it here, but never heard of its having been found here, it being strictly a southern species.

The "*Rana clamata*" I have also erased, because no one of my scientific friends has ever met with it; and Dr. Holbrook, who well knows the species, and has visited this portion of the country repeatedly of late years, to collect materials for his great work, says, in his third volume, this species "is found in the low countries of Carolina and Georgia; farther north than this, I have never seen it."

The "*Salamandra cinerca*" is omitted, because Dr. Green, who first described it, as well as the "*erythronota*," considers them both one species.

The "*Salamandra tigrina*" and "*longicauda*" may perhaps both be found here; but knowing no one who had ever seen them in this State, I wrote to Dr. Emmons, upon whose authority they were given in that catalogue, for information; he writes me, that he thinks he has seen a specimen of each, but adds: "I will not take the responsibility of giving these two species as citizens of the Bay State. I have not studied them carefully enough to be authority."

Having erased the above mentioned species, and introduced three Tortoises, two Colubers, one Heterodon, one Rana, one Hylodes, four Salamanders, and one Scincus, which were not noticed in the catalogue referred to, the Herpetology of our State, as far as I have been able to learn, is composed of fourteen genera and thirty-nine species. More extended investigation will undoubtedly ascertain the existence here of new species, as well as of many which have been already described by naturalists.

Meager though this Report may be considered, friends have kindly tendered their aid in its preparation, and I would express to them my thanks. To the following gentlemen I am particularly indebted:

To Mr. Alonzo Gray, of Andover, for numerous living specimens of Tortoises, Colubers and Salamanders;

To Professor C. B. Adams, of Middlebury College, Vt., for many beautiful living specimens, and much valuable information respecting them;

To Amos Binney, M. D. of Boston, for free access to his rich and very valuable library, at all times, whereby I have been enabled to consult volumes, of which he possessed the only copies in this portion of the country.

Trusting that you will be satisfied that an effort has been made to perform the duty required of me as accurately and faithfully as circumstances would allow, I remain,

Your friend and servant,

D. HUMPHREYS STORER.

REPTILES OF MASSACHUSETTS.

ORDER I.

CHELONIA.

EMYS. Brogniart.

Generic characters. *Shell depressed, solid ; sternum broad, solid, immoveable, firmly joined to the shell, consisting of twelve plates, and four supplemental ones ; extremities palmed, anterior with five nails, posterior with four ; head of ordinary size ; tail long.*

E. *guttata*. Schneider.

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 47, et fig.

Ann. Lyc. Nat. Hist. N. Y. vol. iii. p. 117.

Harlan's Med. and Phys. Res. p. 151.

Dum. et Bibron, Hist. Nat. des Rept. tom. ii. p. 295.

N. A. Herp. vol. ii. p. 25, et fig.

This, our most common species of *tortoise*, is found in small streams and clear water throughout the State, oftentimes in great numbers ; a very concise description only is therefore offered :

The upper shell is black, sprinkled over its whole surface with more or less distant, roundish, bright yellow spots. In some specimens, eight or ten quite small spots may be seen crowded upon a single plate ; while in others, several of the plates, particularly those on the dorsum, exhibit but one spot each, brighter colored and larger than those just referred to.

The sternal plates are yellowish, with large black blotches, or black with yellowish blotches, or uniformly black. Sometimes the plates of the sternum are perfectly smooth, at other times marked with concentric striæ. The top of the head, and upper part of the legs, black with yellow spots.

It feeds upon insects, worms and frogs.

E. *picta*. Schneider. *The painted Tortoise.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 45, et fig.

Ann. Lye. Nat. Hist. N. Y. vol. iii. p. 115.

Harl. Med. and Phys. Res. p. 151.

Dunn. et Bibr. Hist. Nat. des Rept. tom. ii. p. 297.

N. A. Herpet. vol. ii. p. 19, et fig.

Next to the "*guttata*," this is the most generally distributed species. It is usually found with the preceding, and is a very easily recognised species. A specimen five inches in length, serves for the following description :

Body above, compressed ; upper shell, greenish brown, with the edges of the dorsal and lateral plates margined with yellow. A very narrow dorsal yellow line passes from the anterior to the posterior marginal plate ; the marginal plates are darker colored than the other plates of the upper shell, having in their centre a bright red blotch, which is much larger upon the inferior side ; and over this blotch, one or two red markings, which are concentric upon the plates not attached to the sternum, and nearly straight upon the four plates which are thus attached : the red color predominates upon the under side of the marginal plates.

First dorsal plate quadrangular : second and fourth, hexagonal ; third, quadrangular ; fifth, heptagonal.

Sternal plates yellow, with a triangular ribbon upon the anterior portion, and a straight one upon the middle and posterior portions, of a brighter tint.

Back of the head, dark brown ; directly back of the eyes, a broad yellow band ; a narrower band of the same color runs

also back, from the middle of the eye. From the tip of the snout, a narrow yellow line runs to each eye; from the side of the mouth also, two lines pass to the middle of the eye, and two from the lower edge of the jaw. From the extremity of the lower jaw, two larger bands run backwards; the first passes slightly down, then outwardly to the angle of the lower jaw, whence it is continued by a broad bright yellow band; within this, from the middle of the lower jaw, a narrower band of the same color passes back parallel with this; and from the tip of the chin a band runs down a short distance, and then bifurcates into broader bands. These yellow lines upon the head become red upon the neck, and are continued on to the shoulders of this color. Two large yellow spots upon the occiput. Eyes small; pupils, a deep black; irides golden; a dark line running through their centre. *Fore legs* black, a red band passing through their centres; and the commencement of a second, on a line with the base of the previous one; phalanges marked with red lines. Hind feet, dark brown, above; beneath, lighter, with a red band on each side. Tail of moderate length, with two narrow longitudinal yellow bands uniting at the posterior extremity; beneath, marked by the narrow red lines of the legs continued, which unite at the posterior portion, forming a single red band.

Its food is the same as that of the previous species.

E. *insculpta*. Le Conte. *The wood Tortoise*.

Ann. Lyc. N. Y. vol. iii. p. 112.

Harkn's Med. and Phys. Res. p. 152.

Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 251.

Specimens of this, our most beautiful tortoise, I have received from Walpole, Concord, Amherst and Andover, and learn that it is not uncommon in the ponds of several other portions of the State. This species wanders a great distance from, and remains a long time out of the water; and being oftentimes found in *woods* and *pastures*, has received the com-

mon name of *wood tortoise*. Its usual length is from six to eight inches. The upper shell is composed of five dorsal, eight lateral, and twenty-five marginal plates; these plates are of a greenish brown color, strongly marked with concentric and radiating striæ. A dorsal ridge is formed by the convex portion of the superior plates. Sternum composed of twelve yellow plates, having upon their posterior lateral margins, a large black spot. All the under portion of the legs, neck and tail, is red.

Young specimens exhibit a very rough upper shell, produced by the prolongations of the posterior angles of the plates.

This species was erroneously considered by Say, as synonymous with the "*scabra*," Lin.; and as such, he catalogued it the 4th Vol. J. A. N. S.

STERNOTHAERUS. Bell.

Generic characters. *Head subquadrangular, pyramidal, covered in front with a single plate; warts on the chin; marginal plates, twenty-three; sternum cruciform, bivalve, anterior valve only movable; supplemental plates contiguous, placed on the sterno-costal suture; anterior extremity with five nails, posterior with four.*

S. odoratus. The mud Tortoise.

Ann. Lyc. Nat. Hist. N. Y. vol. iii. p. 122.

Harl. Med. and Phys. Res. p. 156.

Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 358.

N. A. Herpet. v. iii. p. 29, et fig.

Shell oblong, convex, somewhat carinated on the dorsal ridge; of a brownish color, irregularly blotched with darker spots.

The first vertebral plate is triangular, the next three hexagonal, the last pentagonal. There are four lateral plates; the first of which is quadrangular, the remainder are pentagonal. The marginal plates, twenty-three in number, are small, gen-

erally elongated, forming a margin ; the posterior plates largest, and appearing as if they were a continuation of the last vertebral plate.

Sternum small, composed of nine yellowish brown plates ; it is divided into three portions by two ligamentous hinges ; the anterior, composed of three plates, is quite moveable upon the second division ; the third portion, of four plates, the posterior of which are emarginated, and have their posterior angles acute, although united to the second division of the sternum, consisting of the two large abdominal plates, by a similar hinge with the first, is scarcely moveable.

Head pointed, flattened above ; snout, truncated. Eyes moderate in size ; pupils black, irides golden. Nostrils large at the extremity of the snout. Top of the head nearly black. A narrow yellow line passes from the tip of the snout backwards over each eye, and is lost upon the neck ; a second line of the same color, larger and much brighter, is continued backward beneath the eyes to the neck. A broad yellow band is also observed upon each side of the chin, exhibiting a striking contrast with the dark brown color of the jaws. Skin of the neck, throat and legs, ash colored. Neck, covered with granulations. Several yellowish warts or cirrhi upon the throat. Legs and feet slightly granulated ; upon the anterior legs, three large scaly plates ; at the base of the feet several smaller scales of a similar character ; these scales do not exist upon the legs of the posterior extremities, although they do upon the feet. Toes palmated ; fore feet with five toes, and five claws ; posterior, five toed, with four claws. Tail short, with several rows of pointed warts.

The specimen from which I have drawn the above description, is three inches and a half long, one inch and a half high. Of six specimens lying before me, five do not vary a line in length. The sixth, which is considerably younger, is less than three inches in length ; has a more marked dorsal ridge than either of the others, and the blotches are more numerous.

This species has a very disgusting odor, and is hence sometimes called *stink-pot*.

It is found burying itself in the mud in ditches and small ponds, frequently covered with a thick coat of foreign matter, from which circumstance it has received the common name of *mud tortoise*.

A single specimen of this species was found in Fresh Pond in Cambridge by J. W. Randall, M. D.; one specimen was taken at Amherst, and several at Falmouth by Professor C. B. Adams; and Mr. Erastus H. Clap has brought me one from Walpole.

EMYSAURUS. Dumeril.

Generic characters. *Head large, covered with small plates; snout short; jaws hooked; two warts beneath the chin; sternum immovable, cruciform, composed of ten plates; three sterno-costal plates; fore feet with five claws, hind feet with four; tail long, surmounted with a scaly crest.*

E. *serpentina*. Lin. *The snake Tortoise.*

Shaw's Zoology, vol. iii. pt. 1. p. 72, et fig.

Ann. Lyc. N. Y. vol. iii. p. 128.

Dum. et Bibr. Hist. Nat. des Rept. vol. ii. p. 350.

This is the largest tortoise found within the borders of our State; sometimes weighing from 15 to 20 pounds. It is exceedingly powerful and voracious, feeding upon fishes and frogs; and the farmers sometimes complain of its depredations among their chickens and ducklings. From its habit of snapping suddenly at almost every thing offered it, it is generally known by the name of the "*snapping tortoise*," in New England, while its crested tail, resembling the *Crocodilus lucius*, gives it the distinction at the South, of "*alligator tortoise*." It is usually found in filthy water, and is occasionally met with at considerable distance from any pond or pool, dragging itself leisurely along.

The flesh of this species is often used as food, and when made into a soup is considered by many as quite a delicacy. The *oil* obtained from this species is carefully preserved in many portions of the interior of the State, for its supposed virtues in bruises, sprains, &c. when externally applied.

The upper shell is of a dark brown color, oval, compressed above. composed of five vertebral, eight lateral, and twenty-five marginal plates, which are marked by radiating and concentric striæ. A dorsal ridge is produced by the prominent posterior angles of the vertebral plates; the projections of the posterior superior angles of the lateral plates also form, in some specimens, indistinct carinæ. The anterior marginal plates are narrow and oblong; the fifth, sixth and seventh are much wider, while the posterior three plates are marked with strong, concentric striæ, and the posterior angles form strong spinous points. The sternum is yellow, narrow, lozenge-shaped, composed of ten plates, and united to the marginal plates by a long narrow plate, having two smaller plates at its outer extremity. The head is very large, scaly above; eyes large; jaws powerful, hooked; beneath the chin, two warts; neck above, covered with warts or small fleshy cirrhi; beneath, granulated. The legs are large and strong; the fore legs are armed above with large scales, feet with five claws; hind legs with large scales beneath, feet with four claws. Tail, two thirds the length of the body; round at its base, compressed at the sides, tapering to a point; armed above by a ridge of strong pointed spines, diminishing towards the posterior extremity.

The largest living specimen I have seen, was taken at Marshfield; its dimensions were as follows: Entire length, 44 inches, viz. length of the shell, 18 inches; length of the head and neck, when extended, 11 inches; length of the tail, 15 inches. Width of the shell, 15 inches; width across the head, 4 inches.

CISTUDA. Fleming.

Generic characters. *Shell gibbous, strong; marginal-plates twenty-five; sternum oval, covered with twelve plates, bivalve, both valves moveable on the same axis, and joined to each other and to the shell by ligamento-elastic tissue; anterior extremities with five, posterior with four nails.*

C. *Carolina*. Edwards. *The Box Tortoise.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 36, et fig.

Ann. Lyc. N. Y. vol. iii. p. 124.

Harlan's Med. and Phys. Res. p. 149.

Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 210.

Bell, monog. Test.

I have received living specimens of this species through the kindness of friends from Barnstable, Amherst, New Bedford, Holmes Hole, and Walpole; and although at neither of these places is it common, yet their distances from each other shows that it is pretty widely distributed throughout the State. This is a *land* species, being found in dry and arid situations, and can live but a short time in the water. From the circumstance of the sternum being divided into two portions, the anterior of which is moveable, enabling the animal when disturbed, to encase itself entirely within its shell, the species is generally known under the name of "*box tortoise.*" Several varieties have been made by naturalists dependent upon the difference of their markings.

A beautiful living specimen before me exhibits the following characteristics:

Length of the specimen, six inches. Shell round, gibbous, carinated. Sternum bivalvular. The plates of the upper shell are of a dark brown color, sculptured with radiating and concentric striæ, and covered over their entire surface with bright yellow spots, varying in their size, form, and manner of distribution, frequently confluent. A great portion of each marginal plate is occupied by a yellow blotch. The first and fifth vertebral plates, are pentagonal; the second, third and fourth

are hexagonal. Of the lateral plates, the posterior are the smaller. The sharp edges of the seventh, eighth, ninth and tenth marginal plates, which are the largest, project outwardly, forming a keel. The sternum is divided unequally, the anterior portion the smaller; it is of a very dark brown color, with dull yellow blotches. The anterior plates of the sternum are triangular; the middle, oblong; the posterior, triangular. These plates likewise exhibit concentric striæ. Head above, black, reticulated with yellow; the upper jaw of a dull white color, with black lines passing from the eye to its margin. Throat white, with dark spots; flesh on the sides of the neck of a dull horn color, varied with red and brown. The upper jaw has a large hook-like process at its extremity; the lower jaw, a sharp point. Pupil of the eye, black; irides red. The fore legs are covered with large scales of an orange color, tipped with dark brown; posterior legs of an uniform dark brown color.

The principal food of this species is insects.

C. *Blandingii*. Holbrook. *Blanding's cistuda*.

N. A. Herpetol. vol. iii. p. 35 et fig.

By the kindness of Mr. Edward Appleton I have received from Haverhill a fine living specimen of this rare species. It presents the following appearance: Length of the specimen $7\frac{1}{2}$ inches; breadth of the shell 5 inches; length of the sternum, 7 inches; height 3 inches. Shell oblong, rounded, slightly flattened above. The plates of the upper shell are black, covered with numerous bright yellow circular and oblong spots or blotches, irregularly distributed. The first vertebral plate is pentagonal; the second and third are hexagonal; the fourth is heptagonal; the fifth is octagonal. Of the lateral plates, the anterior and posterior are quadrilateral, the third and fourth, pentagonal. The marginal plates are twenty-five in number; the nuchal plate is very small, about a line in width, and less than half of an inch long; the first, third,

fourth, sixth, eighth, tenth, and twelfth plates are quadrilateral ; the second, fifth, seventh, ninth, and eleventh, pentagonal ; the edge of these marginal plates is sharp and entire. The sternum is composed of two valves, the posterior of which, the larger, is oblong, rounded before, emarginated behind ; both valves are moveable, and when closed they shut the animal entirely with the exception of his toes. The sternal plates, twelve in number, are yellow, with large quadrangular dark spots, occupying nearly one half of each plate ; the plates are marked with concentric striae.

The head is nearly black, with yellowish spots. The upper jaw is of a dark brown color, with transverse yellowish lines ; the lower jaw is of a bright yellow. The anterior extremities are protected by large imbricated scales in front, with smaller ones beneath, and granulations behind ; there are five fingers, which are palmated, with nails. The posterior extremities are larger than the anterior, of the same color, and, like them, having scales and granulations ; these extremities are flattened upon the leg and foot, with 5 toes ; the posterior only destitute of a nail. Tail cylindrical, gradually tapering to a point.

In regard to this species, Dr. Holbrook, in the third volume of his Herpetology, which is just published, observes : " The sole locality that can at this moment be assigned to the *Emys Blandingii*, is the prairies in the state of Illinois and the territory of Wisconsin, where they are said to be abundant. The only specimen I have seen came from Fox river, a tributary of the Illinois."

SPHARGIS. Merrem.

Generic characters. *Body covered by a leathery skin, tubercular in the young, perfectly smooth in the adult. Feet without nails.*

S. *coriacea*. Lin. *The Leather Tortoise.*

Plate IV.

Pennant's British Zoology, vol. iii p. 7, et fig.
 Shaw's Gen. Zoology, vol. iii. p. 77, et fig.
 Phil. Trans. vol. lxi. pt. 1. p. 271, et fig.
 Dum et Bibr. Hist. Nat. des Rept. t. ii. p. 561.

The only specimen I have heard of having been seen on the coast of the United States, was taken asleep on the surface of the water in Massachusetts Bay, in the year 1824, and being brought to Boston, was purchased by Mr. Greenwood of the New England Museum, of the captors, for two hundred dollars, and placed in this institution, where it still remains. The naturalist may judge of the great rarity of this species from the following observations by Dumeril and Bibron, in their "*Erpétologie générale ou Histoire Naturelle complète des Reptiles*;" "This species is very rare; it inhabits the Mediterranean, and the Atlantic ocean. Rondelet speaks of a "*Sphargis luth*" five cubits long, which was taken at Frontignon: Amoreux described another which was captured in the harbor of Cette; and in 1729 a third was taken at the mouth of the Loire, which was described by Delafout in the "*Mémoires de l'Académie des Sciences*." Borlase has given a bad figure of a "*Sphargis luth*," which was taken in 1756 upon the coast of Cornwall, in England."

The specimen in the New England Museum presents the following characters: *Ertire length* eighty-five inches; *widest part*, fourteen inches; back of the head, thirty-four inches; *greatest depth* fourteen inches. The body is covered above, by a dark brown shield, fifty-seven inches in length, of a firm leathery texture, which is divided into furrows by seven longitudinal elevated ridges; all these ridges are noded, resembling the vertebral column; the dorsal ridge runs the whole length of the shell; those on the side, next the dorsum, commence one inch and a half further forwards than the dorsal ridge, and within sixteen inches of the posterior extremity of

the shell curve upwards towards the dorsal ridge, but are not as perceptible after curving, and reach the upper ridge, six inches anterior to the extremity of the shell. The second lateral ridge commences about seven inches back of the preceding, and, at the posterior extremity, curves up like that; the abdominal margin makes the third lateral ridge. The posterior extremity of the shell is truncated, and is two and a half inches wide.

Length of the head and neck, sixteen inches: of the head, nine and a half inches; width of the head nine inches; width of the neck, thirteen inches. Diameter of the eye, large. Nostrils just back of the tip of the snout. A large notch in the middle of the upper jaw, which receives the projections of the lower jaw, when the mouth is closed; on each side of this median emargination of the upper jaw are two others, one on each side of it. Upon the middle and posterior portion of the roof of the mouth, strong spinous processes.

A portion of the œsophagus of this specimen belongs to the cabinet of the Boston Society of Natural History; it is compactly armed with long firm very sharp spines.

Anterior extremities, thirty-five inches long, rounded at the origin, compressed in the middle, tapering to a rounded extremity; in their widest portion, ten inches across.

Posterior extremities, sixteen inches in length; for about half their length, nine inches wide, truncated posteriorly, and, as well as the anterior extremities, bordered upon their posterior margin by a deep fleshy fringe or border.

Length of the tail, thirteen inches; eight inches wide at the base, tapering to a point.

Body beneath, covered by a less firm envelope, of a lighter color.

I am indebted to my friend Dr. Wyman for the accompanying plate of this species.

ORDER II.

SAURIA.

FAMILY.

SCINCOIDEA.

SCINCUS. Daudin.

Generic characters. *Head oblong, pointed, covered with plates; jaws furnished with closely set teeth; two rows of teeth on the palate; tongue fleshy, slightly extensible, emarginate; tympanum apparent; neck as large as the head; body elongated; tail conical; the whole body and tail covered with small imbricated scales; extremities with free and unguiculated toes.*

S. *fasciatus*. Lin. *The Blue-tailed Lizard.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 241.

Harlan's Med. and Physic Res. p. 138.

N. A. Herpet. vol. iii. p. 45, et fig.

The only specimen of this beautiful species I have known to be found in New England, was captured in Barre, by Dr. Joseph N. Bates of that place, and kindly loaned me to identify and describe. He took it, he writes me, "in a mud hole; it evaded my attempts to capture it for some time on account of its agility and cunning, and when captured made much resistance with jaws, claws, &c."

Length of the specimen five inches, elongated, covered above with longitudinal rows of imbricated scales; color above, a deep shining black, with five longitudinal deep golden yellow lines; abdomen, of a light yellow color; tail, a deep

sky blue, blended with yellow and black lines, which run longitudinally along the back.

A yellow line commencing over each nostril, passes obliquely backwards, and, approaching each other, they unite at the distance of rather more than a quarter of an inch back of their origin, forming a dorsal line, which, continued the whole length of the body, is lost upon the tail; on each side of this dorsal line, runs another, which arises at the superior anterior angle of the eye, and terminates like the preceding; beneath this, is still another, commencing at the snout, and interrupted only by the meatus of the ear, is continued like the others upon the tail. These yellow lines give the back the appearance of being divided into yellow and black longitudinal lines. Head, half an inch long; one quarter of an inch wide; with large plates above. Eyes, small. External meatus of the ear, vertical, large. Anterior feet short, with five toes, each armed with a sharp nail. Posterior extremities, large; second toe very much elongated, and all the toes, like those of the fore feet, nailed.

Extremities above, of a brown color, having a longitudinal yellowish white line running along their posterior portion to the toes.

The vent is transverse, situated just back of the interior of the thighs. Tail longer than the body, its posterior portion a deep blue.

The species feeds upon insects.

ORDER III.

OPHIDIA.

FAMILY.

SERPENTIA.

COLUBER. Lin.

Generic characters. *Body long, cylindrical and tapering ; head oblong, covered above with smooth polygonal plates ; above covered with rhomboidal scales, imbricate, reticulated, or carinated, or smooth ; abdomen with transverse plates ; beneath the tail with double plates ; anus transverse, simple ; jaws furnished with sharp teeth ; without poisonous fangs. Some species oviparous, others ovo-viviparous.*

C. *sirtalis*. Lin. *The Striped Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 535.

Harlan's Med. and Phys. Res. p. 116.

This pretty species, generally known as the *striped snake*, is our most common snake. The usual length is about two feet ; occasionally it is met with two feet and a half long. The upper part of the body is of a dark olive brown color. A narrow yellow band extends from the occiput to the extremity of the tail ; on each side of this, joining the abdominal plates, is a somewhat broader parallel band of the same color. The brown color of the back is variegated with black blotches, which are much more strongly marked in the smaller specimens ; in the larger specimens, they are hardly discernible, unless the scales be slightly separated by the observer. Abdo-

men greenish ; its upper portion towards the sides, lighter ; the posterior edge of the abdominal scales, at their union with those of the sides, marked with a black spot ; at the distance of one or two lines within this spot, towards the centre of the abdomen, another spot is observed, which in young specimens is equally dark with the former, but duller in old specimens. Scales oblong, strongly carinated ; smaller upon the back of the head and the upper anterior portion of the body, than farther back. Scales of the yellow lateral lines, larger than those of the olive colored back. The scales that are shortest, least carinated, and at the same time the largest, are in a single row between the abdomen and the lateral line referred to. Head flattened, having upon its top ten plates ; one at the snout, two pairs behind this, three between the eyes, and two, larger than either of the preceding, upon the occiput. Pupil of the eye, black ; iris, reddish. Upper jaw margined on each side by seven plates, besides that at the tip ; the fifth, situated directly beneath the posterior angle of the eye, the largest. Lower jaw bordered by ten plates on each side. Two pairs of plates upon the throat, very much elongated. Small teeth in the jaws and upon the palatine bones.

The bright yellow color, which renders this a beautiful species when alive, changes to a dull greenish yellow after being immersed in spirits ; in this state, it appears to have been described by Herpetologists. When the scaly cuticle is removed, the dorsal line beneath is found to be white ; and the sides of the back are of a deep blue color, with two rows of black, nearly circular blotches. Sometimes the line on the back is a greenish white, while the lateral bands are yellow. Upon the occipital plates of one of my specimens are two small yellow spots towards their middle at their interior edges. The brightness of the lateral lines disappears at the anus ; beyond, the color is greenish, and this is gradually lost towards the tail.

Linnæus describes his species as having 150 abdominal plates, and 114 caudal scales ; Shaw copies this in his "*General Zoology*." Harlan makes 150 plates, and 60 caudal scales.

One specimen before me, has 154 plates, and 75 scales; a second specimen has 146 plates, and 63 scales.

This species feeds upon *frogs* and *toads*, and is frequently found enormously distended by having swallowed one of a very large size.

C. *ordinatus*. Lin. *The little brown Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 497.

Harlan's Med. and Phys. Res. p. 113.

This is also quite a common species with us, growing to the length of two feet. The color above, is a browish ash, with a broad, lighter ash-colored longitudinal band upon the dorsal ridge, running the whole length of the animal; on each side of this dorsal band, a row of small dark brown spots. Body beneath, fawn-colored; of a darker tint upon the sides. A row of very minute black dots upon the outer edge of the abdominal plates. Scales small, carinated; a row of scales larger than the rest, upon the sides joining the abdominal plates. Head very small, flattened above; with ten scales upon its top, the two upon the occiput, and that directly in the middle of the top of the head, the largest, and black; the others are quite small, and of the color of the back; these scales are arranged as follows: Two triangular ones upon the occiput; a third, hexagonal in its form, in front of them; its posterior portion, between the anterior inner portion of the former, making the top of the head; on each side of this, protecting the top of the eye, a small oblong scale, rounded upon its outer edge; in front of these, immediately back of the eye, two pairs of quadrangular scales; the posterior, larger. A single large scale forms the snout. Besides these scales, three are seen in front of the eye, on the side of the head; and quite a large scale back of the posterior angle of the eye, separated from it by two very minute scales only. Upon the margin of the upper jaw, fourteen scales; upon the edge of the lower jaw, twelve, besides the tip. An oblique black band passes downwards

across the angle of the jaws, and a transverse one back of the occiput, crosses the neck on each side ; in some specimens all the scales upon the upper jaw are edged with black.

Sometimes the spots on the sides of the abdomen are very distinctly seen ; in others, as in several specimens lying before me while I write, they are scarcely observable.

When preserved in spirit, the longitudinal dorsal line becomes lighter colored, and the abdomen changes to a yellowish green color.

The abdominal plates are 128 ; the caudal scales 62 and 64.

In the stomach of this species, I have found fragments of insects.

C. *vernalis*. Dekay. *The green Snake*.

Harlan's Med. and Phys. Res. p. 124.

One of our most beautiful species, this snake is generally well known. A fine living specimen before me, twenty-one inches in length, exhibits the following characters :

Above, of a beautiful grass green color ; beneath, a yellowish white. Length of the head, half an inch ; greatest width of the head, a quarter of an inch ; head flattened above ; ten plates upon the top of the head ; one at the snout ; two pairs immediately back of this ; three plates between the eyes ; two large plates upon the occiput. Upper jaw bordered by fourteen scales. Nostrils circular, just back of the posterior lateral angle of the snout. Pupil of the eye, black ; iris cupreous. Scales rhomboidal, smooth, not carinated. Tail six inches in length, gradually tapering to the point.

Four specimens vary in their plates and scales as follows :

One specimen has	137	plates ;	85	caudal	scales.
A second	“ 132	“	80	“	“
A third	“ 133	“	81	“	“
A fourth	“ 127	“	84	“	“

Like the preceding species, this feeds upon insects.

C. *punctatus*. Lin. *The ringed Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 553.

Harlan's Med. and Phys. Res. p. 117.

N. A. Herp. vol. ii. p. 115, et fig.

This pretty species is less common than either of the preceding, being usually found concealed beneath the bark of decaying trees. The specimen before me is fourteen inches in length; the body is elongated, with smooth scales. Color above, of an uniform bluish brown; beneath, of a reddish yellow, with a longitudinal row of black spots upon each side of the abdomen, where the abdominal plates and lateral scales unite; a third row of similar spots runs longitudinally along the middle of the abdomen, as far as the vent, beyond which they are not visible. Ten plates upon the top of the head; sixteen plates, beside that at the tip, border the upper jaw; and fourteen, margin the lower. Head half an inch long, one quarter of an inch wide; flattened above; rather lighter colored than the body. Nostrils large. Eyes of moderate size; pupils black, irides grayish. A broad yellowish white band crosses the occiput. Tail, three inches in length, tapering to a point. The abdominal plates are 156, and the caudal scales 56. A second specimen exhibits 156 plates, and 62 scales.

C. *constrictor*. Lin. *The common black Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 464.

Harlan's Med. and Phys. Res. p. 112.

In some parts of the State, this is not an uncommon species, frequently growing to the length of six feet. A fine specimen, fifty-one inches in length, serves for the following description: Length of the head, one and a half inches; greatest width of the head, half an inch. Body, above, almost black; beneath, slate-colored; neck, margin of the jaws, and snout, yellow. Plates upon the top of the head, very large; that at the snout,

convex, projecting, yellow, bordered with black at its upper and lateral margins; the first pair of plates, nearly quadrangular; the second, pentagonal; of the three between the eyes, the middle, which is largest, is hexagonal; those at the sides of this, over the eyes, are pentagonal; the two posterior plates, pentagonal. Sixteen plates border the upper jaw. Eyes large. Nostrils large, vertical, situated between the second and third plates, back of the snout. Three pairs of elongated plates on the throat, just back of the chin; back of these plates, two pairs of smaller plates anterior to the abdominal plates. The whole back covered with large rhomboidal smooth scales. Body somewhat compressed at the anterior extremity; cylindrical at the posterior, gradually tapering to the tail, from which it more suddenly becomes smaller, and terminates in a point. Length of the tail, eleven inches.

The abdominal plates are 184; the caudal scales, 85.

This species is generally met with in wild and unfrequented places; it is avoided as venomous by many, although perfectly harmless. It feeds upon the *toad*, and several species of *frogs*; oftentimes it catches *small birds*. Mr. Erastus H. Clap informs me that he saw one that had swallowed a common sized specimen of the *Robin*, "*Turdus migratorius*," entire; it is said also to prey upon the different species of *meadow mice*.

C. *amaenus*. Say. *The red Snake*.

Journal Acad. Nat. Sciences, vol. iv p. 237.

Harlan's Med. and Phys. Res. p. 118.

A single specimen of this species has been received from Professor Adams, who found it at Amherst; this specimen being preserved in spirits, and its natural character somewhat affected thereby, I avail myself of the very accurate description of Say:

"Body above, reddish brown; beneath, vivid red; head not larger than the neck, obtusely rounded before; terminal plate curving a little on the top of the head, so as to be nearly hori-

zontal above ; first pair of plates rather short, breadth decidedly more than double the length ; second pair rather large, oblique, posterior outer angle reaching the eyes ; central plate convex, rounded ; subtri-angular, wide before and angulated on the anterior middle, posterior angle acute ; posterior plates a little convex, with a single scale between their tips ; eyes with one scale behind, one before twice as long as the posterior one, small plate above the eye less than half the length of the central plate, and not twice as large as the posterior eye plate ; teeth minute ; scales smooth, polished, somewhat opalescent, slightly convex, rounded at the tip ; tail less than one seventh the whole length ; tip rather abrupt, conic, solid, acute.

Plates, 124 ; scales, 25. Total length, ten inches and three tenths ; tail, one inch and two fifths.

Var. a. dark slate color above.

A pretty and perfectly harmless serpent. The contrast of color between the lively red, sometimes rosaceous, of the inferior surface of the body, and the brown, more or less deep, of the superior surface, is very striking ; the abrupt termination of the tail and the narrow head, are also distinguishing traits. It is found beneath stones and prostrate logs, but not very frequently."

My specimen is seven inches long ; tail, one inch ; abdominal plates, 136 ; caudal scales, 32.

C. *eximius*. Dekay. *The chicken Snake*.

Harlan's Med. and Phys. Res. p. 123.

This not very uncommon species, is known by the names of *house snake* ; *thunder and lightning snake* ; *chicken snake* ; *milk snake* ; and *chequered adder*. It is one of our largest species, measuring sometimes five feet or more in length ; and is a beautiful *snake*. A specimen thirty-four inches in length, furnishes the following description : Body elongated, varying very little,

in its circumference anterior to the tail, but back of the vent, rapidly terminating in a point ; all the upper portion of the body covered with smooth rhomboidal scales. Body, above, of a dark brown color, with numerous transverse white bands, which become confluent on the sides ; the brown portions of the back, between these transverse bands, irregular in their form, and margined with black ; blotches of a similar color with the back, along the sides. Abdomen yellowish, variegated with quadrangular black spots. Circumference of the head less than that of the body ; length of the head, one inch ; width across the head, half an inch. The plate at the snout large, with a well marked emargination beneath ; the first pair of plates moderate in size, quadrangular ; the second pair of plates also quadrangular, and much larger ; the central plate on the top of the head large, pentagonal ; those upon the sides of this, irregularly quadrangular ; occipital plates very large. Fourteen plates margin the upper jaw ; sixteen plates edge the lower ; these plates on the jaws are yellow, margined with black. Eyes moderate in size ; from their posterior angle, a black band passes obliquely backwards. Upon the neck, seven longitudinal plates, between the chin and the abdominal plates ; the anterior three, largest ; the second, larger than any. Length of the tail, four inches.

The abdominal plates are 207 ; caudal scales, 48.

This species feeds upon toads and frogs.

C. *sipedon*. Lin. *The water Adder*.

Shaw's Gen. Zoology, vol. iii. pt 2. p. 496.

Harlan's Med. and Phys. Res. p. 114.

Large numbers of this species are found in mowing meadows which are overflowed a part of the season ; it is frequently killed at Cambridge, four feet and more in length ; its body being the size of a man's wrist. By many it is avoided, as being poisonous in its bite. The body is large ; its circumference lessening but little, anterior to the vent ; rapidly

tapering posterior to the vent ; of an uniform dark brown color above ; reddish upon the sides ; abdomen yellowish white, mottled with dark brown ; beneath the tail, nearly black. Whole upper part of the body covered with rows of elongated, strongly carinated scales ; these carinæ, more obvious upon the posterior extremity ; nothing peculiar in the arrangement of the plates upon the head ; the ten plates upon the top of the head, of moderate size ; sixteen plates upon the upper jaw ; eighteen plates upon the lower jaw. Eyes prominent. Nostrils of moderate size.

The abdominal plates are 139 ; caudal scales 72.

In a young individual lying before me, seventeen inches in length, with the same number of abdominal plates and caudal scales with the above described specimen, the back is crossed transversely by a large number of yellow bands, and the scales on the tail are so strongly keeled, as to produce well marked grooves between the rows of scales.

This species feeds upon frogs.

C. *saurita*. Lin. *The riband Snake*.

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 532.

Harlan's Med. and Phys. Res. p. 115.

This beautiful little snake is not very common ; it resembles somewhat the *sirtalis*, but it is smaller, lighter colored, and much more graceful in its figure and proportions. Its form is very slender, tapering to an acute point. Above, dark brown, with three longitudinal stripes of a greenish white color, which are very distinct as far as the vent, back of which they are insensibly effaced ; both sides of the dorsal line, and the upper edge of the lateral lines, margined with black. Whole length of the specimen before me, ten inches ; length of the tail, three and a half inches. The scales upon the top of the head are moderate in size ; fourteen upon the upper jaw, twenty upon the lower jaw. Eyes rather large.

The abdominal plates are 162 ; caudal scales 112.

C. *occipito-maculatus*. Nobis. *The spotted-neck Snake.*

This pretty species, which I suppose to be undescribed, was received from Professor Adams, who found it at Amherst. It was sent me in spirits, and therefore it is probable that its colors had somewhat changed. Its length is ten inches and a half; length of the head, less than half an inch; width across the head two lines. Body elongated, covered with longitudinal rows of pentagonal scales, connected, and at their posterior extremity, slightly fissured. All the upper portion of the body, a light ash or gray color. An indistinct band of a lighter color passes longitudinally down the back; this is margined on each side with a row of dark colored, almost black scales; on each side of the body, a row of larger scales than those upon the back, unite the back with the abdominal plates; these scales are black, with a longitudinal delicate white line passing through their centres. Abdomen yellowish white, with black or fuliginous markings upon the outer edge of the plates, appearing upon the anterior plates like black dots. Circumference of the neck less than the remainder of the body; body largest just anterior to the vent; back of the vent it more rapidly approaches a point. The three anterior plates upon the head, viz. that at the snout, and the two pairs immediately posterior to this, yellow; the other plates the color of the back, variegated with white. Twelve plates upon the upper jaw, besides that at the snout; fourteen plates margin the lower jaw, besides that at the chin. Three large white irregularly formed blotches, directly back of the occipital plates; one above, and one on each side of the first.

There are 124 abdominal plates, and 38 caudal scales.

In as much as the "*punctatus*" sometimes exhibits merely a *spot* upon the occiput, instead of a circular band, the superficial observer might think *that*, and the species I have just described as identical; a little attention will show the marked differences between them.

HETERODON. Palisot de Beauvais.

Generic characters. *Plates and scales as on the Colubri; the rostral plate a trihedral pyramid, with a ridge above, and pointed at the tip; posterior maxillary teeth largest.*

H. *platirhinus*. Latreille.

Daud. Hist. Nat. des Rept. tom. vii. p. 153.

Harl. Med. and Phys. Res. p. 120.

N. H. Herpetol. vol. ii. p. 97, et fig.

I have never seen a specimen of this animal; but Dr. Holbrook assures me he possesses an individual which was captured at Medfield. His description therefore is here introduced: "The head is large, flat, triangular, broad behind, with the snout pointed and elongated at the tip; it is covered with scales on the posterior part, and with plates on the anterior and on the vertex. The vertical plate is regularly pentagonal, with its broadest point directed forwards. The superior orbital are quadrilateral, elongated, and broadest posteriorly, with their outer margins projecting over the eye, which gives a sinister look to the animal. The occipital plates are rhomboidal. The frontal are quadrilateral, with their anterior inferior angles very much prolonged; the anterior frontal are triangular, with their bases directed inwards, and their apices rounded, and turned to the nostrils. Between these frontals, so as to prevent them coming in contact with each other, is a narrow elongated azygos plate, reaching from the posterior frontal to the rostral plate, with a ridge on its upper surface, continuous with that of the rostral plate. The rostral plate is triangular, with its basis below and the apex very pointed above, and recurved, with a strong carina or ridge on the upper surface. The nostril plates are two on each side; the anteriorly quadrilateral, lunated on the posterior margin, with its anterior and inferior angle greatly prolonged; the posterior is narrow, and concave in front to complete the nostril. There are twelve orbital plates, the superior of which have been already described. Besides these there are three anterior orbital plates,

which are quadrilateral, the largest being above ; the inferior orbital are five, and the posterior orbital three in number, all of which are quadrilateral. The upper jaw has six lateral plates, quadrilateral, and increasing in size to the sixth, which is largest. The nostrils are very large, near the snout, and lateral. The eyes are large, the pupils dark, the iris light gray. The neck is nearly the size of the head when he is quiet, but when roused or irritated he flattens it more than twice its ordinary breadth. The body is elongated, thick, rounded above, but flattened at the abdomen, covered with scales strongly carinated above, the three inferior lateral rows being ecarinate, and with plates below. The tail is long, narrow, and terminating in a point, with scales or bifid plates on its under surface.

Color. The head above is dusky, with a light band between the orbits ; behind the occiput is a dark spot ; a dark band begins at the back of each nostril, which increases in size as it descends, and forms a large blotch on the side of the neck. The body is olive-brown, or sometimes brownish yellow, and marked with a triple series of black or dark gray spots ; those of the vertical series being subquadrate and elongated transversely ; the spots of the lateral rows are rounded, and many of them correspond with those of the vertebral line, while others alternate with them. Sometimes the spots of the lateral and vertebral lines are confluent, so as to give the appearance of bands.

Dimensions. Length of the head, 1 1-2 inches ; breadth of the head, when not disturbed, 1 inch ; length of the body, 27 inches ; length of the tail, 5 inches ; circumference of the body, 4 1-2 inches. In the individual here described, there were one hundred and forty-four abdominal plates entire, and two bifid plates near the vent ; and forty-two pair of subcaudal scales."

CROTALUS. Linn.

Generic characters. *Head large, triangular, rounded in front, covered with plates anteriorly; vertex and occiput with scales; a deep pit between the eye and nostril; upper jaw armed with poisonous fangs; body elongated, thick; tail short and thick, terminating in a rattle, which is a corneous production of the epidermis; plates on the abdomen, and under the tail.*

C. *durissus*. Kalm. *The banded Rattle Snake.*

Turton's Linnæus, vol. i. p. 672.

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 317, et fig.

Harlan's Med. and Phys. Res. p. 132.

N. A. Herpetol. vol. iii. p. 81.

This species, which is generally known in New England as the *rattle snake*, is extensively distributed throughout the State. Two fine specimens, taken at Douglas the last summer, gave me an opportunity for minute observation. One of them measured three feet and one inch in length, and was five inches in circumference; the other was three feet long. From the former, I drew up the following notes:

Upper part of the body, of a yellowish brown color, with rhomboidal black spots continued along the back, margined with bright yellow; upon each side of these rhombs a black band is continued to the sides of the body, where it terminates in an irregularly quadrate black spot; tail black. Body, beneath, yellow, with fuliginous dots and blotches distributed irregularly over its surface. Scales on the back elongated, carinated; scales upon the sides larger, carinæ less prominent. Length of the head, one inch and a half; width of the head, one inch. Top of the head, flattened; scales upon the top, small; on the sides of the head, large, pentagonal; on the edges of the jaws, quadrangular. Snout, terminated by one large plate; a quadrangular plate on each side of this; directly back of these, a smaller one, in which are the circular nostrils, situated obliquely, pointing forwards. Directly

above the two lateral plates, two others are situated; the first, meeting the snout anteriorly, and the second, extending some distance beyond the nostrils behind. At the anterior angle of the eye, a large plate, separated from the nostrils by two quite small plates, at the anterior inferior angle of which, is the aperture for the poison. A large plate over the eyes. Two plates much larger than the others, upon the throat.

The rattle is composed of six corneous portions. The other specimen has eleven rattles. The abdominal plates are 170; caudal plates, 24.

Although the poison of this species is very virulent, an accident is seldom known to occur; proving its unwillingness to be the aggressor, and that the fangs are used only as weapons of defence, after sufficient warning has been given of its presence, by the *rattles*.

The general impression that a rattle is added annually is incorrect. Dr. Holbrook observes, "It is now certain that rattle snakes have been known to gain more than one rattle in a year, and to lose in proportion, the exact number being regulated no doubt by the state of the animal as to health, nourishment, liberty, &c. I have known two rattles added in one year, and Dr. Backman has observed four produced in the same length of time."

The power of fascination attributed to this genus, is too absurd to require our serious consideration.

ORDER IV.

BATRACHIA.

RANA. Lin.

Generic characters. *Body covered with a smooth skin ; upper jaw furnished with a row of minute teeth ; another interrupted row in the middle of the palate ; no post-tympanal glands ; posterior extremities long, and in general fully pal-
mated ; fingers four ; toes five in number.*

R. *pipiens*. Lin. *The Bull-frog.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 106, et fig.

Harlan's Med. and Phys. Res. p. 101.

N. A. Herpetol. vol. iii. p. 81, et fig.

This is by far our largest species of frog ; it inhabits ponds, ditches, and pools of stagnant water, but is not common in this portion of the State.

A specimen lying before me twelve inches in length, serves for my description. Greatest width nearly three inches. Color above, a light green, with sparse dusky spots upon the back ; head green. Sides of the body, brownish ; beneath, white ; throat yellow. Legs, more or less barred with dull transverse bars. Fore legs, including toes, three inches in length ; above, of a dull greenish brown color, with indistinct brownish transverse bands ; beneath, white ; four toed, that next the outer, the largest, each with three small tubercles at the joints of the phalanges. Posterior extremities, seven and a half inches long, of a similar color with the anterior extremities ; the upper anterior half of the thighs barred with brown bands ; the upper posterior portion, greenish brown, with an in-

termixture of a duller brown color, with small white spots or blotches; legs with four transverse brown bands; indistinct bands on the feet; five toed, that next the outer, much the largest, being two and a half inches in length; toes palmated; and tubercled like the toes of the anterior feet; at the base of the little toe, is a prominent projecting carina along the edge of the phalangeal ridge of the largest toe; a row of yellow dots run to the second phalanx.

Length of the head, one inch and a half; width across the tympanum, two inches. Eyes prominent, large; pupils black; irides greenish yellow; distance between the eyes, three lines. Snout obtuse and yellowish, as well as the margin of the upper jaw. Nostrils about a line in length, situated obliquely, half way between the tip of the snout and the eye, appearing like two small black points. Tympanum half an inch in diameter, plane, looking like a large scale fastened to the head; just within its outer margin, a brownish circular ring; within this ring, greenish. Mouth large; numerous small sharp teeth in the upper jaw. Tongue large, fleshy.

In the stomach of this specimen, taken in Muddy Pond, Roxbury, I found five specimens of the "*Helix albolabris*," with the contained animal; one only was perfect, the others being more or less digested; this specimen measured one inch in its greatest diameter, and was five lines in height.

This species usually feeds upon frogs and insects, and the farmers assert that it sometimes robs them of their chickens.

R. *fontinalis*. Leconte. *The Yellow throated green Frog*.

Ann. Lyc. N. Y. vol. i. p. 282.

Harlan's Med. and Phys. Res. p. 103.

N. A. Herpet. vol. iii. p. 85, et fig.

This species appears very early in the spring, and continues extensively distributed throughout the season. It may be at once recognised by its greenish color, and yellow throat. Length of the specimen before me, three inches; length of the posterior extremities, four inches and a half. Head and

upper part of the anterior portion of the body, of a brilliant green color; posterior portion of the body slightly maculated, greenish, mixed with brown; sides granulated, brown, mottled with irregularly formed and distributed black blotches; beneath the throat, yellowish, abdomen white. Head one inch long; snout blunted and yellowish at the extremity. Eyes very prominent; pupils black; irides metallic, encircled by a brilliant golden ring. Nostrils nearer to the eyes than to the mouth. Gape of the mouth large, upper jaw with many minute teeth. Tympanum plane, circular, rust colored; four lines in diameter. From the posterior angle of the eye a cuticular fold extends just over the tympanum, along the edge of the back on each side, to the posterior part of the body.

Anterior feet fawn colored above, with several indistinct transverse brownish bands; a dark colored band along the posterior edge of the leg, extending on to the sole of the foot. Feet four toed.

Posterior extremities of a darker brown color than the anterior; thighs with indistinct bars upon their outer portions; buttocks covered over their whole surface with irregularly distributed black blotches; beneath, a dull white; legs and feet, same color as the extremities of the thighs. Feet five toed.

R. *halecina*. Kalm. *The Leopard Frog*.

Shaw's Gen. Zoology, vol. iii. p. 105.

Journal Academy Nat. Sciences, vol. v. p. 337.

N. A. Herpet. vol. i. p. 89, et fig.

This most beautiful species, called by Kalm the *shad frog*, from its appearing in Pennsylvania in the spring of the year, with the *shad*, is better known in this state as the *leopard frog*, from its ocellated appearance. It is exceedingly well marked, and considered by all a very pretty animal.

The upper part of the back, and external side of the limbs, brassy, with a metallic lustre. Upper surface of the body, marked with large distinct irregular spots or blotches which

have a brownish centre, a black circumference blending with each other, and a bright green halo ; generally there are two longitudinal rows of these blotches, which are continued the whole length of the body ; sometimes these spots are very regular, at other times, a third row may be seen, or the two will have become confluent at their inner sides, or the spots in the same row will have united with each other. Throat and abdomen white. Eyes prominent ; pupils black ; irides golden. On each side of the back, an elevated bronze colored ridge passes from the eyes to near the extremity of the body. A similar, but smaller ridge runs from the anterior angle of the eye to the snout. On the outer side of the thighs, legs and tarsus, the blotches are long, irregular, but arranged transversely, having the appearance of bands. Buttocks and posterior surface of the thighs granulated and mottled with black. Upper surface of the body finely corrugated with several irregular cuticular folds, arranged longitudinally on the back. Throat and belly smooth. Feet palmated ; the fourth toe much larger than the others. All the fingers and toes with tubercles on the inner surface of the joints. The body of this species seldom exceeds four inches in length.

This frog is generally found in damp places, a short distance from water ; although, being a great leaper and hence enabled to reach its wonted situations with ease, it is occasionally met with at considerable distance from any pond or brook.

R. *palustris*. Leconte. *The Pickerel Frog*.

Ann. Lyc. N. Y. vol. i. p. 282.

Harlan's Med. and Phys. Res. p. 105.

N. A. Herpet. vol. i. p. 93.

Although Leconte applied the specific name of "*palustris*" to this quite common species, on account of its being found near salt marshes, it is as frequently, in this vicinity at least, met with about the margins of fresh water brooks and ponds, as in any other situations. It is a prettily marked species, but much less brilliant in its colors than the preceding.

The largest specimen I have met with, measured three inches in length; and the posterior extremities were four inches and a half long. Color above, cinereous; abdomen white; interior of the limbs and lower part of the flanks, yellow. Upon the back, two longitudinal rows of dark brown spots, which are generally square, sometimes nearly circular; in some specimens, these become confluent and produce an elongated band; in the same specimens, both square and circular spots may occasionally be observed. Between the back and sides, a broad yellowish brown band is seen, commencing at the eyes, and extending the length of the body. Two rows of smaller spots of a similar appearance with those on the back and sides. Snout, pointed. Eyes rather prominent; pupils, black; irides, golden. Tympanum, small, color of the back; a dark colored line extends from the snout to the eyes, a roundish spot on the upper and inner side of each orbit, one on the top of the head, and a smaller one below each nostril. Thighs, legs, and tarsus, striped transversely with broad dark bands or oblong spots; arms irregularly spotted. Back, smooth; flanks slightly tuberculated; buttocks, granulated; fleshy tubercles on the lower surface of the toes at the joints.

R. *sylvatica*. Leconte. *The Wood Frog*.

Lyc. Nat. Hist. N. Y. vol. i. p. 282.

N. A. Herpet. vol. i. p. 95, et fig.

This beautiful species is not often met with, inhabiting as it does damp and thick woods; occasionally it is seen at a great distance from any water, and is very difficult to be taken on account of its agility in leaping. It is rather smaller than the "*palustris*," and presents the following characters: above, of a reddish brown color, resembling a dried dead leaf; sides, variegated with green and yellow; abdomen, white; under part of the arms and posterior extremities, lighter colored than the back. Snout, blunted. Eyes, prominent; pupils, black; irides, golden. A broad black band, narrow at its origin, wider at its

posterior portion, extends from the snout to the shoulder: this band passes through the centre of the eye, including within it, the tympanum; margining the lower edge of this band, is a deep yellow line running its whole extent. Extremities above, rather lighter than the back; the anterior extremities are seldom banded; the posterior extremities, crossed by transverse dark colored bands. Anterior extremities, four toed; posterior, five toed.

Like the three preceding species, this frog feeds principally upon insects.

HYLODES. Fitzinger.

Generic characters. *Mouth furnished with a tongue, teeth in the superior maxillary and palatine bones; tympanum, visible; extremities slender, tips of the fingers and toes terminating in slightly developed tubercles.*

H. *Pickeringii*. *Pickering's Hylodes.*

N. A. Herpet. vol. iii.

Rev. John L. Russell, of Salem, showed me the only specimen of this species I have ever seen, which was captured by Dr. Nichols, in Danvers. Having no opportunity to describe it myself, I extract the following account from the pages of the "Journal of the Essex County Natural History Society."

"Above, fawn color, changeable to dark cinereous; marked with two transverse narrow black lines, forming a cross, and an irregular narrow line on each side, producing, with the other lines, a general rhomboidal configuration; a large triangular spot on the back of the head, formed by the junction of lines proceeding from the centre of the irides; a spot at the insertion of the fore legs; a pale yellowish line margined with black, bounds the back part of the fore and hind legs; an irregular spot on the extremity of the rump; beneath, granulated on the abdomen, legs and thighs; a character also perceptible in some degree, on the upper surface. Head rather obtuse;

lower lip whitish ; throat, clavicle, and auricles, minutely spotted with black dots ; irides golden copper. When resting on a dark substance, it changes at pleasure to a dark ashen hue, the lines becoming black and prominent, and the spots on the head and rump very perceptible, as also the transverse bars on the upper surface of the legs. Length of the body from the snout, to the vent, one inch ; of hinder thighs and legs, each half an inch ; of tarsus and toes, seven tenths of an inch ; of the largest toe, four tenths of an inch. Whole length of the fore legs, half an inch."

HYLA. Laurenti.

Generic characters. *Body in general elongated ; upper jaw and palate furnished with teeth ; tympanum apparent ; no post tympanal glands ; fingers long, and with the toes terminating in rounded viscous pellets.*

H. *versicolor*. Le Conte. *The common Tree Toad*.

Ann. Lyc. N. Y. vol. i. p. 281.

Harlan's Med. and Phys. Res. p. 109.

As the *tree toad*, this species is commonly known throughout New England, from the circumstance of its being more generally found upon trees than in any other situation ; its color conceals it admirably, and it often eludes a careful search on account of its similarity to the object upon which it may be resting. A specimen two inches in length, exhibits the following appearances. Above, of a light ash color, with a brownish cruciform marking between the shoulders, and smaller irregularly formed blotches distributed over various parts of the back ; beneath, white, granulated, with a yellowish tint at the posterior portion of the sides. Head, broad ; snout, blunt. Eyes, large ; pupils, black ; irides, golden. Extremities ash colored above. Anterior extremities with a small number of brown markings ; beneath, white and brownish ; four fingers free, terminating in pellets. Posterior extremities

transversely barred ; beneath, granulated, yellowish white, becoming yellow near the abdomen and upon the legs ; five toes, terminating, like the fingers, in pellets.

An acrid secretion protects the skin of this species from its enemies. Its principal food is insects.

H. *squirella*. Bosc. *The little peeping Hyla*.

Ann. Lyc. N. Y. vol. i. p. 279.

Harlan's Med. and Phys. Res. p. 107.

N. A. Herpet. vol. i. p. 105.

The only specimen I have seen of this species was in a dried state ; its colors were destroyed and its proportions much changed from life. I have therefore no hesitation in copying the description and observations of my friend, Dr. Holbrook, as published in the first volume of his "*North American Herpetology* :

"*Characters*. Body olive green above, marked with dark brown blotches irregularly disposed ; a transverse dusky band between the orbits ; whitish beneath and granulated ; head short, with a white line extending along the upper lip to the shoulders.

Description. The head is short, with a dark band between the orbits, the line from each orbit being directed backwards so as to meet at an angle ; the snout is obtuse, with an indistinct dark band extending from the nostrils to the eyes, below which is a white line along the margin of the upper lip, reaching to the shoulder ; the lower jaw is almost white ; the nostrils are placed near the extremity of the snout ; the eyes are prominent ; the pupils black ; the irides golden ; the tympanum is bronzed and surrounded by an indistinct circle of dark brown. The skin is smooth ; the body short and depressed while living ; the back is olive green, with irregular blotches of darker olive ; the flanks are gray. The inferior surface of the body is granulated, greenish white in front, with a few dark spots at the throat ; the posterior part of the abdo-

men is darker. The anterior extremities are olive green above, with occasional spots of brown, and flesh colored beneath; the fingers are four in number, distinct, and each terminating in a viscous pellet. The posterior extremities are long, green above, obscurely blended with dark brown, and flesh colored beneath, tinged with yellow externally; the lower surface of the thigh is granulated; the toes are five in number, and semi-palmated.

Dimensions. Length of the body and head, 1 1-4 inches; of the thigh, 4-5ths of an inch; of the leg, 4-5ths of an inch; of the tarsus and toes, 9-10ths of an inch.

Geographical distribution. Its most northern limit must be considered as lat. 34°; we have no evidence of its being found farther north. It abounds in South Carolina, Georgia and Florida; how far west of these States it may exist cannot at present be determined.

Habits. This animal is found on trees, often seeking shelter under the bark of such as are decaying; it frequently chooses old logs for its place of hybernation. In fine weather and after showers, it climbs even the highest trees in search of insects.

General remarks. The colors of this animal are even more changeable than in any species with which I am acquainted. I have seen it pass in a few moments from a light green, unspotted and as intense as that of *Hyla lateralis*, to ash color, and to a dull brown with darker spots; the spots also at times taking on different tints from the general surface. The markings, too, vary exceedingly in different individuals, the white line on the upper lip and the band between the orbits alone presenting some constancy. Daudin remarks that the leg is "shorter than the thigh;" we have found them nearly equal in length, and this character is by no means so conspicuous as in *H. versicolor*.

Daudin first described this animal, and gave a figure of it, from a drawing furnished him by Bosc. Leconte has given the latest and most detailed account of it, establishing three

principal varieties, in one of which the spots, as well as the yellow on the thighs, disappear altogether.”

The specimen I possess was captured in Roxbury.

BUFO. Laurenti.

Generic characters. *Head, short ; jaws without teeth ; tympanum visible ; behind the ear is a large glandular tumour, having visible pores ; body short, thick, swollen, covered with warts or papillae ; posterior extremities but slightly elongated.*

B. *Americanus.* *The common Toad.*

Harlan's Med. and Phys. Res. p. 109.

N. A. Herpetol. vol. i. p. 75.

This very common species is beginning to be looked upon by the horticulturalist in the light of a benefactor, and by many is carefully preserved on their grounds for the benefits it affords them by feeding upon noxious insects.

A fine specimen, three inches in length, furnishes the following description : Greatest width, two inches. Body, brownish, mottled with black blotches ; its whole upper surface covered with prominent tubercles ; those upon the back, larger ; beneath, granulated, yellowish, sprinkled with black spots. Head large ; superciliary ridges prominent ; tympanum small, light colored, with an irregular darker colored black marking within its circumference. Mouth, large. Post tympanal glands large, equal in length to the distance between them. Eyes large ; pupils black ; irides beautifully reticulated with black and golden ; eyelids tuberculated. Between the eyes, on the top of the head, a yellowish white line commences, which terminates at the posterior extremity of the body.

The extremities above, of the same color as the back ; beneath, the color of the abdomen. A few small dark colored blotches upon the anterior extremities ; larger spots, sometimes

transverse, upon the posterior. Fingers four in number, short, free. Toes five in number, semipalmated; the second, much the longest; a large tubercle beneath, resembles somewhat a sixth toe.

SALAMANDRA. Brogniart.

Generic characters. *Body elongated; tail long; extremities four; fingers four; toes five; no tympanum; numerous small teeth in the jaws and palate; tongue as in frogs; no sternum; ribs rudimental; pelvis suspended by ligaments.*

S. *erythronota*. Green. *The red-backed Salamander.*

Journal Acad. Nat. Sciences, vol. i. p. 356.

Harlan's Med. and Phys. Res. p. 95.

N. A. Herpet. vol. iii. p. 113, et fig.

This beautiful and quite common species presents the following characters. My description is drawn up from a specimen between three and four inches in length. Tail rather shorter than the body, cylindrical, gradually tapering to a sharp point. On the upper part of the body, a broad band of a reddish brown color, sprinkled with brown spots, extending from the snout to the extremity of the tail, being less marked however upon the latter. Beneath, cinereous; much darker upon the sides. Throat whitish, having a distinct fold. Upper part of the head and tail, and also the sides of the body, presenting under the microscope, a beautiful metallic lustre. Head wider than the body, three lines in length, one and a half lines in width. Eyes very prominent; pupils black; irides metallic-colored. Anterior feet with four toes; posterior, five toed.

The motions of this species are very agile; walking rapidly when undisturbed, and running by sudden and irregular jerks when taken. I kept specimens alive several weeks by allowing them dead leaves, which were constantly kept moistened. From correspondents, I have received them from Cambridge, Roxbury, Milton and Amherst, at which places they were found under stones and decayed wood.

S. *symmetrica*. Harlan. *The symmetrical Salamander*.

Journal Acad. Nat. Sciences, vol. v. p. 153.

N. A. Herpetol. vol. ii. p. 59, et fig.

The fine specimens before me of this species, were found at Amherst, under decaying wood and leaves, by Professor Adams.

Length, three inches; tail, the length of the body, circular at the base, compressed towards the extremity. Whole upper part of the body, of a salmon brown color; on each side of the spine, from three to seven small ocellated spots of a beautiful vermilion color, surrounded by a black areola; skin above, covered with innumerable very minute tubercles, scarcely discernible without a glass, giving it a rough appearance. Beneath, of a golden orange color, sprinkled with minute black points, from the tip of the chin to the very extremity of the tail. Head three lines long, two wide, flattened; two longitudinal very obvious ridges, the length of the head, between the eyes. Eyes, not very prominent, of a deep black color, with a bright golden iris. Snout, obtuse. Anterior feet, with four toes; posterior, five toed.

In young specimens, the whole back is covered with minute black dots, and the sides have fewer ocellated spots than in the adult. The largest specimen in my possession, has seven ocellated spots on each side; in different specimens, these spots vary in number; but in all the specimens I have seen, an equal number exists on each side of the spine, in the same specimen.

The motions of this species are much less rapid than those of the "*erythronota*." It casts its skin in June. In the stomach of this species are found *spiders*, and detached portions of *insects*.

Dr. Holbrook has received this species from Florida; and J. W. Randall, M. D. of this city, brought me specimens from Hallowell, Maine.

S. *fasciata*. Green. *The banded Salamander.*

Journal Academy Nat. Sciences, vol. i. p. 350.

Harlan's Med. and Phys. Res. p. 94.

N. A. Herpet. vol. iii. p. 103, et fig.

The beautiful living specimen, from which my description is made, was found by Professor Hitchcock, at Monson, and kindly transmitted to me.

Its length is five inches ; length of the tail equal to that of the body ; oval at its anterior portion, slightly compressed in its middle, and pointed at its posterior extremity. Upper part of the body, of a light clay or ash color, with transverse dark brown bands extending from the head to the extremity of the tail. Whole under portion of the body, of a dark slate color.

Width of the head, equal to one half its length. Eyes prominent ; pupils, black ; irides, color of the abdomen. Snout, rounded. Anterior feet, four toed ; posterior, five toed.

Some of the bands in my specimen are confluent.

This is the only individual I have seen, and therefore think it must be a rare species with us.

S. *venenosa*. Barton. *The violet-colored Salamander.*

Daud. Hist. Nat. des Rept. t. viii. p. 229.

Trans. of Amer. Phil. Soc. vol. vi. et fig.

Harlan's Med. and Phys. Res. p. 93.

N. A. Herpetol. vol. iii. p. 105, et fig.

Dr. Barton's account of this, our earliest described Salamander, which is exceedingly interesting, is contained in the "Transactions of the American Philosophical Society." His specimen was six inches and eight tenths of an inch in length. It grows to a larger size even than this.

The specimen upon my table, is five inches in length ; tail, two and a half inches long, cylindrical at the base, compressed towards the extremity. All the upper part of the body, of a dark

purple color. On each side of the dorsal line, a longitudinal row of oval, circular and oblong spots of a bright yellow color, varying in size; these spots commence on the back part of the head, and are continued towards the extremity of the tail, where they become single. Smaller spots of the same color on the legs and feet, and above one of the eyes. Beneath, the body is of a lighter color, with a great number of very minute white dots. Length of the head, two thirds of an inch; width across, half an inch. Eyes, of a deep black color, and very prominent. A strongly marked cuticular fold around the throat.

The above described specimen was found in Roxbury.

In another individual, found by Professor Adams, at New Bedford, three inches in length, a row of small yellow spots, resembling a broken line, partially encircles the eyes; in this specimen, the abdomen is destitute of the small white points so perceptible in the preceding specimen, but its sides are covered with them.

A specimen of this species was brought me from Kennebec county, Maine, by J. W. Randall, M. D.

S. *salmonea*. Nobis. *The salmon-colored Salamander.*

N. A. Herpetol. vol. iii. p. 101, et fig.

The specimen described by me in Holbrook's "American Herpetology," was found by Dr. Binney, in Vermont; but as Dr. Holbrook says an individual of this species has been "found in the neighborhood of Danvers, Massachusetts," I can have no hesitation in admitting it in this report.

Length, six and a half inches; length of the tail, two and a half inches; compressed, carinated above, gradually tapering to a point. Whole upper part of the body, head, tail and legs, of a yellowish brown color; the sides of the head, neck, body, tail and legs, of a salmon color. The entire surface of all the upper portion, as well as sides, spotted with irregular grayish

markings, which are more obvious on the lighter colored sides. Beneath, the head and body white ; light salmon color beneath the tail.

Head, one inch in length ; width of the head, back of the eyes, four lines ; snout, very obtuse ; nostrils, rather small ; a strongly marked cuticular fold upon the neck. Eyes, remote, and very prominent ; pupils, deep black, with a metallic, copper-colored iris ; from the edge of the upper lip, just exterior to the nostrils, arises a salmon-colored line about a fourth of a line in width, which runs back to the inner angle of the eye, and passing up over the eye loses itself upon the middle of the back part.

This species was found upon moist land. It lived a year in confinement, and appeared perfectly healthy, eating voraciously of flies.

S. *dorsalis*. Harlan. *The many spotted Salamander*.

Journal Academy Nat. Sciences, vol. vi. p. 101.

Harl. Med. and Phys. Res. p. 99.

N. A. Herpet. v. ii. p. 57, et fig.

From Roxbury and Amherst I have received numerous specimens of this species by the aid of Professor Adams, and my brother-in-law Dr. Brewer. An individual three inches and three lines in length, exhibits the following characters. Tail rather longer than the body. Body, above, dark olive, and granulated as in the "*symmetrica* ;" lighter on the sides. All the upper part of the body, together with the feet, to the extremities of the toes and tail, sprinkled with innumerable black points. Beneath the body, the legs, and tail, of a sulphur color, darker under the tail, and tinged with olive ; similar black points with those above, are spread over the surface beneath, which in some specimens are much larger than in the "*symmetrica*." Eyes prominent ; pupils and irides similar to those of the "*symmetrica*." Tail very much compressed in its whole length, carinated above and beneath. Vent very prominent. Anterior

feet with four toes ; posterior five toed. Ocellated spots of a similar color with those on the "*symmetrica*," but smaller, are arranged on each side of the spine ; these spots vary in number on the two sides ; thus, of the eight living specimens before me, of nearly the same size, but three have five of these spots on each side ; the others have three and four and six and seven on one side, with five on the other ; and one specimen has nine on one side, eleven on the other, with a single line with one similar spot beneath this line on the side, and still another beneath, on the edge of the yellow abdomen.

All the specimens I have seen were taken in brooks. In the stomachs of several individuals, were found fragments of the genera "*Lymnea*," and "*Physa*." I have kept these animals for months, they seeming to thrive very well by a daily supply of fresh water, and a sufficient quantity of flies which they seize by a sudden spring, and swallow by several continued efforts. This species casts its exuvia in June, and the new cuticle is in all respects similar to the former.

In the "*Journal of the Academy of Natural Sciences*," Harlan describes a salamander which he calls "*dorsalis*," some of the specific characters of which, are "a whitish dorsal line extending from the occiput over the tail ; a row of whitish colored oblong spots on each side of the dorsal line ; beneath, freckled with black dots."

Not meeting with any description which agreed with the species I have just described, two years since I read an account of it before the *Boston Society of Natural History*, under the name of "*S. millepunctata*." My friend, Dr. Holbrook, while examining, with me, the last season, the reptiles belonging to the above mentioned Society, assured me he had seen the specimen in Philadelphia originally described by Harlan, and that it was the same species that I had supposed new. How Harlan could have made such a description as he has from this species, it is difficult to imagine. He must have described a specimen preserved in spirits, else he could not have seen "a row of whitish colored oblong spots on each side of the dorsal line ;" but even alcohol could not produce "a whitish

dorsal line," where no defined line existed, of any color, in life. Dr. Holbrook's second volume of his "*North American Herpetology*," containing a description of the "*S. dorsalis*," has, within a few months, issued from the press. Was I governed by his description, which makes no mention of the innumerable black dots above, which cover its entire *upper* as well as *under* surface in every individual of whatever age I have met with ; or his plate, which corresponds with it, I might be induced to disbelieve the identity of our species ; but preferring to think the omission may have been accidental, I would yield my doubts to the conviction of that distinguished herpetologist.

S. picta. Harlan. *The painted Salamander.*

Journal Academy Nat. Sciences, vol. v. p. 136.

Harlan's Med. and Phys. Res. p. 98.

I have never met with this species ; but Dr. Pickering, of Philadelphia, informed me, some time since, that a specimen belonged to the cabinet of the "*Academy of Natural Sciences*," which was found in a well at Ipswich in this State ; I therefore extract from the Journal of the Academy, Harlan's description of the species :

"Body blackish or dark slate color above, yellowish or light orange color beneath ; skin beneath the neck, folded ; head large ; legs strong ; tail compressed at its inferior portion nearly the length of the body.

Dimensions. Total length nearly four inches ; body rather more than two inches ; tail less than two inches ; length of the head six tenths ; breadth five tenths ; length of the hind legs six tenths ; of the fore legs four tenths.

Description. Head large, rather flat ; occiput broad, slightly protuberant ; snout obtuse, rounded anteriorly ; rictus of the mouth wide, extending posteriorly to the eyes ; anterior borders of the lips slightly undulating ; skin of the throat folded, so as to form a collar nearly surrounding the neck ; body above, blackish ; a longitudinal furrow extending from the

occiput along the back to the base of the tail ; inferior portion of the body obsoletely punctured with dark spots, more visible on the sides ; legs short, strong, and thick, externally of the color of the back ; internally of the color of the belly ; tail subquadrangular for the first two thirds ; the remainder or inferior portion abruptly compressed, pointed, with the superior and inferior borders carinate.”

S. *glutinosa*. Green. *The blue spotted Salamander*.

Journal Academy Nat. Sciences, vol. i. p. 357.

Harlan's Med. and Phys. Res. p. 94.

The only specimen I have seen, was sent me from Andover by Mr. Alonzo Gray. It continued alive for several weeks, and presented the following characters :

Length, six inches. Whole upper part of the body, of a very dark brown thickly sprinkled with distinct light blue spots. Sides appearing quite light colored from the blue spots having become confluent. Abdomen lighter colored than the back, exhibiting the spots more numerous and distinct than the back. Head, three quarters of an inch long ; nearly half an inch wide, flattened above. Eyes very prominent ; of a deep black color, widely separated from each other. Nostrils rather small. Legs, color of the body, and spotted like it. Anterior feet, four toed ; posterior, five toed, and unusually long. Tail, length of the body ; much compressed throughout its whole extent, save the extremities, the anterior of which is circular, the posterior pointed.

S. *maculata*. Green. *The brown spotted Salamander*.

Journal Academy Nat. Sciences, vol. i. p. 350.

Harlan's Med. and Phys. Res. p. 96.

The only specimen of this species I have seen was brought me by John W. Randall, M. D., of this city, who found it in a pond in Groton. This is quite a young specimen, being

only an inch and a half long, and having the branchiæ still attached; and as its colors have somewhat changed in the alcohol, I extract Green's description from the *Journal of the Philadelphia Academy*. "Length, four or five inches; tail about as long as the body, tapering, slightly compressed, and pointed; snout rounded; back whitish, sprinkled with irregular, reddish brown spots; beneath white; anterior feet, four toed, posterior feet five toed.

NOTE. Individuals of this species vary much in size, and in the number of spots. I have one about three inches long, with the tail more compressed and obtuse, than the above."

All the Salamanders here described, feed upon insects, which they devour in very large numbers, and hence their utility cannot be questioned.

A

REPORT

ON THE

ORNITHOLOGY OF MASSACHUSETTS.

BY

WILLIAM B. O. PEABODY.

TO HIS EXCELLENCY EDWARD EVERETT,

Governor of Massachusetts :

SIR,—

In some remarks which I had the honor to submit to you on a former occasion, when I offered reasons for not presenting my report at the time first proposed, I mentioned that the history and habits of our birds were not fully understood, and that experiments and observations would be necessary to accomplish all the objects of a survey. These will be suggested in the course of my report; and it will be obvious, that, were I so situated as to be able to make them, it could not be done without employing in it several successive years. I therefore respectfully set before you such information as I have, trusting that our present knowledge will soon be extended by the active and intelligent observers, who are engaged in this delightful study.

One object proposed is, to enumerate the birds of Massachusetts; another, to give what information we possess respecting their habits, particularly such as cultivators are interested to know. As Nuttall's valuable Manual is accessible to most readers, I have thought it better to refer to him for descriptions of the appearance of our birds, than to swell this report by repeating them. For the same reason, I shall follow his arrangement, subjoining to my account of each bird all I can learn respecting its services and depredations; that the husbandman and horticulturist may determine which it is his interest to protect, and which he has a right to destroy; or rather, whether it is not the part of wisdom to encourage and protect them all.

With respect to the first of these objects, it would be easy to give the names of those which remain with us throughout the year, or of those which come to us in their regular annual migrations. But beside these, there are some which make their appearance at uncertain intervals, and it is not always easy to determine whether they should or should not be numbered with our birds. There are others also, which have been found apparently wandering from their usual ways, but which, having come to us once or twice, may do so again. The

proper course seemed to be, to give the names of all which have ever been seen here, leaving it to future observation to determine whether our State is their resting-place or their home.

In explanation of the difficulty alluded to, I may mention one or two facts which were communicated to me by Dr. Thomas M. Brewer of Boston, whose unwearied and successful researches will soon extend our knowledge of this subject much beyond its present bounds; and to whom, in connection with some other gentlemen, whose names will appear in the course of the report, I am happy to acknowledge my great obligations. He informs me, for example, that a PURPLE GALLINULE, *Gallinula martinica*, was shot in Stoneham on the 27th of November, 1837. This is a bird belonging to tropical America, and usually passes its winters near the Gulf of Mexico; and yet, when taken, instead of appearing exhausted, like a lost wanderer from its usual haunts, it was in good flesh, and evidently had been lately feeding. Mr. Cabot also states that a FLORIDA GALLINULE, *G. galcata*, was shot in Fresh Pond several years ago. This last incident is not wholly unprecedented, the same bird having been found near Albany, in the state of New York. The visit of the beautiful Purple Gallinule, is, I believe, entirely without example. But I can no more regard them as our birds, because they have been thus found once or twice within our borders, than I can regard the Stormy Petrel as a land bird, from the circumstance of having met with it in Springfield, seventy miles from the sea. I learn also from Dr. Brewer, that three specimens of the LITTLE CORPORAL, *Falco tomicarius*, were lately killed in Stoneham and brought to the Boston market. This is a bird discovered by Audubon, and so rare, that even Nuttall professed to know nothing of it from personal observation. The same gentleman has also obtained in Boston harbor, the POMARINE JAGER, *Larus pomarinus*, a bird so rare, that the indefatigable Audubon himself never encountered it within the limits of the United States.

It is well known that some birds, for obvious or unknown reasons, change their favorite resorts, at times withdrawing from places where they have been common, and appearing in other places where they have not been seen before. Of this singular migration, the CLIFF SWALLOW, *Hirundo fulva*, is a remarkable example. It is well known that the Chimney swallow came from the wilderness in the same manner; but in that case, the reason was manifest; it was because, in cities and villages, chimnies are always to be had, while trees, hollow from the top, are not common, even in our ancient woods. No simi-

lar reason can be given for the movement of the Cliff Swallow, which has emigrated to us with a quarter of a century, and is now the most common of the tribe in some parts of the State. The earliest information I have of its appearance in New England is from Chief Justice Shaw, who tells me that he found it at the White Mountains, in the summer of 1816. In the case of birds rarely or lately found among us, I can only offer what information I am able to obtain, and must leave it to the reader to judge for himself, whether they come as accidental wanderers, as spies to explore the country, or as pioneers to take possession and establish a permanent home.

With respect to the second object of the survey, that of giving information which may be useful to cultivators of the soil, I am fully persuaded from my examination of the subject, that there are no birds which it is our interest to destroy. There are some which are occasionally troublesome in our fields and gardens; but, do what we will, we cannot prevent their depredations; if we shoot them, we only gratify our revengeful feeling, since new reinforcements stand ready to supply the place of every one that falls. And this is not the only thing to be regarded. In every instance of our removing a present inconvenience, we are opening a door for the entrance of much greater evils. But without any systematic discussion of this point, I shall introduce remarks as they suggest themselves, in the course of the report, showing where we are indebted to any birds for services, and where we suffer from their depredations; leaving the reader to balance the one against the other, and to judge for himself whether the course of mercy or revenge is the best for him to pursue.

Having made these remarks in explanation of the plan which I propose to follow, I proceed to give the names of such residents and visitors in our State as I have been able to ascertain. There may be some passed over; and if so, I hope that those who have not favored me with the results of their observations, will aid in accomplishing the objects of the survey, by giving the information they may possess, to the public, in some other form.

BIRDS OF PREY.

THE JER-FALCON, *Falco Islandicus*, a bold and graceful bird, is seldom found wandering far from the icy latitudes in which it dwells, and it is only in the depth of winter, that it is ever seen as far south as Massachusetts; but we have Nuttall's high authority for saying that a pair is occasionally seen within our borders. In the days of falconry, this fine bird was employed for striking the larger prey, which it did by out-soaring and pouncing upon them with great rapidity and power. There is much variety in its markings, and some specimens are found to be nearly white; which is believed to be an indication of age, its whiteness increasing with years.

THE AMERICAN SPARROWHAWK, *Falco sparverius*, a beautiful little falcon, which is said to be rare in the maritime parts of our State, is not at all uncommon in the inland villages, where it comes fearlessly into cultivated enclosures, and pursues its prey without regard to those who pass by. The blue jays have a bitter aversion to it, probably, because it interferes with their own piratical expeditions. Whenever it appears, they follow it with loud and abusive language, mocking its cry with ridiculous exactness, till the hawk, who, in general, seems rather entertained with the exhibition, at last, stunned with their noise, and provoked at their impudence, seizes the foremost of their number; without, however, putting a stop to their persecutions.

This bird is partial to the southern climates: some few remain in New York during the winter, but the ordinary cold of New England at that season is too severe. Still, it is seen here in cold weather, perched on some tree or stake which commands an open view, where it watches for mice or any smaller game, not being particular, and caring more for the quantity than the quality of its food. It is easily tamed, and would be an amusing companion, were it not for its taste for

chickens; the hen, no longer hen-hearted in defence of her young, gives battle to the little hawk and destroys him. I believe that the nest of this bird has not been found in our State.

THE PIGEON HAWK, *Falco columbarius*, is rare in the western part of the state, and Nuttall had the impression that it was not seen in New England; but Dr. Brewer informs me that he has often found it in the vicinity of Boston. It is migratory in its habits, and, when in pursuit of its prey, cares not whither it goes. It siezes the robin, the wild pigeon, and even the gold-winged woodpecker, on the land; and on the water, it pursues much larger birds, which can escape from it only by diving. It has been known to attack birds in cages, in the very heart of cities; and so indifferent is it to danger, that it does not even shun the presence of man, the common object of dread. When wounded, it throws itself on its back as the hunter approaches, and with angry screams, prepares to defend itself to the last. Where the pigeon hawk raises its young is not certainly known. It is not seen in the United States except in early autumn and winter; in the spring and summer, it is probably in the northern regions; but at other seasons it travels to the most southern boundaries of our country.

THE LITTLE CORPORAL, *Falco temerarius*, is so rare a bird that when Nuttall's work was published, the only specimen known, was the one discovered in Pennsylvania, and described by Audubon, twenty years before. In a spirit of somewhat doubtful compliment, he named it after Napoleon, I believe from some supposed personal resemblance to that great human bird of prey. Nothing is yet known respecting its habits, nor the place and the manner in which it rears its young; but the singular fact just mentioned, that three specimens of a bird so uncommon were obtained at the same time in a single village, seems to indicate that the species will be more common. This would be no unheard of thing on the part of hawks, which sometimes appear and remain in considerable numbers, where none had been found for years, if ever before.

The GOLDEN EAGLE, *Falco fulvus*, a fierce and angry bird, loves the wildness of desert and mountainous regions, where it neither seeks nor fears the presence of man. As such tracts are not wanting in Massachusetts, it sometimes comes within our bounds; but it delights more in ridges as desolate as the White Mountains of New Hampshire. It is not common anywhere, and is hardly ever seen in the more level and cultivated parts of the country. In pace and swiftness of flight it is inferior to some other birds, but it exceeds them all in the power of its brilliant eye, which enables it to aim, with unerring precision, at its destined prey. Its flight, if not so rapid as that of other eagles, is exceedingly majestic and graceful, and answers to the fine description,

“Sailing with supreme dominion,
Through the azure depths of air.”

The nest of the golden eagle has been found on the Hudson, but never, I believe, within the limits of our state. Perhaps it may be found hereafter on Graylock or some of our western mountains. They build, of course, where they can find abundance of their usual food, such as fawns, young racoons, rabbits, and wild turkeys; but they are indifferent to climate, enduring the utmost severity of winter, and moving with ease and unconcern in the face of the most violent storms. The golden eagle would be the acknowledged head of its family, were it not for the giant discovered by Audubon. The ring tailed eagle of Wilson is now well known to be the young of the present species.

The WASHINGTON EAGLE, *Falco Washingtonianus*, was discovered by Audubon, and happily named by him in honor of the man, who is still the absolute sovereign of all hearts in this country, and will continue to rule over it for ages, by his memory and example. It was known before our great ornithologist recognised it as a new species, and was supposed to be one of the familiar kinds; but from the circumstance of its building on a cliff, and procuring its food by diving instead of robbing the fish-hawk, it was obviously different from the

brown eagle, as the bald eagle, in his immature state, is often called. It was not till two years after he first saw it, that Audubon was able to obtain a specimen, when he found that his conjectures were correct, and that it was neither the brown or sea eagle, as Wilson calls the young of the white-headed, not knowing that it was an immature bird; nor was it the true sea eagle, *Falco albicilla*, which it more resembles. From the latter it is distinguished by its greater size, and by the greater length of the tail, which in *F. albicilla* does not extend beyond the folded wings.

The favorite residence of this bird is in the rocky solitudes near the great lakes, where it is seen flying in broad circles near the land or the surface of the water: when about to dive, it descends in spiral rounds, keeping its eye upon the fish, and comes very near it before it makes its plunge; when rising, it flies low, to a considerable distance, and then devours its victim at leisure. When the severity of winter closes the water and abridges its means of subsistence, it sometimes wanders into New England, and in January and February, the coldest months in our year, it is occasionally seen within our bounds.

The WHITEHEADED OR BALD EAGLE, *Falco leucocephalus*, is the most familiarly known of all the eagles. Against the remonstrances of Franklin, it was adopted as the emblem of our country, an honor to which it was entitled, if not by its character, at least by residence, since it is found in every part of the Union, leaving the colder latitudes to the sterner and harder of the race. It manifests a preference for the warmer parts of the country, but all who live near our lakes and larger rivers or the shores of the sea, are acquainted with its towering flight and its solemn cry, which, impressive as it is, in the midst of desolation, is nevertheless, like that of all other eagles, so harsh and discordant as to leave without excuse the excise officers of Bristol, in England, who detained a couple which Colonel Montague had imported, under the act which imposed a duty on singing birds.

The manner in which this eagle subsists, though not credit-

able to its morals, is strongly illustrative of its power; and as power and oppression are apt to be united in human beings, we cannot wonder that the same alliance should exist in birds. It stands perched on some tree, from which it commands a wide view over the waters, where it waits in gigantic repose, its wings lifted, as if keeping time with the heaving sea. It seems to look with calm unconcern on the numberless birds that are sporting or gathering food upon the waves; but all the while its bright eye is fixed upon the industrious fish-hawk, which, unconscious of danger, is quietly gathering food for his young. The moment he reappears from his plunges, whitening the sea with foam, the eagle launches forth from his resting place, pursues him with force and rapidity even greater than his own; and when, after wheeling in broad circles and trying every art and effort to escape, the hawk is compelled, as a last resource, to let fall his prey, the eagle balances a moment, as if to make sure its aim, then shoots down like an arrow, and secures its prey before it touches the wave. These exhibitions excite much sympathy for the injured party in those who witness them; and it is to be hoped, that it was no prophetic discernment which selected this eagle, beautiful as it is, to represent the character of our Union.

Sometimes the fish-hawks, when they can endure their injuries no longer, combine their forces, and compel the eagle to retreat from the shore. In that case, it makes havoc among other birds, or when those resources fail, it sometimes carries away lambs from the neighboring farms. It is said that it has made an attempt to carry off children, and there is no doubt that it has sufficient strength and courage. Sometimes it robs the sportsman of the birds which he has shot; it seems to understand the use of the gun, and to know that when once discharged, it is harmless till loaded again. It is commonly very difficult for a person thus armed to approach this eagle, for, audacious as it is, it does not rashly expose itself to danger. It is shot by approaching it under the cover of a tree, or after a snow-storm, when, for a time, it seems to lose much of the power of its eye.

The white plumage of the head, from which this eagle derives its name, is not fully developed till the fourth, and sometimes not till the fifth or sixth year of its age. This is the case when the bird is in confinement; perhaps when at liberty, it may attain its full beauty at an earlier age. In other respects, this eagle is mature within a year from the time of its birth.

The FISH-HAWK, *Falco haliæetus*, which is so often a victim to the rapacity of the eagle just described, is an interesting and harmless bird, which confines itself industriously to its employment of fishing, never attacking other birds nor land animals, though it has great strength of flight and of talons, and though it sometimes arrives in the spring when the bays and ponds are frozen and its food is difficult to be procured. It has no controversy with any bird except the eagle, and that warfare must be regarded as defensive; no single hawk is able to encounter the enemy, but by joining their forces, they become too strong to be resisted.

The fish-hawk is on excellent terms with the fishermen, though they are of the same trade. Its coming announces the arrival of the shoals of fish that crowd our rivers in the spring. Perhaps its exemption from persecution may be owing also to its well known gentleness of disposition. Unlike other birds of prey, the fish-hawks are social and friendly to each other. They come to us in flocks of eight or ten, who build near each other, and rear their young in perfect harmony, and this spirit of hospitality and kindness is extended to other birds that seem to have no claim upon them. The crow blackbirds are permitted to shelter in the interstices of their nests, which are huge constructions, made of a cartload of heavy materials firmly matted together. The notion that the fish-hawk protects the domestic poultry from other hawks is without foundation, since it never interferes with the pursuits of any bird whatever. It is well however, that the impression should exist, for if not well founded, it serves the cause of humanity and saves the fish-hawk from destruction.

These birds come upon the coast of Massachusetts at the last of March or the beginning of April, keeping time with the alewives, on which they feed. For some reason or other they seldom breed here. The first appearance of frost, is the signal for them to retreat to warmer climates. They are not uncommon in the interior of the country near our lakes and large rivers. In winter, they are sometimes seen near New Orleans; but this is not by any means the extent of their migrations, and these probably are individuals which have not strength to accompany the rest.

The AMERICAN GOSHAWK, *Falco palumbarius*, formerly supposed, on the authority of Bonaparte, to be different from the European, is now generally admitted to be the same. It is not common in Massachusetts, nor in any part of the United States; but it sometimes follows the flocks of ducks in their migration, and destroys considerable numbers. It is an active and restless bird, seldom seen off the wing, except when devouring its prey, and is so fleet in its motions that, in Maine, it will dash down at the farmer's door and carry off chickens so rapidly that it is hardly possible to shoot the robber. In the western country, it follows the immense flocks of pigeons, and selects its prey from among them, notwithstanding the swiftness of their flight. Audubon saw one of them give chase to a flock of grakles, from which he seized four or five in succession, letting them drop into the water below; after killing a sufficient number, he picked them up one after another and carried them to the shore. This bird is so savage and voracious, that it has been known to eat the young of its own species, when destitute of other food.

The AMERICAN BROWN, OR SLATE COLORED HAWK, *Falco fuscus*, is now known to be the same with *F. velox*, and *F. Pennsylvanicus*, which Wilson described as distinct species, though not without suspicions that they might turn out to be the same with others formerly known. It is not common in New England, but is said to abound in the thinly settled parts of the southern states, where it often makes great havoc among

the domestic poultry, which it seizes and carries off in the very sight of the farmer. We learn from Nuttall, that one of them, in pursuit of his prey, burst through the glass of a green-house in the Botanic garden at Cambridge, and then through an inner partition of glass, where, his wing feathers being torn by the glass, he was arrested in the attempt to break through a third. Wilson speaks of the slate-colored hawk, as found in the Atlantic states generally; but its numbers anywhere must be small. Its nest was found by Audubon, in one instance, in a hole in a rock, in others, built with sticks on trees.

COOPER'S HAWK, *Falco Cooperii*, was named by Bonaparte, in honor of Mr. William Cooper of New York. It is added to the list of our birds, on the authority of Mr. Samuel Cabot, Jr., who obtained a single specimen in Cambridge. The circumstance that so little is known of this fine bird, after all the researches of eminent ornithologists, shows what a broad field of the science is yet untrodden, and makes it a subject of congratulation, that so much zeal and intelligence are now engaged in the study. The food of this hawk consists principally of birds; which, of various sizes, from the ruffed grouse to the sparrow, are laid under contribution. In the southern states, they are said, like the preceding species, to be troublesome in consequence of their depredations upon the poultry.

The ROUGH-LEGGED FALCON, *Falco lagopus*, and *Falco Sancti Johannis* were supposed to be two distinct species, till Audubon showed that these, and *Falco niger* of Wilson, were names of the same bird at different ages; a mistake easily made, since of eight specimens which Audubon received at one time in Boston, no two were alike in their markings. Their flight was alike, and all their attitudes, as they sat perched on stakes and trees, or flew about pursuing their prey; but the dark colored birds were much more shy than the light ones, a difference which he ascribed to their greater age. *Falco niger*, in his opinion, is the old rough-legged falcon.

These birds are found in the neighborhood of swamps and

marshes, where they watch for moles, mice and frogs, and occasionally encounter a wounded bird. Their appearance is heavy and inanimate, suiting well with the dreary places where they reside ; but as they are supposed to resemble the owls in their vision, perhaps they make up, by activity at night, for their sluggish listlessness by day. Their home is in the north, where they doubtless rear their young ; but their habits in this respect are very little known ; it is only in winter, when their food fails, that they come into our State, and sometimes proceed to the south as far as Maryland.

The SHORT-WINGED BUZZARD, *Falco butoides*, is found in this State ; more abundantly at the approach of winter than at any other season. In New York, it is said to commit depredations on the poultry ; but here, it is not thought to have activity and courage enough for an enterprising and successful robber. It remains inactive on the margins of swamps and meadows ; making a hoarse cry at intervals, to which its mate replies. But if not remarkable for spirit, it has some good traits of character ; it is said that if the female is killed, the male will attend and feed the young till they are able to provide for themselves ; but of their habits in this respect, we know nothing from observation ; they do not breed in this State, though Pennant says that they remain in New York through the year, and build in the beginning of May.

The RED-TAILED HAWK, *Falco borealis*, is more certainly known as a destroyer of poultry. Though shy at other seasons, in winter they approach the farm, sweeping near the ground and snatching a wandering hen or chicken. But, like the crow, they seem to have an intuitive perception of the use and reach of the gun, and if they see a person armed, they give a scream of disgust, and sail away far beyond his reach. As farmers give them the name of hen-hawks, and treat them accordingly, they are compelled to exert much caution in their distant intercourse with man. They are able to do this successfully, by means of their rapid and powerful flight ; they can float high over a whole plantation without a single flap-

ping of their wings : all the while they make a mournful cry, as if wholly intent upon their own sorrows, but they are in reality keeping sharp watch on every thing that moves below ; should they see an animal, they alight, take deliberate aim, and shoot down like an arrow to secure it. They will sometimes, as if in the mere enjoyment of this power, soar upwards till they are lost in the clear blue sky. These birds rear their young in Massachusetts, building in forests where they may escape persecution. The frame-work of their nest is made of sticks, and finished with twigs and coarse grass. The eggs are of a dull white, blotched with black and brown. The young are fed with squirrels, rabbits, and various other food. As soon as the young are able to take care of themselves, the old birds dissolve their partnership, and treat each other as perfect strangers.

The BLACK WARRIOR, *Falco Harlani*, was first discovered by Audubon in Louisiana. He at first supposed it to be the black hawk of Wilson, but on examination it proved to be a new species, allied to the preceding, but superior to it in every thing but size. It is considerably smaller, and, though not able to contend with its enemy, the red-tail, escapes by its superior fleetness. It seldom preys on animals, but subsists on poultry, partridges and other birds. Nuttall informs us that these birds are occasionally seen in Massachusetts ; and, though it is not known that any one has been taken, the observation of such a naturalist is not to be disregarded. Of the nest and habits of this bird at the breeding season, nothing is yet known.

The RED-SHOULDERED HAWK, *Falco lineatus*. It has been a subject of discussion whether this is a species distinct from the Winter falcon, *Falco hiemalis* ; Audubon, in his first volume, maintained that they were different, and said that the winter falcon was much more common than the former. I have since understood that he has found reason to change his opinion ; and if it be true that they are the same, *F. lineatus*, the name of the supposed adult, is the one that should be pre-

ferred. In a list kindly furnished me by Dr. Brewer, it is set down as breeding in our State.

The HEN-HARRIER OR MARSH HAWK, *Falco cyaneus*, though found here in considerable numbers, is not of any great importance, either as a friend or an enemy of man. In the southern states, though not common, it is in high estimation for its services in destroying the small birds, while they are engaged in plundering the fields; but in the northern states, it generally confines itself to marshes, where it skims along the ground in search of mice and frogs, which are its main dependence for food, sometimes carrying on its labors in the twilight or the moonlight. In the winter, it extends its migration from Hudson's Bay to the southern limits of the United States. Audubon found it at Labrador on the one hand, and at Texas on the other.

The MERLIN, *Falco aesalon*, of which a specimen was obtained by Dr. Richardson at Carlton House, in the fur countries, is at present but little known in America. It is the same with the English merlin, which was formerly used in falconry, being valued for its strength and spirit, though inferior in size. The female could kill a partridge at a single pounce, but the male contents himself with humbler game. Nuttall assures us that this bird is occasionally seen in the vicinity of Boston.

In the list of birds of prey, I have not included the GREAT-FOOTED HAWK, *Falco peregrinus*, not having ascertained that any one has been taken here; but as they are growing numerous in other places where they have been rare, and are now found in states not distant, subsequent observations will probably include them in the number of our birds.

The HAWK OWL, *Strix funerea*, is so much like the former class of birds of prey in its appearance, that, at a short distance, one could hardly determine whether it is a hawk or an owl. It is a native of the Arctic regions; in the fur countries it is well known, from its practice of following the hunter and

snatching up the game when it falls. Little is known about it here, since it is but seldom that it wanders into New England.

The SNOWY OWL, *Strix nyctea*, is more common in Massachusetts than in most other states of the Union. It makes its appearance at the approach of winter; its large size and snowy plumage are well suited to resist the climate in the icy solitudes where it dwells, and nothing but the difficulty of procuring a subsistence, drives it from its favorite home. There, it delights in the stern solitude of a night which lasts for half the year, and its dismal cries, resembling those of a man screaming in agony, are said to increase the dreariness even of that fearfully desolate scene. When it is compelled to wander in search of food, it is quite abundant in Canada; often found in the most northern states, and occasionally seen as far south as Florida. It frequents the banks of streams, sailing slowly over the surface, or takes its station on a rock, watching for its prey; and the moment a fish appears, it secures it by a sudden grasp of its claw. Its food, however, is various, consisting of rabbits, grouse, ducks, and mice; it is probably the pursuit of rats and mice which brings it near the abodes of men, where it would not be caught by accident, since it has power to see both by night and by day.

Audubon believes that he has reason for asserting that the yellowish whiteness which makes the plumage of this owl so rich and beautiful, is not acquired till after a certain age. He has shot many which were of an uniform light brown; these he formerly thought were of a different species; but now he considers them the young of the snowy owl.

This bird is said to breed in the northern parts of the state of Maine, but there is, as yet, no sure authority for the assertion. Their nests are not found in Labrador nor Newfoundland: probably they are to be sought for in the highest latitudes, since the snowy owl comes to us like a herald of the winter storms, and spends the rest of the year in his Arctic home.

The RED OWL, *Strix asio*, is a permanent resident, and rears its young in Massachusetts; appearing more common in winter, not because it migrated in the milder season, but, its supplies in the forest failing, it comes to barns and houses in search of food. During the day, it finds shelter in unfrequented places, and when seen, appears drowsy and listless, as if more than half asleep. It has good reason for preferring solitude at such times; for the smaller birds, which it persecutes by night, know that they have the advantage by day, and do not scruple to follow up their revenge. Sometimes they proceed from words to blows, and the owl, having the worst of the battle, is compelled to seek safety in a random flight. It is known by the name of the little screech owl, from the cry which it makes in the early part of the night.

In connexion with the history of this bird, Audubon asks the question, why it is that the owls living in the milder climates, should be thus defective in their power of vision, while the natives of Arctic regions can see both by night and day, when the sun or moon shines bright on the snow. Without referring to the structure of the eye, it is obviously a *reason* of this difference, that, if those birds had not the double power, in latitudes where the days and nights are unequal, they would be able to see for half the year, and would be blind for the other; and thus when the days are long, must perish for want of food; whereas, to those which live where the hours of sunshine are not many, even at the summer solstice, it is no hardship to be compelled to take rest by day.

Nuttall kept one of these owls in confinement, to observe its habits. In the day, it retreated to a dark closet; but as night came on, it grew restless, gliding along the room in perfect silence, a power which the owls owe to the delicate plumage of their wings. Sometimes it would cling to the wainscot, and turn its head almost round, resembling a spectre with its bright glaring eyes. In all the owls, the globe of the eye is immoveably fixed in its socket, by an elastic cartilaginous case, in the form of a truncated cone. On removing the outward membrane which covers this case, it is found to consist

of many parts, placed like the staves of a cask, overlapping a little at the narrow end, and capable apparently of being enlarged or contracted. The eye being thus fixed, the owl, in order to see any object is obliged to turn its head, and has the power to move it round, almost in a perfect circle.

The RED OWL, *Strix asio*, rears its young in Massachusetts ; it lays from four to six eggs, in a hollow tree, with a lining of hay or leaves. As soon as the young are hatched, it makes liberal provision of food for them. It is the small birds which suffer on these occasions, and it is in revenge for this carnage, that they pursue the owl with so much detestation.

The GREAT HORNED OR CAT OWL, *Strix Virginiana*, is well known, though not much to his advantage, in consequence of his depredations on the domestic poultry. Being one of the largest and strongest of his tribe, more than two feet in length and four in extent, with energy and courage in proportion, he is capable of making great destruction in solitary farm yards, especially when he adds to his powers of mischief, a caution and cunning, in which even the cat does not exceed him. This, however, is one of those evils which lessen as the population increases, so that in our state, though most villagers are acquainted with the bird, there is not much complaint made of his depredations.

The flight of this owl is easy and graceful : when it discerns its prey, it falls upon it so swiftly that escape is impossible. Hardly anything comes amiss to its voracious appetite, but it prefers the larger gallinaceous birds, and delights particularly in any fish that chance may throw upon the shore. Its cries are loud and shrill, sometimes resembling the barking of a dog ; at other times, they are compared to the last gurglings of a murdered man striving in vain to call for help. When wounded, it resists with great fierceness, striking with its bill and claws, its large eyes opening and shutting in quick succession, and its feathers rising so as to double its apparent size.

The great horned owl is one of those which rear their young

in Massachusetts. The nest is generally in the fork of a tree, made of twigs, and lined with leaves and a few feathers. The eggs are from three to six in number; the color, white. The male relieves the female in sitting. The young remain in the nest till they are fully fledged, and acquire the full plumage of the old birds in the succeeding spring.

The CINEREOUS OWL, *Strix cinerea*, or Great Grey Owl, as he is commonly called, is very often found in Maine, but seldom in Massachusetts. Several years since, one was taken on a woodpile in Marblehead, and lived some months after its capture. But such visits are accidental, and its home is at Hudson's Bay and Labrador, where it is found throughout the year.

The LONG-EARED OWL, *Strix otus*, is found in Massachusetts, but is never common; it is most likely to be seen in winter, when it comes near the farms in search of rats and mice, which, together with moles and field-mice, are its chief dependence for food. It is sometimes mistaken for the young of the great-horned owl, a species which it resembles in everything but size, so that they are easily confounded by untaught observers. It is like it in courage also, and when wounded, makes a fierce and angry resistance, which it is difficult to overcome.

The SHORT-EARED OWL, *Strix brachyotus*, is another of those wanderers which occasionally leave their northern home to visit us. It feeds almost entirely on mice, and can be brought into view sometimes, by imitating the low squeak of its prey. They are attracted also by the light of fires, and, either in blindness or ferocity, have been known to attack the men near them. They are remarkable for spirit, and, though small, not exceeding thirteen inches in length, it is almost dangerous to approach them. In their intercourse with each other, they are more social than most other birds of prey. Bewick says, that in England, more than two dozen have been seen engaged in the same field, destroying mice in company. In this work of extermination they are eminently serviceable to

the farmer : but, like many other birds, they have reason to complain that man is slow to discover, and still slower to acknowledge his obligation.

THE BARRED OWL, *Strix nebulosa*, is found in this and all the other states of the Union, and though it inhabits the northern regions, abounds most in the southern parts of our country. Their food is various, consisting of rabbits, grouse, squirrels, rats and mice, and, beside what they obtain in the field and forest, they levy large contributions on the domestic poultry. They are not destitute of sight by day, but they move doubtfully, as if uncertain of the character of the objects near them ; in the night they are quick and active, and if domesticated for the purpose, are said to make excellent mousers. So delicate is their plumage and so noiseless their motion, that we are told by Audubon, he was aware that one was flying directly over his head, only by its shadow cast by the moonlight on the ground ; though it was only a few yards distant and flying fast, he could not hear the least rustling of its wings. Their cry is loud and discordant, resembling a forced burst of laughter, and makes a strange contrast with the solitude and silence of the night.

The barred owl is often offered for sale in the New Orleans market, and by some is considered palatable food. Audubon says that the snowy owl is good eating, but they are so cat-like in their habits, that before they could meet with much favor on the table, a considerable amount of prejudice must be overcome.

THE ACADIAN OR LITTLE OWL. *Strix acadica*, is found in Massachusetts, but lives so retired by day, that it is not generally known. It is a beautiful and animated bird, with a note singularly discordant, resembling the filing of a saw. Audubon, one day, walking near his saw-mill, heard this sound proceeding from it, and finding the door locked, went to the miller's house to ascertain who was engaged in filing the saw. There he ascertained that the little owl which had a nest hard by, was the author of these unmusical sounds. This bird is

probably the *saw-whetter*, which is heard so often by those who visit the White Mountains. Its common cry at night resembles the dull sound of a whistle.

This bird is solitary in its habits, confining itself to the ever-green forests by day. When disturbed it flies timidly, and takes advantage of the first shelter it reaches, where it may be caught by one who uses sufficient caution in his approach. At evening it becomes lively, flying round with wonderful swiftness in search of mice, beetles, moths and grasshoppers. It sometimes manifests a desire to see the world. Some have been taken in the heart of our cities; in Cincinnati, one was caught on the edge of a cradle in which a child lay asleep.

The ARCTIC, or WHITE-HORNED OWL, *Strix arctica*, is a rare and beautiful bird, of which a single specimen was obtained by Dr. Richardson in his expedition, shot with an arrow, by an Indian boy. Nuttall says, that a specimen was once seen for two or three days in Cambridge, and from descriptions which I have received, of a bird resembling the snowy owl, with horns, I am persuaded that it will turn out to be a more frequent visiter than is now supposed.

TENGMALM'S OWL, *Strix Tengmalmi*, is a small species, and so entirely a bird of night, that when seen abroad by day, it is unable to escape, and may be caught by the hand. It feeds on mice and beetles, and is found in all the forests of the fur countries, where its melancholy note, repeated at intervals, like minute guns, awakens the superstitious feeling of some of the Indians, who call it the bird of death. It is on the high authority of Audubon, who, as Dr. Brewer tells me, has found this owl here, that it is added to the present list.

In an economical point of view, the birds of prey just enumerated, are of no great importance. The hawks, and some of the owls, are powerful birds, and, as the depredations of the latter are carried on by night, they might be very destructive to the poultry if their numbers were greater. But in so extensive a country, most of them can secure food without trusting

themselves in the vicinity of man. For this reason, the great proportion of them do not come near us ; and those which do, are more likely to render service by destroying field-mice and similar animals, than to make themselves odious by plundering the farm. Instead, therefore, of waging a war of extermination against them, it is our interest, if not to encourage, at least to let them alone.

OMNIVOROUS BIRDS.

Before proceeding to describe the omnivorous birds, which come next in the proposed order, it may not be amiss to make some remarks on the practice of destroying them, which prevails to a great extent in our state. Sometimes it is deliberately done, by those who wish to secure their orchards and gardens ; and, in such cases, there is a right, no doubt, to prevent aggressions, if possible. But far more are killed every year by wanton boys, who, without any reason but their own pleasure, are permitted to indulge in a cruel amusement, from which every man of sense and feeling should carefully withhold his children. Any one who can find sport in giving pain to animals, needs to be taught the first principles of humanity ; and, lightly as this matter is regarded, it is certain that this thoughtless indulgence always depraves the moral feeling more or less, and leads on to the formation of habits of idleness which are not easily broken in after years. In a busy country like ours, there are few, beyond the age of boy-hood, who have time for play ; a civilized man is supposed to find his enjoyments in his duties ; and if he needs relaxation, he can find it without torturing animals, whose right to happiness is as good as his own.

It is, however, in the light of utility, that this subject can be most forcibly presented ; and it will be seen, that, to exterminate birds which do a little harm occasionally, is to protect

ourselves from a small evil at the expense of a greater ; it is in fact securing the fruit by the sacrifice of the tree. There is no question that we are now suffering severely in consequence of this folly. No kind of cultivation is affected to any considerable extent by the depredations of birds, and if it should be, means may be devised to prevent them. Not so with the insects and their ravages ; the fate of the locust, the apple, the pear, and many other trees, shows, that if insects fasten themselves upon one of them, we must give it up as lost, for all that we at present know. Surely, then, of two evils we should submit to the one which may possibly be prevented, rather than invite and encourage one over which we have no control.

A slight calculation will show what an amount of service birds are able to render. Wilson makes the computation, that each red-winged blackbird devours on an average fifty grubs a day ; so that a single pair, in four months, will consume more than twelve thousand. Allowing that there are a million pairs of these birds in New England in summer, which is but a moderate estimate, they would destroy twelve thousand millions. Let any one consider what an immense injury that number of insects would do, and this would be sufficiently striking to show how much we are indebted to the labors of these birds. But the computation may be greatly extended, for many insects have young by the hundred ; beside cutting off the existing destroyers, they are prevented from multiplying ; and when we consider what myriads of birds there are, constantly and efficiently engaged in this service, it gives us an impression, beyond the power of calculation to reach, of the astonishing manner in which the increase of insects is kept down, simply by sparing the lives of their natural destroyers ; and this, it must be remembered, is the *only* means of preventing their increase and reducing their formidable numbers. No other remedy that man can apply will reach the evil ; this is the vocation of birds ; and if, for the sake of removing a small evil, we will not permit them to live and labor in it, we must not complain when the natural consequences come.

This is not mere speculation ; we have experience to teach us on this subject. Kalm records, that after some states had paid three pence a dozen for the destruction of blackbirds, the consequence was a total loss in the year 1749, of all the grass and grain, by means of insects which had flourished under the protection of that law. The example of our trees, just alluded to, is also a standing warning ; for we see that new ones are adding to their numbers. The maple, perhaps the most valued of our ornamental trees, is now marked out for destruction, and in spite of all that *we* can do, will soon be entirely lost. There is nothing to prevent this process from going on ; other trees will soon swell the list of victims ; and when it is too late, we shall lament that we have extended the evil, by protecting our enemies and persecuting our friends. Every cultivator, for his own sake, as well as the public good, should endeavor to spread right views on this subject, and to show that the wanton extermination of birds, is throwing difficulties in the way of horticulture and farming, which no industry, science, or skill can overcome.

The AMERICAN STARLING, *Sturnus ludovicianus*, better known by the name of meadow lark, is a beautiful bird, and one of the most welcome messengers of spring. Wilson thought it far superior to the sky lark in sweetness of voice, though not equal to it in compass and power. By others, its song is underrated ; and the truth is that the notes of different individuals vary from each other, some having a wriery and lisping voice, while that of others is eminently sweet.

The favorite haunts of this bird are meadows and old fields. They can walk easily on trees, but prefer the ground, where they employ themselves in searching for insects and berries, almost always associated in companies, though not very near each other. If a gun be fired, great numbers will start from different parts of the same field. They are always gentle and retiring, and never show any disposition to encroach upon the orchard or the garden. In winter, they resort to the open woods, but in the close, deep forests, they are never found. Some of them are seen with us late in winter ; but the great

body doubtless emigrate to the south, since they are found at that season in the Floridas, in great numbers, and some retire beyond the limits of the Union.

In the pairing time, these birds select a tuft in the field or meadow, and there construct their nest with coarse grass, with a lining of the same material. It is in the form of an oven, and is ingeniously concealed by matting together the blades that surround it. It is also provided with a retired avenue, through which only one at a time can enter. The eggs are white, blotched, and sprinkled with reddish brown. These birds are very kind and friendly to each other. While the female sits, the male provides her with food and watches over her retreat. When the young are hatched, toward the end of June, they both guard and provide for them with affectionate care. The lark has few enemies excepting hawks and snakes and young sportsmen. The farmer brings no charge against him, and even children spare the nest and the young.

THE BALTIMORE ORIOLE, *Icterus Baltimore*, is perhaps the most splendid of all our summer visitors, and is admired, both for the richness of its plumage and the full-hearted sweetness of its song. It is known by various names; children call it the gold-robin; it is often called the hang-bird, from the peculiar nest which it suspends from the tree, and some give it the poetical name of fire-bird, from its glancing through the foliage like a flame of fire. Most birds of this family remain in tropical climates, where they need an inaccessible nest to secure them from serpents, monkeys, and other artful foes, and when they come to us, they retain the same habit, though exposed to no such dangers. They are not, however, without that prophetic instinct which is so remarkable in many birds. When they build in the south, they make their nest from the light moss, which allows the air to pass freely through it, and, as if aware of the heat which is to come, complete it without a lining; while in the cool and variable climate of New England, they make their nests of soft substances, closely woven, with a warm lining, and hang it in a place where it shall have the early heat of the sun.

The construction of this nest is a singular process of art. The male takes a string, stolen perhaps from a window, and with his bill and claws ties one end to a drooping twig of an elm or some orchard tree. Having secured this, he proceeds to fasten the other end, in the same manner, to another twig drooping parallel with the former, a few inches distant, letting it fall between the two twigs like a swing. The female then comes and fastens another string so as to cross the former, and to keep the twigs in their place as a circular frame-work for the nest. Having thus determined its depth and circumference, they proceed to weave a coarse cloth, with such materials as they can find, forming a pouch, impenetrable to the elements, in the bottom of which they place the real nest, the whole fabric being shaded by the arbor of leaves above it from the rain and the heat of the sun. They take such materials as come to hand; skeins of silk and thread, which have been missed by housewives, have been found at last, woven into the baltimore's nest. It is difficult to understand how they can do this without the aid of mechanic art; but Nuttall observed that a tame one was constantly endeavoring to thrust his bill between the closed fingers, in order to force them open; which helps to explain the manner in which they open interstices and insert threads in the process of weaving. The female lays from four to six eggs, of pale brown, dotted, spotted and lined with dark brown. A day or two before the young are able to leave the nest, they creep in and out, and sometimes cling to the outside. After leaving it, they are fed and protected by their parents for several days, and then driven forth to try their own fortunes in the world.

The motions of this bird are singularly animated and graceful. They are often seen clinging by the feet, like a rope-dancer, in order to reach some insect from a branch beneath them. In the spring, they feed almost entirely on insects, and it is evident, that, numerous and active as they are, their services must be of great value. Nor can they be accused of doing harm to any extent, natural as it would seem for them to claim some reward for their labors. They are often charged with

plundering the pea-vines in the garden ; but Dr. Harris has shown that they resort to them for the sake of the grub of the pea-bug, which they draw out from its shelter, and thus protect the vegetable which they are said to destroy. But it is not necessary to plead the cause of this universal favorite ; he seems to know the esteem in which he is held, and he builds as readily in the elm that swings over the city street, as on the tree that shades the cottage door in the country.

The RED-WINGED BLACKBIRD, *Icterus phæniceus*, is well known in all parts of Massachusetts, and though sometimes mischievous here as well as elsewhere, is not disliked and persecuted, as he is in many other states. On the contrary, the pleasant associations of spring are awakened by his coming ; some of his notes are agreeable to the ear, and his bright red wing coverts, contrasted with his glossy black plumage, make him a striking object in the meadows where he resides. As soon as these birds hear the voice of spring, they set out from the southern states for the north, in small flocks, the males singing an invitation for the females to follow. They often reach us before the snows are gone, and are seen laboring to collect worms, grubs and caterpillars, as they walk with a rapid and graceful step over the meadows and fields. They often follow the ploughman to collect the insects turned up by the share, and move with easy confidence, knowing that they may trust his good nature then, if at no other time. In fact, they seem to know, that they can do for us, in the way of exterminating these enemies of all vegetation, what nothing else can ; and to take it for granted, that man, who is blessed with reason, will make some use of it and not deprive himself of services which no other creature can render. This calculation, like many others made on human wisdom, is often disappointed, and men and hawks combine to reduce their numbers, but in vain.

The red-wings build their nests in marshes or wet meadows, forming the exterior of coarse dried weeds, lined with fine grass or hair, and sometimes secured to the ground by such cordage as the place affords. The eggs are from four to six,

light blue, thinly spotted with dusky. In August the young are ready to associate in flocks, and this is the time when they are found in such countless numbers, feeding upon the corn. Those who make war upon them, resemble the traveller, who, annoyed by the chirping of grasshoppers, alighted from his horse to put them all to death. When fired upon, they only remove from one part of the field to another ; and as for scare-crows, they seem to be rather entertained by such exhibitions of human skill.

The COW BLACKBIRD, *Icterus pecoris*, is never numerous, like the former, and is so much less inclined to the corn-field than to the insects which are found in it, that it cannot be regarded as an enemy of man. But it is generally detested for other good and sufficient reasons, that is, if we suppose the bird to be a moral agent, and fully acquainted with the enormity of its own proceedings. Inclined to perpetual roving, and having a strong aversion to all domestic cares, the cow-bird contrives to escape them by laying its eggs in the nests of other birds, making them foundling hospitals for its own young. When the owner of the nest returns, for the cow-bird takes advantage of its absence, and when it finds the stranger in its premises, it manifests much uneasiness and agitation. Sometimes it throws it out, but as small birds are the victims on those occasions, it often has not strength for the effort. If that is the case, it sometimes covers up the egg by making a new floor to the nest. If unable to do either, it submits patiently to the imposition. The cow-bird's egg is always hatched first, and the young cow-bird sometimes stifles the lawful heirs by its superior size. The parent bird however, feeds it, and treats it with more kindness than could be expected under the circumstances ; and the foundling, as if aware of his obligation, conducts with decency and respect, making various ineffectual efforts to strike a tune, in acknowledgment of the kindness of its benefactor.

These birds are named from their habit of following cattle,

to which they are of service, by catching the insects that molest them. They come with the spring, and leave us in October, in company with their cousins, the red-wings, with which they associate very little while here, perhaps because they are remarkable for that philoprogenitiveness in which the cow-birds are so shamefully wanting.

The RICE BUNTING, *Icterus agripennis*, which has received its name from the wild-rice on which it feeds, is much better known among us by the name of *bob-o-link*, a word resembling its notes, some of which are wonderfully sweet. It is not among the pioneers of spring, but whenever it arrives from the south, it is warmly welcomed, and gives great animation to the meadows by its parti-colored dress, its busy chatter, and its queer and lively motions. Here, it does very little injury to the grain, though it is said to be troublesome in the southern states. On the contrary, it is incessantly employed in exterminating crickets, grasshoppers, and ground-spiders, creatures which are especially beholden to those who make war on this beautiful bird. But it is not nearly so much persecuted in New England as in other parts of the country, where it is regarded as delicious food and sent to the markets in great numbers. How far to the south they go on their return, is not certainly known; it is thought, that many of them pass the winter in the West India islands.

The nest of the rice-bird is always among the grass or grain, and composed of coarse grass, lined with that which is finer. The eggs are from four to six, white, tinged with blue, and spotted with a blackish color. As soon as the young are able to fly, they all begin to gather in flocks, the males having put off their summer uniform, and wearing the quaker dress of the females and young. This is the time for their depredations, and immense foraging parties lay waste the fields of the middle and southern states. For this purpose they fly by day, whereas in their migration eastward, in the spring, they fly only by night.

THE CROW BLACKBIRD, *Quiscalus versicolor*, is an active and sociable bird, who warns us by his loud clanking note, late in the spring, that he is once more in our fields and gardens, apparently unconscious that there can be any objection. He is one of those creatures, concerning which it is difficult to say whether they are friends or foes; sometimes they are the one, sometimes the other, and it is only by striking a balance between the service and the injury, that we can determine how to regard them. That the grackle pulls up corn for the sake of the seed, is undeniable; but it is also true that it devours immense numbers of insects, grubs, and caterpillars; perhaps it may be possible to secure his services and prevent his depredations; and farmers are now trying to accomplish this object by preparing the seed before it is sown, in some solution which shall make it less tempting to the crow blackbird.

This bird returns from the south early in the spring, and large numbers resort together to some favorite tree, where they associate with each other on the most friendly terms, and keep up a perpetual chatter. They build also in communities, sometimes in bushes, but most frequently in a large tree. The nest is made of mud and coarse grass, with a lining of fine grass and horse hair. The eggs are five or six, green, blotched with dark olive. As soon as the leaves fall, the young set out with their parents, in vast collections, on their return to the south, laying the country under contribution as they go. No matter how much they are fired upon, they think it better to be shot than to starve, and all the efforts of the farmer cannot drive them from his fields. Audubon says that the southern farmers soak their seed in a solution of Glauber's salts, which is believed to make it less palatable to the birds in the spring.

THE BLACK ORIOLE, *Quiscalus baritus*, is seldom seen in this vicinity, and probably rests here but a little while, on its annual migration. One has been obtained by Mr. Samuel Cabot, jr. in the neighborhood of Boston.

THE RUSTY GRAKLE, *Quiscalus ferrugineus*, is much more common than the former in the western part of the state. On their way to the north, they are in haste, having an immense distance to travel; on their return, they are more deliberate, and are seen in the field in large flocks, keeping company with the cattle. Neither this nor the former rears its young in this state.

THE AMERICAN CROW, *Corvus Americanus*, persecuted as it has been for years, still abounds in Massachusetts, as is testified by the scare crows and other ornamental devices, that embellish our fields in the spring. It is not to be supposed that the sagacious crow mistakes for living beings these productions of the statuary's art; but he easily understands what they are meant for, and makes his depredations in a less public manner than he might otherwise do. His suspicions are always awake, and he exerts a caution, which has given rise to the imagination that he can smell powder; but this, though a common belief, implies a delicacy of sense and a knowledge of cause and effect, quite beyond the compass even of the crow. His bearing in a domesticated state contrasts powerfully with his shyness when wild; he becomes familiar and easy, talks loudly and incessantly, steals and secretes whatever he perceives is valued, opens the door by treading on the latch, and plays a great variety of tricks, some of them laughable, others very annoying. In his wild state, he exerts all this shrewdness in the work of procuring a subsistence. His art is so perfect, that he can, by inserting his bill in the egg of the largest bird, carry it away from the nest to be eaten at his leisure. In this manner, he will bear away, one after another all the eggs in the nest of a wild turkey. His cunning does not arise from want of courage, for he may sometimes be seen chasing a hawk or an eagle, which, pressed by numbers, is compelled to sound a retreat. In this way he often officiates as a guardian of the domestic poultry.

The crow feeds on almost every thing eatable, without choice or delicacy in the selection. It devours fruits, vegeta-

bles, and seeds ; snakes, frogs, and other reptiles are also to its taste ; it does not despise worms, grubs, and insects ; and if hungry, will eat the flesh of animals when so far decayed that even an epicure would reject it. Farmers are very bitter in their feeling toward the crow, but perhaps they would be more moderate in their resentment at his depredations, if they were aware, that the cut-worm has the benefit of all their efforts to destroy the crow. Whether that voracious grub will feel any gratitude for this protection, may be doubted.

The crow selects the most retired places for its nest, forming it of dry twigs interwoven with grass and plastered with mud or clay, with a lining of fibrous roots and feathers. The eggs are from four to six, of a pale green spotted and clouded with olive or blackish brown. Both the male and female sit, and are remarkable for their attachment to their young as well as to each other. If any nest is approached, all the crows in the neighborhood gather in crowds and express their disgust at the transaction. As soon as the young are able to fly, the parents introduce them into the community of crows, and they remain in flocks till the spring. It is needless to say that they spend the winter here.

The BLUE JAY, *Corvus cristatus*, one of the most graceful and elegant of all the feathered race, is very troublesome to other birds, which he persecutes by stealing their eggs, and sometimes by destroying their young ; but he can hardly be called a nuisance by the farmer, since it is only in winter, that he comes into enclosures in search of food, and then he takes little, except what has accidentally fallen from the corn-house or the barn. In the southern states, his depredations are much greater, and the planters soak their seed in a solution of arsenic, which proves fatal to the robber. These birds are said to abound at the south in winter ; but if any really migrate from Massachusetts, it must be but a small proportion ; since, if a handful of corn be anywhere thrown upon the snow, it will be very soon surrounded with a busy and animated party ; and, bad as their reputation is, no one can help admiring their beau-

tiful colors and lively motions. It is impossible to deny that their reputation is deserved. One of them, in Charleston, destroyed all the birds in an aviary. A flying squirrel was once put into the cage of a blue jay for one night, and on the following day, it was found killed and partly eaten; but, savage as he is, his courage is not proof; many smaller birds will drive him away from their nest; he, therefore, creeps to it in their absence, and will thus steal round a whole neighborhood daily, to devour the new-laid eggs. He sometimes frightens away the smaller birds, by imitating the sparrow hawk's voice. In this power of mimicry he excels; and when domesticated, he counterfeits the sounds and voices of the household so naturally as often to occasion much perplexity and confusion.

The blue jay breeds generally in the United States. Here it makes a coarse nest of twigs and fibrous roots, on some forest or orchard tree. The eggs are four or five, of a dull olive, spotted with brown.

The favorite food of the blue jay consists of chestnuts, acorns and Indian corn. It always breaks the corn; and for this purpose holds it between its feet, and hammers it with its bill. But almost everything eatable, even potatoes, sometimes are included in its bill of fare, and it should not be omitted, that they render service by destroying insects and caterpillars in great numbers.

The BLACK-CAP TITMOUSE, *Parus atricapillus*, is better known by the name of Chickadee, an imitation of its note in winter, when it is exploring the trees in all directions to find insects and their grubs or eggs, which latter form its favorite food. By their labors in this way they are of eminent service, particularly in keeping down the numbers of the canker-worm, a pest which human ingenuity is wholly unable to reach. When these are wanting, they subsist on various seeds, holding them in the claws, and picking them open with the bill. They often come near houses also, in search of small bits of meat, or the crumbs which are swept out at the door. They seem perfectly indifferent to the change of seasons, moving

about gaily in the severest day; but they give the spring, when it returns, a warm and grateful welcome; their plaintive whistle at that time, resembling the words *phe-be*, with rising and falling inflections, is one of the sweetest sounds which announce the morning of the year.

The eggs of the chickadee are laid in holes in trees, which they sometimes excavate with their bills, without the formality of preparing a nest. They are from six to twelve in number, white, with specks of brown red. The young, as soon as fledged, resemble the parents, and associate with them, in a cheerful party, running over trees in all directions, sometimes hanging with the head downward, and leaving no crevice unexplored where insects may possibly harbor.

The CEDAR BIRD, *Bombycilla Carolinensis*, is well known, or as some would say, notorious, and not so generally welcome as one might suppose, who regarded only the silken delicacy of its plumage, and the insatiable appetite with which it gathers caterpillars, beetles and cankerworms from the trees. The reason is, that in the season of fruit, they repay themselves by eating cherries, pears, and other luxuries with so much relish and so little discretion, that they have been known to gorge themselves to death. When they alight upon a tree, they are so crowded together that many may be killed by a single shot. They immediately spread themselves over the branches, picking the fruit faster than their mouths will hold it; and not suspending their labor for an instant, except to invite other flocks that may be passing over, to descend and share it with them. If the horticulturist, who sees the results of his labor disappearing, undertakes to prevent it, he only wastes his powder; that some of their number are shot, is a matter of unconcern to the survivors; he may gratify his revenge, but the scene of plunder will go on before his eyes; and he can only console himself with the reflection, that, in proportion to the appetite with which they devour his fruit, is the energy, with which, at other seasons, they take his part against enemies which he himself cannot reach. The truth seems to be, that, till

fruit becomes more common, as it doubtless will be, these depredations will continue to be vexatious and discouraging; and the better way will be, to accept them as an intimation, to provide enough for ourselves and the cedar-birds too.

There are some things curious and unexplained in the habits of this bird. They may not unfrequently be seen sitting in a row, when one who has found a favorite morsel, hands it to his next neighbor, he, instead of eating it, passes it on, and thus it goes round, each one declining it with a Parisian nod of his tall cap that is perfectly irresistible. What this ceremonious display may mean, it is not so easy to tell. They have also a habit, when wounded, of remaining still and stiff, as if dead, and will suffer a person to take them up in his hand, without the least effort to resist or get away.

They generally build, in the orchard, a carelessly constructed nest, of coarse grass lined with fine. The eggs are about four, of a purplish white marked with black spots, larger toward the great end. The young are fed at first on insects, and afterwards on fruit. The parental affection of the old birds is not exemplary, since, if the nest is approached, their impulse is to take particular care of themselves. Gentleness, however, is the uniform characteristic of this bird. It comes to us in the beginning of April, and remains till late, being a northern bird, and capable of enduring cold.

The WAXEN CHATTERER, *Bombycilla garrula*, is a bird hitherto supposed to be unknown in Massachusetts; but I learn from Dr. Brewer, that an individual of this species was pursued in this State by the younger Mr. Audubon, who is familiar with birds of all descriptions. It must therefore be set down as a visiter in our State, though probably accidental.

INSECTIVOROUS BIRDS.

The GREAT AMERICAN SHRIKE, *Lanius septentrionalis*, is commonly called the Butcher bird, from its habit of destroying other birds. It pursues them with a vigor from which they cannot escape, and strikes at them, even when kept in cages and under the protection of man. There have been many cases in which it has thus risked its own life and liberty in order to secure its prey. But Wilson was of opinion, that grasshoppers and other insects were its main dependence for food, and that it was only when pressed with hunger, that it preyed on other birds. Still, it has the habit of imitating the notes of other birds, particularly such as indicate anxiety and distress, and it does it apparently for the purpose of bringing the companions of the supposed sufferers within its reach.

All who have paid any attention to this bird, have remarked its curious habit of impaling on thorns the insects it has caught, and there leaving them to decay. This practice of gathering what he does not want, and keeping it till it can be of no use to him, is regarded as an unaccountable mystery in a bird, while in man, the same proceeding is considered natural and wise. It can hardly be meant as a decoy, for, as just stated, it has the power of attracting other birds by false appeals to their sympathy, and does not need to take this trouble. It may sometimes be heard sending out these false alarms, and when the poor birds collect, in anxiety to learn what the matter is, it darts at one of them and fills the air with the cries of a real victim.

Though the feet of this bird are small, the claws are sharp, and can inflict a severe wound. Its flight is bold and strong, and on this it depends for securing its prey. It is seldom, if ever, seen walking on the ground. At the approach of spring, most of them leave us, though some are said to pass the summer in the forests of New England.

THE AMERICAN GREY SHRIKE, *Lanius excubitorides*, is said by Nuttall to be seen in winter in the vicinity of Boston.

THE KING-BIRD, *Muscicapa tyrannus*, is with us from the middle of May to September. All this time he labors diligently in our gardens, destroying beetles, crickets, grasshoppers, and cankerworms, without claiming any reward. In fact, he seems to take the whole farm under his protection, and if a hawk ventures near, he attacks him with so much fury, flying over him and plunging on his head and back, that the hawk and even the eagle is glad to leave the field. The only instance in which he is supposed to do mischief, is in catching the bees as they are engaged among the flowers. This however is not common enough to be a subject of complaint or revenge. The king-bird fears no enemy except the purple martin, which has the advantage in its superiority of flight; thus on many occasions, they combine their forces to repel any intruder upon their bounds.

The king-bird's nest is constructed of coarse stalks of grass, with flakes of wool, tow, or down, woven in between, and lined with fibrous roots and horse hair. The eggs are from four to six in number, blush-color, spotted with brown. They are very affectionate toward their young. I once observed a pair building on a decaying tree, apparently unaware that all the branches of the tree were dead, except the one which contained their nest. When the young were hatched, the weather became intensely hot, and the nest was entirely open to the sun. In order to shield their offspring, the old birds stood, by turns, on the side, with their wings spread so as to overshadow them. The position was evidently constrained and painful; they panted with the effort and the heat; but they did not grow weary of it till the weather relented, and the protection was no longer needed by the young. If a cat appears in the vicinity of their nest, the king-birds attack her so violently that she is glad to retreat, though somewhat ashamed to yield to such a little foe.

The GREAT-CRESTED FLYCATCHER, *Muscicapa crinita*, is spoken of by Nuttall, as nearly unknown in New England. It is probably more common in other parts of the state than in the vicinity of Boston ; though I learn from Dr. Brewer, that Mr. Cabot, who is familiar with the bird, has seen it in Cambridge. Professor Emmons assures me that it breeds in Berkshire. It is doubtless one of our birds, but not numerous enough at present to be of much importance. It is difficult to say why its reach of migration should be less than that of other birds of its tribe, which do not equal it in hardihood and power of flight, nor can any natural cause be imagined which should prevent its going farther to the north than our southern border. Its food, consisting of insects, grapes, and berries, such as those of the poke-weed, can be found any where. It was probably some accidental preference in the beginning, afterwards continued from habit, which confines this species to the southern parts of New England.

The PEWEE FLYCATCHER, *Muscicapa atra*, commonly known by the name of *phoebe*, is a familiar and welcome bird ; not valued for its beauty or its song, in both which respects it is deficient, but held in general esteem, because it reposes confidence in man. Its favorite resorts are bridges and barns and similar frequented places. It prefers the vicinity of water, but this is not indispensable ; it cares rather for a good hunting ground for insects, and as these are most abundant in the places just mentioned, the phoebe generally selects them. There it sits on some roof or post, singing its song, such as it is, occasionally suspending it to dart after a passing fly. As these birds are active and successful in this pursuit, the domestic cattle are not a little benefited by their labors.

The phoebe returns from its winter quarters in the beginning of April. At first it resorts to the woods, but soon comes into the village to select a place for its nest. It is remarkable for its local attachment, and will return to the same place, year after year, even when it has been disturbed repeatedly in its possession. It builds under bridges, in caves, or the sides of

wells, under the eaves of buildings, or in barns, making the nest sometimes on the top of a beam and sometimes attaching it to the side. The eggs are about five, of a pure white. As the nest and the young are so little concealed from observation, they are often destroyed by boys taking early lessons in inhumanity, and their parents little suspect how much such practices can do to brutalize the character and moral feeling. Audubon gives a very interesting account of a pair, which became so familiar with his presence and so well satisfied of his good intentions, that they made no objection to his going up to their nest and handling the young. He tied threads round the legs of some ; but not having any particular need of garters, they or the old ones, always contrived to remove them. He then made use of silver thread, which they could not displace, and the next year found that some of those thus distinguished, had returned to the same spot. After an absence of two years, he revisited the spot, and found that one of the birds knew him, while the other was distrustful and shy. On inquiry, it appeared that a boy had killed the female and her young, and that the old male had brought home a second wife, who knew nothing of him as a friend of the family, while her husband remembered him well. Before the country was settled, the phoebe, no doubt, built its nest on the rocky banks of streams ; but finding an advantage in acquaintance with man, it has left its old haunts, when better can be found.

The OLIVE-SIDED FLY-CATCHER, *Muscicapa Cooperii*, is described by Nuttall, who first discovered and gave it a name. He says that it is doubtless the same with the *M. borealis* of Richardson, though he became acquainted with it before the publication of the "Northern Zoology." The nest of this bird is said to resemble that of the king-bird, and the eggs, those of the wood pewee. Audubon confirms the fact that this bird is found in Massachusetts, but the line of its migration he has not been able to ascertain. He considers it as a new comer into the country.

THE WOOD PEWEE, *Muscicapa virens*, is a very common summer bird, and may be regarded as very useful, since, though solitary in its tastes and habits, and preferring the shelter of the woods, it is very often found in orchards and fields. It resorts to the most shaded parts, not from any fear or distrust of man, but because, having the power of seeing in the obscure twilight, it does not love the glare of day. It arrives in Massachusetts in the middle of May, and may then be seen perched on low stakes or branches, occasionally darting after insects, which it secures with a snap of the bill. Its song, heard in the dusk of evening, is pleasant, and harmonizes with the calmness of the hour.

The nest of the wood pewee is generally built on a horizontal branch, somewhat after the manner of the humming bird's, and coated over with moss, so as hardly to be distinguishable from the bark. The eggs are three or four, of a yellowish white, spotted with lilac and brown. In autumn, when the young are full grown, the parents bring them into our villages, and even our cities, and teach them to procure their food. They sweep so near the surface of ponds, as to snatch the insects floating on the water; sometimes they chase them from the top of the highest tree. Before the leaves are fallen, they are gone to their winter home.

THE SMALL PEWEE, *Muscicapa Acadica*, is a very common summer bird, which comes to us from the far south, toward the close of April, and returns in September. Like the former species, it prefers retired and shaded places, where it sits quietly on a low branch, waiting for insects to come near. When they appear, it takes a sweep and secures them, and then returns to its station. Its note is sharp and not pleasant; but the bird is fearless and familiar, not removing from one who passes by, till he comes almost within reach. Like all the rest of this tribe, it is eminently useful in destroying flies, moths, and various other insects which are troublesome to man and beast; on this account, they all should be treated with encouragement and regard.

The nest of the small pewee is sometimes on horizontal branches, sometimes in the upright forks of a tree. It is composed of dry grass woven with wood, down, and other soft materials, cemented together with the saliva of the bird. The eggs are five, of unspotted white. While the young need support and protection, they remain with their parents; but afterwards, they separate into different parties, to migrate to their winter quarters.

The AMERICAN REDSTART, *Muscicapa ruticilla*, is a very beautiful bird. It is not rare, but is seldom seen, because it lives retired, and when it comes into our gardens, confines itself to the shade. It is in constant motion, exploring the branches, and moving its tail and wings so as to display its rich colors; sometimes it starts up to catch an insect flying over; then it may be seen balancing itself in the air, looking sharply into a bunch of leaves. It flies with the mouth open, and its success is known by the snapping of its bill. When it tries to seize a wasp, the insect presents its sting in so formidable a manner, that the redstart dares not catch it, and moves after some less dangerous prey.

In the cold weather in June, 1832, when so many birds were found lying dead, in all parts of the country, one of these birds came, for several days in succession, up to my study window, and there employed himself in catching insects, within a few feet of the place where I was writing. He frequently watched me, but finding that I did not trouble him, he dismissed his reserve and seemed to be on familiar terms. When the weather changed, he disappeared, and I never saw one in the same place again.

The nest is generally on a low bush or tree, and appears as if hanging by the twigs. It is composed of various materials, fastened together with saliva. The eggs are a soft white, sprinkled with yellowish brown. The parents are anxiously watchful for the safety of their young. These birds come to us in May, and, at the last of September, retire beyond the limits of the Union.

THE SMALL-HEADED FLYCATCHER, *Muscicapa minuta*, is a species first discovered by Audubon. Little is yet known concerning it, though ornithologists have been acquainted with it for a considerable time. Dr. Brewer informs me that it has been found in Ipswich, and that he picked up one of them, evidently just dead, on the step of his door in Brookline.

THE BLUE GREY FLYCATCHER, *Muscicapa cærulea*, which was formerly thought to proceed no farther to the north than New York, is, I am told by the same gentleman, found in Massachusetts and as far as the Canada line. Professor Emmons tells me that in Berkshire, the preceding species is common, but that he has never met with this.

TRAILL'S FLYCATCHER, *Muscicapa Traillii*, a bird discovered by Audubon, and named by him in compliment to Dr. Traill of Liverpool, is also found in our State. A specimen was obtained by Mr. Samuel Cabot, Jr. in the neighborhood of Boston. It has probably been seen and mistaken for the small pewee, which it so much resembles, that some ornithologists regard them as the same. The difference in the size and markings is trifling; but the tail, which in the former is even, is slightly emarginate in this. Nuttall, however, describes the tail of *M. Acadica* as decidedly emarginate, and not, as Audubon says, even, and slightly rounded.

THE GREEN BLACK-CAP FLYCATCHER, *Muscicapa Wilsonii*, is enumerated among the birds of Massachusetts, on the authority of Audubon. It is very rare in this State, though common enough in Maine.

THE CANADA FLYCATCHER, *Muscicapa Canadensis*, which, like the preceding, is often classed with the warblers, is not now uncommon in this State, however it may have been in former years.

THE YELLOW BREASTED ICTERIA, *Icteria viridis*, certainly

makes occasional visits here, though it is generally described as not passing the bounds of our adjoining states. Professor Emmons assures me that he has found it in Berkshire. Their ordinary migration does not extend so far, but in the middle states they abound.

The YELLOW THROATED VIREO, *Vireo flavifrons*, is one of a beautiful family of singers, some of which are quite familiar, and highly valued for the sweetness of their song. This is not the most musical of their number, but its note is pleasant, resembling that of the red-eye. It prefers the solitude of the forest to the society of man, and there employs itself in exploring the branches of the largest trees, in search of its insect food; passing over each with short hops, examining every leaf and bud, in order to be sure that nothing is left undetected. There it may be found from May to September, when it retreats to the warmest parts of America.

Its nest, like that of other vireos, is suspended from the branch of a tree, being attached to the twigs with slender strings, mixed with the threads of caterpillars and fine blades of grass, cemented with the saliva of the bird. The whole is covered with green moss attached by threads of silk, and resembles the foliage in color so much as to deceive, or rather to elude the eye. The eggs, four or five in number, are white, spotted with black. When the young are hatched, it conducts them into orchards and gardens, in search of berries for food.

The WHITE-EYED VIREO, *Vireo Noveberacensis*, comes to us in April, and passes the summer in our state, where it appears to be much more abundant than the former, because it is more retired. Its song and its motions are energetic and animated; it passes from twig to twig in quick succession, glancing up and down so quickly, that nothing can escape it, sometimes swallowing an insect, then stopping to drink a dew-drop that hangs upon the leaves. Its song is spirited and emphatic, with considerable variety of expression, and more powerful than could be expected from so small a bird. This bird suspends its nest,

like the former, but not high in the air; it is generally hung from the branch of a brier or a vine, and composed of bits of hornets' nests, newspapers, or grass woven in with twigs, with a lining of root-fibres. The eggs are four or five, white, with a few brown spots toward the larger end. If any one approaches the nest, the vireo scolds with great heat and passion. At other times, it seems quite indifferent to his presence, and looks at him with perfect composure, at the distance of a few feet.

The WARBLING VIREO, *Vireo gilvus*, is a charming singer, and so unwearied in its various and animated warble, that it is one of the chief attractions of a summer day. Its notes, so mellow and flowing, cannot be mistaken for those of any other bird; neither is any one who hears it at a loss to trace it to the performer, who never retires to the forest, and seems to delight in the society of man. At the same time his note is unambitious, and gives the listener the impression that it was not intended to be heard, but was simply an unconscious outpouring of the harmony and happiness of his breast. In this unpretending manner, he differs from most other birds of sweet note, which appear as if fully aware of their powers, and desirous to display them.

The nest of the warbler is suspended high in the air, formed of blades of grass disposed in a circular form, with bits of hornets' nests, corn husks, or old apple blossoms, inserted between, and kept in place by threads of caterpillars' silk; the lining is of fine grass, pressed into the proper form with great care. The eggs are four or five, white, spotted with reddish black at the larger end. These birds remain with us from May to October, when they leave us reluctantly for the tropical regions. They are not, like the red-eye, seen in Florida in the winter.

The RED-EYED VIREO, *Vireo olivaceus*, is perhaps more common than the former: not equal to the warbler in its song, which is rather broken and interrupted, than easy and flowing;

but nevertheless is expressive and sweet, resembling that of the robin, though not so clear and strong. From May to August it sings all day without ceasing, never oppressed by the severest heat; at every short suspension of its song, it moves up and down the branches, searching every bud and blossom, and peeping under the leaves. The cloudy weather, which is so depressing to most birds, has no effect upon the red-eye; he sings as cheerfully in the dark afternoon as in the brightness of the rising sun, seeming to hold a perpetual festival, and quenching his thirst with the drops of dew.

The nest of the red-eye is suspended at various elevations, but never so high above the ground as that of the warbler. It is more particular in lining it than in building. The materials of the nest are miscellaneous; the lining is of fibrous roots, pine leaves, and strings of the bark of vines, disposed in beautiful order. In it are three or four eggs, white, with spots of brown at the larger end. The red-eye is an attentive parent, and for this reason perhaps, the cow-bird often chooses it as the nurse of its young. The eyes of the young birds are brown, and do not become red till the following spring. A species alluded to in Audubon's description of the red-eye, as resembling it, but quite distinct, and which he promises to describe in his fourth volume, is, as Dr. Brewer informs me, sometimes seen in our state.

The MOCKING-BIRD, *Turdus polyglottus*, is rarely seen in Massachusetts. The brown thrush is sometimes mistaken for it by careless observers, and that fine bird, though not an imitator, at least to any great extent, has a depth, sweetness and variety of song which even the far-famed mocking-bird cannot exceed.

The BROWN THRUSH or THRASHER, *Turdus rufus*, must be regarded as the finest of our singing birds. It is also very common, though not as familiar as some others. From the time of its arrival, about the first of May, it may be seen, on the high twig of some tall tree, pouring out its soul in a full

and flowing strain, not changeful and capricious like that of the mocking-bird, but uniformly eloquent and sweet. It may be fancy, but the song seems more in harmony with the season than any other, and more resembling what we imagine of the voice of spring.

In point of strength and intelligence, the brown thrasher is superior to all the birds of its class. It bids defiance to large and powerful birds of prey; if a cat or a dog come near its nest, it attacks and chases him away; and the snakes which are tempted to rifle its nest, which is generally on or near the ground, are beaten in such a manner that they are glad to make an early retreat. These birds have many contests among themselves, but if the least alarm is given, they suspend hostilities at once and join in hearty alliance against the common foe. As to its intelligence, it appears at once in those which are domesticated. Mr. Bartram observed that one which he reared from the nest, if he found that crusts of bread which were given him as food, were too rough for him to swallow, would take them to his water-dish and soak them. He was also fond of wasps, but before he swallowed them, would examine to see if they had a sting; and if so, would carefully remove the poison before he ventured to eat them. The food of the brown thrasher consists of insects, worms, berries, and fruits of all descriptions. They are sometimes accused of pulling up the new corn, but this is so seldom done, that it is doubtless accidental, and the grub, instead of the corn, is the object which it aims to secure.

The nest is built on the ground, or a few feet above it, with small twigs and dry leaves, strips of bark and root fibres. The eggs are of a buff color, thickly sprinkled with dots of brown. Both the male and female sit, but the time of the former is very much occupied in keeping guard against the approach of enemies, which he resists, if it is possible, and if not, attempts to soften to compassion by his plaintive cries. If any one plunders the nest, both parents follow him with alternate imprecations and appeals to his feeling. After the breeding season, they are generally silent, and are found in gardens in great

numbers, where they employ themselves till October, when they retreat to the southern states.

The CATBIRD, *Turdus felivox*, is strangely persecuted, though he deserves good treatment on account of his services, which are great ; and also on account of his song, which is fine and sweet when he feels secure ; but this is not often ; for he seems fully aware that a bad name has been given him ; and his cat-like *mew* is an expression of his anxious fears. Beside his own wild snatches of melody, he gives many broken imitations of other birds, but never seems sufficiently easy in his mind to finish the strain he has begun. Latham says, that in a domesticated state, the catbird has been taught to imitate the strains of instrumental music ; and that he will counterfeit the cry of young chickens in distress, so as completely to deceive the parent hen. His attempts to mock the notes of other birds can be easily detected in listening to his song, and blended in with his own original strains, form an anthem so singular, that no one who has the least portion of taste or fancy, can hear it without delight.

The catbird remains with us from May to October, constantly employed in picking off wasps, worms, grubs, and various insects, and, at the season of fruit, it ventures to claim some little reward for its labors ; not so much however, as would have been consumed by the wasps alone, which it has destroyed. It seems surprising, considering how they are treated, and how sensitive they appear to be, that they have not long ago deserted us. But the nervous anxiety which they betray in their voice and motions, is not really owing to anxiety for themselves, so much as to affection for their young. They are quite discriminating in their apprehensions ; the sight of a dog does not disturb them, but a cat throws them into a fever of dread ; and while they are wretched the moment an idle boy enters the garden, they will permit some men to handle the eggs in their nest.

The nest is in a bush or a vine, composed of twigs, strips of bark, old grass and dry leaves, with a lining of root fibres.

The eggs are four or five, of a deep green. It is not easy^f to make them give up their nest ; if it is carried away they will follow it, and retake possession as if nothing had happened. In cases where the young of other birds have been put into their nests, the female has thrown them out to make room for her own ; but the male, observing their distress, has taken compassion on the orphans and fed them as his own. Surely, this is not a creature at which it is wise for man to cast the first, nor indeed to cast any stone.

The AMERICAN ROBIN, *Turdus migratorius*, is not the earliest, but is certainly the most welcome messenger of spring ; and the confidence which he places in us is seldom disappointed, except by boys taking their first lessons in cruelty, in which they afterwards become masters. His note is hearty and joyous, sometimes very musical, but always associated with spring-blossoms and early fruit so inseparably, that his song reminds every one of something which he loves to remember. His familiarity is his greatest charm ; and he often disarms bad intentions, by alighting near us with a look and manner which seem to say, that, bad as men are, he does not think they mean to injure him. He is greatly respected by children on account of the name which he bears ; they mistake him for the red-breast, which is said to have displayed so much humanity to the children in the wood ; but, though our robin is not often called to such benevolent exertions, there is no doubt, that in any similar case of distress, it would show itself as kind and thoughtful as the other.

The robin well deserves the name of migratory, though some remain with us in ordinary winters, retreating from the cold into the depth of evergreen woods. They spread themselves over the whole continent ; they are found in all the fur countries, and almost all places where man has ever been. They are never stationary, except when rearing their young ; for we sometimes find that in the summer, they will leave a place where they have abounded, and for days together not one of them can be found. Their movements are irregular, depend-

ing probably on the supply of food which they find in different parts of the country. They migrate in large flocks, flying high and far without resting ; sometimes, if the weather is fine, they continue their course by night.

The nest of the robin is found in various situations, most commonly in an orchard tree. It is composed of dry leaves, grass and moss, connected together by mud ; the lining is of fine grass, sometimes in part of feathers. The eggs are from four to six, of bluish green. It is not necessary to be particular in these matters, the nests being almost always made near human dwellings, and often within the reach of man. It is supposed that it chooses these resorts in order to escape from the cuckoo, which sucks its eggs wherever it dares venture ; but the robin soon forms a strong local attachment, and often returns in successive years, not only to the same spot, but the same nest which it has occupied before. One has been known to build in the stern timbers of an unfinished vessel in New Hampshire. They are very affectionate to their young, and if an accident happens to one of them, the whole neighborhood of robins is in alarm.

The robin is easily domesticated, and soon becomes very fond of its owner. It shows a taste and talent for imitation also, which does not appear in its wild state. It will not only mock the notes of other birds, but will imitate tunes which it has often heard. In this state it has been known to live for nearly twenty years.

The WOOD THRUSH, *Turdus mustelinus*, is a retiring bird, but not so solitary as it is sometimes represented. It is most partial to shaded glens, where it sings toward the close of day. Its note is very remarkable ; with notes of no great variety, but clear, flowing and silvery as a sweet-toned bell ; of all the voices of summer there is none so thrilling, particularly when heard as the shades of night are falling, and in scenes of deep repose. Each bird seems to have some favorite resort of his own. It is generally in some deep hollow, overhung by large trees festooned with vines, where the sunbeams at mid-day can

hardly reach the ground. Here it delights to sing; and no one can hear it without having his mind calmed by the spirit-like melody, and the harmonious quiet of the scene.

This bird is a constant resident in Louisiana, but whether, or how far it goes beyond the limits of the United States, is not known. It comes to us in April, performing its migrations in the woods, and seldom appearing in the open country. Its nest is built in shrubs or low trees, saddled on the branch, and composed of grass and leaves held together by mud, with a lining of root-fibres. The eggs, four or five in number, are of a greenish blue. The young come out from retirement into gardens, and are even known to visit the outskirts of the city. They are easily raised in confinement, and sing nearly as well as when free.

On alighting on a branch, the wood thrush gives its tail a jerk two or three times with a peculiar chuckle. It walks and hops on the branches, occasionally bending down to look round it. It often descends to the ground, and scratches in search of worms and beetles, but the least alarm sends it back to the tree. It never commits depredations of any kind whatever. These birds are never seen in flocks; they pair in the breeding season, but at all other times are found single and apart from each other. They do not leave New England till quite late in the fall.

The HERMIT THRUSH, *Turdus minor*, is described by Audubon and Wilson as destitute of song, while Nuttall represents it as hardly inferior to the nightingale in the power and sweetness of its voice. There are some other points of difference in their several descriptions. Audubon says that the bill is dark brown, yellowish toward the base of the lower mandible. Nuttall says that it is black above and flesh colored below. Audubon says that the tail is even, while Wilson and Nuttall speak of it as forked. These and some other discrepancies I am unable to reconcile, from want of acquaintance with the bird. Nuttall however sets it down as passing the summer in our woods.

WILSON'S THRUSH, *Turdus Wilsonii*, is described by Nuttall as a common bird, resembling the wood thrush in its voice and song. He describes its nest as usually made in a low bush, not much above the ground, and depending for security on its resemblance to the foliage where it is built. No earth is employed in its construction. The eggs are four or five, of an emerald green. This and the preceding species are not yet sufficiently known.

THE NEW YORK THRUSH, *Turdus Noveboracensis*, which, according to Nuttall, hardly ever comes here except in autumn, arrives, as Dr. Brewer assures me, in the spring, and rears its young in our state. Its nest and eggs have been found in Roxbury.

THE GOLDEN-CROWNED THRUSH, *Turdus aurocapillus*, is a very timid and retiring bird, which remains with us from May till September. It is not distinguished by any power of song, though it has a succession of simple notes which sound pleasantly, in its quiet and solitary home. It sits and runs on the ground like the lark, and the moment it is discovered, escapes from observation in the deepest shade of the woods.

This bird is better known by its curious nest than by its aspect or its song. It is built on the ground, among dry leaves or decayed moss. It is neatly constructed with grass inside and out, and is arched over with a large patch of the same material, overspread with twigs and leaves, so as to resemble the rest of the ground. An entrance is left at the side, which is generally toward the sun. The eggs, from four to six in number, are white, spotted with brown toward the larger end. If the female be discovered on her nest, she creeps swiftly and silently away. If she sees the intruder looking for the nest, she flutters, pretends lameness, and generally succeeds in drawing off his attention; but she suffers much from snakes and other animals, which are not easily deceived, and cannot be resisted. These birds live on insects, particularly such as they find upon the ground.

The YELLOW-CROWNED WARBLER, *Sylvia coronata*, sometimes called the myrtle bird, is quite common here for two or three weeks in May, and after an absence of more than three months, it reappears on its way to its winter home. While here, they are very social among themselves, and come fearlessly about our houses, entirely unsuspecting of danger, collecting the insects on which they feed. They breed in the northern regions. In autumn, they return with a less brilliant dress than in spring, which may be either a decided change in plumage, or possibly only the result of wear and travel. Their song, as well as some of their habits, bears a strong resemblance to that of the summer yellow-bird. Audubon found the young in Labrador; but the only nest he has ever seen, was presented to him in Nova Scotia. It is very much like that of the bird just mentioned, lined with thistle-down, hair, and feathers, and containing four rose-colored eggs, dotted with reddish brown, round, but not upon, the larger end.

The YELLOW REDPOLE WARBLER, *Sylvia petechia*, comes to us, like the former, after passing the winter in the southern states. Here it is a rare species. Audubon found the birds abundant at Labrador, but sought for their nests in vain.

The SUMMER YELLOW-BIRD, *Sylvia aestiva*, is a beautiful summer resident, and a favorite in all parts of New England. Its delicious warble, though it has no great variety, is one of the sweetest sounds heard at the window on a summer day. They probably spend the winter beyond the limits of the Union. Early in May they return, and are seen in all directions, darting through the foliage in search of insects, their golden yellow dress richly contrasted with the fresh and tender green. The male comes a little earlier than the female, as if to explore the way. They soon begin to construct their nest, which is generally near our dwellings, and sometimes within reach. They make use of hemp, flax, and cotton, soft grass, and hair; but they are not particular in their choice of materials. The eggs are four or five, of a dull white, speckled with brown

toward the larger end. This bird is very much annoyed by the cow-bird. Sometimes, when it finds the strange egg, it buries it by making a new lining to its nest; but if this be impracticable, it feeds and protects the foundling with as much kindness as its own young. In its migrations, this little bird travels by night.

The SPOTTED WARBLER, *Sylvia maculosa*, is a beautiful bird, which passes through the State in May, on its way to the north, where it rears its young. Here they are always rare; but in Maine they are sometimes exceedingly common, being detained there, waiting till the season is sufficiently advanced to permit them to go farther. This bird excels in song as well as in beauty of plumage; its motions are graceful, and, when on the ground, it holds its wings drooping, as if to display their markings to advantage. They pass but a few days with us, and on their return do not visit us; they probably, in returning, avoid the coast, and make their way along the course of the great western rivers.

The BLACK-THROATED GREEN WARBLER, *Sylvia virens*, is not common in Massachusetts. It comes from the south in May, and may be seen searching the blossoms of the apple tree for food, so intent upon its employment as to pay no regard to the presence of any observer. Sometimes the chipping-sparrow, delighted to find a bird weaker than itself, puts on airs of state, and orders the little warbler away from the tree. A few spend the summer in the northern states. Their nests are not easily discovered, but Nuttall met with one in a juniper, on the Blue Hills in Milton. It was made with strips of bark, horsehair, and feathers, and contained four eggs, inclining to flesh-color, dotted with purple together with large spots of brown. There was no other nest of the kind near it. These birds are seen roving in the forests, on their way to the south, in October.

The BLACKBURNIAN WARBLER, *Sylvia Blackburniae*, is sometimes seen in this State, and, whenever it appears, its ele-

gant colors attract attention. In the list furnished me by Dr. Brewer, it is marked as breeding in this State. Its nest, however, is not often seen. Audubon received one from Professor MacCulloch, of Nova Scotia; it was composed externally of different textures, and lined with silky fibres and thin delicate strips of fine bark, over which lay a thick bed of feathers and horsehair. The eggs were white, with red spots toward the larger end. It was found in a small fork of a tree near a brook, five or six feet from the ground. It is seldom that this bird appears here, except in May and September, on its annual migration and return.

The ORANGE-THROATED WARBLER, *Sylvia auricollis*, is another rare and transient species, which makes us a passing call, on its way to Canada.

The CHESTNUT-SIDED WARBLER, *Sylvia icterocephala*, passes through this State on its way to the north. In 1837, they were quite common near Connecticut river. Audubon professed himself ignorant of their breeding places; but Mr. James Eliot Cabot, has succeeded in finding a nest in Brookline, in our State.

The BAY-BREASTED WARBLER, *Sylvia castanea*, comes to us about the middle of May, and remains a few days. In its appearance and manners it strongly resembles the preceding. While here, it is busily engaged in searching for insects, along the hedges and in the highest trees. Where it goes when it leaves us, is not yet distinctly known. Audubon says that he has often seen them in Louisiana, in the month of June, which would indicate, that, unlike the warblers in general, they remain and breed in the southern states. But if it is so, their nest has not yet been found.

The BLACK-POLE WARBLER, *Sylvia striata*, is not uncommon in the latter part of May, when it is seen in the orchards in pursuit of cankerworms and other food. Its note is a low

clinking sound, that can hardly be called a song. Audubon was fortunate enough to find its nest at Labrador. It was built on a fir tree, about three feet from the ground. There is something curious in the manner in which this and other warblers, in their migration, skip over some parts of the country.

The PINE WARBLER, *Sylvia pinus*, is a summer resident in the State, but not much known, because it resides in deep, evergreen forests, where it explores the bark and buds of trees in search of the insects which infest them. Nuttall describes a nest of this species, which he found at Mount Auburn, on a tree, forty feet above the ground. The eggs were white, with a very pale tinge of green, and thickly sprinkled with pale brown. In summer, their food consists of insects, and their eggs and larvae; in autumn, when the young accompany their parents, they come into gardens and groves. One which Nuttall domesticated, fed on flies and worms that were offered him, without the least timidity; and was so tame and familiar as to be in danger of being trodden under feet.

The AUTUMNAL WARBLER, *Sylvia autumnalis*, is not at present known to rear its young in Massachusetts, but it cannot go far for that purpose, since it is found in our forests, attended with its family, as early as the month of July. Early in the season, they are seen darting through the woods in search of flies. One which Nuttall obtained, by its flying in at an open window, soon pursued the house-flies, as if nothing had happened, and became so sociable that it would eat from his hand. In the autumn, it may be seen turning over the fallen leaves, or searching the chinks of fences and the rough bark of trees. Its nest has been found in Pennsylvania, and also near Lake Champlain.

The HEMLOCK WARBLER, *Sylvia parus*, differs so little from the *pine*, that Nuttall is inclined to regard them as the same species; but Audubon, who procured many specimens, together with a nest and young, pronounces them distinct, and it is

on his high authority that this is set down among the birds of our State.

The PRAIRIE WARBLER, *Sylvia discolor*, is a small and quiet, but fearless bird, which comes to us about the middle of May. Nuttall found one of their nests at Mount Auburn, in a low barberry bush, formed very much like the nest of the yellow-bird. The proprietor eyed him with much curiosity but without any appearance of fear, and when he approached the nest, the female kept her station. There is considerable difference in the accounts given by him and Audubon, of the nest and the song of this bird. The latter describes the nest as covered with lichens, like that of the humming-bird. The one found at Mount Auburn did not answer at all to his description.

The PARTICOLORED WARBLER, *Sylvia Americana*, is not common, but several specimens have been obtained by Mr. Samuel Cabot, Jr., and as its song has been heard here as late as the close of May, there seems reason to believe that it sometimes breeds in the State. It comes in May and returns in October, on its way to its winter home in the West Indies. Few of the warblers are more beautiful than this.

The BLACK THROATED BLUE WARBLER, *Sylvia Canadensis*, is a wayfaring and unfrequent visiter, which appears in April, on its way to the north, and returns late in the fall. It is not known where it rears its young. Its winter quarters are in the West Indian Islands. The Pine Swamp Warbler, *Sylvia sphagnosa*, is now believed to be the young of this species.

The MARYLAND YELLOWTHROAT, *Sylvia trichas*, is one of our most common birds, found among the alders of almost every brook, from the beginning of May till the leaves fall. It is quiet, humble, and never ambitious to be seen; still it shows no distrust nor fear of those who visit its retreats in shady hollows, except when they go so near the nest as to create appre-

hensions for its young. Its song is simple, pleasant, and suited to the places where it resides.

These birds commence building their nest in May. It is in thickets, on or near the ground, among dry leaves, brush or withered grass, which may protect it from observation. It is made of dry sedge grass and leaves, with a lining of fine bent grass. The eggs are about five, of a soft white, with specks, blotches, and sometimes lines of brown chiefly toward the larger end. At the close of July the male ceases to sing, and the old and young rove about in parties till the season warns them to depart.

The MOURNING WARBLER, *Sylvia Philadelphia*, is a rare species, but Dr. Brewer assures me that he has seen it here in summer. Very little is known of its habits, and I believe, nothing whatever of its nest. *Sylvia agilis* is now believed to be the young of this bird. Prince Bonaparte believed that the mourning warbler would turn out to be an accidental variety of the species just described. It is said, however, to be quite different in its song.

The WILLOW WREN, *Sylvia trochilus*, is the same which, in England, is called the hay-bird. Nuttall says that it visits us in October, when it feeds on flies and other insects, and often is seen rising with a low and pleasant song from the tops of trees. It is named from its attachment to the willow.

The WORM-EATING WARBLER, *Sylvia vermivora*, arrives from the south late in the spring, and retreats early, before the northern storms. It was not known to breed in this State till a nest was discovered in Cambridge by Mr. Rotch, who gave a specimen of the eggs to Dr. Brewer. That gentleman, it is to be hoped, will hereafter find time to supply the defect of information on this part of the subject, to which very little attention has been paid.

The GOLDEN-WINGED WARBLER, *Sylvia chrysoptera*, which

Nuttall thought was never seen in this State, is ascertained to be one of our visitors by Mr. James Eliot Cabot, who shot one of them in Cambridge.

The NASHVILLE WARBLER, *Sylvia rubricapilla*, is placed among our birds by Mr. Samuel Cabot, Jr., who obtained a specimen in Brookline. Audubon states that three or four, found in Louisiana and Kentucky, are all that he ever saw.

SWAINSON'S WARBLER, *Sylvia Swainsonii*, has been found by Mr. Cabot, within the limits of our State.

The ORANGE COLORED WARBLER, *Sylvia celata*, probably passes through the State on its way to the eastern parts of Maine and the British Provinces, where it builds and rears its young ; but it is not ascertained that any one has yet been discovered here.

ROSCOE'S YELLOW-THROAT, *Sylvia Roscoe*, so much resembles the Maryland Yellow-throat, that Audubon, the discoverer, at first thought it only an accidental variety of that species. Nuttall says that it is seen in Massachusetts at the close of summer, and his impression is that it breeds here.

Before leaving the subject of warblers, I may be permitted to say how much we are under obligation to them ; not as a plea in their behalf, since their diminutive size protects them. They are too small to be valued for food, or to afford the requisite degree of excitement to the sportsman. We are told by travellers, that the scenery of Spain seems lifeless and heavy, from the want of singing birds ; ours, on the contrary, is animated with the voices and lighted up with the plumage of these little birds, most of which are as beautiful in colors as they are sweet in their song. From a circumstance mentioned by Audubon, one can easily estimate the importance of their services. He says that he found more than fifty insects in the crops of only two of them. Millions remain in the United

States throughout the summer, and those which pass through the country, arrive precisely at the season when insects are springing into life and action ; so that the visit of two or three weeks, which they make with us at that time is as valuable to us as ten times the same amount of labor at any other part of the year.

THE RUBY-CROWNED WREN, *Regulus calendulus*, is a beautiful little bird, often seen here late in the autumn, on its return from the northern regions. How far they go, and what are their habits at that season, no one has yet been able to inform us. Audubon had no doubt of its breeding in Labrador, but he did not succeed in finding its nest, neither has it been found by any of the arctic expeditions. Wilson met with them in Pennsylvania, in the summer, but they are not seen in Massachusetts till the autumn, when they associate with the titmouse, and move round in busy silence, wholly intent on the work of gathering food. At the north, their song is equal to that of the canary, in richness, variety and power. They are not uncommon in the western parts of the State.

THE FIERY-CROWNED WREN, *Regulus tricolor*, has been obtained by Dr. Brewer, in the vicinity of Boston. It rears its young in Labrador, and is seen here on its return in October, when it collects its food, consisting of the larvæ and eggs of insects, without regarding the presence of any observer. It is said, that on striking the branch on which they are perched, these little birds will fall dead, as the Canada jays are often killed by their enemies, the hunters.

THE HOUSE-WREN, *Troglodytes aedon*, is a summer resident in the State. It is a spirited, restless, wayward little bird, which treats the human race with great familiarity. It seems to expect that lodgings shall be provided for it ; but if this is not done, it will build under the eaves of houses or in barns. Nothing in the vicinity of human dwellings troubles it but the

appearance of a cat, which throws it into a vociferous passion, which does not subside till the hated enemy retires. It remains with us from April to September, and adds much to the attractions of summer by its animated and often brilliant song, which, like that of the vireos, is heard in the heat of day, when other birds are at rest. It has many quarrels with other birds, and, small as it is, maintains its rights, and perhaps something more. In the war of words it has no equal; and some other birds seem as if they gave up to it, not from fear or conscience, but merely to escape its perpetual and abusive din.

The nest of the house-wren is formed with an outwork of twigs interlaced with care and skill. Behind this barricade is the true nest, made with grass and lined with feathers. The eggs, from six to nine, are of flesh color, inclining to red. The young, soon after they are fledged, seem to have all the playful activity of the older birds. It is rather singular, that these birds should bear the name of *Troglodytes*, signifying dwellers in caves, when they are so remarkable for constructiveness, that the male often amuses himself while the female is sitting, with building another nest, which he has no thought of ever using.

The FRESH-WATER MARSH WREN, *Troglodytes brevirostris*, is a summer visiter, not uncommon, but not known as a distinct species, till it was described by the unwearied Nuttall. It should have borne his name; but that will be so identified with the science as to need no such commemoration. It is known to boys by its song, *chip-a-day-day*, which is so often heard in the meadows. He describes its nest as made of sedge, bent from the top of a grassy tuft, and forming a spherical arbor with an entrance on the side. He remarks, that in a nest containing seven eggs, three of them were larger than the rest, and were fresh, while the other four were far advanced toward hatching. From this he inferred that two different birds had laid in the same nest. There seems no great need of crowding thus, since the male employs himself in building nests, a great part of which are neither wanted nor used. This species,

which has been confounded with the following, remains with us from May till September.

The SALT-WATER MARSH WREN, *Troglodytes palustris*, is found on marshes and the borders of rivers near the sea, but is not so common as the preceding. This bird is quick and active in its motions, and in its song resembles the last described. The nest is formed of wet rushes twisted into each other, and filled in with mud, in the shape of a cocoa-nut, with an opening in the side. The eggs are from six to eight, of a color approaching to mahogany. Nuttall thought that this bird hardly ever came nearer than New York; but Dr. Storer has found its nest and eggs at Barnstable in our State.

The WINTER WREN, *Troglodytes hiemalis*, is inserted in the list of our birds, on the authority of Audubon. It abounds in Maine in summer, but in this State it must be always rare.

The WOOD WREN, *Troglodytes Americana*, is a new species, discovered by the same distinguished ornithologist, who says that it is found in Massachusetts, though he cannot speak with certainty of its summer haunts, nor of the extent of its migrations.

The BLUE BIRD, *Sialia Wilsonii*, is a delightful messenger of spring, whose early appearance makes us ask, "Hast thou a star to guide thy path?" since he comes before the fetters of Orion are unbound, or the sweet influences of Pleiades have begun to fall. He is said to resemble the English redbreast so much in form and habits, as well as the tinge on his breast, that he was called the blue-robin, by the first settlers of this country. The first indication of spring brings the blue-bird, and his sweet, but rather timid and tremulous note seems expressive of uncertainty, whether the season will permit him to remain. He is often driven back by a relapse, as happened in January of the last year, when he came on one or two fine mornings, but was soon compelled to retreat. Every body

loves the blue-bird, and some make it a practice to encourage him by providing lodgings for him, which he readily occupies, and where he manifests a freedom from uneasiness, which he cannot feel where his nest is more exposed. It certainly is wise to encourage him; for almost all his time is spent in catching beetles, grasshoppers, spiders, and grubs, for which we have seen him descending in fields, and open grounds. The wire-worm is another of their luxuries, which are all of a kind that man can easily spare. When they eat berries, it is not those of the garden, but the sumach and wild cherry.

Unless the hospitality of man provides the blue-bird with lodgings, he resorts to hollow trees, where he shelters himself from the elements, and there, or in a house made for the purpose, the pair construct their nest; it is a short and easy process, for nothing is required but a lining of hay and feathers. The eggs are from four to six, of a pale blue. Two broods, and sometimes more, are raised in the season, and, while the female sits on the second set of eggs, the male takes charge of the young. In defence of his family he is very courageous; he has been known to attack a hen with chickens, who came too near his abode, and put her to a hasty flight.

During winter, the blue-birds abound in the southern states, and particularly in the Floridas, which, however, they leave as early as possible. But they do not go very far to the north. In Maine they are not common, and in Labrador not one was seen by Audubon's party. Towards autumn, their song is no longer heard, except one complaining note in which they seem to lament the necessity of leaving their home. To the last moment they linger, and it is not till the trumpet of the storm indicates that the hosts of winter are upon them, that they will consent to bid us farewell.

The BROWN LARK, *Anthus spinoletta*, is one of those birds which arrive from the north, without much to indicate whence they came or whither they are going. They are common in fields in the country, and are said to be equally so along the borders of rivers and the Atlantic shores. They fly in loose

scattered flocks, giving out a feeble note, run rapidly on the ground, and when they take wing, generally move high and far before they alight. Some of them spend the winter in Pennsylvania, and they abound at that season in the southern states. Those which pass through our State in the autumn, are all young ; nothing is known of the old birds, though Labrador is one of the places where they rear their young.

GRANIVOROUS, OR PASSERINE BIRDS.

The SHORE LARK, *Alauda alpestris*, is a pretty bird, which comes to us from the north at the approach of winter, and, if the season closes early, is seen here in October, on its way to the middle states. If the season is mild, they sometimes remain here, and those which proceed, seldom go farther south than Maryland. While here, they fly high, in loose scattered flocks, and have a single note, resembling that of the sky-lark of England. Their food seems to consist of seeds and the larvæ of insects, which they find on the ground, or on fences where they sometimes alight, though they never perch on a tree. They pass the night on the earth, in small parties, near tufts of dry grass. When they are alarmed, all take wing, and after flying round for a short time, return to the same place again.

Andubon describes the nest of this bird, which he found in the moss at Labrador, and tells us that the song of the male at that season is very sweet.

The SNOW BUNTING, *Emberiza nivalis*. As soon as winter reigns "sole monarch of the inverted year," these birds come, riding on the snow-storms, and are seen in parties sweeping over the desolate country. Sometimes they alight on trees, sometimes on fences, and are even familiar enough to take their

station at times upon the roofs of houses. Till they are persecuted for the sake of their flesh, they are disposed to be on the best possible terms with man; but as they are considered the harbingers of very severe weather, they meet but a cold welcome. Their flight is swift, and well sustained; they seem to enjoy the fierce and angry winds; but careless of cold as they are, and apparently well protected, they are sometimes so chilled as to be unable to escape from those who pursue them. In Labrador, where they are called *White Birds*, they feed on seeds and insects, but while here, they must depend for their subsistence almost entirely on seeds. For this purpose they often alight on trees, but are seldom seen in the woods. Like the larks, they live much on the ground.

The summer dress of the snow bunting is pure white and black; but they are not seen with this plumage here. Their appearance here is various; but generally they are white and rusty brown. In the summer they are said to sing sweetly, but their strains are wasted on the desert air. Some have been known to rear their young in the White Mountains of New Hampshire.

The BLACK-THROATED BUNTING, *Emberiza Americana*, is found in high meadows near the salt water marshes, from the middle of May till the last of August, when it returns to the south, and spends the winter in countries beyond the boundaries of the Union. Early in summer, they feed on caterpillars and insects, and are among the destroyers of the pernicious canker-worm. Their note is constantly heard from every level field of grass or grain; they often perch on some low tree, and there for a long time breathe out their simple and unpretending song. At these times, they may be approached without taking wing; they seem to be friendly to man, to other birds, and to each other. In August they become silent, and not long after, leave us for the south, going beyond the extremity of the Union.

The SCARLET TANAGER, *Tanagra rubra*, is a splendid sum-

mer resident in this State. He is retired in his habits, but not distrustful, and as he often comes into enclosures, he is well known by his rich and elegant plumage, and the sweet variety of his song. His common note is a *chip, chirr*, repeated at short intervals, in such a tone that it is very difficult for the hearer to determine whence the sound proceeds. At other times he has a song, which bears some resemblance to that of the red-eye, excepting that it is more continuous and unbroken. Were it not that the eye is charmed by the beauty of his scarlet and glossy black, as it glows against the foliage in the sun, his musical powers would be more highly estimated. There is nothing to be set off against these recommendations. He cannot be accused of any kind of depredation. His food consists of insects, and of these, he is particularly fond of the wasp, one of our greatest fruit destroyers. Sometimes he feeds on berries and seeds, but they are not taken from the garden.

These birds arrive toward the last of May, and immediately begin to build, generally on the large bow of an oak, but sometimes on an orchard tree. The nest is loosely put together. The eggs are three or four, bluish, spotted with purple and brown. They are very affectionate toward their young. If any one approaches the nest, the female is in great distress. As soon as they require food, the male supplies it, and so anxious is he for their welfare, that he has been known to follow one of them for half a mile, and as he could not release it, to feed it through the wires of its cage, and roost in the same tree by night. At the beginning of August, the male assumes the green and yellow dress of the female, and in company with their young, they set off for their winter quarters.

The INDIGO BIRD, *Tringilla cyanea*, is a spirited and beautiful summer resident, well known in every garden, where, from the tops of trees, from roofs, and chimneys and lightning rods, we hear his sweet lisping song, which at first is exceedingly pleasant, but at length wearies the ear by its perpetual repetition throughout the summer day. The rich blue which gives

this bird its name, belong exclusively to the male ; the female and the young wear plain flaxen dresses. The young males of the first year have a little blue in their buff colored plumage ; this increases as the bird grows, and it is not till the third year that it acquires the azure with green reflections, which makes the mature bird so ornamental to the village scenery. It is sometimes difficult to determine whether it is blue or green, so rapidly does it change in different lights, as it glances in the sun.

The nest of the indigo-bird is usually in a low bush, sometimes in vines ; in the former case, it is suspended between two twigs. The outside is composed of coarse grass and withered leaves ; the lining is of grass and hair. The eggs are greenish white and unspotted, according to Nuttall ; Wilson says, blue, with a purple blotch at the larger end ; Audubon says, " with a blotch or two of purple." As to these singular discrepancies, I have already remarked, that this part of the subject is greatly in want of attention.

The WHITE-CROWNED SPARROW, *Fringilla leucophrys*, is one of the finest of this family of birds. It is seen here, but very rarely, on its way to the north in the spring. Audubon describes its nest, which he found in Labrador, and speaks of its notes as very plaintive and sweet.

The WHITE-THROATED SPARROW, *Fringilla Pennsylvanica*, is much more abundant than the last. It attracts attention by its size and beauty, and still more by its song, which, though unvaried in tone, and slowly and solemnly uttered, is nevertheless, as heard in May mornings, one of the most delightful melodies of spring. It is not known in what manner it performs its migrations ; the first news we have of its coming is from its own plaintive note, heard from the borders of the fields. The sparrows move in companies, and frequent hedges and thickets, where they run upon the ground and scratch for seeds. On any alarm, they plunge into the deepest shade ; but when free

from uneasiness, they ascend to the highest branches and open their plaintive and emphatic strain. In the warmer days, they resort more to the borders of woods, but the thicket is always their favorite home. They appear to have no great dread of the presence of man; but the hawks are very destructive to them, and the sparrows seem aware of their danger, and desirous to keep as much as possible out of their sight and reach. In New Hampshire their note is interpreted into a warning, that the time to sow wheat is come. Their stay does not exceed two weeks; and, when they leave us, they go to the far north. Dr. Richardson found their nests on the banks of the Great Bear Lake.

THE BAY-WINGED FINCH, *Fringilla graminea*, is a bird, plain in appearance, but pleasant and unpretending in its song, which is constantly heard in fields and dry pastures; they run on the ground, in the manner of larks, in search of the seeds and insects which compose their food. To the grass-bird, as it is called, we are indebted for some of the sweetest music of our spring; their song begins very early in the morning, and continues after sunset, but they are generally silent in the heat of the day. They come early in April, and the best of their song is heard till the summer opens, when their note becomes more monotonous for the season. Some of them spend the winter in Pennsylvania, but most of them go farther to the south to escape the cold.

The nest is built in the grass, partly sunk in the ground. It is formed of leaves and dry grass, well lined with horse-hair. The eggs, four or five in number, are flesh-colored white, with spots of reddish brown. When the female is disturbed, she pretends lameness, and practises various arts to withdraw attention from her young.

THE AMBIGUOUS SPARROW, *Fringilla ambigua*, of which a single specimen was obtained by Nuttall, was, he says, a young bird, and may undergo some changes in its markings. Audubon suggests that it may turn out to be the white-crowned

sparrow in its winter plumage. The size is different ; but the point must be left for future observations to decide.

The SONG SPARROW, *Fringilla melodia*, is a well-known bird, very common in all parts of New England, and richly deserves its name. It comes in company with the blue-bird, and though it has no pretension to the beauty of its friend, exceeds it in the sweetness of its song. This cheerful and pleasant note is heard, in the near vicinity of human dwellings, from trees, stakes, and fences, and if it were not one of the most familiar sounds of summer, would be universally admired. This bird is common in Louisiana, in winter, and comes to the north before the snows have left the ground. From the time of its arrival we hear its unwearied note at all hours of the day, growing louder and more animated as the spring advances. It frequents fields and meadows, which afford the insects which it is active in destroying. It also enjoys the vicinity of water, in which it is fond of bathing. It has been known to swim to some distance when disabled from flying.

The song-sparrows build sometimes in a bush, and sometimes on the ground. They have been known to resort to a hollow tree. The nest is usually made of dried grass with a lining of hair. The eggs are greenish white, speckled or spotted with umber, chiefly toward the larger end. Audubon inquires, why it is, that they never use the same nest twice, when they raise two or three broods in a season, and always keep it so scrupulously clean? The obvious reply is, that a bird so neat and industrious, is the very one most likely to take the trouble of building a new nest; while a bird more slovenly and indolent, would re-occupy its old abode, from the same aversion to labor which induced it to leave it neglected.

The SAVANNAH SPARROW, *Fringilla Savanna*, is rare, compared with the preceding, and is most common near the sea. Its song is animated, though far inferior to that of the song-sparrow. Though it is very hardy, it proceeds to the south

in winter and returns in April, when it resorts to fields and open plains. Audubon says, that it breeds in all places from Maryland to Labrador. If so, the nest probably can be found here, though it may be easily mistaken for that of the species last described.

The SNOW-BIRD, *Fringilla hiemalis*, commonly called the blue snow-bird, to distinguish it from the snow-bunting, a bird much less common than this, comes to us just in advance of the wintry desolation, an infallible sign that the dreary season is at hand; dreary to us, it would be proper to say; for this little traveller, though it retreats before it, evidently has no fear of its cold and snow. It is almost always seen here in company with the tree-sparrows. After doing all they can to pick up a subsistence from the frozen ground, they come round our houses to gather crumbs, or any morsels of provision that may have been cast out from the door; and if a handful of meal is thrown to them, they receive it with great delight. After remaining with us as long as possible, in the heart of the winter, they are compelled to remove; but with the first glimpse of spring they reappear, resorting to orchards or to the edges of the wood, and roosting in hay-stacks, when the nights are severely cold. They are only summer residents in the fur countries, and never about there. Wilson tells us that they sometimes breed in the Alleghany mountains.

The YELLOW-SHOULDERED SPARROW, *Fringilla savannarum*, comes from Mexico and the West-India islands, where it passes the winter. It pays us a passing visit, when it attracts some attention by its song; but it soon hurries on to some other breeding-place. While here, it prefers the neighborhood of the sea, where it explores newly ploughed fields in search of insects and seeds. It never retires to the woods.

The TREE-SPARROW, *Fringilla Canadensis*, arrives from the north at the approach of winter, and remains here during most of that season. It is called the snow-bird, by many, and

is often seen in company with the blue snow-bird. When the deep snows cut off their resources for food, they come together into our yards and under our windows, and generally succeed in obtaining some small charity from man. Early in spring they prepare for their return, but delay it on various pretexts; till, a day or two before their departure, they recover their voices, and sing sweetly from the trees of the orchard. Audubon did not find them at Labrador; but he met with their nests in Nova Scotia, and his impression is, that they breed in the northern parts of Maine. The tree-sparrows are easily distinguished from others, by the spot in the centre of the breast.

The CHIPPING SPARROW, *Fringilla socialis*, is our most common bird, and so well known as hardly to need a description. It is found alike in the city and the village, in the field and the garden, in the forest and at the house-door. After passing the winter in the southern states, it returns early in the spring. It has no pretension to song, though, when it first returns, it keeps a continuous jingling sound, unlike the chipping note to which it owes its name. At the close of summer, the old and young birds search for seeds in the fields in large flocks, collected in preparation for their flight. The first snow fall is their signal for disappearing.

This little sparrow, in order to escape from worse enemies, places its nest under the care of man. It builds in the sides of walks, the corners of piazzas, or some spot equally open to observation; and so strong is its confidence, that, if the nest is torn down, it regards it as an accident, and builds in the same place again. It adopts these sheltered situations, with a view, no doubt, to escape from cuckoos, which would steal all its eggs if they were exposed in the woods.

The FIELD SPARROW, *Fringilla pusilla*, resembles the species last described, but is brighter in color and has a longer tail. With us, after the first of April, it is found in open fields and pastures, where it lives on insects and seeds. The song

is peculiar and likely to attract attention, not so much from its sweetness, as its canary-like trill. Its nest is built on the ground, after the fashion of most other sparrows, and made of hay, with a lining of fine grass or horse-hair. The eggs are so thickly sprinkled with rusty brown as to appear almost wholly of that color. It usually raises two broods in a season.

THE SWAMP SPARROW, *Fringilla palustris*, is rather common, after the middle of April, in the swamps and marshes, from which it takes its name. Wilson speaks of it as destitute of song. This is a mistake; its strain, though not equal to that of some others of the tribe, is lively and pleasant. It is distinguished by its passion for the vicinity of water, where it continually forces through brush and thickets, till its tail is worn almost away.

The nest of the swamp sparrow is made on the ground in swamps, with the coarse grass which grows there. The eggs are four or five, of a dull white, spotted with reddish brown. The old birds express great anxiety for their young, but apparently without much reason, for they have a wonderful alacrity at hiding in the grassy places where they dwell.

THE SHARP-TAILED FINCH, *Fringilla caudacuta*, is added, at the suggestion of Dr. Brewer, on the authority of Nuttall.

THE SEASIDE FINCH, *Fringilla maritima*, is found along the borders of the ocean, and in the sea islands; it visits the interior only when driven by easterly storms. It runs in search of marine insects and small shell-fish, like a sandpiper, on the edge of the strand. Like the swamp sparrow, it has feet and legs of great strength, and suited to its way of life. These finches build on those parts of the marshes which are above the flow of the tides. The nest is of grass; the eggs are dusky white, speckled with brown.

THE AMERICAN GOLDFINCH, *Fringilla tristis*, well known by its beautiful yellow plumage and jet black wings, can hardly

be said to return in the spring, since many of them do not leave us in winter, though, as they roam about in their dusky dresses, with their complaining note, there is little about them to remind us of the gay musicians of the spring. They are often seen when the ground is covered, gathering a living from the tall stalks of weeds that rise above the snow. For some time they will be missing, and then they rove about without any fixed direction, and apparently never much troubled by the want of food. When the warm gales begin to blow, the males resume their colored dress, the females among birds not being permitted to share that fatal gift of beauty, that might attract attention to their nest. The social habits of these pretty birds give double interest to their song, since all join in harmony, sometimes plaintive and low, then gay and loud, as they enjoy the sunshine together. They are fond of bathing and pluming themselves in company; in fact, they always associate together on the most friendly terms. In our gardens they collect the seeds of lettuce, but thistle down is their favorite food, and they cannot be justly charged with doing any injury whatever.

They make use of thistle down, with other soft and delicate substances, to build their nests. They are placed on trees or tall bushes, and constructed externally of dry leaves and other rubbish, with a lining of fine grass, hair or down. Audubon speaks of its nest as covered with lichens, glued on with saliva; the nests here have no such disguise. He also speaks of the eggs, which are from four to six in number, as white, tinged with bluish, and speckled with reddish brown. Here, the eggs are white.

A year or two since, I saw one, in a large flock of goldfinches, which was distinguished from the rest by plumage partly flaxen and partly white. At a little distance it appeared like a snow white bird.

The PINE FINCH, *Fringilla pinus*, comes occasionally from the north in winter, and sometimes proceeds as far as the southern extremity of the Union; but the first approach of

spring drives them back to their northern home. In the state of Maine they abound in the cold season, and are sometimes, though not regularly, seen here. Their flight resembles that of the goldfinch, with rising and falling inflections, and their note is said to be similar and equally sweet. Where they rear their young has not yet been discovered.

The LESSER REDPOLE, *Fringilla linaria*, is an occasional visiter in winter. Flocks have been seen as far south as Philadelphia; but they come at uncertain, and generally distant intervals, and very little is known concerning either their habits or their song.

The FOX-COLORED SPARROW, *Fringilla iliaca*, is perhaps the finest of this family of birds. It is large and handsome; generally larger than Nuttall's measurement, which is but six inches. When the evening sun falls on its cinnamon plumage, its appearance is beautiful. It passes through Massachusetts on its way to the south, soon after the fall of the leaf, and returns early in the spring; it is then seen in gardens, scratching the ground, in search of seeds and insects, making no sound except a low call occasionally to its companions. It waits till the weather grows mild enough for its journey, and as soon as it determines to go, perches on the high branches of trees and sings an air, easy, flowing, clear and incomparably sweet. They rear their young in the British Provinces and other northern regions.

The GROUND ROBIN, *Fringilla erythrophthalma*, is an exceedingly common bird, found on the borders of forests and woodland roads, where it scratches among the dry leaves for worms and insects, so entirely absorbed in its employment that any one can approach within a few feet of it without its taking any alarm. While thus engaged, it often utters the loud call from which it is named the *pee-wink*, and sometimes the *to-weet* bunting. But at times, it sings with much more pretension, and, perched on the high branch of an oak, warbles a loud,

clear, and very agreeable song. It leaves us for the south in October, and returns in April, the males coming first, as if to make the necessary preparations. In autumn the case is reversed, and the females lead in the migration. There is sometimes a fortnight between.

Wilson praises the address with which the ground-robin conceals the place of its nest ; but it seems to depend almost entirely on its resemblance to the ground about it, to secure it from unfriendly observers. It is sunk a little below the surface, sometimes under the shelter of a small bush, and is made of such materials as come most readily to hand, such as strips of bark and withered grass, with a lining either of fine grass or the fallen leaves of a pine. The eggs are four or five, of a soft white, spotted with reddish brown. The old birds are very anxious for the safety of their young, and practise the usual arts to draw the intruder from their nest.

The CARDINAL GROSBEEK, *Fringilla cardinalis*, cannot be considered as one of our birds, though its occasional visits require its insertion in our list. It is seen, but only at irregular intervals, in the villages on Connecticut river. Wherever the celebrated red-bird appears, it attracts attention, not only by its splendid plumage, but its bold and beautiful song.

The ROSE-BREADED GROSBEEK, *Fringilla Ludoviciana*, supplies the place of the cardinal, rivalling that fine bird in beauty and surpassing it in song. It is difficult to determine at what time its visits to us are paid. It is seen here sometimes before the snow has left the ground, and is met with at intervening periods till midsummer ; as this is the time for incubation, it must rear its young in some places not distant, certainly, if not within our bounds. At the latter part of the summer, our gardens are frequented by the young in great numbers, and bitter complaints are made, with or without reason, of their depredations on the peas. Near the sea-shore they are much less common than in the interior ; in some years. it is rare in all parts of the State.

This bird migrates to the south early in autumn, and on its way, is seen in many parts of the Union ; the nest is found in New York and Pennsylvania, and regions farther north, but in Labrador, Audubon did not find a single bird. The note of this grosbeak is striking, particularly when heard, as it often may be, in the silence of the night. It may be seen standing with its wings lifted, as if to display the crimson lining, before it begins its song. The young are three years in obtaining their plumage. Till then, they resemble the female, except that the red begins early to show its traces on the breast. The descriptions usually given of the bird, do not agree with specimens that are often found with stripes of white on the head and over the eye. The tail, instead of being forked, is very slightly emarginate, if at all. The food of this grosbeak consists of insects, berries and seeds.

The BLUE GROSBEAK, *Fringilla cœrulea*, is not at present known as one of our birds ; but a gentleman, whose authority is unquestionable, is confident that he has seen more than one in this State. It will without much doubt, be numbered with our occasional visitors, by future observers.

The PURPLE FINCH, *Fringilla purpurea*, is not an uncommon bird in this and more northern regions. Some of them pass the breeding season here ; the greater number keep on toward the British provinces, where they spend the summer, and return to the south about the time when the leaves fall. At that season their food consists of insects and berries ; when these cannot be had, they eat the seeds and sometimes the buds of trees.

The crimson linnæus, as it is sometimes called, has a rich and varied warble, clear as the softest tones of a flute. It sings not easily and unconsciously, like the sweet vireo, which it resembles, but more with the air of a performer, and as if it knew that some one was standing still to listen. It runs through various changes, with great rapidity and skill, and seems to challenge all the feathered tribes, to rival its admirable song.

General Dearborn was the first to discover the nest of this bird in Massachusetts. It was built on the low branch of a balsam fir, with the outside covered with lichens. Mr. Cabot and Dr. Brewer have also found them; but the number of those that remain with us at that season, must be small.

The PINE GROSBEAK, *Pyrrhula enucleator*, is an inhabitant of cold regions, and comes to us at irregular intervals, either in winter or when that season is nigh. Professor Emmons tells me that they were common near Williamstown in the autumn of 1836, which was unusually gloomy and cold. They are splendid birds, but so great strangers here, that they hardly merit a description.

The COMMON CROSSBILL, *Loxia curvirostra*, belongs to northern regions, and comes to us during the winter, in search of food. It delights in the seeds of evergreens, and makes use of its singular bill to extract them, holding the cones in its claw, like the parrot, while it forces the seed vessels open. At the south it is in the habit of tearing apples to pieces, for the sake of extracting the seeds. Wilson says, that in deep snows, it is familiar at the cabin of the hunter; when disturbed, it flies only to the roof and soon descends to the ground, to feed as before. When better food is wanting, it sometimes relieves the sensation of hunger by swallowing bits of clay. When engaged in eating, it may be seen standing on one foot and feeding itself with the other. It sometimes employs its bill to aid itself in the act of climbing.

Audubon has not succeeded in finding the nest of this bird, but he has explained the difference of markings as connected with its particular age.

The WHITE-WINGED CROSSBILL, *Loxia leucoptera*, visits us, like the former, in the winter season. It is more common perhaps than the other, but still is rare. It comes in large flocks, and then is not seen for several years. In form and habits it

resembles the other ; but is a much handsomer bird. It is known by its colors, black and crimson, and by the white bands upon the wings.

ZYGODACTYLI.

The YELLOW-BILLED CUCKOO, *Coccyzus Americanus*, arrives from the south about the first of May, and is by no means an uncommon bird. It is often heard when it cannot be seen, uttering its loud, coarse notes, in rapid succession, from the depth of the woodland shade. There is a prevailing impression that the cuckoo's cry is the harbinger of rain, from which it has derived its popular name of rain-crow. This bird flies in silence, under the shadow of the foliage, as if it were conscious of the discreditable manner in which its living is obtained, and were not desirous to call the public attention to its proceedings ; for when thus seen, it is passing from the nest of one small bird to another, to suck the new laid eggs. But this is not all its subsistence. It devours many insects, among others the large yellow cockchafer, and thus does some good to man, to atone for its injuries to its own race.

The cuckoo seldom follows the example of its foreign namesake, which lays its eggs in the nests of other birds. In this country, that kind of knavery is almost confined to the cow-bird. It builds for itself a hasty and carelessly constructed nest. The eggs, from two to four in number, are bluish green. If they are disturbed, the female is apt to desert the nest ; but if the young are hatched, it is so devoted and affectionate, that it will almost be taken in the hand, rather than abandon its charge. The young are fed with the hairy caterpillars that are found on apple trees ; but it is well that they are not more numerous, since they might greatly diminish the numbers of other birds whose services would be more important than theirs.

The BLACK-BILLED CUCKOO, *Coccyzus erythrophthalmus*, is often mistaken for the preceding, from which it differs in some of its habits, beside arriving later in the spring. It feeds on insects and birds' eggs, like the other, but extends its bill of fare to include the small shell-fish found in fresh waters and the small frogs from wet grounds. For this reason it is often found near the edge of water, or on branches bending downward to the stream. This species is less timid than the other; its note is equally unmusical.

These birds build their nests in the forest, resembling those of the former species, being little more than a flooring of twigs and moss, with a slight hollow in the centre to receive the eggs. These are from three to five, of the same color with the other, but rather smaller.

The GOLDEN-WINGED WOODPECKER, *Picus auratus*, is a very common bird in our gardens, known when flying at a distance, by the white on the lower part of the back, disclosed by the open wings; when nearly examined, it is admired for the beauty of its markings. It is driven from the northern states in winter by the excessive cold, but in April it is with us again, when its voice resembles a laugh, as if it were rejoicing to be able to return. They are cheerful, animated birds, which do much to give life to our scenery in spring. Their flight is strong and well sustained; when passing from one tree to another, they move in a straight line, till they come near the spot where they mean to alight, when they raise themselves a few feet and cling to the bark of the tree by their claws and their tail, with a nod of the head and a note, from which they are generally called the 'Flicker.' They hop on the ground with ease, in search of food, which consists of insects and various kinds of fruit. In winter, they occasionally supply themselves from the farmer's corn. They are a good deal persecuted by black snakes, which steal their eggs and young; and also by hawks, from which they escape by darting into a hole in a tree, if any one is at hand, and if not, by alighting on a trunk, and moving round it faster than the enemy can follow.

These birds are sometimes shot, but their practice of eating ants and their larvæ gives a taste to their flesh. Sometimes they are persecuted as fruit stealers, but most unwisely, for all the woodpeckers are very efficient aids to the horticulturist. When they alight on a tree, they listen attentively, and the slightest movement of an insect under the bark does not escape them. They enlarge the hole by repeated blows of their powerful bill ; then striking in their long, viscid tongues, with their horny tip, they seize the grub, and put a period to his mining.

They build in hollow places, found, or made for the purpose, in trees ; and such is the strength of their bill, that they have been known to make excavations a foot and a half deep, into the heart of the hardest wood. Their blows may be heard at a great distance, as loud as those of a hammer. The eggs, about six in number, and pure white, are deposited on bits of the wood. Soon after the young are hatched, they leave their den, and are fed on the branches of the tree till they are able to fly.

The PILEATED WOODPECKER, *Picus pileatus*, is a large and powerful bird, not uncommon in the woodlands of Massachusetts, but seldom found in the vicinity of large towns. It does not leave us in winter, like the preceding, but remains throughout the year in our wild forests ; and almost every wood-cutter can describe the rapid and angry manner in which he strips the bark from a hemlock or spruce, throwing it in long flakes around him. Should any one pursue him, he keeps far out of his reach, laughing, as one would think from his loud cackle, at his enemy's vain endeavors. He never, under any circumstances, relents from his natural wildness. If wounded, he makes fierce resistance to all attempts to seize him ; and if overpowered and carried captive, spends all his time in trying to escape from his prison. This he can easily do, unless the materials are very hard and strong ; and if he does not succeed, he can make an impression in an hour on the walls of his house of bondage, which the carpenter cannot repair in a day.

This bird excavates a gallery with its bill, for a nest, in

which it lays five or six white eggs. Sometimes it saves itself this labor, by making use of a hollow tree. The young remain for a considerable time with their parents, who feed them till their bills are grown hard enough to procure a subsistence for themselves. This is not the case at first; for two or three months, the bill is so soft that it can be bent with the fingers, and it takes twice that time to harden it for the rough uses to which it is to be applied. In the south, this bird is called the Log-cock; and the Black Woodcock in the middle states.

The RED-HEADED WOODPECKER, *Picus erythrocephalus*, is a very elegant bird, and perhaps the most common of this familiar race. When Wilson first landed in this country, long before he devoted himself to ornithology, as he was walking from Newcastle to Philadelphia, he shot one of these birds; its fine appearance and rich colors struck his imagination so much, that it had an influence in determining his mind to that pursuit for which he was afterwards renowned. After spending the winter in the south, this bird returns to us in May, after which it is very common in the interior, though somewhat rare in the eastern part of the State. It makes its home in the woods, but spends most of its time in gardens, particularly at the time when the best fruits are ripe. It helps itself with the utmost freedom, caring little for the rights or threats of the owner. Fruit like apples, too large to be eaten on the spot, it carries away, striking it with a jerk of the head, and flying off with the apple sticking on its bill. There is no secrecy or shyness in its depredations; they are conducted with perfect good nature, and with a confidence, fully expressed in its manner, that the proprietor enjoys the appropriation as much as they do. But there is another side to the account, for they show great skill and industry in searching the trees for grubs, which would be infinitely more destructive to the tree, than the woodpecker to the fruit.

They make their holes in decaying trees, where the eggs, white, with reddish spots at the larger end, are deposited without the ceremony of a lining. The black snake is a great de-

stroyer of the eggs and the young. They show considerable local attachment, and for years in succession, they resort to the same tree.

The RED-BELLIED WOODPECKER, *Picus Carolinus*, is said to be unknown in the eastern part of the State. In the interior it is found, and Professor Emmons tells me that he has shot the bird in the season of incubation; others have taken them in the autumn. They are found through the whole extent of the United States; but instead of frequenting the gardens, they choose the solitude of the forests, preferring the hardy independence of the woodlands, to the dangers which threaten them in the vicinity of man. They have no objection to the first approaches of civilization, and come freely to the girdled trees which surround the log hut of the borderer; sometimes they pay a visit to his cornfield, when animal food is wanting, and their loud, barking cry, is one of the most familiar sounds he hears. They were doubtless common in Massachusetts, some years ago; but as they gradually withdraw before the settlements, they will disappear as the forests are cut down; a consummation, which is quite as near at hand, as the friend of civilization could desire.

The YELLOW BELLIED WOODPECKER, *Picus varius*, is found in summer, in most parts of the State, but is not familiarly known, because, like the former, it keeps itself within the shade of the forest, seldom suffering either hunger or curiosity to bring it near human habitations. Its notes, which are loud and plaintive, differ from those of all others of its tribe; but the bird is so shy and suspicious that it is not easy to discover whence the sound proceeds. In its flight it seldom goes farther than from one tree to another, and is hardly ever seen upon the ground. Its food consists of grubs and beetles. In the summer, it varies its fare with berries and grapes, which it frequently hangs, head downwards, from the vine, to gather. When they migrate, they proceed by day in parties of half a dozen, and at night take shelter all together in some hole in a

decaying tree. Sometimes on these occasions, they have sharp conflicts with the Little Owl, in which they generally prevail by perseverance and force of numbers.

This woodpecker bores its hole in a sound tree, the male and female laboring alternately ; and such is the power of their bills, that an excavation is sometimes made to the depth of two feet, at the end of which is the nest. The entrance is just large enough to admit the bird, but it grows larger, and becomes quite spacious at the farther end. The eggs, from four to six in number, and white with a slight blush, are laid on the fragments of wood. The young remain in the hole till they are fully fledged.

The HAIRY WOODPECKER, *Picus villosus*, is a pretty bird, which comes so familiarly near our houses, that every one has seen it, intent upon its labor, searching for grubs and insects, not only in trees, but in posts, rails, and all kinds of decaying wood. Its call is a shrill whistle, and it makes a complaining sound as it explores the bark of the trees. It is either very tame, or so absorbed in its employment as not to regard the presence of an observer. It builds in the branch of a tree ; sometimes taking one which is already hollow, sometimes scooping out an opening, which it does by beating off fragments with its bill, and scraping them out with its feet. The eggs, like those of others of the race, are white. The female is known by its wanting the red cockade on the back of the head.

The DOWNY WOODPECKER, *Picus pubescens*, a small and very common species, is almost exactly like the former in every thing but size. It is often called the sap-sucker, from its practice of making perforations in circles on the bark of trees. The popular notion was that this is done in order to extract the juices of the tree ; but it is now well understood that the bird is in search of insects, and that, so far from injuring the tree, its proceeding is highly beneficial. It is amusing to observe

the tenacious industry with which this little bird keeps on in its labor, never leaving a spot till it has been thoroughly explored. There could not be a more signal instance of the manner in which ignorance confounds friends and foes, than the case of this poor bird, which, notwithstanding all its services, is thus defamed and persecuted. In summer it is found in the garden and the forest; in the winter, it may be seen from the window, on the wood-pile or some old fruit tree, which it relieves from many destroyers. It is perfectly happy under all circumstances, and seems to look at mankind, not with disgust and wonder at their folly, but with cheerful confidence that they will do it justice at last.

The nest is made like that of the preceding species, either in sound or hollow branches. The eggs, commonly six in number, are white. The extensile part of the tongue of this woodpecker, as well as of the two last described, is cylindrical, while the extremity is linear, flat above, convex below, with the tip pointed and the edges serrated backward; so that a grub, once impaled upon it, cannot easily be withdrawn.

The **THREE-TOED WOODPECKER**, *Picus tridactylus*, is found in Massachusetts, but much more abundantly in Maine and those northern regions in which it resides. Dr. Brewer informs me, that a woodpecker, answering to the description of this, was shot in Templeton, and that it breeds as near the border as Keene in New Hampshire. It is distinguished by its yellow crown, and that peculiar formation of the feet from which it derives its name. In its voice and habits, it most resembles the yellow-bellied; its breeding habits are like those of all the rest; its motions, like those of the red-cockaded, are petulant and restless, passing from one tree to another, or to different parts of the same tree, without taking time to examine any single spot. In the middle of the day, it is silent, and goes to some solitary place to rest. It is sometimes seen chasing insects in the air, but never hurts them on the ground. Its flight is swift, gliding and undulatory; at every gliding, it gives out

a loud, shrill note. These birds are more common in the northern states, in winter, than at any other time; because they are then driven from their homes by the severity of the cold.

SLENDER BILLED BIRDS.

THE WHITE-BREASTED NUTHATCH, *Sitta Carolinensis* is seen in autumn and winter, not because it migrates to us at that season, but because the supplies of food in the forest fail, and it resorts to fields, gardens, and the neighborhood of houses, in search of insects, such as ants and spiders. At a distance, it is easily mistaken for the downy woodpecker, though more lively in its motions. It moves sideways or head downwards, with great rapidity, stopping every now and then to cast an inquiring look at the observer. Its bill is strong and sharp, and when it would open an acorn or chestnut, it holds it in a crevice, and splits it with strokes of its bill. Its tongue is capable of extension like the woodpeckers, so that it has great advantages for procuring a subsistence; but, if it were less favored, it might contrive to live, since it is sometimes seen hopping among the poultry on the ground.

These birds chisel out a perforation in a decaying tree, in which to deposit the eggs. These are five, dusky white, spotted with brown at the larger end. The young are fed and taught to fly with affectionate care. They are fond of roosting in their own nest, and are believed to return to it year after year. They are easily known by their cry, *quank*, two or three times repeated, as they run over a tree.

THE RED-BELLIED NUTHATCH, *Sitta Canadensis*, is more common among us than the other. It is not found farther south than Maryland, and becomes more common as we proceed toward Maine, where many of them are hardy enough

to encounter the severest winters. It is a very active and industrious bird, always running over the branches of trees, searching with sharp eyes, sometimes rapping with its bill, and occasionally striking off a bit of moss or bark, to dislodge the grub below ; the only time it has for resting is at night, when, like others of the tribe, it holds by its feet to the bark and sleeps, head downwards. It seems almost indifferent to the presence of man, unless he comes near it with obviously bad intentions. When it spends the winter here, it often comes near our dwellings in search of food. Its flight, when seen here, seldom extends farther than from one tree to another ; but it must have great power to sustain itself on the wing, since on one of his homeward voyages, Audubon saw one come on board his vessel at the distance of three hundred miles from the shore ; it alighted on the rigging, and began to search for food, but it had fasted too long, and in the course of the night it died.

This species is partial to pine forests, where it feeds on the seeds of the trees. Its nest is made in dead stumps, not high above the ground. We have at present no account of its breeding within the limits of our State.

The BLACK AND WHITE CREEPER, *Certhia varia*, comes from the south in April, and is seen running nimbly round the trunks and large branches of trees, in search of insects, particularly ants and their larvæ, which are its favorite food. It is an unsuspecting bird, always too much taken up with its own affairs to pay much regard to an observer. It moves by short successive hops, with great rapidity, and in all directions with equal facility, with the head either up or down. It has but a very short flight, from one tree to another. Its notes are a series of *tweats*, rapidly pronounced, the last greatly prolonged.

Audubon says that at the south they breed in holes in trees, but Nuttall found a nest in Roxbury, on the ground, protected by a shelving rock, and composed of coarse strips of the inner bark of the hemlock, which overshadowed the spot. The lining was a thin layer of hair. It contained four young birds, about

a week old, which the parents fed in his presence without fear. The eggs are white, marked with brownish red spots at the larger end.

The BROWN CREEPER, *Certhia familiaris*, makes its appearance at the approach of winter, not coming from other regions, but only from the forest, where it passes the milder season. Its bill is not powerful, but it has the advantage of a rigid tail, on which it rests while examining the bark of trees. Insects are its chief dependence, though it sometimes eats the seeds of the pine. With us it is not a common bird, nor is it known to breed in our State.

The HUMMING BIRD, *Trochilus colubris*, is a beautiful little visiter, that generally makes its appearance with the earliest blossoms; and almost always in considerable numbers, though sometimes cold and wet seasons destroy many of the young. Of man it is very fearless, being often seen on flowering vines that climb over windows, and sometimes taking courage to enter apartments in which flowers are to be found. Its bill is long, and the tongue capable of extension. The bill is inserted into the urns of flowers, and then, darting out its glutinous tongue, it draws forth the insect from its fragrant home. After feeding, the bird settles on a bough and dresses its feathers, without caring who observes its motions. It is a mistake to suppose that the honey of flowers is its principal support; it is rather its luxury than its means of subsistence; without a supply of insects, it will perish, as those have found who have endeavored to keep it on honey and sugar. This delicate little bird is easily reconciled to confinement, but it is so very sensitive to cold, that a northern winter will destroy it, however carefully it is guarded.

The nest of the humming bird is very ingeniously constructed. It is generally placed on the large horizontal branch of an apple tree, and covered with moss so as to resemble the place where a limb has been taken off and a circle of bark has risen round the spot. As the female is green; birds of prey might

easily pass over it, without discovering the nest below. Their nests are sometimes built in small trees and shrubs. I have seen one on the drooping limb of a peach tree, not more than three feet from the ground, and this was carefully covered with moss, though there was none upon the tree. If any one goes up to the nest, the parent flies up to him as an intimation that he is doing wrong, then alights almost within the reach of his arm, and watches his motions with composed attention. The parents feed their young with affectionate care, till they are able to fly, and for about a week after. The young do not come to their full plumage till the following spring.

H A L C Y O N S .

The BELTED KINGFISHER, *Alcedo alcyon*, is found in the neighborhood of fresh waters over all the United States. He may generally be seen sitting on some post or dead branch, near a solitary mill-dam, quietly watching his prey in the element below. If fish do not come near him, he sweeps along the course of the stream with rapid flight, and occasionally hovers over the water, as if watching something beneath. Having made sure of his aim, he darts down and seldom rises without his prey. If scared from his retreat, he flies off with a grating sound of displeasure, resembling the noise of a watchman's rattle. When the northern rivers are frozen, the kingfisher resorts to the sea, where it may occasionally be seen fishing as in fresh water. The nest of this bird, it is well known, is made in an excavation, scooped in the side of a bank overhanging a stream or mill pond. It extends to several feet in length, with a larger chamber at the end. The eggs, about six in number, white, are deposited on some twigs, grass and feathers.

S W A L L O W T R I B E .

The PURPLE MARTIN, *Hirundo purpurea*, is more intimate with man than any other native bird. So great a favorite is he, that lodgings are provided for him, by the northern farmer, by the southern slave, and even by the Indian, who puts up a calabash for him at his cabin door; not wholly from benevolence, but because the martin pays rent, by keeping insects from the deer skins and venison, exposed in the air to dry.

The martin spends the winter in the south, and reappears in Louisiana in February, moving on deliberately in immense flocks, which divide into smaller parties as they proceed. They have a rapid flight, though not equal in that respect to the Barn Swallow. They can drink and bathe on the wing, without stopping for the purpose, by plunging hastily in the stream and then shaking themselves to throw off the water. They alight on the ground, and can walk with ease, notwithstanding the shortness of their legs, which is unfavorable to that kind of progression; but flying is their favorite motion; and in the air, they can make themselves formidable by the rapidity of their movements, to an enemy far superior in size. Even the eagle, if he comes in sight of the martin's box, is compelled to retire in disgrace.

The nest of the martin is made, toward the last of April, of sticks, willow twigs, grasses, leaves, rags and feathers. The eggs are white, from four to six in number. The male takes part in the work of incubation, and is very attentive to his mate. If no habitation is provided for them, they will dislodge bluebirds from their box, and after depriving them of their home, will add insult to injury, abusing them on every occasion. If no other lodgings can be found, they will resort to a woodpecker's hole. But they are not often driven to such extremities; the industrious class of the community give them shelter for the sake of their morning call, which is the earliest that salutes the day. Their notes are generally pleasing, though not in the least musical; and the martin, aware of the

estimation in which he is held, flies carelessly through the street, poises himself in the air to look into windows, hangs by the eaves of houses, plays with the kite string of the children, or chases away the cat who seems to be prowling in search of his young. As his food consists entirely of insects, his services are very useful. There is a tradition, that they first came into New England shortly before the revolutionary war, but whether their history resembles that of the cliff swallow, in this respect, or not, I am not able to determine.

THE BARN SWALLOW, *Hirundo Americana*, like the preceding, is generally welcomed by the farmer, who knows that these birds are of incalculable service in protecting his cattle from the insects that torment them almost to madness, and therefore is wise enough to allow them a shelter among the rafters of his barn. In April they return from the south, and soon begin to build against the timbers, with pellets of mud from the borders of some neighboring stream, inlaid with slender grasses, which serve to bind it together. The eggs are white, spotted with reddish brown. When the young are fledged, the parents use persuasion to induce them to come out from the nest, and try their first flight in the barn. When they have gained a little confidence, they go forth to some wall, fence or tree, where the parents can feed them without trouble. They soon become so expert in receiving food, that the parent can feed the young one, while both are on the wing. In fact, they seem in their element only when flying, their movements being easy and graceful, apparently without effort, and so rapid that no bird can equal them in fleetness. Before the close of summer, the barn swallows are seen in flocks, constantly increasing in number, and alighting on churches, barns or high trees, chattering gaily to each other, as if some interesting plan was in view. They are talking over the subject of their migration; and on some fair morning they set forth, following the course of streams or the sea beach, and thus with very little delay, proceed beyond the limits of the Union. The idea that these birds avoided the severity of winter by plunging

into the mud, is now generally abandoned. No doubt many are found occasionally, on draining mill-ponds, and under circumstances which it is not easy to explain; but no one pretends that one swallow has been reanimated after its submersion, nor is there anything in the structure of the bird which authorizes us to suppose that it can live beneath the water. Least of all should we expect any such proceeding from a bird which can fly more than a mile a minute, and in a day or two can reach those regions where the flowers do not wither nor the leaves fall. When they return in the spring, the bank swallows, which pass the winter in Florida, come first; the white-bellied follows; next the purple martina; then the barn swallows; and last, the chimney swallows. The probability is, that those which are latest in returning, come from the most distant winter quarters, and that the extent of their migration may be determined by the date of their usual reappearance in the spring.

The CLIFF SWALLOW, *Hirundo fulva*, was hardly known to naturalists till within a quarter of a century. The first account of its habits was derived from Long's expedition to the Rocky Mountains. Since that time the whole body have commenced a great system of emigration, moving gradually on towards the Atlantic, till now it is become quite common in many parts of New England. A peculiar sagacity is manifested by this and the chimney swallow. Its wild practice was to build against the sides of cliffs; but when it comes into civilized life, it builds under eaves and cornices, where its nest is partially sheltered from the rain. The first emigrants who came informed the rest of their discovery, and induced the whole tribe to make a radical change in some of the most important habits of their lives. The nest is a large patch of clay mixed with sand, having an entrance near the top, rounded, projecting, and bent downward; the whole resembling a coarse earthen retort, with the neck broken off, stuck and flattened against the side of the building. The nest has a lining of dry grass and straw, on which are generally four eggs, white, with dusky

spots. These birds defend their nest, when attacked, with great spirit and resolution. They are not common as yet in the eastern part of the State, but in the west they begin to abound.

THE WHITE-BELLIED SWALLOW, *Hirundo bicolor*, is not so common in the western part of this State as either of the two preceding. It differs from them in never using mud in the construction of its nest, which is made of dry grass and lined with feathers. The eggs are four or five in number, of a pure white. Other swallows are harmonious and friendly to each other; but these are angry and quarrelsome. In taking their food, they make a snapping noise with the bill. This bird returns in spring earlier than any of its tribe, except the sand martin; and though not particularly friendly to its own kindred, it is on good terms with man, and well disposed to accept the lodgings which he provides.

THE BANK SWALLOW, *Hirundo riparia*, is found wherever there is a sandy bank on the side of a pit or river. There it bores a hole with its bill, below the upper edge of the bank; having opened it so far as to insert its body, it scrapes the sand with the feet, inclining the excavation upward, in order that the waste earth may fall out readily below. The depth varies, in different situations, from two feet to five; the end is enlarged in the form of an oven, to receive the nest. These birds are so gentle, industrious, and friendly to each other, that it is quite interesting to see them engaged in their labor. They often, unfortunately, are compelled to work in vain. Idle boys destroy their tenement, or some *improvement* destroys the bank; but they are so hopeful and persevering, that they will continue boring the earth, even when the shovel, day after day, destroys the results of their exertion.

The nest is formed with bits of dry grass and feathers. The eggs of the first brood are from five to seven, of a pure white. The young, as soon as they are able, crawl to the entrance, where they become a prey to crows and hawks, which lie in wait to catch them, both at that time, and after they have left

the nest to perch in trees. In winter, these birds resort to East Florida, where they are seen by thousands. Audubon has discovered that there is another species, nearly resembling this, and often confounded with it. He has given it the name of rough-winged swallow, *H. serripennis*. The bill is longer, with the point of the upper mandible more decurved. The tail is shorter and but slightly emarginate. There are no feathers on the hinder part of the tarsus, as in the common species, and the wings extend half an inch beyond the tail.

The CHIMNEY SWALLOW, *Cypselus pelagius*, is a singular bird, which formerly, when the country was unsettled, made its nest and place of resort in hollow trees; but having discovered that chimneys have an advantage over those wild tenements, and that a great proportion of them are not in use in the summer, it has now become familiar with man, and abounds in almost all the towns and villages of the country. As soon as they arrive in May, they select a chimney for their encampment, where both sexes roost together at night; and if not disturbed in their rendezvous, they return to it several years in succession. Here they may be seen in the evening, flying round in broad circles, till it grows dark; at length, as one passes over it, he drops into it as if dead. One after another, at intervals, follows his example, whirring with their wings as they descend, and making a sound like distant thunder. They spend the night on the sides of the flue, clinging with their claws and resting on their tails, all in profound repose. At the first glimpse of daybreak, all are in motion, and they pour out in a rushing volume, as if the chimney were bursting out with flames; for a moment it trembles to its foundation; but the swallows disperse to their several cares, and it is left deserted for the day.

Each pair select a chimney in the neighborhood, taking one which appears to be disused for the season. Their first process is to collect twigs, which they break off in an ingenious manner, grasping them with their claws and pushing the body suddenly against them, by which the stick is separated from the

branch with the end in the swallow's grasp. These they glue to the side of the flue with their saliva, to form the frame work of their nest, which is placed four or five feet from the top. In this rude basket-work their eggs are laid without the semblance of a lining. They are white, and from four to six in number. In wet weather these nests are often dislodged, and come down with the young in them ; sometimes the young fall out of the nest. In either case, they scramble up the chimney and support themselves with their claws and their tail, till they are able to fly, in a place near the mouth of the flue, where the parent can conveniently feed them. Before the end of the summer they all disappear, leaving us earlier than other swallows, because they have a greater distance to go.

The WHIPPOORWILL, *caprimulgus vociferus*, is not often seen, because compelled by its delicate sense of vision, to retreat into the forests, to escape the blaze of day ; but every one knows its wild and melancholy song, which, when it first arrives, is heard from the distant woods, but comes nearer as the season advances, and at last is heard very near the dwellings of men. The song of birds is always expressive of happiness ; but the complaining notes of the whippoorwill seem to indicate suffering, and create a sympathy in the hearer, which the case of the bird does not call for ; since all this while, it is collecting moths, beetles, ants and grasshoppers ; and instead of foreboding change and disaster, it is employed advantageously for us, and no doubt to its own satisfaction, in destroying insects that trouble the repose of the cattle. The barn-yard affords it a foraging ground, which it often visits ; sometimes it takes its station on the step of the house door, not chasing its prey on the wing, like the night hawk, but waiting till insects pass by ; when they appear, it rises to snatch them, and then resumes its position, and proceeds with its song.

The nest of the whippoorwill, if it can be said to have any, is a mere hollow place in the ground, in some retired part of the woods. The eggs, bluish white, with blotches of dark

olive, are laid directly on the ground. The young are soon able to run about, and until they can fly, are sufficiently protected by their resemblance to the ground. This bird is very susceptible of cold; during the severe season of 1832, many of them were found dead in New England in the month of June. It would be no subject of regret if they were more common in Massachusetts, for their note is pleasant, heard in the silence of evening, and their services in destroying insects are not balanced by any injuries whatever.

The NIGHT HAWK, *Caprimulgus Virginianus*, notwithstanding its popular name, is much less properly called a bird of night than the former. It flies in the day, even when the sun is shining, and retires to rest before it is late in the evening, about at the time when the whippoorwill begins his song. Its wings are very large in proportion to its weight, and its flight is firm and graceful; it sweeps in circles, sometimes rising high in the air, then shooting suddenly downward, with a sharp squeak, which seems to say that it has caught sight of its victim. In the evening, it flies lower than by day, often striking off wildly from its line of flight, doubtless to pursue some insect which its sharp eye has discovered. It can hardly walk on the ground, nor even stand erect without resting on its breast. When it grows dark, it alights on the earth, or on fences, where it passes the night, giving a squeak now and then, as if it were still following its prey in dreams.

In May, the female deposits her muddy colored and freckled eggs on the naked ground, without any sort of preparation. The young, like those of the preceding species, are sufficiently guarded, by the resemblance of the down, which covers them, to the ground, in which they nestle. The food of the night hawk consists of insects, which it secures and swallows while flying. It is strange that Wilson was obliged to take so much pains to show that this and the whippoorwill are different birds, when, beside that one flies by day and the other by night, the whippoorwill is so formed, that he can walk firmly and fast, while the night hawk can hardly support itself on the ground,

and, when it perches, is obliged to stand on the branch lengthwise, in order to lean upon its breast. Beside this, the closed wings of the former do not extend so far as the tail by two inches, while those of the night hawk are longer than the tail. In the night hawk the tail is forked, while that of the whip-poorwill is rounded. It shows that Wilson labored in a field which had been very little explored, and it is wonderful that he did not leave more errors to be corrected, and deficiencies to be supplied, by later observers.

PIGEON TRIBE.

The CAROLINA TURTLE DOVE, *Columba Carolinensis*, is common enough at the western part of Massachusetts, where it is called the Mourning Dove, from the plaintiveness of its call, which is often heard in the woods. The sound seems expressive of deep affliction, but the bird that makes it is very happy, and quite unconscious of the interest which he inspires. When these doves come to the north in the spring, they disperse in small parties, and it is not often that more than two are seen together. They are generally met with in roads through the forest, to which they resort in order to dust themselves and swallow gravel. They are by no means shy, though unobtrusive in their manners; they are sometimes seen among the domestic poultry, as they go to be fed at the farmer's door. Occasionally they join the flocks of passenger pigeons, and are taken in snares, together with their relations. Their food consists of grain and small acorns, together with poke, partridge, and dogwood berries, in their season. They are said to be easily tamed, and to raise their young in confinement; if so, they would reward attempts at domestication, since the flesh is pronounced equal to that of the woodcock, by those who profess to be judges of such matters.

The PASSENGER PIGEON, *Columba migratoria*, is a hardy wayfarer, which cares very little for climate, and is governed in its migrations, not by the desire to escape a cold climate, or to build its nest in a mild one, but simply by the necessity of going where food abounds, because no small supply will satisfy the appetite of such immense numbers. Having powers of vision equal to their power of flight, they can easily take a survey of the country over which they are passing; if they determine to descend, they break the force of their motion by repeated flappings of their wings, to keep themselves from being injured by dashing upon the ground. So swiftly do they move over an immense extent of country, that they have been killed near New York, with their crops full of rice from South Carolina plantations. In the Atlantic states, their numbers are nothing compared to the countless multitudes which assemble in the west, where, as they pass over, the rush and roar seem like those of a tornado, darkening all the sky. But their numbers, though reduced from those of former times, are still considerable, and as soon as it is known in a neighborhood, that the pigeons are flying over, it is the signal for assembling all the arts and instruments of destruction. Many are shot with the gun; many are taken with nets; and others are decoyed by pigeons with their eyes blinded, which are stationed on a roost, provided for the purpose; the roost being shaken with a string, these pigeons open their wings to balance themselves; and the wayfarers, supposing that they have just alighted, after examining the region, think it safe to come down and join them without farther investigation.

The accounts of the breeding places of the pigeons at the west are almost incredible. Some of them extend several miles, covering thousands of acres; the grass and underwood is all destroyed; the ground overspread with limbs, broken down with the weight of the birds clustering upon them, and the trees killed as completely as if girdled with the axe. When the young are fully grown, but have not yet left the nest, a general invasion is made upon the spot. Hawks and eagles snatch them from above; hogs devour the thousands that fall

to the ground ; the axe-men cut down the trees most loaded with nests, and the crash of falling timber mingles with the thundering roar of the wings of ten thousand pigeons. One large tree, as it descends, often brings down several others, and two hundred squabs have been gathered by means of a single fall. The multitudes of birds are continually breaking down large branches with their weight, so that it is dangerous to walk below.

There is some disagreement in the accounts given of their breeding. Wilson maintained that there was but a single young one in a nest ; while Audubon asserts that there are two. The prodigious numbers of the birds would seem to confirm the statement of the latter. The young come to maturity in six months. Every year they, at least, double their numbers.

One office of the pigeon seems to be to protect the oak forests. It is stated, on excellent authority, that for some years after they have occupied a particular spot as their breeding place, the oaks, for many miles around, are remarkably free from the green caterpillars, by which they are apt to be infested.

GALLINACEOUS BIRDS.

The WILD TURKEY, *Meleagris gallopavo*, was formerly common in all parts of the United States, but has gradually disappeared before the encroachments of civilization, and is rare, except in the unsettled regions of the west. It is still found occasionally in our western mountains, and also on the Holyoke range, where some are taken almost every year. Its migrations, like those of the pigeon, are irregular, having nothing to do with seasons, and are governed wholly by the supply of food. This fine bird is so uncommon in Massachusetts that it does not seem necessary to describe it at large ; in a few years it will doubtless leave us forever.

THE AMERICAN QUAIL, or PARTRIDGE, *Perdix Virginiana*, is quite common in Massachusetts, where it bears the former name; in the southern and western states, it is always known by the name of Partridge. It remains with us throughout the year, and sometimes suffers so much from the deep snows, that it may be seen in the sheds and near the houses of our largest villages, in search of shelter and food. A party will sometimes resist the cold by collecting in a circle, pressing close, with their heads outward, borrowing warmth from each other; but in our fiercest winter storms they sometimes perish under the drifted snow.

The quail is a gentle bird, and fond of associating with its own race, though not in large numbers. It generally resorts to open fields in search of food, such as grain, buck wheat and Indian corn. It sometimes joins the parties of domestic fowls and scratches the ground after their example. Though it is fond of grain, it requires something more for its support; and the demand of the young quails for insects makes the chief difficulty in the way of its domestication. The female prepares a nest of various grasses, arranged in an oven-like form, under the protection of a tuft, and partly sunk in the ground. The eggs are from ten to eighteen, of a pure white. The male takes part in sitting, and as soon as the young are hatched, they are able to leave the nest. Wilson believed that the quail might be domesticated. Its eggs have sometimes been hatched by the common hen, and the chickens are sufficiently tame; but though kept through the season and the succeeding winter, they go away in the spring. Two that were brought up by a hen, as soon as they were turned off, associated with the cows, going with them to the pasture in the morning, returning at night, and standing by them when they were milked, waiting to share their lodgings in the barn. These, however, contented as they appeared, deserted, like all the rest, in the spring. This wildness might after a time be overcome; but there would be more difficulty in supplying all the food they require, and after all it would be doubtful whether success would repay the care and attention which it would demand.

The note of the quail is well known, being generally interpreted into the prediction, *more wet, more wet*; the sounds are continued for a long time. This note of the male is most frequent and loud in the month of September. Sometimes there is an introductory whistle preceding the clear and emphatic *more wet*, or *bob white*. This call may be easily imitated so as to deceive the bird. When a covey are about to take wing, they make a sound resembling that of young chickens; when they separate, the parent assembles them by a plaintive and expressive call.

The RUFFED GROUS, *Tetrao umbellus*, is called pheasant in the middle and western states, and partridge in New England; a confusion of names somewhat perplexing. These elegant birds generally keep themselves within the shelter of the woods, and prefer those which grow on the sides of mountains. There they can find their food at all seasons; it consists, in spring and autumn, of the buds of various trees, the catkins of the alder and hazle, and all the berries that the fields and forest afford. In winter, they live on the buds of apple-trees, laurels and azaleas, together with the berries of the wintergreen, and the favorite partridge berry, which they are able to rescue from the snow.

The ruffed grouse begins its drumming in April; the sound is heard most frequently at the beginning and at the close of day. It is produced by the male, who beats his sides with such a rapid motion as to make this sound resembling distant thunder, which is heard at a prodigious distance in the woods. It is said to be imitated by striking an inflated bladder with a stick; on hearing it, the male takes it for a challenge, and as he comes forth to do battle with his supposed rival, he falls an easy prey. The nest is constructed in May. It is little more than a handful of leaves, spread under a bush, or at the side of a fallen log, and unlike that of the quail, it has no roof above. The eggs are from nine to fifteen, brownish white. The young leave the nest as soon as hatched, and are led by the mother with a cluck like that of the hen. If the family are sur-

prised, the mother resorts to arts like those of the quail, throwing herself on the ground, fluttering and beating with her wings, as if hardly able to move ; and while she thus draws off the attention of the intruder, she calls to the young to disperse and hide themselves. They do this so effectually that they are seldom found, though they only creep among the dry leaves, or remain perfectly still, trusting that their resemblance to the earth will conceal them from an unfriendly eye.

The old birds, when hard pressed by the hunter, if there is snow on the ground, save themselves by diving into it, and working their way out at some distance from the place where they went in. Much as they are pursued, they are still abundant in New England, and the wildness of their habits will save them from extermination so long as the forests are permitted to last. They are now cut down with wanton profusion ; and as fast as they are cleared away, birds of this description are driven to other regions less infested by man.

THE PINNATED GROUS, *Tetrao cupido*, was once very common in New England, but, being more shy than the preceding species, it has already been driven from all but a very few places, where it is comparatively free from intrusion. Audubon says, that when he first went to Kentucky, they were so abundant, that they could hardly be given away ; now, hardly one can be found in the State, and they are, in like manner, fast disappearing from all the settled parts of the west. In Massachusetts, laws have been enacted to preserve the heath-hen, as it is commonly called ; but it is impossible to withstand the operation of the law of nature by legislative enactments, and the same causes which have removed the greater proportion will soon deprive us of all. The better way is to try the experiment of domestication ; the bird is easily tamed, and breeds in confinement. Some which Audubon kept for the purpose, soon became familiar, and would eat from the hand as readily as common fowls. Unfortunately, they became so destructive to the vegetables of the garden, that he was obliged to have them killed ; but the experiment proceeded far enough to show,

that neither the natural wildness of the bird, nor the want of proper food, would prevent their being reared by any one who is willing to take the trouble.

The grouse feeds on berries of various kinds, in their season, the acorns of dwarf oaks, and the buds and leaves of trees. In summer, they pick whortleberries and cranberries, and sometimes venture into a field to pick the leaves of clover. It is said, that, sometimes in winter, when they are hard pressed with hunger, they will feed on the buds of the pine. They are also known, under those circumstances, to join the domestic poultry.

The *tooting*, for which these birds are remarkable, is produced by means of the air bags at the side. When these, resembling a small orange, are inflated, the bird lowers its head, opens its bill, and sends forth the air contained in these receptacles, in a succession of rolling notes, like those of a muffled drum. In parts of the country where the birds are become few and wild, this sound is seldom made after sun-rise, and sometimes the battles of the rival males are carried on in silence, and the *scratching grounds* carefully concealed.

The nest is built in May, with dry leaves and grasses, interwoven, and is carefully placed amidst the tall grass of a large tuft, where it is not often discovered. The eggs, from eight to twelve in number, resemble those of the preceding species, though somewhat larger in size. The female sits nearly three weeks, and as soon as the young are hatched, leads them away from the nest. When surprised, they conceal themselves, like young partridges, and one may search for them in vain, though perhaps he is treading them under his feet. In autumn, the different families associate together, sometimes in very large parties. Their most dangerous enemies are the hawk, the skunk, and the greatest of all destroyers, man.

The only place where they are now found in Massachusetts, is in Martha's Vineyard, and one small island near it; and there, though pains are taken to protect them, they are said to diminish fast, the high price which they command in the market, being a strong temptation to shoot them. Cats, also, which

run wild in the island, do their part in the work of extermination. The wonder is, that with all their timidity, they have remained so long, but their patience and their attachment to their old haunts will be wearied out, and other means must be found to gratify the epicure's taste, and the sportsman's love of pleasure. The order of nature supplies such game, as a resource for the pioneers of civilization, while the process of clearing the soil goes on; till the earth is subdued, the deer, the birds, and the fish, supply means of sustaining life. But when agriculture, and the other arts of life, begin to be pursued with profit and success, these resources cease to be needed; the habits of the hunter are inconsistent with regular industry; and as the game would only serve to tempt men away from their cares and duties, the forests and streams are deserted, and their wild tenants go where there are other adventurers who need them. If the gallinaceous tribes can be preserved, it is by domestication, not by law. Experiments should be made for several years in succession, and if these fail, we must make up our minds to lose them.

WADING BIRDS.

The SANDERLING, *Calidris arenaria*, is an autumnal and winter visiter, which arrives from its northern breeding places in August, and spreads along the coast from Maine to Florida. They are seen in flocks, running in the face of the waves, and uttering a plaintive whistle, as they gather the small shellfish, insects, and other minute animals, with which the beach abounds. This bird obtains much of its subsistence by inserting its bill obliquely in the sands; it does this with great activity, and when the tide is going down, great numbers of the holes which are made by this process, are seen upon the wet beach. They can run very fast upon the sands; their flight is

rapid, but they generally alight at no great distance from the spot whence they started. When they return to us in autumn, from the northern regions, they are in good order for eating, and their flesh is much esteemed.

The BLACK NECKED HILT, *Himantopus nigricollis*, if known at all in Massachusetts, appears only as an accidental visiter. Dr. Brewer tells me that a bird somewhat answering to the description of this has been seen occasionally near New Bedford, but he has never obtained a specimen.

The AMERICAN OYSTER-CATCHER, *Hæmatopus palliatus*, is found along our whole Atlantic coast, but more rarely in New England than in other parts of the country. It spends the winter in the south, and returns to the north in spring. Its breeding places extend from the middle states to Labrador, where it was found breeding in July. Dr. Brewer informs me that he has once found this bird in Massachusetts. We learn from Audubon, that he has never found the *Hæmatopus ostralegus*, described by Wilson, in any part of this country, and, though he does not say it is not to be found, it is more likely that this species has been mistaken for it, than that it should have escaped his searching observation. This bird is exceedingly difficult to approach, flying off the moment it perceives that any one is watching it; so that it was only with a telescope that he could observe its motions, as it probed the sand with its bill, tore off the limpets by inserting its bill as a wedge between the fish and the rock, or beat a shell-fish against the sand, for the purpose of breaking the shell. These birds return to the south early in October.

The GOLDEN PLOVER, *charadrius pluvialis*, is a common bird on our coast in spring and autumn, when they return from their breeding places in the north, and prolong their stay, till they are driven away by the approach of winter. They live principally on such insects as are found in the vicinity of the sea; they are sometimes seen patting the earth with their feet,

to force out the worm from his burrow, but when grasshoppers are to be had, they appear to be the plover's favorite food. They assemble in such immense flocks, that on one occasion, when Audubon accompanied some French gunners from New Orleans to shoot them, one man killed sixty-three dozens in the course of the day. When they are about taking their departure, they assemble in large flocks in the morning, though they rest apart from each other at night; and at such times, they are caught in great numbers in nets, which they are driven into by creating a panic among them. No difference can be detected between this and the golden plover of Europe; it is doubtless the same with the bird so abundant in the Hebrides, and found in most parts of the known world.

The PIPING PLOVER, *Charadrius melodus*, so called from its pleasant, though plaintive note, is found along our whole coast in summer. They spend the winter on the shores of the southern states. In the spring they proceed to the eastward in pairs; if they find a suitable breeding place on the way, they alight and take possession, and as they are soon joined by others, they soon form a considerable party. In autumn, they move in flocks of twenty or thirty, always keeping near the shore. Its flight is strong and rapid, but it is more remarkable for its swiftness in running, which is so great, that it eludes the eye, and reposes quietly on the sand, which it so much resembles that it has no fear of being detected. I have no information of its nest having been found in our State, but it can hardly be that it should breed so far on each side of us, and yet pass us by. The piping plover is valued as game, but the sportsman generally gives his attention to birds of larger size.

WILSON'S PLOVER, *Charadrius Wilsonius*, a species resembling the preceding, and named in honor of the great ornithologist, is a constant resident in the southern states, but was supposed never to come farther to the east than Long Island. Audubon thought it strange that its range should be so limited, compared with that of the piping plover. I am, however, in-

formed by Dr. Brewer, that Wilson's plover was abundant at Nahant in August of the last year. It was probably some irregular movement, which would not be repeated every year, since it is hardly to be supposed that the bird should be often in our limits, and yet escape the eye of so many accurate observers.

The KILDEER PLOVER, *Charadrius vociferus*, is a common bird, which spends the winter at the south, but returns early in the spring, leaving the coast and spreading over the inland country, where it is found in open fields, and on the banks of streams, and known by the name of *kill-dee*. It seems to have great sagacity in suspecting danger. In the presence of horses, cows and sheep, it is perfectly indifferent; but if a man or dog appears, it betrays extreme uneasiness and distrust. When they move in small flocks, they appoint one as sentinel, who stands on tiptoe, watching all the objects around; when anything appears, in the least suspicious, it sounds the alarm, and the place is at once deserted.

The kildeer plover makes its nest on the ground of a field, or the sand of the downs, sometimes lining it with grass, at others laying the eggs on the naked earth; they are four in number, of a cream color, blotched with black; the young run about as soon as they are hatched, and the parents are kept in perpetual agitation by fears for their safety.

The food of the kildeer consists of grasshoppers, crickets, snails and earth worms. They often strike their bill into the ground, in search of their prey. In the meadow, they pat the ground, to force out the worms, and sometimes follow the ploughman, to seize those which he has turned out from the ground. They have a peculiar motion of the body, when about to pick up their food, in order to bring their bills to the earth to reach their prey. The flesh of this plover is often eaten in the fall, but at other seasons it is poor and ill flavored; indeed, there is hardly any time when it is worth the trouble of shooting.

The SEMIPALMATED PLOVER, *Charadrius semipalmatus*, is not an uncommon bird, and is seen on our coast in the spring, from the last of April till the end of May; then it goes to high northern latitudes to spend the breeding season, at which time, Dr. Richardson assures us, they abound in the arctic regions. As soon as the young have acquired strength for the journey, they set out on their return, and early in August they again make their appearance on our shores. They feed on land as well as marine insects, though they are generally seen playing before the waves on the beach. They are found in the markets of our cities at the close of summer, and are well esteemed for food.

The BLACK-BELLIED PLOVER, *Charadrius Helveticus*, called sometimes the large Whistling Field Plover, because of its attachment to newly-ploughed fields, where it finds the insects and berries which compose its food, is found over a large extent of country, having breeding places from Pennsylvania to the most distant northern regions known to civilized man. It often chooses the field for the place of its nest, which is carelessly made of dry grass, and in which are laid four eggs, of cream color, dashed with black. Nuttall says, that their nests are of rare occurrence in New England, but does not say whether he had ever found them. In the summer they feed on various berries, and are valued as food. At the close of August, they go down with their young to the borders of the sea, where they live on such materials as the shores afford them. They are called the beetle-headed plovers, and sometimes the kildeer, from their cry, in which they resemble that restless bird, as well as in their never-resting suspicion. Toward the last of September they collect in great flocks, preparatory to their migration, but linger with us for a considerable time before they go.

The TURNSTONE, *Strepstilus interpres*, derives its popular name from the habit of turning over stones with the bill and sometimes the breast, to find insects and worms beneath them,

a habit which they are said to retain when in a domesticated state. They arrive in the spring, and linger on the shores till the summer, when they hurry away to the desolate coasts of the northern ocean, where they breed. They return in August, and, as the weather grows cold, move off to the south, extending their migration over a vast extent of country. The turnstone flies with a loud twittering note, and runs with its wings lowered, but not rapidly. They do not collect in great numbers, like the sandpipers, but are seen in small parties of three or four. The bill resembles that of the nuthatch, and is used with great skill in collecting food. It is strong enough to break the shells of many small shell fish ; from others, it picks out the flesh like the oyster catcher.

The GREAT BLUE HERON, *Ardea herodias*, is a constant resident in Massachusetts, searching for its prey, in winter, in springs and ponds, which are not sealed up by the cold. It seems indifferent to climate, but is not found very far to the north, though it is seen westward as far as the Rocky Mountains. It is a shy and suspicious bird, with most penetrating and far-reaching powers of vision, so that it is extremely difficult to approach it, except in the depth of the wood. Their principal food is fish ; but they have an extensive bill of fare, embracing frogs, lizards, meadow mice, young rats, snakes and birds. It does not refuse insects when it can find nothing better ; but it prefers fish, and has been known to expose itself so much in order to secure it, as to plunder a pond of its gold fish. It suffered the penalty of its transgression, but not till it had eaten the last fish. The amount which it will devour exceeds belief. These birds have great strength and spirit, so as to make it dangerous even for a man to encounter them, since they seem to know the points most unguarded, and always aim at the eye. The blue heron breeds under various circumstances, sometimes in communities, sometimes apart ; some nests are in very tall trees, some lower, and others are on the ground. The eggs are three, of a bluish white color, and larger than those of a hen. The old ones provide very liberally for the

young till they are able to shift for themselves, when they turn them adrift without ceremony, and, from want of experience, they often suffer for the want of food. They take three years to reach maturity, and even after that period they sometimes continue to grow.

The GREAT WHITE HERON, *Ardea egretta*, is, according to Audubon, sometimes seen as far eastward as Massachusetts.

The WHITE HERON, *Ardea alba*, is inserted on the authority of Audubon, who, as Dr. Brewer informs me, has ascertained that it is sometimes found in this State. Its principal residence is in the southern regions, and when it comes to the north, it is found on the low marshy shores of rivers and broad swamps, where it is open to view, but contrives to escape from injury by its watchful suspicion.

The SNOWY HERON, *Ardea candidissima*, is inserted on the same great authority; but it seldom comes farther to the north than New York. It was said to proceed as far as the gulf of St. Lawrence, but Wilson was probably misled by his informer. They come from the south in May, and in summer they are seen along the coast from this State to the gulf of Mexico. It is a fine looking bird, with animated and graceful motions; if wounded, it defends itself vigorously, and sometimes inflicts a severe wound. The fall of the leaf is the signal for its departure. This heron is often exposed for sale in the southern markets, and in the early part of autumn the flesh is said to be good.

The NIGHT HERON, *Ardea nycticorax*, called the Qua-bird from its peculiar call, is found in the southern states throughout the year, but many of them come to the north in spring, and their breeding places extend as far eastward as Maine. One of their breeding places is found in a marshy island in Fresh pond, in Cambridge, where they continue to resort, though exposed to much persecution. Their sight by day is

imperfect ; but the sense of hearing is so quick, that it is very difficult to approach them. They have a strong and steady flight, and seldom alight on the ground, without first resting on the neighboring trees to examine the spot. On the ground it walks stooping, and is constantly moving about in search of food, which consists of frogs, tadpoles, water insects, and fish, which it wades deep in the water to procure. When satiated it retires to a tree or a swamp, and there reposes on one leg, but starts from its slumber on the least alarm. When taken, it defends itself with its bill, but sometimes uses its claws with serious effect, making a rough and angry sound, and constantly attempting to escape.

The nest is formed of sticks arranged on each other so carelessly, that it is sometimes overset by the young. The eggs are four in number, of a light sea green. The young remain a long time in the nest ; as soon as they are able, they climb to the tops of the trees, and there wait to be fed. Their flesh is said to be as good as that of the pigeon. They undergo three annual changes of plumage before they reach their mature state.

The AMERICAN BITTERN, *Ardea minor*, sometimes called the Night Hen, from its nocturnal habits, is a retired bird, which remains hidden in the reeds and sedge throughout the day, never leaving its retreat, except in cases of alarm. It then flies off with a hollow cry, and as its motions are heavy, it is easily brought down. They feed mostly in the night, and it is in the dusk of morning and evening that their booming note is usually heard. They breed in the northern regions, where their nests are made in swamps among the coarse grass ; the eggs are four, of a green color. They also breed in this State.

The GREEN HERON, *Ardea virescens*, is better known than any other of the tribe, and, without any reason, is held in general contempt. He cares very little, however, for the scorn or favor of man, and neither seeks nor fears his society. He prefers the solitude of swamps and marshes, where he can associ-

ate with birds of habits similar to his own, and there seeks his subsistence from the waters or the muddy shores. If fishes or frogs make their appearance, for which he waits patiently, he seizes them with great adroitness; dragonflies and other insects, also serve to help out his fare. When surprised, he rises with a hollow scream, but flies only to a little distance, as if considering just how far it is necessary to go. The nest is made of twigs, and placed on trees; the eggs four, of a pale blue. They sometimes breed apart, sometimes in company with each other, and not unfrequently put themselves under the protection of the larger herons. They come from the south in April, and return in October, not in large flocks, but in small family parties.

The LEAST BITTERN, *Ardea exilis*, the smallest of this class of birds, is so slender that it can pass between two books set an inch apart from each other without displacing them. From their habit of retiring into extensive marshes, they are but seldom seen, as they rise only in sudden alarm. At such times, they fly slowly and timidly; but, like other nocturnal birds, as the enemy comes on, their flight grows confident and strong. Its food consists of snails, tadpoles, field mice and moles, which it collects, sometimes by day, but more frequently at night; in the day, they sleep so soundly that they are sometimes approached and caught in the hand. Their nest is among coarse grasses, and either on the ground or attached to the stalks a little way above it. It is formed of dried weeds, and contains three or four eggs, of a dull yellowish green. Though they breed here, their nests are seldom found, and no one has yet given an account of their migrations.

The BAY IBIS, *Ibis falcinellus*, is a rare and accidental visiter, inserted on the authority of Nuttall, who says that a single specimen is sometimes offered for sale in the market at Boston.

The LONG BILLED CURLEW, *Numenius longirostris*, is seen in Massachusetts in the spring, on its way to the north to

breed; in August they return, to spend the winter in warmer regions. Dr. Brewer tells me that he has seen large flocks of them at Nahant, and they are offered for sale in the market in Boston, at the close of the summer. The name curlew, is an imitation of their cry of alarm, by counterfeiting which, the fowler takes advantage of their sympathy, and brings them within his fatal reach.

The **ESQUIMAUX CURLEW**, *Numenius Hudsonicus*, passes the winter at the south, and returns in the spring, on its way to the north, where it breeds; but in what place is not known. Audubon could not find them at Labrador, nor learn that any had ever been seen in that country. In August and September they return, and many of them are shot in Boston harbor. They are found in pastures as well as marshes, feeding on grasshoppers and berries, till the time of their departure, when they assemble in large flocks, preparatory to their migration.

The **SMALL ESQUIMAUX CURLEW**, *Numenius borealis*, like the preceding, go to the north in the spring. Though they abounded at Labrador, Audubon found none remaining to breed there; they also proceed beyond Hudson's Bay; but Dr. Richardson succeeded in finding a nest at Point Lake, in the month of June. At the close of summer, these birds arrive in company with the preceding, and feed, like them, in marshes and pastures. They are also valued as game. Though sufficiently common here, this bird is hardly ever seen in the southern states, which it must pass through or pass over in its annual flight. Even Audubon, before he went to Labrador, had never seen more than a single specimen, furnished by Mr. Oakes, of this State.

The **CURLEW SANDPIPER**, *Tringa subarquata*, is an exceedingly rare bird; inserted here, because Audubon tells us that of the few specimens which he has ever seen, two were procured in Boston.

THE RED BACKED SANDPIPER, *Tringa alpina*, is called in England the Dunlin, in this country the Red-back, or the Ox-bird. They make their way to the north in the spring, where they go far within the arctic circle. In September they return, and are seen in company with other sand birds, running gaily before the breaking waves.

SCHINZ'S SANDPIPER, *Tringa Schinzii*, has been found by Mr. Oakes in this State. Bonaparte says it is common in autumn, on the coast of New Jersey. They resemble other sandpipers in their habits and food, but even Audubon has never found them breeding.

THE PECTORAL SANDPIPER, *Tringa pectoralis*, is more abundant on the shores of Massachusetts Bay than in any other part of the country. They arrive at the last of August, and remain till the fall of the leaf, feeding on insects and a kind of seaweed. Their northern breeding places are as yet entirely unknown.

THE BUFF BREASTED SANDPIPER, *Tringa rufescens*, is not uncommon in the Boston market, in August and September, but so rare in other parts of the country, that Wilson never saw it, and Audubon first met with it in England. He received a wing of this bird from Captain Ross, that was picked up by a sailor on the Arctic expedition, and this is all we know concerning it in the regions where it must undoubtedly breed. Here it associates with the preceding species, which it resembles in form, though not in plumage, and feeds with it, on insects, particularly grasshoppers, which abound in the neighborhood of the sea.

THE BROAD BILLED SANDPIPER, *Tringa platyrhinca*, is very rare in the United States, but I am enabled to add it to our list, on the authority of Mr. S. Cabot, Jr., who procured a specimen at Nahant, the only one which, to my knowledge, has been found in Massachusetts.

The PURPLE SANDPIPER, *Tringa maritima*, is another of these wanderers, which abounds in autumn, and is sold in the market at Boston, but is less common in other parts of the United States. They fly in flocks of eight or ten, avoiding sandy beaches, and alighting on rocky shores ; from which peculiarity in their habits, they are sometimes called *rock snipes*, by the fowlers. Audubon did not find them breeding at Labrador, but Dr. Richardson says that they breed abundantly on the shores of Hudson's Bay.

The LITTLE SANDPIPER, *Tringa pusilla*, which is, as Dr. Brewer informs us, the same with Wilson's Sandpiper, is known by the name of *Peep*, and is found, in its season, on all the shores and in all the markets of the Union. It goes to the north to breed, like the rest of the tribe ; but returns in the early summer in large flocks, roving from place to place in search of food. Its bill is pointed and flexible ; and in order to collect its fare of worms and insects, the bill is inserted in the mud or wet sand, after the manner of the woodcock. This bird leaves us before the fall of the leaf, and passes the winter in distant southern regions.

The KNOT, OR ASH-COLORED SANDPIPER, *Tringa cinerea*, appears on our coast in May, on its way to the north, whence it returns before the end of summer, and is seen in large flocks, collecting small shell fish along the strand, moving with great adroitness under the edge of the waves. The shell fish are swallowed whole ; but the birds grow fat upon them. While thus employed the birds are easily approached ; nor does the fate of those that are shot strike any fear into the survivors.

The SEMIPALMATED SANDPIPER, *Tringa semipalmata*, is sometimes confounded with the peep, with which it often associates ; but is obviously distinguished from it by its half-webbed feet. This habit of keeping company with other birds has prevented accurate observation of its periods. Wilson says that it arrives and departs with the sanderling, and associates

with the red back, though in flocks apart from each other. They are found in the salt marshes near Boston, and are considered better eating than any other of the small birds.

The SEMIPALMATED SNIPE, *Totanus semipalmatus*, is not common in Massachusetts, though it is found near Boston, and occasionally breeds near New Bedford. It is known by the name of *Willet*, a sound resembling its usual cry. It is a shy and artful bird, and not approached by the fowler without cunning equal to its own. It makes its nest on the ground in the marsh, constructing it with the coarse grass which grows on the spot; it contains four eggs, of a yellowish olive, blotched and speckled with dark umber. In the autumn, the young are known by their grey color, and are marked out by the fowler as excellent game. They come to us before the end of April, and return before winter to the southern states.

The TELL TALE, *Totanus vociferus*, whose name is given in consequence of its habit of sounding an alarm to all birds within reach, whenever the fowler is nigh, and thereby saving many ducks from the fate that would otherwise await them. In Massachusetts they are uncommon; though they sometimes touch upon the capes in considerable numbers, it seems only a stop for the purpose of resting in their migration.

The YELLOW SHANKS, *Totanus flavipes*, is a common summer resident in this State. Its breeding place extends from the middle states to the high northern regions; but common as the young birds are, the nest has not yet been found in our borders. Its breeding place in Nova Scotia is found in the grass on the edges of ponds and rivers. The bird resides chiefly on flats and marshes, and is seldom seen at any considerable distance from the sea. Their food consists of small fish, aquatic insects and worms. It is a shy bird, which often gives an alarm to others that are less on their guard; but they do not associate with other birds, though often seen near them. When alarmed they run to some distance before they fly; when they take

wing, they are known by their long yellow legs, stretched out behind them to steer their flight. It has been said, that when one was shot its companions would gather round it; but, like other creatures, their sympathy is principally vocal, and seldom indulged at any risk to themselves.

THE SOLITARY TATTLER, *Totanus chloropygius*, is seen in Massachusetts in the autumn, on its way from the north where it breeds. Dr. Richardson says that it makes no nest, but lays its eggs on the naked beach or the gravel. It is very unsuspecting; and when it takes wing, returns to the same place after a wheeling flight, and contents itself with occasional glances at the observer. The solitary habits, however, from which these birds derive their name, protect them; since their numbers are too small to tempt the sportsman. When so wounded as to be unable to fly, they take to the water to save themselves by swimming and diving. Nuttall says that two of these little birds frequented the fish pond in the Botanic garden at Cambridge, in search of the insects which feed on the water lily; these they secured by stepping lightly and with expanded wings over the leaves which rested on the water.

THE SPOTTED TATTLER, *Totanus macularius*, is one of our most common birds from May to October. From its note, it is called the Peet-weet, which is its familiar name. It is seen about creeks and rivers, flying in winding sweeps and sounding its clear whistle. When the young are added to the company, they keep up a constant call to each other, so that the whole region is eloquent with the sound. They usually breed in meadows, in nests made of the grass, slightly arranged for the purpose, with a lining of hay. Sometimes they lay directly on the ground. The eggs are four, cream-colored, with spots of brown. The female practises the same arts with the quail, to secure her young, and they, when alarmed, trust to their color, and remain motionless on the ground.

BARTRAM'S TATTLER, *Totanus Bartramius*, is a bird first de-

scribed by Wilson, who found it on the banks of the Schuylkill, and named it in honor of his friend. It is common on the sea coasts, but not confined to them; it extends into the country, where it is called the upland plover, and is seen running through the grass in search of insects; grasshoppers being its favorite food. Its breeding range extends from the middle states to the fur countries; to these it returns in the month of May, when its nests are made in various parts of the State. They keep in small parties, and are always suspicious of danger; when alarmed, they run fast, and make a sharp whistle as they take wing to fly. Fearful as they are of man, they are great friends to the cattle. They commonly find food in such abundance, that they grow very fat, and their flesh is considered a great luxury.

The MARBLED GODWIT, *Limosa fedoa*, is a visiter in this State in the spring and autumn, on its way to and from the north, where its breeding places are but little known. In August they appear in large numbers, and many are shot for the table, though their stay is very short, and their habits are shy. The fowler has little chance of success, except he resorts to stratagem, or alarms and confuses them by shooting one of the number; in which case they hover round the fallen, with many complaints of what has been done.

The HUDSONIAN GODWIT, *Limosa Hudsonica*, is not common here, though it abounds in its northern breeding places; so that the great proportion must travel and return over land, or turn away to the northwestern shores. Audubon never saw it, till he found it in the Boston market, where it is called the goose bird. Dr. Brewer tells me that he doubts the existence of *L. fedoa* in America, and suspects that the bird so called, will turn out to be the adult of the present species.

The RED BREASTED SNIFE, *Scolopax grisea*, arrives on our coast, from the south, in April, and spends three or four weeks, never going far from the shores, and frequenting the flats and

sand bars, at low water, in search of food ; while so engaged, they can be approached more easily in a boat than on the shore, and as they often settle very near each other, great numbers are shot down. Their breeding places must extend from the northern shore of Lake Superior to the coast of the Arctic Sea, but their nest and eggs have not yet been described. In July, they return with their families, and are considered a great luxury for the table. They find abundance of food, by inserting their bills in the ground and drawing out the larvæ of water insects, which are hidden below. They also make use of some plants and seeds ; and, like many other birds, swallow gravel to aid in disposing of their food.

The AMERICAN SNIPE, *Scolopax Wilsonii*, was first shown by Wilson to be different from that of Europe, and is therefore honored with his celebrated name. It is well known to sportsmen, who take advantage of its local attachment, and by ascertaining its favorite resorts, are able to shoot large numbers. They arrive early in the spring, from their winter quarters in the south, and are found on meadows and low grounds, when, at evening and early in the morning, their peculiar murmur, which cannot be described by words, is heard proceeding from these birds, soaring high in the air. It does not seem to be owing to the beating of the wings, as one might suppose from the sound ; it is, no doubt, a call of love, since after the time of incubation ceases, it is heard no more for the season. This bird breeds in soft marshes, where man cannot easily disturb it, laying its eggs in a hollow, loosely lined with grass. They are four in number, of a yellow olive, speckled with light and dark brown. The young leave the nest as soon as hatched. Their bill is, for some time, soft and easily bent ; meantime they feed on small insects, such as lie on the surface of the wet soil ; as they grow older, they learn, like their parents, to strike the bill firmly into the ground. When one of them alights, it listens to see that all is safe, then strikes its bill into the ground several times, in quick succession, till it is satisfied, when it lies close till the evening. Their security and de-

fence generally consist in lying still. When suddenly startled, they fly in a zig-zag course, to elude the aim of the fowler, and it is so difficult to shoot them, that they are most frequently caught in snares. Their food consisting of insects, ground worms, and juicy roots, they grow fat, and are in great demand for the table. Many epicures are said to eat the bird with all that is in it when killed, making no selection; but, inasmuch as leeches are part of its fare, and are not considered luxurious food for man, it is as well to eat this game with more discrimination, and less gastronomical taste.

The AMERICAN WOODCOCK, *Rusticola minor*, is a very common bird, but not often seen in the fields, except by sportsmen, because of their nocturnal habits, in which they exceed the snipe, hardly ever flying in the day time, and travelling and feeding almost exclusively by night. They remain in woods and thickets till evening, when they proceed to the broken soil in search of worms and insects, and leave perforations made by their bills in the soft ground, showing where they have been. They have such delicacy of perception, by means of the bill, that they make but little use of the eyes in feeding; they plunge their bills up to the nostrils, and suck up their prey. The eyes of this bird are placed high, and far back in the head, probably for the purpose of seeing enemies at a distance, and watching their motions, without betraying the place where it lies, by any movement on its own part.

The woodcock returns from the south very early in the spring, and soon after selects a breeding place in the woods, where the nest is set on the ground, and formed of dry grass and leaves. The eggs are four, of a yellowish clay color, and marked with blotches of purple and dark brown. The young leave the nest as soon as hatched, but three or four weeks elapse, before they are able to fly. During the time of incubation, the male rises in a spiral flight, after the manner of the snipe, making a hurried sound as he ascends, which increases as he descends, when it becomes loud and sweet. When he touches the ground, he makes a bleating sound with a forward

movement of the body, and then waits to see if his call is answered. The woodcock, unlike the snipe, which never flies through the woods, often goes into the depth of the forest, and turns over the dead leaves with its bill, like the pigeon, in search of the insects that may lie below.

Toward the last of October, as their food begins to fail, the woodcocks leave the interior, and move toward the sea, in preparation for their migration to the south. They take the journey in the evening, not in flocks, but following each other, in close succession, so as to make almost an unbroken line. They do not leave the coast, however, till winter begins. From August till their departure, they are in good order for the table, and are shot in great numbers by those who are versed in this kind of sporting. In Louisiana they are killed by men with torches, which the birds stand gazing upon, till the fowler knocks them down with a stick.

The VIRGINIAN RAIL, *Rallus Virginianus*, spends the winter in the southern states, and returns to us in May. It hides in swamps and marshes, in the day time, and only ventures abroad at night; but it feeds both by night and day, on water insects, worms and seeds. It is extremely swift in running, and if pursued by a dog, will change its direction so often, rising on its wings at times, that he soon loses its track, as it escapes among the weeds. When on the wing, it can be shot, as it flies low and heavily, and only a short distance at a time. The nest is not easily found, being generally placed in a tuft, in soft meadows, where it is not easy for a man to go. It is a little raised by means of the stalks of grasses, with a shallow cavity, lined with dry weeds, to contain the eggs. These are from four to seven in number, of a dusky white, with specks of brown red and pale purple, thickest toward the larger end. Dr. Brewer succeeded in finding one of these nests in a small meadow near Jamaica Plain, and within a few yards of the Providence rail-road.

The SORA RAIL, *Rallus Carolinus*, which was formerly

thought to follow the example of the swallow, and bury itself in the mud for the sake of passing the winter pleasantly, is a rare bird in Massachusetts. Birds of passage, on their way to their breeding places in the north, move on with very little delay; but on their return, having nothing but the fear of winter to hasten their motions, they linger till their instinct warns them that the last minute is come. It is, accordingly, in the autumn only, that this bird has been seen in our State. The same gentleman who ascertained that the former species breeds here, suspects that the nests of the other rails will hereafter be found; they have been discovered on the borders of Lake Champlain and the North River.

The YELLOW-BREASTED RAIL, *Rallus Noveboracensis*, is also rare here, and in most parts of the United States. From May to September, it is found on the shores of Hudson's Bay, where it breeds; and on its return to winter quarters, probably takes an inland route, the greater proportion avoiding the Atlantic states. From Audubon, we learn that only a few, comparatively, go to the north; the great body remain in the extreme southern parts of the United States throughout the year.

The PURPLE GALLINULE, *Gallinula Martinica*, and the Florida Gallinule, *G. galvata*, have already been mentioned as rare and accidental visitors in the State.

LOBE-FOOTED BIRDS.

The CINEREOUS COOT, *Fulica Americana*, is found in almost every part of North America, seeming to have little choice of climate or temperature, and to regulate its migrations by the scarcity or abundance of food. They appear among us in early autumn, and remain till November, when they leave us for the south by night. Their food consists of seeds, grasses, worms,

snails and insects, together with such small fish as they catch upon the edges of the water, to which they add a quantity of gravel and coarse sand. They are not seen to dive, except when wounded ; then they make their way under water to the grass or reeds, and then swim for the nearest shore, where, notwithstanding the awkward appearance of their legs and feet, they walk with firmness, and run, if necessary, with great expedition. They probably breed in the State occasionally ; Nuttall mentions that a pair took up their residence in Fresh pond in April, and in June were seen accompanied by their young ; but their nests and eggs have not been found in this, nor, I believe, in any of the states of the Union.

The RED PHALAROPE, *Phalaropus fulicarius*, visits us on its return from the north in autumn ; but they are seldom seen in Massachusetts. Audubon mentions that once, when sailing in a packet sixty miles from Nantucket, the vessel encountered a bed of seaweeds and froth, on which were hundreds of red phalaropes, walking with as much ease and confidence as if on shore.

The HYPERBOREAN PHALAROPE, *Phalaropus hyperboreus*, is, as its name implies, a northern bird, seldom seen farther south than New York. Dr. Brewer tells me that he has procured them here in May, but they are more abundant toward the Bay of Fundy. None are seen in the interior ; and they are found in the greatest numbers on the banks of seaweed, floating on the ocean, at great distances from the shore.

WILSON'S PHALAROPE, *Phalaropus Wilsonii*, is a rare visiter, which, Dr. Brewer tells me, I may insert on the authority of Audubon, who has found it in various places along the eastern coast, from Boston to New Jersey ; but it is not sufficiently common to have its history well understood.

The CRESTED GREBE, *Podiceps cristatus*, is a bird which breeds in the fur countries, and is seen here late in the season

on its return to the south ; but while some proceed by the coast, more seem to follow the course of the great rivers, since they are seen in great numbers in the western states, flying at all hours of the day. From their alertness in diving, by which they often elude the aim of the fowler, they are called Dippers ; when pursued, they keep only the bill above water ; and Audubon says that they are easily caught when in ponds, by hooks placed on lines near the ground.

The RED-NECKED GREBE, *Podiceps rubricollis*, is found along the coast from New York to Maine, in winter. In the fur countries, they are common in the breeding season. Dr. Brewer tells me that he has procured them here in the winter, which, unlike the former, they spend in the eastern states.

The HORNED GREBE, *Podiceps cornutus*, returns from the north in October, when it is seen in Massachusetts. Dr. Brewer classes it with those that spend the winter here ; but the greater proportion must go on, since they are common at that season, on the southern inlets and rivers. While here, they keep in the salt water, diving with great celerity, and soon becoming so familiar with the gun, as to hide under water whenever they hear it. Nuttall mentions that the stomach of those which he has opened has generally contained quantities of their own feathers, plucked from the breast and swallowed. Audubon says the stomach contains hair-like substances rolled together like the pellets of owls ; particulars which require more explanation than our present acquaintance with their habits enables any naturalist to give.

The PIED-BILLED GREBE, OR DOBCHICK, *Podiceps Carolinensis*, comes to us from the north early in autumn, and remains till the approach of winter. Those found here are generally young. Their food consists of plants, seeds, water insects and small fish, together with which they swallow gravel. In the gizzards of some which Audubon examined, he found collections like those just mentioned, which consisted of the down of thistles

and other plants, which had been swallowed together with the seed. These birds dive with great quickness, and use their wings under water; they sink so gently as to leave no ripple showing where they went down, nothing but the small end of the bill remains above, and this easily escapes observation, particularly among the bulrushes, to which they resort when alarmed. Nothing was known of their nests, till Audubon found one near the banks of the Wabash River. None have ever been found in this State.

WEB-FOOTED BIRDS.

The CAYENNE TERN, *Sterna Cayana*, is common at the south, where it breeds. Audubon also found it breeding at Labrador; so that, although none have yet been seen here, they must pass by us, and will probably be found to touch upon the coast of our State.

The COMMON TERN, *Sterna hirundo*, is common on our coast, where it bears the name of Mackerel Gull, from its being supposed to announce the arrival of that fish in its summer quarters. In May, they prepare, if it can be called preparing, a nest on some rocky islet or sand bar, where their eggs, are laid, with only a little sand scraped up to keep them in place; and in all pleasant days are left to be warmed by the sun, the female sitting only at night and in foul weather. The eggs are of dull yellowish olive, with dark brown specks and blotches. The parents, though they appear so careless of their domestic establishment, watch over it with anxious vigilance, and are very bold in resisting intrusion. They breed at Egg rock near Nahant. When the young are first hatched, they tear fish in pieces to feed them; afterwards they drop the fish among them, where it is seized by the strongest; but they find other

resources in the insects which they collect for themselves, rambling near the spot, but always attending to the voice of the old bird, when it warns them that danger is nigh. In winter they migrate to warmer regions.

The ROSEATE TERN, *Sterna Dougalli*, has received its popular name from the color of the breast, which, however, soon fades after death. Audubon found them in great numbers, breeding, on the Keys of Florida, and Nuttall procured one specimen at Chelsea Beach. Its eastern visit was probably accidental.

The SILVERY TERN, *Sterna minuta*, the same with the Lesser Tern of Wilson, comes to us in the spring, later than the preceding. It is not uncommon on our shores, where it is seen dashing into the water, like a little fish-hawk, to secure its prey, or chasing insects over the pools and marshes. It sometimes goes into the interior, and has been found at a great distance from the sea. They are generally careless and unsuspecting, and pay little regard to an observer.

BONAPARTE'S GULL, *Larus Bonapartii*, is seen occasionally, early in autumn, on the coast of this State, and its whistling is heard in the air, as it proceeds to the south or inland, to feed.

The KITTIWAKE GULL, *Larus tridactylus*, is common along the coast, from New York to Eastport, though never seen in the interior. Audubon found it in great abundance on some of the islands in Boston harbor. In the air, its motions are light, bold and graceful, sweeping in broad circles at an immense height in the air, then stooping downwards to rest upon the waves. It is so awkward on the ground, that it can hardly walk; and it gathers its food, even the shell-fish from the sands, while on the wing.

The COMMON GULL, *Larus zonorhyncus*, is quite abundant on our coast, but it understands the danger of too near ap-

proach to man, and keeps, as much as possible, out of his reach. It floats gracefully in the air, till something attracts its attention, when it descends in a spiral curve, and seizing a fish, flies off, alights and swallows it at leisure. When satisfied with food, they rest themselves by swimming in parties on the waves, their white plumage contrasting strongly with the deep green of the sea. When spring has commenced, the gulls assemble in flocks on flats and beaches, and when paired, fly off to their breeding places, which Audubon found in great numbers in Labrador, and the eastern part of Maine. Part of their food consists of shell-fish, which, being unable otherwise to break the shell, they are said to carry high into the air, and to let them fall on the rocks below.

The SILVERY GULL, *Larus fuscus*, is found on our coasts in winter, and is said to breed, both in the northern regions, and in islands near South Carolina.

The HERRING GULL, *Larus argentatus*, is, according to Dr. Brewer, the most common species in the State. Audubon found them breeding at an island in the Bay of Fundy, where he was assured that, formerly, all made their nests, like other seabirds, on the ground; but finding that they were often disturbed by intrusive visitors, they had, many of them, adopted the practice of building in trees, a reach of sagacity one would hardly have expected from such a quarter. The younger ones still build on the earth; but, while those which are hatched below run about in a few days, those which are in the trees, do not undertake to leave their nests till they are able to fly. The same distinguished ornithologist saw one of these birds which had taken a very hard shell-fish, carry it into the air and let it fall without effect; it tried the experiment again, and yet a third time, when it succeeded; the gull, after each failure, carrying it higher than before. Much of their food consists of herrings, which they catch by following the shoals; they sometimes feed on small birds, and suck all the eggs they can find.

The **WHITE-WINGED GULL**, *Larus leucopterus*, is inserted on the authority of Dr. Brewer, who has obtained it near Boston. It is not found farther south than New York. Its flight resembles that of the preceding species, but it differs from it in size and markings, as well as in its greater fearlessness of man. It breeds in the high northern regions.

The **BLACK-BACKED GULL**, *Larus marinus*, is inserted on the authority of the gentleman just mentioned, who has found it in Boston harbor. It is a large and powerful bird, and though shy and timid towards man, is very oppressive to other sea-birds. It devours voraciously all sorts of food except vegetables, even in the last stages of decay, but young birds and fish are its favorite food. The fish are caught as it flies, and if not too large, swallowed without suspending its flight. It makes great consternation among the sea-fowl, by sucking their eggs, without regard to the remonstrances of the owners. When young ducks are on the water, they seize them, none except the eider having courage to resist; they sometimes plunge after fish in a considerable depth of water, but have no facility in diving. These birds, powerful as their flight is, do not go very far to the north to breed, nor are their breeding places found more toward the south than the eastern extremity of Maine. They do not go into the interior, except on the great lakes; they appear to rejoice in the storms of the ocean, having power to force their way against the heaviest wind.

The **SKUA GULL**, *Lestris catarractes*, called by Linnæus the cataract yager, from the manner in which it darts down upon its prey, is a bird belonging to high northern latitudes, but in the depth of winter it comes as far south as Massachusetts. It is a strong and daring bird, and though considerably less in size than the preceding, readily attacks and puts him to flight. If its nest is disturbed, it is completely insensible to danger, and gives battle at once, not only to all other animals, but even to man. Having all the rapacious habits of the gulls, with all

this strength and courage, it is considered by other birds as the pirate of the shores.

RICHARDSON'S JAGER, *Lestris Richardsonii*, visits the coast of Massachusetts and Maine, in the winter season, when it is seen on the inland bays about Boston, flying in pairs, or sitting on the water. Its flight is firm and long continued, and it takes advantage of it to pursue other sea-birds, and force them to disgorge their prey. It breeds in the fur countries, but, respecting its habits at that season, very little is known. Audubon has doubts whether it is a distinct species from the one which follows.

THE ARCTIC JAGER, *Lestris parasiticus*, inhabits the northern sea shores in summer, and in winter is found in Florida. It resembles the preceding in its habits of plundering other birds of the fruit of their labors. By means of its long tail, it can suddenly check its flight or change its direction, so that the victims of its oppression cannot escape its pursuit.

THE POMARINE JAGER, *Lestris pomarinus*, is a bird which Audubon never had the opportunity of examining till he went to Labrador, but Dr. Brewer has obtained it in Massachusetts bay, and thus authorized us to claim it as a visiter of the State. So far as its habits are ascertained, they are like those of other gulls, but its history is very imperfectly known.

THE STORMY PETREL, *Thalassidroma Wilsonii*, is found on almost all the Atlantic, and known to seamen, who look upon it with very little affection, by the name of Mother Carey's chicken. It follows the vessel in its course through the deep, not caring whither it goes, and when the tempest rises, seems so indifferent to its raging, or rather to enjoy it so much, that the superstitious formerly believed that this harmless bird had some agency in raising the storms. It is called the Petrel, from its walking, like the apostle Peter, on the surface of the water, where it gathers any food that may be thrown from the vessel

which it pursues. After it grows dark it rests on the water for the night ; but on the following morning, easily overtakes the vessel that has left it behind. In general it is rather silent, but at times it makes a low sound, as if asking the seaman to throw it out some food. It usually subsists on resources supplied by its favorite element, the sea.

The FORK TAILED PETREL, *Thalassidroma Leachii*, was said by Bonaparte, to be uncommon on the American shores ; but Audubon declares that on the coast of Massachusetts, this is much more abundant than the other species. On approaching land, when returning from Europe, he shot a number of those that surrounded the vessel, and found among them specimens of all the three. This is the most suspicious, never flying close to the vessel like the others ; it is not known to alight on the rigging, and rests less frequently upon the water. But its food is the same, consisting of such small fish and crustacea as it can pick up from floating seaweed on the water, or oily substances thrown from vessels into the sea. These birds are able to bear considerable abstinence, but everything which they swallow, seems to be turned to oil, and their flesh is rank and unpleasant to the taste. They are found breeding in the fissures of rocks, above the reach of the spray, while the preceding burrows in the sand on low islands. Though this bird seems so bound to the ocean, by all its habits and wants, I have had one brought to me which was taken near Chicopee river in Springfield, seventy miles from the shore.

The FULMAR PETREL, *Procellaria glacialis*, has been found by Audubon from Long Island to Newfoundland, but I do not know that any one has, as yet, been taken within the State. This is the bird so well known as the main dependence of the singular inhabitants of St. Kilda, one of the western isles of Scotland.

The SNOW GOOSE, *Anser hyperboreus*, breeds in Arctic America, resorting to the sandy shores of lakes and rivers. They

are so cautious as to station one of their number as a sentinel, to warn them of approaching danger. They return with their families in September, after which they are occasionally seen in Massachusetts bay. They are very noisy, and their note is distinguished from that of the common wild goose, by its greater shrillness. Their flesh is said to be better than that of the latter species. As the cold grows severe, they leave us for their winter quarters.

The CANADA GOOSE, *Anser Canadensis*, is well known in Massachusetts, as one of the heralds of spring. Their spring migration appears always determined by the advance of the season, and the melting of the snow, which discloses a supply of grass and berries, uninjured by the frost, and ready as a resource for food. Their arrival is most welcome in the fur countries, where the aborigines depend upon them for their subsistence in summer. The hunter sets up stuffed birds as a decoy, and imitates their call; thus bringing them within his reach, he destroys them in great numbers. But while the great proportion go to the north to breed, Audubon assures us, that many remain and breed; some, he says, in pools in the eastern parts of Maine and Massachusetts, so that he thinks it entitled to be set down as a permanent resident within the Union. Farther north, they become more numerous, and in Labrador, their nests abound in every marshy plain.

When the young have become large, and sufficiently practised in flying, they prepare for their return. On the first appearance of snow, the ganders arrange the flocks in order of flight, the old males in front, the females next, and the young after them, the weakest behind; and thus they set forth, sometimes with an extended front, sometimes in single file, but generally in a sharp angle, with an old gander at the head. When any one is fatigued, he falls back in the wake of another, who cleaves the air before him; the leader at times gives out a loud cry of encouragement, or command, which is answered from various parts of the line. They fly with great strength and steadiness, at a great height in the air, if they

have far to go ; but when doubtful of the season, they fly lower, and are often bewildered in fogs and snow storms, so as to come to the ground stupified, and to submit quietly to their fate. They are so much alive to changes of temperature, that, when they are seen returning over their line of march, it indicates that a change of weather is nigh.

When they alight in some place where they intend to pass the night, they crop the grass sidewise, like the domestic goose, or pat the ground with both feet to force the worms out of it. Sometimes they alight in corn-fields, where they do considerable damage ; sometimes in the water, where they plunge their heads to the bottom in search of food. They always keep sentinels stationed, who, at the approach of cattle, are silent ; but if a bear, or panther, or worse than all, a man comes nigh, the alarm is given, and all glide into the nearest water and swim to a distance from the shore. Their sense of hearing is wonderfully quick and discerning ; they can at once distinguish a sound made by man.

The crossing of the breed of the wild with the tame goose, as in the case of the turkey, has been attended with much advantage ; the hybrid being larger and more easily fattened, brings a higher price than either of the species from which it is descended. The difficulty in the way of keeping the Canada goose, is, that it does not multiply as in the wild state ; but, though it requires time to effect a considerable change in its habits, a persevering attempt at domestication would probably succeed. In some cases, it has succeeded already ; but when flocks are passing over, it answers their call, and seems strongly tempted to return to the savage state.

The BARNACLE GOOSE, *Anser leucopsis*, is said by the gunners on the coast, to be shot in this State. Audubon never met with it. Nuttall speaks of it as a straggler on our coast.

HUTCHINS' GOOSE, *Anser Hutchinsii*, is inserted on the same authority. They call it the Flight, or Winter Goose. It resembles the common wild goose, except that it is less in size.

The BRANT GOOSE, *Anser bernicla*, a bird well known in our markets, breeds on the coasts of Hudson's Bay and the northern ocean, and spends the winter in the southern states. Early in October, they arrive in large numbers, some in order of march, others in noisy confusion, and make little more stay than is necessary for resting, after their long flight. But flocks continue to follow each other in long succession, and the gunners secure considerable numbers. In spring they return, but their stay is still shorter, and their flesh very uninviting; in winter it is more valued, but has a fishy taste at best.

The SHOVELER, *Anas clypeata*, which is considered one of the greatest luxuries of the table, belongs to the northern part of the continent, but sometimes visits our coast, and still more frequently our lakes and rivers, in the declining year. Were it not for the great bill, this would be a handsome bird. It draws in the watery mud through the teeth of its bill, which fit into each other, forming a sort of sieve, by which it throws out the water, and retains the worms, seeds, and insects for its food. It is sometimes found in the Boston market, brought from the ponds in the vicinity.

The MALLARD DUCK, *Anas boschas*, is our common duck in its wild state. It is common at the south, but not so in Massachusetts, where it is very rare, and beyond Portland it is not known. The reason is, that this duck, instead of resorting to the seacoast, is partial to lakes and rivers. They are most abundant in the western states, where many of them remain, and breed. As they come from the great lakes, they spread themselves over those regions, resorting to meadows, swamps, and thick beech woods. In the wild state, they are strongly contrasted with the domesticated, in the spirit and animation of their movements; their flight is wonderfully swift and well sustained, while the wings of the common duck hardly lift it from the ground. The squatters of the Mississippi catch many of the mallards when young, and they are sufficiently tame by the end of the first year. The young of those thus caught,

are for a year or two, superior to the wild ones, but soon become like the common ducks of the barnyard. The hybrids raised between the Mallard and Muscovy, are said to be large and afford excellent eating.

The mallard has many of the properties of a nocturnal bird, feeding and travelling more by night than by day. In the dark, their flight is distinguished by the whistling of their wings. They generally arrange themselves in the wedge form to go to any distance, and never alight on any spot till they have wheeled several times round it, to ascertain whether it is safe to take possession; except when under the command of an experienced leader, who judges at once of the presence of danger, and if he suspects none, strikes down without hesitation upon the water. They then begin to bathe and dress themselves before they go to the shore for food. After this ceremony is over, some explore the mud for leeches, frogs, or lizards; others go into the woods for beechnuts and acorns, moving round with prodigious cackling. If they hear a sound, they know whether it is made by animals or not; if it is, they go on with their employment; but if it denotes that man is at hand, they glide into the water, and put off to what they consider a safe distance from the shore.

The food of the mallard consists of small fish, snails, water insects and plants, in fact, hardly anything seems to come amiss. It delights in nuts and fruits, soon fattens on rice and other grain, and has an appetite for food which any other bird would regard as entirely uneatable. The young, when raised, thrive on chopped fish. The mallard has the habit of patting the ground with its feet to force worms out of their burrows.

The GREY DUCK OF GADWALE, *Anas strepera*, is an inhabitant of northern regions, and is believed to be rare in the United States. Wilson found it in New York and Kentucky, and some of the young birds are seen at times in the vicinity of Boston.

The PINTAIL DUCK, *Anas acuta*, is very abundant in some of the western states, but seldom seen on the coast, and never

farther eastward than Massachusetts. It breeds in the fur countries, but on its return, follows the coast of the great western rivers, and is so much a stranger to the coast, that it must be regarded as an inland bird. It arrives from the north in autumn, in good condition, and resorts to ponds and streams, where it feeds on tadpoles, leeches, and beechnuts, should they happen to abound. It is graceful in its motions on the water, and Audubon says that its notes are soft and pleasant, not resembling those of the mallard, to which they are often compared.

The AMERICAN WIDGEON, *Anas Americana*, breeds in the fur countries, and, on its return, is found in most parts of the Union. About Chesapeake Bay, it is a companion rather than friend of the canvass-back, which dives for the plants on which it feeds. The widgeon, which likes the plant, but not the diving, watches the moment of the canvass-back's rising, and before its eyes are fairly opened, it snatches the plant from its mouth and makes off with it. The widgeon is found in the interior, as well as on the coast; many spend the winter in the southern states.

The DUSKY DUCK, *Anas obscura*, sometimes called the black duck, is, as Dr. Brewer informs me, the most common of all the species in the neighborhood of Boston. They are met with on the coast, from Florida to Labrador, but are not found in the high northern regions. They frequent salt marshes as well as inland waters, and their food consists of small shellfish and seeds. In the daytime, they are retired and shy; but on the report of a gun, they rise in great numbers and disperse in all directions. They fly high in calm weather, and low when the wind blows hard, when the gunners conceal themselves in the grass and shoot them down. Their flesh is said to be equal to that of the other ducks, when they have been well fed, but it generally has something of the flavor of its food. This bird breeds in this State in fresh water marshes and on sea islands; the eggs are eight or ten in number, resembling those of the

domestic duck. Great numbers however proceed beyond our borders.

The WOOD or SUMMER DUCK, *Anas sponsa*, is a most beautiful bird, which makes its home in Massachusetts, in quiet retreats near ponds and rivers, where some of them spend the winter. They seldom visit the coast, but prefer the fresh water, their food consisting of grapes, beechnuts, acorns, and such berries as are found in the vicinity of ponds and streams. They also eat tadpoles and water insects, reaching their necks into the water to secure them, after the manner of the mallard. On the ground they run fast; they also move with firmness on the larger branches of trees. They swim and dive well, often stopping near the edge of the water, with nothing except the bill above; but often, when alarmed, they run into the depths of the wood. Their sense of hearing is very delicate, and aids them to escape from their various enemies. Their flight is rapid and graceful; they move through the trees and foliage as readily as the pigeon.

The wood ducks build in May, in the hollow part of a branch or the deserted hole of a large woodpecker, which they enter readily, though the entrance seems much smaller than their bodies. The eggs, which are from six to fifteen, of a yellowish green, are laid on dry plants and down plucked from the parent's breast, together with the feathers of various other birds. As soon as the young are hatched, if the nest is over the water, they spread their little wings and feet, and drop into the stream; if not, the mother carries them carefully to the water, in her bill; sometimes she lets them fall on the dry leaves below, and then conducts them to their favorite element, where they soon learn to collect flies, moschetoes, and other insects, for their food. The experiment of domesticating this fine bird has been tried with good success; and after a few years, they would doubtless give up all desire to return to their wildness.

The BLUE-WINGED TEAL, *Anas discors*, returns early in autumn from the north and west, where it breeds. They are

easily affected by the cold, and the first frosts are a signal to them to escape to warmer regions. They are found on our larger rivers, but seldom visit the sea.

The GREEN-WINGED TEAL, *Anus crecca*, is more common in the southern states than here. Audubon did not find it in Newfoundland or Labrador ; but there is reason to suppose that it breeds in the fur countries, and near the great lakes ; those which are seen here, are said to be mostly females and young birds, the males pursuing a different route, and not appearing here till the spring. Being more select in feeding than most other ducks, they furnish an excellent article of food.

The EIDER DUCK, *Fuligula mollissima*, is well known as the bird which covers its eggs with down taken from its own breast. This is now become an important article of commerce, and the hunters, not satisfied with taking the down, carry away the eggs also. The female then lays a smaller number of eggs, and strips herself again to cover them. If the nest is a second time robbed, the male bird supplies his down to cover the last laying ; and thus it is, that many in civilized life feather their nests, at the expense of this plundered bird. Formerly they bred in considerable numbers, from Boston eastward ; but they generally go farther north for that purpose, though in winter many of them are shot upon our coast. Audubon, while in Boston, had twenty-one specimens brought him, which two gunners had shot in a single day. The same high authority says that the eider would be domesticated with great ease, and would be invaluable on account of its down, its feathers, and its flesh for food.

The KING DUCK, *Fuligula spectabilis*, is an inhabitant of the northern regions, living, generally, and finding its food, out at sea. Covered with its coat of down, it braves the severity of the arctic season ; but sometimes, in the depth of winter, wanders into our borders. It is said, by old gunners, that formerly they were not rare on our coast, and that they used to

breed in company with the eiders. Now they are seldom found.

The SURF DUCK, *Fuligula perspicillata*, breeds in Labrador and the regions of Hudson's Bay, and is seen, in spring, bending its course toward the north. On their return, some remain here through the winter; others extend their migrations as far as Florida. They feed principally in the sea; and also resort to shallows and beaches in search of small shell fish, for which they are constantly diving. Their flesh is sometimes eaten, but is not recommended.

The VELVET DUCK, *Fuligula fusca*, breeds in Labrador and the fur countries, and after spending some time about the lakes in those regions, returns to the south, and reaches us in September. It is a sea bird in all its habits; but Nuttall has seen it in Fresh Pond, in Cambridge. After breeding near the fresh water lakes, it leaves them for the rest of the year, and prefers the shores, where its usual food, shell-fish and other articles which form the subsistence of sea-birds, always abounds. On the coast, it is called the White-winged Coot; its flesh, though no great luxury, is in considerable demand.

The AMERICAN SCOTER DUCK, *Fuligula Americana*, comes to us from the shores of Hudson's Bay, and, while here, associates with the other sea ducks, living on similar food. Early in November, it is found in Boston market, and the flesh of the young is considered good.

The RUDDY DUCK, *Fuligula rubida*, breeds in the small lakes of the fur countries, and returns to us in October, proceeding as far south as the limits of Florida. When it first arrives, the young are unsuspecting, but the old are difficult to approach. The females and young are seen in our ponds and about tide waters, and many of them are sold in Boston, under the name of Dun-Birds.

The **PIED DUCK**, *Fuligula Labrador*, is thought, by Nuttall, to belong to the western part of the continent, and only found as a straggler on the Atlantic shores. It is called the Sand-shoal Duck, by the gunners of the middle states, from its resorting to sand bars in search of food. It is rarely found in this State, and only in winter or spring.

The **CANVASS-BACK DUCK**, *Fuligula valisneria*, so well known as a luxury of the table, never abounds in Massachusetts; some are seen in winter near Cohasset and Martha's Vineyard, and I learn from Mr. Cabot, that it has been shot in Fresh Pond. The great proportion, however, on returning from the fur countries, where they breed, establish themselves on Chesapeake Bay and the neighboring waters, and thence extend to the south; some having been seen, in winter, as far as New Orleans. The fresh water plant, *valisneria*, from which they are named, is their favorite food; it grows in long narrow blades, with a white root, which is the part that they eat; they swim about the shoals where it grows, diving and tearing it up, not discouraged in consequence of the losses which they suffer from the dishonest arts of the widgeon. But where this plant is not found, they feed on the eel-grass, as it is called, which affords a subsistence to the canvass-back, and other birds of a similar description.

Though these birds, when they first arrive, are lean, in consequence of exhaustion, they are so diligent in collecting food that they soon are in order for the table; and the gunner resorts to a thousand arts to secure them, which is not easy, since they are shy and watchful, and at night keep sentinels stationed to guard their slumbers. There seems to be no reason why they should not be domesticated, if those who make the attempt are sufficiently persevering. Their subsistence would be easily provided for, since they eat grain as readily as any other food.

The **RED-HEADED DUCK**, *Fuligula ferina*, is the companion of the canvass-back, feeding on the stems of the same plant which the other gathers for the sake of the root, and so much

resembling it, that it often has the honor of being substituted in the market, and sold for a similar price. They breed in the fur countries, and make their appearance here in October. Dr. Brewer tells me, that he has obtained these birds in our State. Mr. Rennie, in his late edition of Montague's British birds, says that he has one of them in his possession, which, as soon as it was caught, took to feeding on oats, and is perfectly tame and healthy, at the end of a confinement of three years.

The SCAUP DUCK, *Fuligula marila*, is said to breed in the fur countries, whence it returns at the approach of the cold season, and is found on our sea coast and the great western rivers. It is said to derive its name from feeding on scaup, or broken shell fish. Audubon says that he never found any portion of testaceous mollusca in those which he examined, though the birds might have found them in abundance, had they desired them. They are common here in bays and fresh waters. They are easily domesticated, but their flesh is of no value for food. Audubon says that nothing but an epicure could eat them with satisfaction.

The RING-NECKED DUCK, *Fuligula rufitorques*, is found in autumn and winter on our Atlantic coast and our western waters. Its flesh is considered equal to that of any other duck, in tenderness and flavor. Dr. Richardson speaks of finding it in the fur countries, but gives no account of its nest. On its return from the north, it is spread over the whole extent of the Union; but much more abundant in some states than in others. Mr. Cabot obtained a specimen in Fresh Pond, and thus enabled us to add it to the list of Massachusetts birds.

The GOLDEN EYE, *Fuligula clangula*, is an inhabitant of northern regions, which comes from the fur countries, where it breeds, and remains till it becomes difficult to obtain food. In the winter, they are not uncommon in the United States, but they return very early in the spring. While here, they

are silent, and the name of Brass-eyed Whistler, which they sometimes bear, is given in consequence of the sound made by their wings. They fly well, but are so entirely made for the water, that they are hardly able to walk on the ground. Like most other birds of the class, they live partly on fish and insects, and partly on vegetable food. As game, they are considered good, though not of the first order.

The BUFFEL-HEADED OR SPIRIT DUCK, *Faligula albeola*, was called, by the aborigines, by a name answering to *spirit*, because of the wonderful quickness with which it disappears at the twang of a bow, or the flash of a gun. It breeds in the fur countries, where it builds on hollow trees, in woods near the water, a situation favorable to the young, who move with difficulty on the ground. In autumn and winter they are found in almost all parts of the United States, sometimes on the coast, but more frequently on the inland waters. They are constantly engaged in diving for their food, and, when wounded with shot, disappear under water, so that it is very difficult to find them. By the last of April, most of them have returned to their northern home.

The HARLEQUIN DUCK, *Fuligula histrionica*, is a northern bird, which was found by Captain Ross in the highest latitudes which he visited. It is hardly ever found south of Boston, and is uncommon here, but I am assured by Dr. Brewer, that he has obtained it in our State. Audubon found it breeding along the coast of Labrador and Nova Scotia, where the male and female are called the Lord and Lady, probably in consequence of their beauty, and the ornaments on their breast. It is difficult to obtain, being anxiously watchful, and diving under water the moment it perceives the flash of the gun. Like other birds of this class, it provides for its security by stationing sentinels to sound an alarm on the approach of danger. The flesh is not much valued.

The LONG-TAILED DUCK, *Fuligula glacialis*, is a resident in

the north, where it associates with the eider and other ducks, and lingers as long as the cold leaves the waters open ; but when the ice begins to form upon the Arctic seas, it migrates toward the south in search of food, and is then seen regularly and abundantly on the shores of Massachusetts ; the young sometimes resorting to the fresh waters, while the old birds keep near the sea. They are lively and animated in their motions, and so noisy in conversation, that they are sometimes called old wives. They are expert in flying, diving and swimming ; their food consists partly of the animal and partly of the vegetable productions of the sea. The caravans which pass along our coasts are large, and their noise can be heard at a great distance, kept up for hours in morning and evening, and also in calm, foggy weather. This bird is elegant in its appearance, but not held in much estimation as food. Its down is said to be equal to that of the eider, but the quantity is not so great.

The GOOSANDER, *Mergus merganser*, is found in winter on the fresh lakes, rivers, and seacoast of the United States. They are seen here in small companies, continually diving in search of food. In April most of them disappear, and do not return till November. The extent of their breeding range is not known ; but it is ascertained that some of the young are reared in Pennsylvania, and yet it is evident, from their habits, that the Arctic regions must be their more familiar home. Audubon describes the goosander as breeding in Massachusetts, and entitled to be set down as a constant resident within our bounds.

The RED-BREADED MERGANSER, *Mergus serrator*, is another resident in the north, which, when the waters there are sealed with ice, comes to the United States in search of food. Wilson speaks of it as brought to the Philadelphia market, from the banks of the Delaware, and as much more common than the preceding in the United States. Like the former, it has an extensive breeding range, its nests having been found in the

rank weeds on the borders of lakes, in Maine and on Lake Michigan.

The HOODED MERGANSER, *Mergus cucullatus*, is a northern bird, found at the utmost limits of the fur countries, and one of the last to quit those desolate regions, when the frost makes it impossible for them to remain, by cutting off their supplies of food. In the winter, it ranges through the United States, and is found on the ocean and the inland waters. Some of them remain through the breeding season, and resort to the lakes, making nests of withered grass and feathers, on their grassy borders. These appear to be their favorite resorts, and those which frequent the seaside, do it from necessity rather than from choice. They are expert divers, and so quick in their motions, that they can take warning from the flash of the pan, in time to avoid the shot of the gunner; if they chance to be wounded, they escape under water, so that it is useless to pursue them. Mr. Cabot and others have found this bird in our State.

The CORMORANT, *Phalacrocorax carbo*, is abundant in winter on the islands near Boston and the coast of Massachusetts, where most of them remain in autumn, winter, and the early part of spring. Nuttall speaks of them as breeding on the islands, near the mouth of the harbor. They are never seen on fresh water, since they subsist entirely on fish taken from the sea. In taking them, these birds are so expert, that a fish can hardly escape them; they swim under water with great rapidity, and almost always rise with their prey in their bill. If the fish is very large, they beat it to pieces on the shore; if they have caught it by the wrong end, they toss it in the air, and catch it by the head as it falls, so that the fins may present no obstacle to its passing down the throat. When thus employed, and when at rest, they are so constantly on their guard, that it is very difficult to approach them; and if the gunner has succeeded in wounding one, it is useless for him to pursue, since both old and young sail under water, using their

wings to propel and their tails to steer them, as in the air. But their safety is provided for, without exertion on their part, since their flesh is so poor, tough and fishy that, Audubon says, not even epicures can eat them.

The DOUBLE-CRESTED CORMORANT, *Phalacrocorax dilophus*, which was first described by Richardson, and has been considered extremely rare, has been obtained by Dr. Brewer, in the vicinity of Boston. They are found breeding on low islands at Labrador, in great numbers, arriving as soon as the ice is dissolved from the water in the spring. They spend the winter on the coast of the eastern states. At that season, not many are seen farther east than the Bay of Halifax. No fish comes amiss to their insatiable appetites; of codlings particularly, they destroy immense numbers. They differ from the Florida cormorant, described by Audubon, chiefly in their superior size, and having more of the long feathers behind the eye.

The SHAG, *Phalacrocorax graculus*, is found in most parts of the United States as far south as Florida, where they breed in large associations. They appear to make the bays and islands of the St. Lawrence their northern bounds. In the high northern regions they have not yet been encountered. They live perpetually near the sea, never wandering inland like the common cormorant, which has been seen on the Missouri river. They are expert divers, and collect great quantities of fish. Near the mouth of Boston harbor, they are found in thick and numerous flocks, at the approach of winter.

The GANNET, *Sula bassana*, a bird known on both sides of the Atlantic, is added to this list on the authority of Dr. Brewer, who has obtained a specimen. In the summer, they are seen in vast numbers in the bay of St. Lawrence, where the Gannet Rock, as it is called, a large rocky island, is entirely whitened with the plumage of the females on their nests, while the crowds hovering over and around it, appear like a driving

snow storm. While thus engaged, they were easily approached, and were not alarmed even at the discharge of a gun, the meaning of which most sea-birds fully understand. They are seen on our eastern coasts in the autumn, and perhaps at other seasons of the year. They are not observed to dive on any alarm, nor for the sake of procuring food.

The LOON, or GREAT NORTHERN DIVER, *Colymbus glacialis*, is not an uncommon bird. It spends the breeding season in the fur countries, the British provinces, and probably in the most northern part of the states. On the approach of winter, they migrate, to escape the severity of the winter, most of their young going to the south ; but some remaining in the vicinity of Chesapeake Bay. They are shy and watchful birds. They breed in the most retired places which they can find, in rocky islets or the borders of lakes ; and as soon as the young are able to travel, the parent conducts them to the sea. They are active and unwearied in diving, and have the power of swimming under water almost as fast as they can fly in the air. In the day time they appear to dislike the bright sunshine, and are most active and animated at the approach of night. Their call is loud and dismal, particularly disagreeable to seamen, because it is thought to portend a storm ; it is so powerful that it can be distinctly heard, when the bird is so distant as to be almost invisible in the air. This bird is offered for sale in our markets ; but its flesh is tough and unpalatable.

The BLACK-THROATED DIVER, *Colymbus arcticus*, is, as its name denotes, a northern bird, and is more rare on our coast than the preceding ; but I am assured, on the authority of Audubon, that it is sometimes seen in our State.

The RED-THROATED DIVER, *Colymbus septentrionalis*, is found on the coast of the United States in autumn, winter, and, it may be said, in spring ; though they retire to the north before the snows are gone. The old birds are rarely seen at the south of Boston bay ; but the young, more affected by the

cold, proceed as far as Maryland. Some of them breed at the Bay of Fundy, but they abound much more in Labrador, on the little lakes which are common in that wild country. They are at all times shy and watchful, alive to every danger, but particularly uneasy at the sight of man. When he appears, though at a great distance, they dive and swim under water to the farther part of the lake, but if he continues to approach, they rise from the water, instead of diving again like the loon. Their notes, uttered in rapid succession, are harsh and rather loud. Dr. Richardson says that they cover their eggs with down like the eider ; but as this was not the case with those seen at Labrador, they probably vary their practice according to the climate where they make their nests.

The BLACK GUILLEMOT, *Uria grylle*, has been seen, in severe winters, as far south as Maryland ; but is uncommon even as far south as Massachusetts. A specimen has been procured at Nahant, by Dr. Brewer ; but they do not abound this side of the Bay of Fundy. At Labrador, they breed in large numbers. They are sea-birds in the fullest sense of the term, hardly ever going inland, except to breed ; and they are so active and successful, in procuring food, that they can remain and thrive, when almost all other birds are driven by the cold from the northern seas. Like many other sea fowl, they show great sagacity in preparing a place for their nest. If the fissure in the rocks where they make it, is dry, they waste no labor upon it ; but if it is likely that any water may run there, in the time of rain or dissolving snow, they raise it with pebbles to a sufficient height to keep their eggs from being injured. Is this instinct, or is it reason ? Or, rather, who will point out the boundary that separates the two ?

The FOOLISH GUILLEMOT, *Uria troile*, so called, from its patience in submitting to evils which it cannot help, is a hardy inhabitant of northern regions. It is said to submit to be killed in the breeding season, without attempting to escape ; but Audubon, who knows more of their habits than any one else, does not mention this circumstance in his interesting description.

The folly of the guillemot seems to consist in its returning to the breeding places where it is annually disturbed ; but this appears to be done in despair of going beyond human reach ; for it once bred in our bay. But it has for many years abandoned it, and proceeds to the north in company with the eiders, early in the spring. Their eggs afford luxurious food, and are collected in great numbers by those who make it their employment, to be sent to distant markets. They are so numerous, that the sailors, who were sent by Audubon to bring him two or three dozen, returned with twenty-five hundred, which indicates an immense abundance of the birds, since the eggs in each nest do not exceed three. The white line that encircles the eye and extends back upon the head, is found only in the old birds. Like the preceding species, they swim under water almost as rapidly as they can fly above.

The LARGE-BILLED GUILLEMOT, *Uria Brunnichii*, is said, by Nuttall, to be occasionally found, in winter, on the coast of the northern states, but I cannot ascertain that any one has been taken in Massachusetts, except in a single instance ; Dr. Brewer found one washed up on the beach, in April, 1836. This, however, is sufficient to give it a place among our birds. The specimen from which Audubon's illustration was taken, was sent him from Eastport in Maine. He found none on the coast of Labrador, though the preceding species, with which this associates, so greatly abounded. They had probably gone farther into their arctic home.

The LITTLE GUILLEMOT, *Uria alle*, sometimes called the Little Auk or Pigeon Diver, dwells far within the arctic circle, and was found by Dr. Richardson at Melville Island. In hardiness and power of enduring cold, no bird exceeds them ; in the depth of winter, when the ice of the ocean is lifted and broken by storms, they are seen crowding to the fissures, to find a supply of food. They seem to delight in tempests, which, by agitating the waters, throw up in greater quantities the marine productions on which they depend for subsistence. In New-

foundland they are called the Ice-bird, from the presumption that, unless extreme cold were approaching, they would not come so far from home. Those that are found in this State are generally exhausted by their long flight ; some have quietly submitted to be taken by the hand. They are not regular visitors, but occasional, solitary wanderers.

The PUFFIN, *Mormon arcticus*, commonly called the sea parrot, has been found in severe winters as far south as Savannah ; but this is unusual ; its common range is from Long Island to the Bay of Fundy, where many of them breed. Many more, however, keep on to Labrador, where Audubon found flocks, which covered the water to the extent of half an acre. Those which proceed to that distance, leave the states in April, and make their way along the shore, never going far from the sea. They breed in holes, which they make by burrowing three or four feet in the ground, and feed their young with small fish. They are very social, and betray strong attachment to each other ; when any one is shot, some one alights by its side, swimming round it and stirring it with its bill, as if urging it to fly or dive ; and when man, the only animal savage enough to torture and kill for pleasure, lifts an oar, to knock it on the head, it reluctantly leaves its friend, and disappears under the water. The puffin flies firmly and swims rapidly under water ; it also dives to the bottom, many fathoms deep, to find shell-fish and other prey. In his contests with the piratical raven, the puffin grapples with his antagonist, and both fall into the water, when the raven is drowned ; but if he can seize the puffin's neck, the victory inclines to the other side.

The RAZOR-BILLED AUK, *Alca torda*, occasionally goes as far south as New York, in winter ; but farther south it is never seen. It is found from Boston eastward, arriving on the coast in November, and returning in April. While here, they are seen fishing far out at sea, and are thought to be able to dive deeper than even the puffin, in search of their food, which consists of shrimps, shell-fish, small fishes, and roe.

They breed in the fissures of the rocky shores of Labrador, sometimes depositing their eggs where the water can run off without wetting them ; but if there is danger that the water will touch the eggs, they are laid on pebbles, which are heaped by the bird, to let the moisture run below. The nests are very near each other ; it is remarkable, that in the fissures and caverns, they sit flat upon the egg like common birds ; but in places more exposed, keep an upright position, with their faces toward the wind. In these places also they lay but one egg, while in places more sheltered, there are often two. The eggs are considered a great luxury ; the flesh is said to be good to the taste, though dark and uninviting to the eye.

The following should have been inserted on the 289th page :

The HUDSON BAY TITMOUSE, *Parus Hudsonicus*, which has been hitherto unknown in Massachusetts, has been found by S. Eliot Greene, Esq. near his house in Brookline.

In the foregoing list of our water birds, I have given the names, with a short account of the habits of all which reside with us or visit us, so far as I have been able to ascertain them. Some, which occasionally visit us, may be omitted ; and if not, succeeding observations will doubtless make a difference in the list ; since the accident of a winter unusually severe, may bring some arctic birds farther south than they have yet been seen ; and a similar cause may make us acquainted with some residents of the south, which have not yet entered our bounds. The range of breeding and migration is thus at times contracted or extended ; but the visits of a stranger, few and far between, are of but little importance, and if our regular visitants and permanent residents are set down and properly described, it is hoped that the purpose of the survey will be answered.

It is more probable, on the other hand, that some birds which come to us regularly now, finding what sort of welcome awaits

them, will gradually withdraw; for they are by no means slow to benefit by experience; those which at first were tame and familiar, are many of them growing cautious and distrustful; the character of man stands in low estimation among them; and as they know him better, they go farther from his reach. Many birds which formerly raised their young in our State, now confine themselves to regions of greater security; the old gunners on our coast can give more than one history of such desertion; and in some cases, the loss has been severe. Thus, for example, the wild goose is believed to have once raised its young in the temperate climates of the United States. The early settlers on the Ohio, testify that they formerly abounded there at all seasons of the year; it was common, within the memory of man, to find the young birds on the ponds of Kentucky; but, like the deer and the grouse, they have learned that the world is wide, and now, they find, in the quiet of the northern wilderness, a home, which has the great recommendation of being out of humanity's reach! The eider duck is another example. So lately as Wilson's time, the young were reared on our coast; but now, they have abandoned it; gaining nothing indeed by the exchange, since there is reason to believe that when it bred in this climate, it was not compelled to cover its eggs with the down which tempts so many adventurers to search for and rifle its nest.

I do not mean to say, that these desertions ought to be prevented. In some few instances, the experiment has been tried; but it is found, as might have been foreseen, that no human enactment can suspend the operation of a law of nature. The statutes on that subject are generally inefficient; no one cares to execute them; the idlers in a community are a privileged order, who pay little reverence to the law, and the industrious, beside having other employment than to note down their neighbors' transgressions, cannot be persuaded that there is any crime in shooting a wild bird, still less that the act is harmless at one season of the year, and injurious at another. Nor is it by any means certain, that it would be desirable, even if it were possible, to prevent this extermination. It is better for

the civilized community that the process should go on. The epicure may lose an indulgence, and his case will doubtless excite all the commiseration which it deserves; but it will be public gain, without question, to have the field and forest offer no bounty to idleness, tempting it away from the serious cares of life, to engage in pleasures, which no one is the better, in character, in habits, or in heart, for enjoying.

It is very desirable, that the experiment of domestication, which has been suggested once or twice in the preceding remarks, should be tried on a large scale; and it might be well if some inducement should be offered to tempt some competent persons to engage in such an undertaking. It cannot be despatched in a single season; it would require time to determine on what food, and under what circumstances, they would be likely to thrive best; and much more time would be necessary to effect a permanent change in the habits of a wild and wandering race, and to overcome that impulse, which, in the season of migration, acts so powerfully upon them, that some imprisoned birds with their wings clipped, have been known to break from their enclosures, and to set out on foot, for the region of Hudson's Bay. In many cases, no doubt, such attempts would succeed without difficulty: and in others, what could not be done by a short experiment, might be accomplished by successive and persevering trials; valuable accessions might thus be made to the number of our domestic birds; many might come into general use, which now only the sportsman and the epicure can enjoy, and races of wild birds be preserved, which will otherwise, in spite of all our game laws, soon disappear, and be lost from our forests and shores.

Respectfully submitted,

WILLIAM B. O. PEABODY.

Springfield, Feb. 11th, 1839.

SUPPLEMENT

TO THE

ICHTHYOLOGICAL REPORT.

SINCE the report on the Fishes has passed through the press, I have had an opportunity, by the politeness of Mr. John S. Sleeper, Editor of the "Mercantile Journal," of examining a specimen of the "*Lophius piscatorius*," Sea-Devil ; and as the account embodied in my report was extracted from Yarrell's "British Fishes," I would present a description here from a recent specimen, that the ichthyologist may judge for himself, as to my correctness in considering our fish the same as the foreign species.

Length of the specimen before me, two feet and one inch ; width across, in front of the pectorals, one foot ; length of the head, from the tip of the snout to the occiput, six inches. All the upper part of the body, is of a dark brown color, caused by very minute irregular markings ; body beneath, white. Numerous fleshy cirrhi beneath the lower jaw, edging it to the angles ; beyond these, they are continued to the pectoral fins, and back of them, they are again continued to the tail ; these cirrhi are, beneath the jaw, nearly an inch in length, on the sides of the body they are much smaller. The vertical gape of the mouth, when expanded, is five inches ; the distance across from angle to angle of the upper jaw, eight inches ; the tip of the lower jaw projects nearly two inches, in front of the upper.

The intermaxillary bones are capable of being protruded nearly an inch beyond the maxillaries, and are armed with a single row of small pointed teeth upon each side, and two rows of much larger teeth in their centre ; one of these rows upon the edge, the other, within and beneath, very incurved ; upon the upper jaw, at its tip, is a space of one and a half inches, destitute of teeth ; on each side of this space, is one quite large tooth, and a second, much smaller ; about half an inch outside of these, a single row of eight or ten teeth, the three or four first of which, are much the largest. On each side of the pharynx, are three rows of sharp incurved teeth, about a line in length, resembling spines ; these rows are arranged directly above each other, and are double. The lower jaw has a single row of numerous, very sharp teeth, some of them half an inch long ; the tongue has a broad, bony, triangular plate, upon each side, armed with two rows of teeth on each side, which are turned toward the throat. The distance from the margin of the upper jaw to the eye, is equal to the distance between the eyes. Several spines are observable upon the head ; two just back of the snout, on each side ; a bifurcated one over the middle of the eye, and another similar one at its posterior angle ; a small one in a line back of these, at the posterior portion of the head. A spine pointing forward, is situated at the angle of the jaws, and three straight spines are seen back of this. The eyes are nearly circular, half an inch in diameter ; the pupils, black ; the irides, yellowish brown, with darker rays. One inch back of the snout, are two elongated tentacula, four inches long, of the firmness of bristles, with the extremities free ; as the tentacula are lying down, directly at their posterior extremities, is situated a third, two inches in length, with about half of its extent only naked ; these tentacula are capable of being elevated at the pleasure of the animal.

The first Dorsal is situated an inch and a half back of this third tentaculum ; it is composed of *three* small rays, connected by a dark colored membrane.

The second Dorsal is two and a half inches back of the first ; it is composed of *eleven* rays ; this fin is six inches long, three

and a quarter inches high at its commencement, and two inches high at its posterior extremity.

The Pectoral fins are three inches long ; quadrate ; rather higher than long ; slightly digitated at their extremities, and ciliated ; width at the extremity, when expanded, six inches ; composed of *twenty-five* rays.

The Ventral fins, one inch long, two inches high ; having *five* strongly marked digitations.

The Anal fin is five inches long ; as high again at its posterior extremity as at its anterior ; it is composed of *nine* rays.

The Caudal fin is two inches long, four and a half inches high, and is composed of eight rays.

Squalus. Lin. (*Selache*. Cuv.) *elephas*. Le Sueur.

Journal Academy Natural Sciences, et fig.

Two or three weeks since, a large male shark was harpooned in the harbor of Provincetown, and being towed to Chelsea, was there exhibited. When I saw it, it was lying upon the beach, where it was entirely exposed at low tide, and nearly, if not altogether covered by water when the tide was high ; the tide was flowing in, when I examined it, which compelled me to make a more rapid survey than could have been wished. It had been opened, and its viscera were removed. The *liver* filled eight barrels, and furnished six barrels of oil. The fish presented the following appearances :

Its entire length was thirty feet three inches. The whole upper part of the body, was of a dark slate color ; lighter beneath. The skin was divided into innumerable rugæ, which were covered with minute sharp points, often collected into groups, resembling the discs of many of the "*Echini*," upon which are situated the spines by which they are ornamented ; or, still more, the tubercles arranged along the lateral line of some of our "*Cotti*," causing the skin to be exceedingly rough. *Head*, small ;

perfectly smooth, for the most part, in front of the eyes, and covered with circular and oblong mucous pores, which keep this portion constantly lubricated. Snout, blunt. *Nostrils*, five inches in front of the eyes, their lower portion upon the edge of the upper lip. *Eyes*, very small ; diameter of the eye, three inches ; largest circumference of the *sclerotic coat*, when removed from the socket, eight and a half inches. Eyes very moveable in their orbits ; distance between the eyes, two feet ; distance between the tip of the jaws, as artificially raised, two feet ; this vertical gap is undoubtedly as much again, *at least*, in the living fish, which gives us an opening of four feet. Mouth white, mottled with fuliginous. Jaws, furnished with a great number of small, incurved, pointed teeth. Six rows of these in the upper jaw, and seven rows in the lower jaw ; the inner row in this jaw, are hardly formed ; each of the rows in this jaw, as I counted them in the mouth, contained one hundred teeth, from the tip of the jaw to the angle of the jaw, or two hundred, as counted from one angle to the opposite one, or in a word, *fourteen hundred teeth* in this jaw. The teeth are conical, sharp, polished, with a sensible ridge upon each side, often roughened, almost serrated ; the lower portion of the tooth, striated ; one of the teeth in this jaw is bifid ; the teeth at the angles of the jaws, short and more compressed. The teeth in the centre of the jaw, are three lines high above the jaw, and their base, or root, about the same length within the socket. *Temporal orifices*, small, just back of the angle of the jaw.

From the tip of the snout to the first branchia, four feet nine inches. Five very large branchiæ, nearly surrounding the head, as the animal was lying ; by measurement, the first pair of branchiæ were separated, on the neck, from each other, six inches ; the second pair were separated, at the same situation, nine inches ; the third pair, one foot three inches ; the fourth pair, one foot nine inches ; the fifth pair, two feet three inches ; showing the first to be much the largest. The first Dorsal fin is triangular : two feet ten inches long, four feet four inches high, anteriorly, three feet posteriorly ; distance between the first and second dorsal, six feet ; second dorsal ten inches long, sixteen

high anteriorly, thirteen posteriorly. *Pectorals*, falciform ; one foot nine inches long ; five and a half feet high ; distance between the pectoral and ventral, eight feet. Length of the *ventrals*, one foot eleven inches ; height, two feet nine inches ; length of the claspers, three feet three inches ; width at their base, eight inches, from which they gradually pass to a point ; they enclose a strong, bony spine. The commencement of the anal is directly opposite the middle of the second dorsal ; its length is eleven inches ; its height, fourteen inches ; across the top, ten inches ; distance between the anus and anal fin, three and a half feet. Anterior to the caudal fin is a lunated depression above and beneath the posterior extremity of the fish ; at the base of the tail, a carina upon each side, one foot eight inches long. The caudal lobes, unequal ; the upper lobe, six feet six inches in length, measured over its curve, having at its extremity a small triangular lobe ; the lower lobe, four feet two inches, measured in the same way ; width of the extremity of the *lower lobe*, six inches ; width at the base, two feet two inches ; width of the extremity of the *upper fluke*, or lobe, one inch ; width of the base, two feet three and a half inches ; from the lunated depression to the middle of the fin, two feet eleven inches.

Attached to the branchiæ, I found a single specimen of the "*Cineras vittata*."

Under the name of "*squalus elephas*," this shark was admirably described by Le Sueur, in the "*Journal of the Academy of Natural Sciences*," from a specimen taken on the coast of New Jersey in 1822 ; and his figure, when it is remembered that it was taken from a stuffed skin, is very accurate.

Among our fishermen it is known as the *bone shark*.

D. H. S.

SUPPLEMENT

TO THE

HERPETOLOGICAL REPORT.

AFTER my Report upon the Reptiles of Massachusetts had passed through the press, I met with a paper which had been long sought for in vain—a “Report of a Committee of the Linnæan Society of New England.” It will be observed that I have embodied in my paper all species which have been recognised by naturalists, whether I have seen them or not. I should be guilty of great neglect therefore, were I to pass unnoticed the following species. It appears by this Report, that in September, 1817, a remarkable serpent was taken near Gloucester, Cape Ann, which, having been carefully examined by a committee of the Linnæan Society, composed of John Davis, Jacob Bigelow, and Francis C. Gray, was considered a nondescript, and the following report was presented by them to the Society, accompanied by a plate of its external appearance and another of its internal anatomy, under the name of

SCOLIOPHIS ATLANTICUS.

“EXTERNAL APPEARANCE. The animal had the general form and external characters of a serpent; but was remarkably distinguished from all others of that class known to your committee, by a row of protuberances along the back, apparently formed by undulations of the spine. From the back of the

head to the first of these protuberances, was a distance of three inches and three-fifths of an inch, during which the spine was straight. Between this place and the vent, its undulations were nearly regular, twenty-four of these protuberances, about equally distant from each other, occupying the space between the neck and the vent. From the latter to the twenty-fifth protuberance, the spine formed a straight line, of the length of one inch and nine tenths; its undulations there commenced again, and were continued quite to the extremity of the tail, forming sixteen more distinct protuberances. The size of these forty protuberances was proportioned to that of the body at the places, where they were respectively situated. The body could be bent with facility upward and downward as represented in Plate I., a circumstance not common to other serpents.* Those parts of the spine, which were straight, admitted much less motion in a vertical direction, than those, which were undulatory.

	ft.	in.
The length of the head was		1 3-10
From the back of the head to the vent	2	2 4-5
From the vent to the end of the tail		7 2-5
		<hr/>
Whole length	2	11 1-2

The smallest circumference of the neck, one inch and a half. The circumference of the body over the largest protuberances, two inches and four fifths. The circumference of the body between the two largest protuberances, two inches and nine twentieths. The size of the body diminished suddenly at the vent, immediately beyond which the circumference of the tail was one inch and three fifths. The tail was round, and tapered very much, terminating in a point.

The head was rather larger than the neck, flattened, its anterior part pyramidal, rounded at the nose; the upper lip entire.

* Ce mode d'articulation explique très bien le mouvement du corps des reptiles, qui, en général, s'exécute sur les cotés, et non de haut en bas, comme le représentent les peintres.

The back part of the head was so much bruised that its original form was not easily distinguishable. In the fragments of the upper jaw were seen three slender recurved teeth ; in those of one side of the under jaw seven similar teeth, and the sockets of three others. No venomous fangs were found. The tongue was bifid, each fork being nearly half an inch long. The nostrils, situated between the second and third plate from the nose, were large and oval. Between the nostril and the eye was a longitudinal hollow, bounded beneath by the upper lip, above by a very prominent superciliary ridge, extending beyond the eye. The eye was very large, nearly round, its breadth apparently a little diminished by the superciliary ridge jutting over it. The whole head was covered with plates, but those on the top of it were so much broken, that their number and form could not be perfectly ascertained. The under jaw was divided by a longitudinal furrow, having a triangular scutella at its anterior extremity, and two rows of scutellæ on each side.

The body was covered with hexagonal flat scales, those on the back narrowest ; the throat with three or four rows of small scales ; the belly with a hundred and eighty plates ; the tail with ninety-three pairs of scutellæ. Over the vent was one pair of scutellæ ; at its sides four pair, the scales opposite to which were smaller than those on any other part of the body.

The color of the head and of the upper part of the body and tail was an uniform deep brown ; that of the belly and under part of the tail a bluish lead color, lightest in the middle. The whole of the under jaw and throat were white, which color extended in a clouded streak some way down under the neck, and fore part of the belly.

In the general disposition of its colors, in the number, form, and arrangement of the scuta and scutellæ, this animal approaches most nearly to the *Coluber constrictor* ; from which, however, it is strikingly distinguished by its undulating back, by its body being larger in proportion to its length, and diminishing more suddenly at the vent, the tail shorter, the teeth

much larger and more distant, and the color brown instead of black.

This animal is probably amphibious, although it has not the flat tail of the Pelamides; nor did the examination of its exterior enable us to discover any thing in its structure, peculiarly adapting it to a residence in the water, excepting only the remarkable facility of bending in a vertical direction. This motion, which may be observed in the leech, and various other aquatic animals, is quite as important as a horizontal one to an inhabitant of the ocean, and comparatively useless in an animal confined to the land.

INTERNAL STRUCTURE. The structure of the *spine* in this animal is very singular, and different from that of any serpent which we have seen, or known to be described. Its course throughout the greater part of the body is regularly undulating or flexuous, consisting of successive curves upward and downward. The structure of the different vertebræ varies to accommodate itself to this configuration, so that the spine cannot be extended into a straight line without dislocation of its parts. In the portion of spinal column which we examined, each curve consisted of about nine vertebræ. Each vertebra was articulated by a round head on its posterior extremity to a socket in the anterior extremity of the next.* It had five principal processes, one a spinous process; two anterior, and two posterior transverse processes. There were also smaller processes articulated with the ribs, and a sharp longitudinal prominence underneath. The spinous processes varied remarkably in shape and size, according to the part of the spine in which they were situated. Those occupying the top of the curve were very broad, and those of the bottom of the curve very narrow, the latter being not more than half the breadth of the

* This is the reverse of what Cuvier asserts of serpents in general, in his learned work on comparative anatomy. He states that the tubercle is on the anterior, and the cavity on the posterior part of the vertebra. “La partie antérieure du corps de la vertèbre présente un tubercule arrondi demi-sphérique; et la partie postérieure offre, au contraire, une cavité correspondante; de sorte que chacune des vertèbres est articulée en genou avec celle qui la suit, et avec celle qui la précède.”—*Leçons d'anatomie comparée*. I. 176.—We are induced to believe that in the above passage the terms anterior and posterior must have been misplaced. The tubercle, we think, always occupies the posterior part of the vertebra.

former. The top of the spinous processes in the ascending or anterior half of each elevation of the back-bone projected considerably backward. In the descending half, on the contrary, they projected forward, so as to appear as if this part of the spine were inverted. The space between the spinous processes was very great, amounting to nearly two thirds of their longitudinal diameter; a circumstance which contributes very much to the vertical flexibility of the spine, being much greater than it is in the *Boa constrictor*, one of the most flexible serpents, as represented by Sir Everard Home, in his comparative anatomy; or than it is in the *Coluber constrictor*, which your committee have examined. The two anterior transverse processes are long and sharp, and are received under or pass within the two posterior transverse processes of the preceding vertebra. They differ in direction according to the place which they occupy. Those in the highest vertebræ pass obliquely downwards; and those in the lowest, obliquely upwards. The posterior transverse processes also grow broader and less oblique as the vertebræ descend. The whole connexion and proportion of the processes is such, that the greatest downward flexion takes place at the top of the curve, and the greatest upward flexion at the bottom; an arrangement admirably adapted to increase the power of the muscles which act in the vertical flexion of the spine.

The ribs are articulated by a double cavity to a small double headed process under the anterior transverse process of each vertebra. They differ in length and direction, those at the bottom of the curve being shorter and more spreading than those at the top, so that the lower extremities of the whole fall in a right line.

Muscles. The principal muscles on the outside of the trunk consist of three strong dorsal muscles with oblique fibres continually arising from the vertebral processes, or ribs, and inserted by an aponeurosis into other bones of a similar kind. Below these is a broad thin lateral muscle or congeries of muscles, connected to the ribs only. These muscles, according

to their situation, act in performing the various inflexions of the body.

On the inside of the ribs a series of their muscles was observed, arising from the bodies of the vertebræ, passing obliquely downwards and forward under three ribs and over the fourth, and afterwards inserted into ribs beyond. These muscles, in conjunction with others, according to Sir Everard Home and other authors, act upon the ribs in serpents to assist their progressive motion on land.

Viscera. The only part of the viscera, which the limited openings permitted us to examine, were a portion of the lung and œsophagus with the mesentery and blood vessels, also a small part of the stomach. The lung was a long cellular and tubular viscus, as in other serpents, but with this remarkable peculiarity. It was successively dilated and contracted so as to adapt itself to the cavities formed by the undulations of the spine. The œsophagus was also unequal, but without relation to the cavities of the spine, not being in contact with it. In the stomach was found a mass of scales, also the tail and part of the skin of a serpent of a different species, having all the scales carinate.

In regard to the use or final cause of the curvatures in the back-bone, which give so peculiar a character to this animal; it is obvious that two important ends are effected by it. These are an increase of *flexibility* and an increase of *strength* in *vertical motions*.

1. The flexibility is increased, because in any given length of body, there will be more joints in a crooked, than there would be in a straight spine, composed of vertebræ of the same dimensions.

2. The strength in vertical motions is increased, since the fulcrum formed by the highest articulation is more remote from the power applied by the lateral muscles, and the fulcrum formed by the lowest articulation, is also more remote from

the power applied by the dorsal muscles; than they would be if the spine pursued a straight and intermediate course.

The dorsal muscles, however, being bound down by an aponeurosis, so as to pursue nearly the course of the spine, are nearer their fulcrum and have less of this advantage than the lateral muscles, which are farther from their fulcrum; so that the greatest power is probably that which is exerted in the forward flexion or extension of the body. This power is the one which would be most useful to the animal in swimming at the surface of the water with a motion in any degree vertical.

Your committee, considering this serpent as nondescript, and as distinct from other genera of serpents in the flexuous structure of its spine, have deemed it necessary to constitute a new genus, founded on this peculiarity. They have adopted the descriptive name of *Scoliophis*, and have added the local specific name of *Atlanticus*. Compared with the genera of Linnæus and Lacepede, its character will stand thus :

SCOLIOPHIS. *Scuta on the belly, scutellæ on the tail, spine flexuous."*

That this is a new and very curious animal, is acknowledged by distinguished foreign naturalists.

D. H. S.



J. WOODMAN, M. D. DEL.

Platessa ferruginea - *Storer*

J. MOURAY, LITH. BOSTON

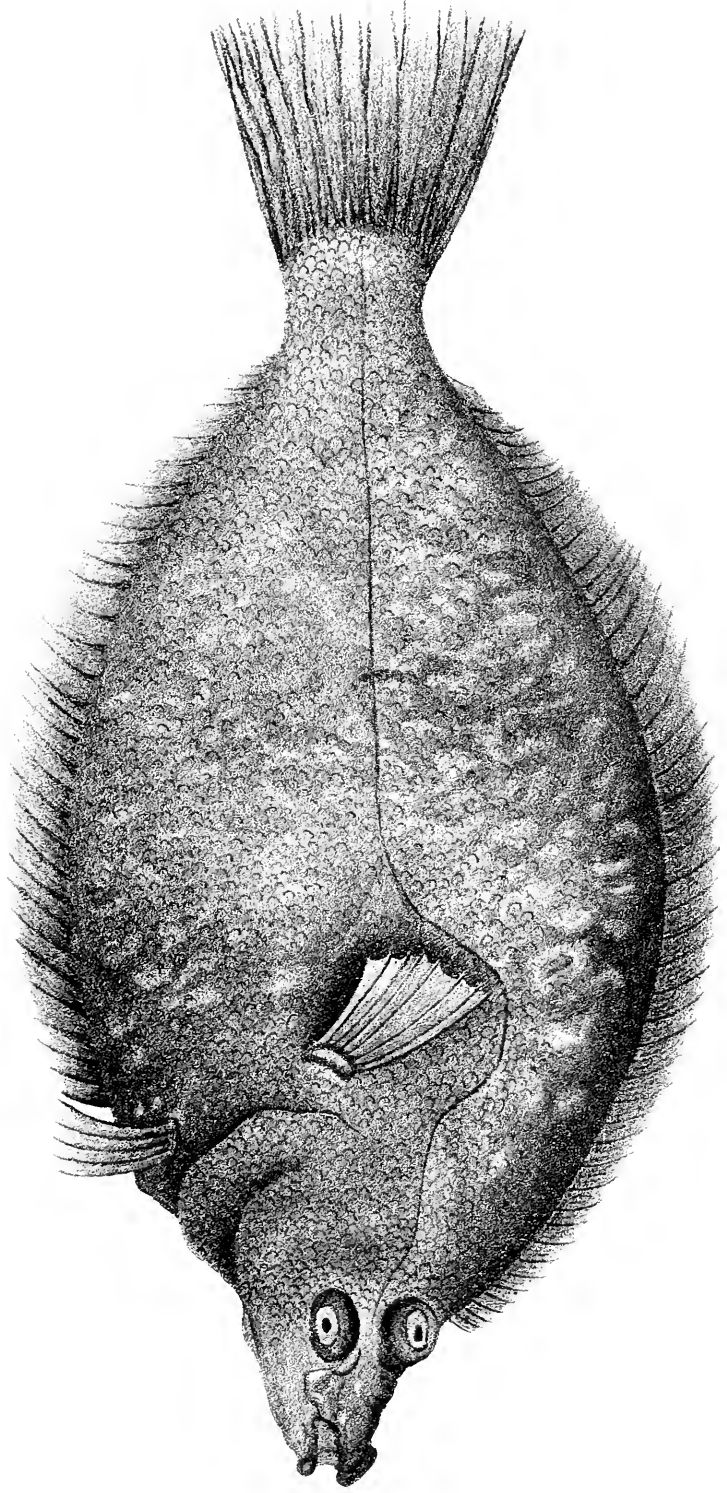




Fig 1

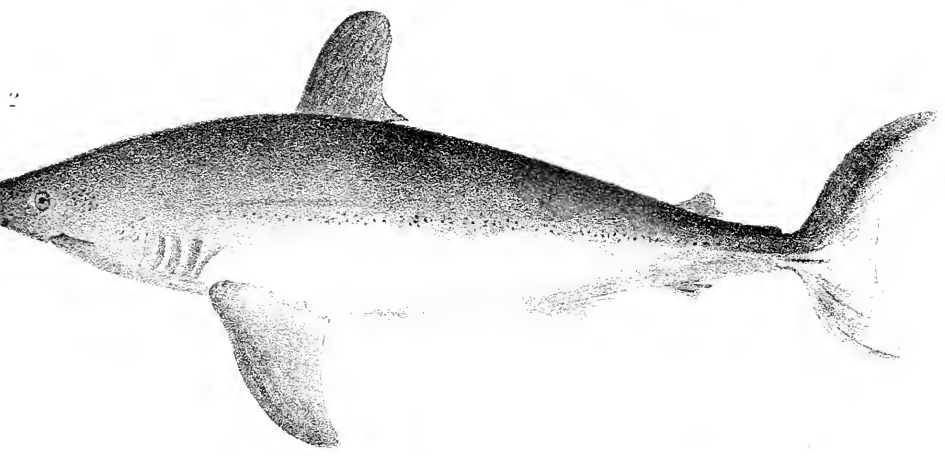
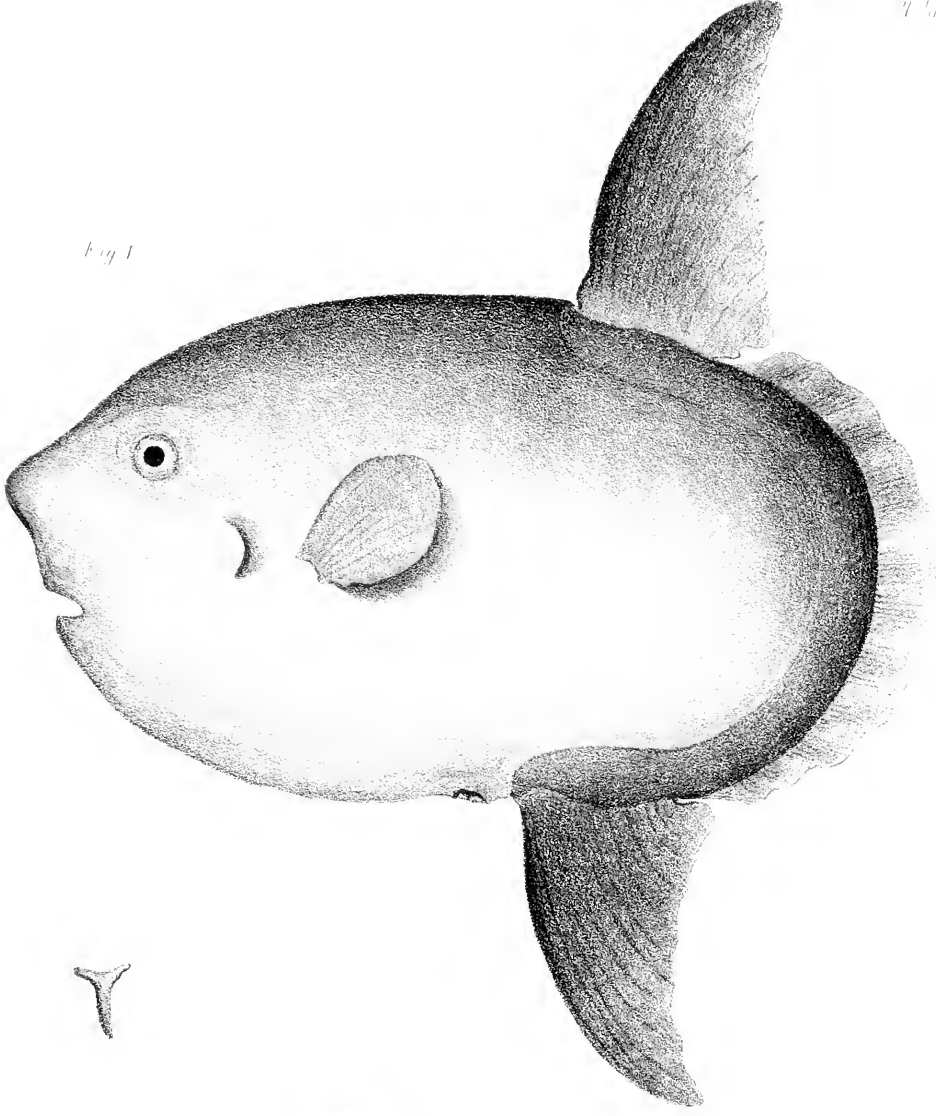
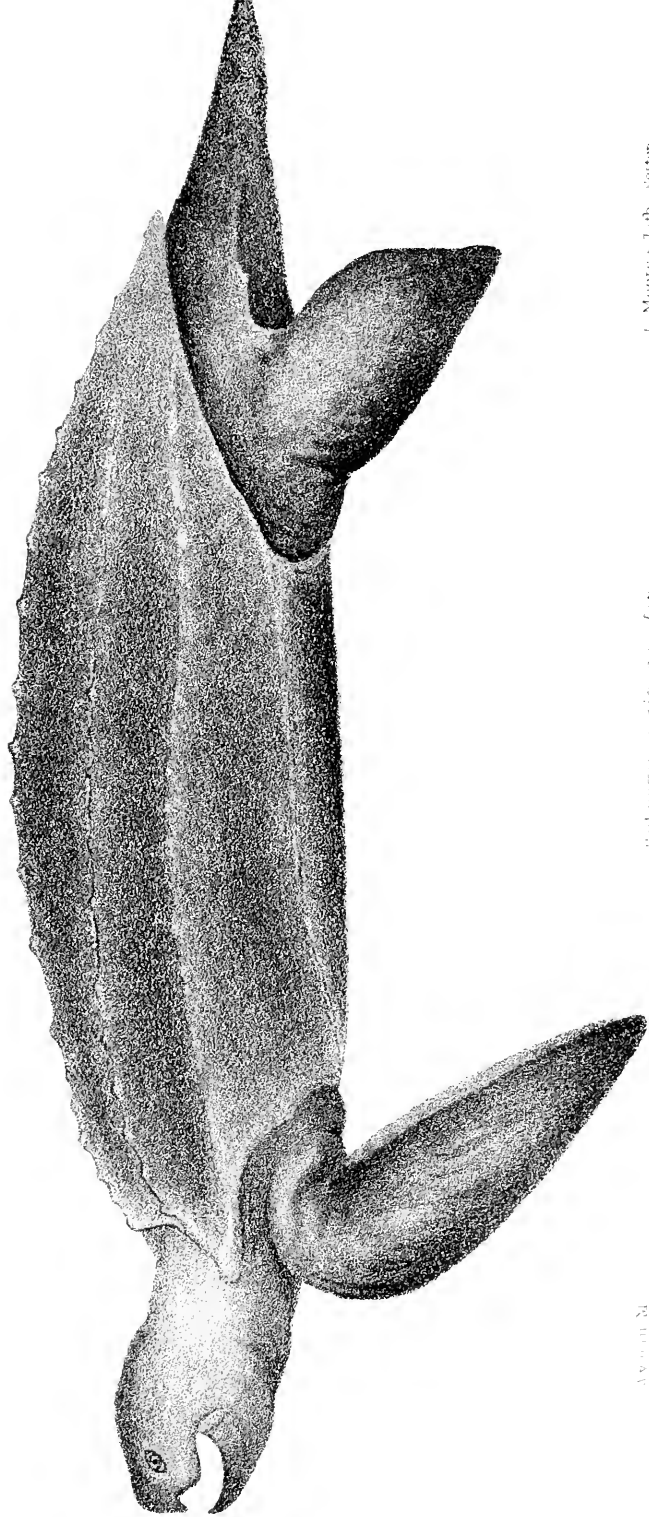


FIG. 1. On the



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