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BOSTON SOCIETY OF NATURAL HISTORY.

TAKEN FROM THE SOCIETY'S RECORDS.

January 4, 1854.

The President, in the Chair.

Dr. T. M. Brewer presented a communication on the Ornithological Fauna of Wisconsin, from the Rev. A. Constantine Barry, of Racine, Wisconsin, as follows:

Order — ACCIPITRES. Family — VULTURIDÆ.

CATHARTES AURA. Found in our State only in rare instances.

Family — FALCONIDÆ.

BUTEO BOREALIS. Very abundant at times, and always met with in considerable numbers about the groves and forests bordering our prairies, where they subsist principally upon moles, snakes, frogs, etc; these being often found in their stomachs bolted entire. B. LINEATUS. Occasionally met with in this vicinity, (Racine;) in some portions of the State considerably numerous, particularly about the large marshes frequented by water fowl, upon which it preys. B. PENNSYLVANICUS. A few specimens have been obtained.

Archi-buteo Sancti Johannis. Very rare, and exceedingly difficult to be taken.

Aquila chrysaëtos. Occasionally met with. Two or three fine specimens have been shot near this city.

Haliaëtus leucocephalus. Only now and then an individual is latterly seen. Opposite this city on the Michigan shore, is an old pair, that for many years have held undisputed possession of the locality — a " brave old oak," where in the same nest they annually rear their young.

Pandion haliaëtus. Common along our rivers and lakes.

Ictinea plumbea. A single bird of this species was seen last spring.

Nauclerus furcatus. At one time quite numerous upon our prairies, and quite annoying to us in grouse shooting; now rarely met with in this vicinity.

Falco peregrinus. Rare.

Hypotriorchis columbarius. Common.

Tinnunculus sparverius. Abundant, and breeds here in considerable numbers.

Astur palumbarius. Abounding largely in this state. A friend of mine in his excursions has shot twenty of them in a season.

Accipiter Cooperi. Not numerous.

Circus cyaneus. Common. Breeds here.

Family — STRIGIDÆ.

Strix funerea. Found here occasionally. S. pratincola. The only bird of this species known to have been found in the State, and now in my possession, was shot in the vicinity of this city.

Nyctea nivea. This regular winter visitor is at times quite numerous upon our prairies; always most numerous during our severest winters. They generally frequent the vicinity of marshes, and only appear about the farm-houses when driven by hunger. In a few instances they have been known to remain with us during the whole year.

ATHENE PASSERINA. Only now and then met with. I have been able to obtain but a single specimen.

SYRNIUM CINEREUM. Very rare, unless it may be in quite the northern part of the State. I have met with it in two instances only. S. NEBULOSUM. Found everywhere in our forests.

OTUS WILSONIUS. Abundant. O. BRACHYOTUS. Very common.

BUBO VIRGINIANUS. A somewhat rare species.

EPHIALTES ASIO. Common, and found in almost every grove and thicket upon our prairies. These seem to be their favorite haunts, in preference to the heavy forests. E. NÆVIA. This species I have good reasons for believing to be separate and distinct from the former. The difference in plumage, I *know*, is not owing to different states of the same bird. With the young and the old of both species I am quite familiar. E. KIRTLANDII. Recently discovered and described by Dr. Hoy, of this city; a beautiful small species, considerably less than the *A. passerina*. Two specimens only have been obtained.

Order — PASSERES. Family — CAPRIMULGIDÆ.

CAPRIMULGUS VOCIFERUS. Among the most common of our birds.

CHORDEILES VIRGINIANUS. Very abundant.

Family — HIRUNDINIDÆ.

ACANTHYLIS PELASGIA. Only occasionally found.

PROGNE PURPUREA. Visits us in great numbers.

HIRUNDO FULVA. Only a single specimen observed. H. RUSTICA. Very abundant. H. THALASSINA. Reported in the interior.

COTYLE RIPARIA. Numerous in early spring. C. SERRIPENNIS. Occasionally found in company with the Sand Martin.

Family — MUSCICAPIDÆ.

TYRANNUS INTREPIDUS. Common.

MYIOBIUS CRINITUS. The only specimen known to have been obtained here was shot by me last spring. M. ATER. Rare. M. ACADICUS. Numerous early in May, only in rare instances found during the season. M. FUSCUS. Abundant. M. VIRENS. Arrives about the middle of May. It nests here in considerable numbers.

SETOPHAGA RUTICILLA. Makes its appearance quite early in the spring, and frequents low grounds abounding in the willow and poplar, about the blossomed tops of which it darts incessantly in pursuit of its prey. It remains with us during the summer.

VIREO FLAVIFRONS. Among the rarest of our spring visitors. V. SOLITARIUS. Exceedingly rare. I had not seen it in the State until last spring, when I shot a single bird; a second one, the male, I failed to secure. V. NOVEBORACENCIS. Abundant. V. GILVUS. Plentiful during the month of May, and many remain to breed. V. OLIVACEUS. Quite numerous during the warm season.

Family — LUSCINIDÆ.

CULICIVORA CÆRULEA. Quite abundant.

MNIOTILTA* CANADENSIS. Stops with us for a few days, on its northward journey, about the first of May, but rarely remains to breed. M. CORONATA. In spring very numerous. M. STRIATA. Common. Makes its appearance from the 10th to the

* This point (Racine) seems to be a favorite rendezvous for the whole family of Warblers, with perhaps two or three exceptions, — Lake Michigan forming a sort of guide-post on their northward journey. From the mouth of the Osage they make their way in great numbers across the country to this immediate point; so that half a mile south, or the same distance north, scarcely a bird of them all will be found. Of their numbers, an idea may be formed from an entry in my note book: — "Shot on the mornings of May 2d and 3d, 1853, Cerulean Warbler, 3; Parti-colored, 6; Cape May, 2; Tennessee, 1; Black-Throated Blue, 4; Chestnut-sided, 6. And on the mornings of May 10th, 11th, and 16th, Pine, 1; Blackburnian, 4; Bay-breasted, 5; R. Throated Green, 3; Canada, 3; Mourning, 1; together with Finches, Vireos, Thrush, &c. &c.

15th of May. M. SUPERCILIOSA. Only a single specimen observed. M. CASTANEA. Numerous about the middle of May, remaining for two or three days only. M. PENNSYLVANICA. Among the most numerous of our warblers, and one of the earliest to visit us in the spring. Occasionally nests here. M. PINUS. Rare. Have met with it only in two or three instances. M. PARUS. Like the *M. pinus*, only an occasional visitor. M. VIRENS. Visits us in considerable numbers from the 5th to the 10th of May. A few remain during the breeding season. M. MARITIMA. Seldom met with save at this point, and here no more than two or three of a season. M. CŒRULEA. Rather common. M. BLACKBURNIÆ. Among the first to come in the spring. Occasionally very abundant, and a few remain to breed. M. ÆSTIVA. Rare. M. NIGRESCENS. Seldom found. M. CANADENSIS. An occasional visitor; never plenty. M. DISCOLOR. A single specimen in the cabinet of Dr. Hoy. M. AGILIS. Some seasons quite abundant. M. PEREGRINA. Rare. M. RUBRICAPILLA. A few only visit us in the annual migration. M. PUSILLA. Some seasons quite numerous. A few remain to nest and rear their young.

TRICHAS PHILADELPHIA. Very rare; two specimens only have been obtained. T. MARILANDICUS. Common, and breeds here abundantly.

PARUS ATRICAPILLUS. Common in all our wooded districts.

REGULUS CRISTATUS. Common. R. CALENDULA. Abundant at this point.

SIALIA WILSONI. Common.

ENICOCICHLA AUROCAPILLUS. Not common. Makes its appearance here in the spring in company with the warblers, and usually journeys with them farther to the north. E. NOVEBORACENSIS. Visits us in small numbers.

ANTHUS PIPIENS. Rather abundant.

Family—CERTHIDÆ.

CERTHIA VARIA. Common, and breeds here in considerable numbers. C. FAMILIARIS. Abundant, and remains during the season.

Sitta Carolinensis. Common. S. Canadensis. Abundant in the northern part of the State.

Troglodytes Americanus. Somewhat numerous. T. ædon. Very abundant. T. arundinaceus. Frequently met with on our marshes, and about our *slues*. T. brevirostris. Also common, — both species breeding with us.

Family — TURDIDÆ.

Mimus Carolinensis. Abundant. M. rufus. Common.

Turdus migratorius. Abundant. T. mustelinus. Another common, and sweet singer. T. fuscescens. Usually found in considerable numbers. T. solitarius. Generally distributed throughout the forests of our State.

Icteria viridis. Extremely rare.

Family — FRINGILLIDÆ.

Otocoris alpestris. Met with everywhere upon our prairies, especially along the highways. Mounts upward when it sings.

Plectrophanes lapponica. Abundant. P. nivalis. Common.

Zonotrichia grammaca. Common. Z. savanna. Breeds here in considerable numbers. Z. pallida. Rare. Z. socialis. As everywhere in the United States, a common bird. Z. monticola. Met with occasionally. Z. palustris. Frequently met with in our swamp-thickets, where it nests. A very shy bird, and a sweet singer. Z. Lincolnii. Rare. Have seen it only in one or two instances. A nest and eggs were procured by me last spring in the low grounds near this city ; the bird I failed in capturing. Z. iliaca. Common, and frequents low wooded grounds and the borders of streams. Z. melodia. Abundant. Z. Pennsylvanica. Very plentiful. Z. leucophrys. Common. Z. atricapilla. Met with only occasionally.

Emberiza passerina. Common. E. Pusilla. Abundant in all settled portions of the State.

FRINGILLA HYEMALIS. A common winter visitor. F. LINARIA. Common. F. PINUS. Rare. F. AMERICANA. Abundant.

SPIZA CYANEA. Not common.

PIPILO ERYTHROPHTHALMA. Abundant.

CARPODACUS PURPUREUS. Some seasons quite abundant.

LOXIA CURVIROSTRA. Like *C. purpureus*, at times quite numerous.

GUIRACA LUDOVICIANA. Abundant, making their appearance early in May.

COCCOTHRAUSTES VESPERTINUS. Rare; a few specimens only have been secured.

PYRANGA ÆSTIVA. Rare. P. RUBRA. Abundant.

Family—STURNIDÆ.

DOLICHONYX ORYZIVORUS. Extremely abundant.

MOLOTHRUS PECORIS. Common.

AGELAIUS XANTHOCEPHALUS. Seldom found. I have never seen more than a single bird. A. PHŒNICEUS. Abundant.

YPHANTES BALTIMORE. Common, though not numerous.

XANTHORNUS SPURIUS. Found in considerable numbers near this city, where they breed.

QUISCALUS PURPUREUS. Common.

SCOLECOPHAGUS FERRUGINEUS. Very abundant.

STURNELLA LUDOVICIANA. Extremely plentiful.

Family—CORVIDÆ.

CORVUS CORAX. Rare. C. CORONE. This bird has not yet made its appearance to any extent in our State; a few only have ever been seen.

PICA HUDSONICA. Seen only in a single instance.

CYANOCORAX CRISTATUS. Abundant.

PERISOREUS CANADENSIS. Found in the northern part of the State.

Family — LANIIDÆ.

Lanius Ludovicianus. Abundant, and breeds here in considerable numbers. L. borealis. Rare. A very few only have come under my observation.

Family — AMPELIDÆ.

Ampelis garrulus. Visits us in great numbers during the winter, frequenting our gardens in search of food. Scores of them are taken every season. A. Carolinensis. Common.

Family — TROCHILIDÆ.

Mellisuga colubris. Abundant. Makes its appearance early in May, when it is seen about the tops of the willows and poplars in the low grounds.

Family—ALCEDINIDÆ.

Ceryle alcyon. Common.

Order — SCANSORES. Family — PICIDÆ.

Dryocopus pileatus. Abundant.

Picus villosus. Frequently met with, though not plentiful. P. pubescens. Common. P. varius. Common.

Melanerpes erythrocephalus. Common.

Colaptes auratus. Very abundant.

Family — CUCULIDÆ.

Coccyzus erythrophthalmus. Rather common.

Family — COLUMBIDÆ.

Ectopistes migratorius. Abundant in spring and fall. E. marginatus. Abundant.

Order — GALLINÆ. Family — TETRAONIDÆ.

Ortyx Virginianus. Distributed in immense numbers over the entire State. Even our gardens in the city at times abound with them.

BONASA UMBELLUS. Abundant.

TETRAO CANADENSIS. Said to be plenty in the extreme northern part of the State. T. CUPIDO. Common. Large numbers are taken during the shooting season. Forty and fifty are not unfrequently bagged by a single sportsman of an afternoon. T. PHASIANELLUS. Occasionally met with.

Order — GRALLÆ. Family — RALLIDÆ.

PORPHYRIO MARTINICA. A few breed here every season.

FULICA AMERICANA. Common, and breeds here in great numbers.

ORTYGOMETRA CAROLINA. Rare.

RALLUS CREPITANS. Not unfrequently met with on our prairie marshes, where it undoubtedly breeds. R. VIRGINIANUS. Rare.

Family — ARDEIDÆ.

GRUS AMERICANA. Often found in very large flocks upon our prairies, and numbers are killed every year. The young are easily domesticated, but make naughty pets. The flesh of this bird is highly esteemed by many.

TANTALUS LOCULATOR. A single bird of this species was shot near Milwaukie a year or two since.

PLATALEA AJAJA. Found along the Mississippi within the bounds of our State, and occasionally about our small lakes in the interior.

BOTAURUS LENTIGINOSUS. Abundant. Breeds here in great numbers.

ARDEA EXILIS. Abundant. A. VIRESCENS. Occasionally met with. A. OCCIDENTALIS. A few of this species visit a large *slue* in the vicinity of this city every spring, but all our efforts to capture one have thus far proved unavailing. A. HERODIAS. Common about our rivers and marshes.

NYCTICORAX NÆVIUS. Rare.

Family — CHARADRIDÆ.

Charadrius Virginicus. Plenty in spring and fall of the year. Immense bodies of them sometimes gather upon the open prairie, especially upon portions over which fire has run. I have seen hundreds of them thus assembled, and busily engaged in feeding — upon what, I am puzzled to know. C. vociferus. Abundant. C. melodius. Not common.

Cinclus interpres. Somewhat numerous, especially in the vicinity of Lake Michigan.

Family — SCOLOPACIDÆ.

Tringoides Bartramia. Abounds largely upon our prairies in autumn and spring, where it breeds, though in less numbers. T. macularia. Common. T. canuta. Found in small numbers about our lakes and ponds. It undoubtedly breeds here, though I have not as yet found its nest. T. cinclus. Visits us in company with others of its species on its annual journey to and from the north. T. subarcuata. At one time quite common in the vicinity of this city, but has entirely disappeared. Found in considerable numbers in unsettled districts about the *slues.*

Totanus semipalmatus. Frequents the shores of our lakes, and occasionally may be seen in large flocks. I found them more numerous about Lake Winnebago than elsewhere. T. melanoleucus. Quite abundant along our forest streams, and wet, wooded marshes, where it breeds. T. flavipes. Abundant. T. glottis. Have seen two or three only.

Limosa fedoa. Rare. I have never obtained more than a single specimen.

Gallinago Wilsonii. Very abundant for a few weeks in spring and autumn, and shot in great numbers.

Philohela Americana. Found in small numbers, but is evidently increasing.

Recurvirostra Americana. Rare.

Numenius longirostris. Has disappeared from this part of the State, though a few probably visit other and unsettled portions.

Order — ANSERES. Family — ANATIDÆ.

Bernicla Canadensis. Abounds largely, and occasionally breeds in our State. A curious fact connected with the habits of this bird, is the intelligence displayed in opening and keeping open ponds and slues upon which ice has formed, or is forming. A flock alights upon the thin ice and commences a *jumping-up* process, at the same time giving hard blows with their wings. When the ice has thus been sufficiently broken to admit them into the water, there begins a *splashing* process, and this is continued at intervals, by individuals, during the night, preventing ice from forming. Large flocks of this bird frequent our small lakes and ponds during the fall, from whence they go out upon the grain fields to feed. They are shot in considerable numbers at this season. B. Hutchinsii. Rare. B. Brenta. Abundant in all parts of the State, and large numbers breed here.

Anser Bruchi. An occasional visitor. A. hyperboreus. Frequently found in company with the *B. Canadensis*, sometimes in separate flocks. Not very numerous.

Cygnus Americanus. Rare.

Anas boschas. Exceedingly abundant, and breeds here in great numbers. A. obscura. Found in small numbers in our rivers and lakes during the fall, especially those bordered by the wild rice. Breeds in the State.

Chaulelasmus strepera. The first observed in the State, was procured by me in a recent excursion on Fox River.

Mareca Americana. Abundant.

Dafila acuta. Common.

Aix sponsa. Found here in great numbers; nearly every wooded stream abounding with them. In autumn they gather in large flocks about the rice marshes, along the margins of our rivers.

Querquedula Carolinensis. Common.

Pterocyanea discors. Abundant.

Spatula clypeata. Rare. A few only have been seen.

Nyroca valisneria. Met with only in rare instances. A large flock was reported to have been seen near our city, November 2d, 1853. N. ferina. Abundant during the month of October. Breeds, to some extent, in the northern part of the State.

Fuligula marila. Not common. F. collaris. Found only occasionally.

Erismatura rubida. Rare.

Clangula albeola. Abounds on all our rivers, though it breeds generally far north.

Harelda glacialis. Exceedingly rare.

Mergus Castor. Frequents our lakes and rivers in considerable numbers ; more abundant in autumn. Breeds in the northern part of the State. M. serrator. Common. M. cucullatus. Abundant in all parts of the State.

Family — PELECANIDÆ.

Pelecanus trachyrhyncus. Common about the Mississippi, and occasionally finds its way into our small lakes in the interior.

Family — LARIDÆ.

Hydrochelidon nigra. Abundant, and breeds in great numbers in the low, reedy marshes about our lakes and rivers. The young, when able to leave the nest, are fed by the parent birds while upon the wing.

Sterna minuta. Not so common as the former, and probably does not breed in the State.

Larus Bonapartii. Some seasons quite abundant, particularly in the month of October, and along the shore of Lake Michigan. L. marinus. Common.

Family — COLYMBIDÆ.

Colymbus glacialis. Common. C. septentrionalis. Rare. and seldom found away from Lake Michigan.

PODICEPS CRISTATUS. Common. P. CORNUTUS. Abundant in the fall of the year about Lake Michigan, and the larger streams that empty into it. P. AURITUS. Reported in the State, though I have not seen it.

PODILYMBUS CAROLINENSIS. Found only occasionally.*

Dr. Brewer also read a letter from Mr. Wm. Hopkins, of Auburn, N. Y., giving a list of some birds obtained there, part of which are sea birds, and others supposed to be inhabitants only of other regions, as follows: —

Large White Egret,	*Egretta alba.*
Glossy Ibis,	*Ibis Ordi.*
Red-necked Grebe,	*Podiceps rubricollis.*
Red Phalarope,	*Phalaropus fulicarius.*
Kittiwake Gull,	*Rissa tridactyla.*
Mealy Redpoll,	*Linaria borealis.*
Large-billed Guillemot,	*Uria Brunnichi.*
Cormorant,	*Phalacrocorax carbo.*

Prof. J. Wyman gave an account of observations upon the Surinam Toad, *Pipa Americana*, lately presented to the Society by Dr. Cragin, as follows:

As yet, no complete description of this animal has been given, though it is not uncommon in collections. The eggs, when discharged, are not permitted to escape into the water, as is the case with the allied species, but are received by the male, afterwards deposited upon the back of the female, and there impregnated, when the skin thickens between them, rises, and partly surrounds each egg, forming a kind of sac or pouch. The dark cuticle is found to be prolonged some distance into the pouch, which is covered by a thin operculum, formed of a layer of gelatinous substance, in a dried state, probably a portion of the gelatinous matter which previously surrounded the egg.

* The abundance and variety of our water-fowl may be inferred from the following result of a short hunting excursion, only a few miles from this city: — 6 Coot, 5 Ring-neck, 1 Tufted duck, 3 Green-winged Teal, 5 Blue do., 2 Shoveller, 1 Dusky, 4 Gadwall, 4 Crested Merganser, 6 Buffle-head, 6 Widgeon, 15 Mallard, 1 Redheaded, 3 Ruddy, 8 Summer ducks.

The yolk is of large size. In the development of the legs, these are seen to be formed distinct from the vertebral column, so that, morphologically considered, they cannot be called appendages of the spine. The external branchiæ are developed and disappear at a very early period. The tail is fully formed in the embryo, but afterwards is absorbed, so that when the animal escapes from the egg the latter has disappeared.

Prof. Wyman exhibited the embryos in three stages of development, and a section of the back of the female. The fully formed embryo is larger than the original egg, so that the animal must have absorbed something from the pouch in which it was lodged — a fact in the embryology of batrachians entirely by itself.

Prof. W. B. Rogers exhibited a series of fossils from the middle secondary belts of North Carolina, Virginia, Pennsylvania, and Massachusetts; chiefly, he said, with the view of calling attention to the evidence afforded by some of them, of the close relation in geological age between what has been called the New Red Sandstone of the Middle States and Connecticut Valley, first designated by Prof. H. D. Rogers as the Middle Secondary Group, and the coal bearing rocks of eastern Virginia and North Carolina.

Prof. R. referred to the existence in Virginia of three distinct belts of these rocks. The most eastern of these, extending almost continuously from the Appommatox River to the Potomac, includes the coal-fields of Chesterfield and Henrico Counties. The middle tract, about twenty-five miles west by south of the preceding, is of much less extent, and has not yet furnished any workable coal seam. Somewhat intermediate in trend to these is a belt of analogous rocks in North Carolina, commencing some distance south of the Virginia line and stretching southwestwardly across the State, and for a few miles beyond its limits, into South Carolina. This area, first mapped by Prof. Mitchell, includes the coal bearing rocks of Deep River. The western belt extends, with two considerable interruptions, entirely across Virginia, being prolonged towards the southwest in the course of the Dan River in North Carolina, and towards the northeast through Maryland, Pennsylvania, and New Jersey, forming what is usually called the New Red Sandstone Belt.

Eastern and Middle Belt of Virginia and Eastern Belt of North Carolina. From an examination some twelve years ago of the fossil plants of the most eastern of the Virginia belts here designated, Prof. Rogers had been led to refer this group of rocks to the Oölite series on or near the horizon of the carbonaceous deposits of Whitby and Scarborough in Yorkshire. Some years later he discovered many of the same plants in the middle belt of Virginia, and, in the summer of 1850, he found several of these plants in the coal rocks of Deep River, in North Carolina. In each of the latter districts we meet with Equisetum columnare, Zamites, and a plumose plant referred to Lycopodites, and strongly resembling *L. Williamsonis* of the Yorkshire rocks. These are among the usual forms occurring in the easternmost of the Virginia belts.

Besides the fossil plants common to these three areas, they contain two species of Posidonomya and two of Cypris. Of the Cypridæ, one species has a smooth, the other a beautifully granulated carapace. They are both very small, seldom exceeding $\frac{1}{30}$ an inch in length and $\frac{1}{70}$ in width. Both species of Posidonomya differ in proportion from the *P. minuta* of the European Trias, but one of them strongly resembles the *P. Bronnii* of the Lias, although of larger dimensions.

Prof. Rogers remarked upon the uncertainty which exists as to the true nature of the small shell-like fossils, which being assumed as molluscs, have been referred to Bronn's genus Posidonomya. But, whatever may be their zoölogical affinities, the fossils now under consideration have great interest, as affording further means not only of comparing together the mesozoic belts of North Carolina and Virginia, above referred to, but of approximating more justly than heretofore to the age of the so-called New Red Sandstone, or Triassic rocks which form the prolonged belt lying further towards the west.

In the report of Prof. Emmons, published in the autumn of 1852, mention is made of the remains of Saurians in the Deep River deposits, as well as of the Posidonia and Cypris, and of an Equisetites, a Lycopodites and other allied forms, together with a naked, rather spinous vegetable, regarded by him as a cellular cryptogamous plant.

In view of the general identity of the fossils thus far found in the Dry River and Middle Virginia belts, with those of the most eastern deposit in Virginia, viz., that including the coal of Chesterfield, Prof. Rogers maintained that the general equivalency of these three areas may be regarded as established, and therefore the Dry River belt of North Carolina, as well as the Middle Virginia belt, ought to be placed in the Jurasic series, not far probably above its base.

Western Belt of North Carolina and Virginia and its Extension towards the Northeast, forming the so-called New Red Sandstone of Virginia, Pennsylvania and New Jersey, and probably of the Valley of the Connecticut. In North Carolina, on the Dan River, where the rocks include one or more thin seams of coal, the same Cypridæ or Posidoniæ are found in great numbers in some of the fine-grained shales and black fossil slates. The latter were noticed as early as 1839, by Dr. G. W. Boyd, while on the Virginia Geological Survey. Regarding this fossil, of which specimens were also obtained about the same time from the middle belt in Virginia, as identical with the Posidonia of the Keuper, Prof. Rogers had, many years ago, announced the probability that a part or all of the great western belt was of the age of the Trias, instead of being lower in the Mesozoic series.

Specimens of the Posidoniæ and Cypridæ, from both belts in North Carolina, and from the eastern and middle belts in Virginia, were exhibited by Prof. Rogers at the Albany meeting of the American Association of Science in 1851, for the purpose of showing the close relationship between these deposits, in geological time. Among the specimens from the Dan River, Prof. Rogers on the present occasion referred to the impression of a Zamite leaf and a joint of Equisetum Columnare. Prof. Emmons, in the report above referred to, speaking of the marly slate of this system, says that " it differs in no respect from that of Deep River, bearing the same fossils, Posidonia and Cypris, in great abundance."

In the belt in Virginia, toward the Potomac River, Prof. Rogers had lately found immense numbers of the same Posidoniæ and Cypridæ, crowded together in fine argillaceous shales, and at several points he had met, in the more sandy rocks, vegetable impressions, which, although obscure, are strongly suggestive of the leaves of Zamites.

In the same belt in Pennsylvania, in the vicinity of Phenixville, early last spring, Prof. H. D. Rogers discovered Posidoniæ in great numbers in a fissile black slate, and on subsequent examination, the same beds were found to contain layers crowded with the casts of Cypridæ. Along with these are multitudes of Coprolites, apparently Saurian, resembling in size and form the Coprolites found in the carbonaceous beds on Deep River, and also some imperfect impressions of Zamites leaves. These facts Prof. Rogers considers sufficient to identify, as one formation, the disconnected tracts of this belt in North Carolina and Virginia, and the great, prolonged area of the so-called New Red Sandstone of Maryland, Pennsylvania, and New Jersey.

As to the geological date of this belt, Prof. Rogers said, that the discovery at various and remote points of its course of Posidoniæ, Cypridæ, and Zamites, most or all of which are identical with these forms in the eastern middle secondary areas of Virginia and North Carolina, makes it extremely probable that these rocks, formerly referred to the New Red Sandstone, and of late more specially to the Trias, are of Jurassic date, and but little anterior to that of the Coal Rocks of Eastern Virginia.

Prof. Rogers considered the frequent occurrence of Cypridæ in all these belts as a strong evidence of their Jurassic age. While only a few species of Cypridæ, and many of the allied genus Cytherina occur in the Silurian and Carboniferous rocks, there is a total absence of these crustacean remains throughout the series of deposits extending from the base of the Permian to the lower limits of the Oölite. But on entering the latter, the Cypridæ re-appear, and become very abundant there, there being no less than twelve species known to belong to the Oölite formations of Europe.

On comparing the silicified wood, found in the western and eastern belts, Prof. Rogers had found its structure to be the same, and to agree very nearly with the fossils figured by Witham under the name of Peuce Huttonia. As this particular structure does not appear to have been met with below the Lias, and occurs in that formation, it furnishes another argument in favor of the Jurassic age of all these rocks.

Prof. Rogers added, that he had not found in the New Red Sandstone of the Connecticut Valley either the Posidonia or Cypris, although he had met with obscure markings which he was inclined to refer to the latter. He had however satisfied himself that one of the plants, from the vicinity of Greenfield, in Massachusetts, was identical with the form in the Virginia coal rocks referred to Lycopodites, and probably *L. Williamsonis;* and that, among the other very imperfect impressions associated with this, was one which he regarded as the leaf of a Zamites.

On the whole, therefore, Prof. Rogers concluded that the additional fossils from the coal-bearing rocks of Virginia and North Carolina served to confirm the conclusion of their being of Jurassic date, and that the fossils thus far found in the more western belt, and its extension through Pennsylvania and New Jersey, rendered it proper to remove it from the Trias and place it also in the Jurassic period, a little lower probably than the eastern belt of North Carolina and Virginia; and there could be little doubt, he thought, that the same conclusion would apply to the New Red Sandstone of the Connecticut Valley.

January 18, 1854.

The President in the Chair.

Prof. Wyman stated, that since he had presented to the Society his observations on the *Amblyopsis spelæus* or "blind fish" of the Mammoth Cave of Kentucky, he had, through the kindness of Prof. Agassiz, been furnished with two other specimens, one of which was larger than any he had seen before.

He stated at that time, (see Proceedings, Vol. IV, p. 396,) that he had found a lenticular-shaped body connected with the eye, and which might possibly be a lens. He had now satisfied himself that this body is truly a lens, and though not a perfectly refracting organ composed of fibres, yet it is to be considered as the rudimentary lens of the eye of this fish.

Another point, more satisfactorily determined, is the presence of a layer of cells beneath the choroid coat, resembling the retina, and corresponding to it in position.

A sclerotic coat, a choroid coat, a layer resembling the retina, a lens, and a nerve, have now been found in the eye of the Amblyopsis. Nevertheless, it is an imperfect eye, and the areolar tissue and skin which cover it prevent all transmission of light to it, except in a different condition. It has heretofore been compared with the eyes of the invertebrate animals, but the above observations show that it is more like the eyes of other vertebrates.

The organ of hearing was examined by Dr. Wyman, in a different manner, and the semicircular canals were seen to be largely developed, and the vestibules to contain large otolithes.

The President exhibited one of a series of specimens of Ornithichnites obtained by exchange with Pres. Hitchcock, and numbering from fifteen to twenty different species. This specimen was prepared in a peculiar way, a section having been made directly through the fossil so as to show the impression from four points of view. It was the track of the Ornithopus gracilis.

Mr. Sheafe presented a specimen from Dr. Codinse, of Philadelphia, found near Memphis, Tennessee. It resembled somewhat an extremity of a large fossil bone, with a central cavity.

Dr. Wyman, from a cursory examination, remarked that it probably was not a bone, but one of those clay masses commonly called *clay-stone.* The specimen could be split in layers at the extremity as well as on the shaft, which is not a character of fossil bone. Its form was imitative of bone, but clay-stones take on great varieties of form. Many substances resembling bone have been at times mistaken for it.

Mr. Edward Daniels, of the State Geological Surveying Corps of Wisconsin, was chosen Corresponding Member of the Society.

The Corresponding Secretary read a letter from Mrs. Teschemacher, in reply to the resolutions transmitted to her by the Secretary; also, one from the Editors of *Silliman's Journal*, thanking the Society for the notice transmitted to them of the life of the late Mr. Teschemacher. Also, a letter from the Linnæan Society, acknowledging the reception of certain volumes of this Society's Transactions.

Mr. James A. Dupee was elected a Resident Member.

February 1, 1854.

The President in the Chair.

Mr. C. J. Sprague presented, in the name of Dr. Charles Pickering, a specimen of common Eel Grass (*Zostera marina*) in fruit, and described in detail the mode of reproduction in this plant as made out by Grönland and Hofmeister.

Mr. T. T. Bouvé remarked that it is very rare to see Zostera in fruit; he had looked in vain for it for several years along our coast.

Dr. Charles Pickering stated that Prof. Asa Gray had seen it in flower not unfrequently on Beverly Beach, and in that neighborhood.

Dr. Henry Bryant exhibited the peculiarly formed trachea of the Courlan (*Aramus scolopaceus*.) It had a remarkable bend, so as to present a number of convolutions upon itself in the form of a watch spring. There is no regularity in the number of turns, nor in the situation of this peculiarity. It is higher up in the neck than a similar anomaly in the Swan, Whooping Crane, and other birds.

The President exhibited a specimen of Ornithichnite in shale, split into two layers, the impression of a tetradactylous foot. This, as well as other tracks in the same shale, has the appearance of a double impression, as if two feet had been placed in the same spot, and makes it somewhat doubtful if they are not the impressions of a quadruped.

The President also stated that he had received a slab of sandstone, bearing an impression of the Otozoum. The impression is that of four toes, all directed forwards, and each track is twenty inches in length.

Prof. Wyman stated that he had recently dissected a Torpedo, (*T. occidentalis* Storer) and had directed his attention particularly to the termination of the nerves in the laminæ which compose the efficient part of the battery. The results at which he had arrived agreed with those of Wagner, who has made a special study of the minute structure of the electric apparatus.

The plates consist of an exceedingly thin membrane, which appears to be nearly homogeneous, its surface showing only traces of striations. On this membrane are distributed ultimate nerve fibres and capillary vessels. When the primitive nerve tube reaches the plate, it breaks up into numerous fibres, and these in turn subdivide and reunite, so as to form a regular network, with large meshes over the whole surface. Connected with these last divisions of the nerve tubes, are to be seen prolongations, into which the white substance of Schwann either does not enter, or if it does, extends only for a short distance, so that the branch loses its double outline. This divides into numerous branches, and frequently, at the point of bifurcation, there is to be seen a large nucleated cell; the ultimate branches terminating, as described by Wagner, in an extremely delicate filament, which seems to be lost on the surface of the plate.

Prof. Wyman estimated the whole number of the plates at between 250,000 and 300,000. There were about 100 to the inch in each electric prism, which is less than the number counted by Mr. Hunter, viz. 150 to the inch. The number of prisms in each battery was about 1200, each prism measuring from one to two inches in height. The interval between the plates was filled with a fluid, consisting of about 90 per cent. of water, containing albumen and common salt in solution.

On examining the contents of the stomach, it was found that, during the process of the digestion of the bones, the calcareous matter was removed before the gelatinous matter was dissolved, and Dr. Wyman had noticed the same result in the dissection of other fishes. This is the reverse of what occurs in dogs and hyenas, where the gelatinous matter alone is removed, the calcareous matter not being dissolved. The stomach of the specimen had been acted upon by the gastric fluid after death, and was perforated in its large curvature. Hydrochloric acid was detected in its contents.

Prof. Rogers alluded to the analogy between this animal battery and the ordinary metallic battery. The nervous tissue might act both as generator and conductor, generating in its minute ramifications, and conducting by its larger branches. The disproportionate quantity of nervous tissue would not be an objection to this, as batteries are constructed in which the copper plate bears but a small proportion in size to the zinc, not more than one twelfth perhaps, which yet exert a powerful effect, especially when a hot acid is employed.

Prof. H. D. Rogers made a communication on the Epoch of the Mammoth or Elephas primigenius.

He called attention to the interesting Palæontological bearings of a fact, which he thinks demonstrable; that while the remains of the Fossil Elephant, or Siberian Mammoth of the Eastern Continent, are imbedded *in* the great Drift Stratum, those of the Fossil Elephant of North America are as invariably *above* it, lying in superficial deposits of a distinctly later age. It is now generally conceded, that the relics of the *Mastodon giganteus* of North America, which do not extend beyond this continent, are nowhere involved in the general or earlier drift, but lie upon it, inclosed either in more recent swampy deposits or in the nearly as recent, later, local diluvial clays and gravels of the great lake and river valleys of the country. But the fact that the bones and teeth of the extinct Elephant on this continent are entombed in the same superficial materials, seems not to have been sufficiently adverted to by geologists, or, if passingly stated, its bearings have been overlooked.

That the American Elephant was the contemporary of the *Mastodon giganteus*, is not only proved by the occurrence of great numbers of their teeth and bones, side by side, in the marshy alluvium of Big Bone Lick, but is manifest, on a scrutiny of the conditions under which its remains are alleged to be imbedded. A careful review of all the cases on record of the positions of the Elephant remains, must satisfy geologists, familiar with the more recent strata of this country, that these two colossal animals lived together in the long period of surface tranquillity which succeeded the strewing of the general drift, (the period of the Laurentian clays,) and were overtaken and exterminated together by the same changes, partly of climate, partly of a second but more local displacement of the waters; that namely which reshifted the Drift, and formed our later lake and river terraces. The fact, that these extinct animals thus occur only *above* the true drift in North America, and *in* it in Siberia and Europe, would seem to indicate one of two things: either that the Drifts of the two continents are not of the same epoch, or these being of one age, that the fossil Elephants of the two regions are not of one and the same species. If we admit, with the great body of geologists, that the general Drift covering of all the northern latitudes of both continents is of one origin and one date, we are constrained to regard the Mammoths of these respective lands as different. Yet the identity of date of the two Drift formations should not be dogmatically pronounced upon in the present incomplete condition of comparative geology.

Prof. Rogers exhibited maps of the Arctic discoveries in the years 1850 and 1851, and explained why Albert Land, of the English charts, should be justly called Grinnell Land, the name given to it by Lieut. De Haven, its discoverer.

Dr. Pickering stated, that between Salem and Danvers were two hills covered with boulders, and between them a plain where no boulders were to be seen. The western hill is of Sienite, the eastern of Greenstone, and the plain level. He had been at loss, until this evening, to account for the absence of boulders in this narrow plain, situated as it is between the two steep hills, but he thought it probable now that boulders would be found under the soil of this plain, if it could be removed so as to expose the curved bed of rock which must be the prolongation of the curved sides of the hills.

Dr. James Lewis, of Mohawk, N. Y., was chosen Corresponding Member of the Society.

February 15, 1854.

The President in the Chair.

Mr. Bouvé read extracts from the printed report of a jury trial, which took place in Edinburgh during July and August last. The case involved the right to work a certain mineral as coal, in the lands of Torbanehill, Linlithgow county, Scotland, commonly known as the Boghead gas coal; and the principal question upon which the whole case turned was, whether this mineral substance was really a coal, or whether it was bitumen, shale, clay, or other substance. The case showed to what extent the most eminent scientific men may differ upon practical points in geology, mineralogy, microscopy, and chemistry, and into what humiliating exhibitions they are sometimes drawn unawares.

Prof. Wyman exhibited the stomach of a lama, which, by the kindness of Fletcher Webster, Esq., he had had an opportunity of dissecting.

The stomach is that of a true ruminant. The paunch, which is of great size, compared with the digestive cavity of the stomach, has a large portion of its surface, as in the camel, provided with sacs, which open into the general cavity by a narrow mouth, and capable of retaining water. The necessity for this arrangement is not exactly understood, as the lama does not generally inhabit desert regions, but places supplied with water.

The Corresponding Secretary read a letter from Dr. James Lewis, of Mohawk, N. Y., thanking the Society for his election as Corresponding Member, and transmitting a description of a new species of Shell, *Cyclas crocea,* as follows :

Cyclas crocea Lewis.

Shell small, fragile, and translucent; outline simple, rounded, without angles; beaks nearly central, full, not large, elevated conspicuously above the gently curving hinge margin ; posterior curve distinct from hinge and basal margins, forming a segment of a circle of a radius three times longer than the radius of the anterior curve ; the posterior is separated by a somewhat abrupt turn from the basal margin, which extends forward in a constantly diminishing curve, and blends with the curve of the anterior extremity ; the valves are rotund rather than compressed ; surface marked with distinct striations, in some specimens reticulated with faint or obsolete radiate scratches; surface of young shells shining ; adults frequently obscured by a thin ferruginous film.

Cardinal teeth, in left valve, two, very projecting; in right valve not discernible. Lateral teeth delicate, prominent and laterally extended, not elevated above the margin of the right valve.

Color. Young specimens yellowish ; adults, orange, with zones of gray and yellow, which are sometimes retained in the dried shells. Young shells dried become nearly colorless, or of a bluish gray. Animal colorless; tubes of the siphon very wide, forming an important distinguishing feature.

Dimensions. Long. .275 inch. ; lat. .165 inch. ; alt. 245 inch.

Habitat. Swamps and sluggish streams in the vicinity of Otsego and Schuyler's Lakes, in Otsego County, and in Little Lakes, Herkimer County, N. Y. This shell seems to be rare. Found most abundant in the muddy bottoms of sluggish streams, in deep water.

Mr. J. M. Barnard, from the Committee on the purchase of the Greenfield Fossils, gave notice that the subscription list was completed; and on his motion it was

Voted, That when the Treasurer's receipt, and the usual vote of thanks are transmitted to the subscribers, that those who have contributed the sum of fifty dollars and over, shall be notified that they are enrolled as patrons of the Society.

On motion of Mr. Stodder, it was

Voted, That a Committee be appointed to revise the by-laws of this Society, and to report thereon to the Society in print.

Dr. Gould and Dr. Shurtleff were appointed this Committee.

March 1, 1854.

The President in the Chair.

The President congratulated the members of the Society, on the reception of the fossils which had lately been purchased for the Society, the largest of which were then reposing against the walls of the library. He observed that the best thanks of the Society were due to the Committee for their endeavors in obtaining them, and for the successful accomplishment of their labor.

The President also stated that he had the pleasure of notifying the Society of a new act of beneficence in the name of an old friend to the Society, and presented a letter from the daughters of the late Hon. T. H. Perkins, offering the Society his collection of shells and minerals, which they had reason to believe he intended personally to present to the Society.

On motion of Dr. Keep, it was *Voted*, That the donation be gratefully accepted, and that the thanks of the Society be transmitted to the daughters of the late Col. Perkins.

Dr. Cabot stated that he was requested to ask the Society to appoint a Committee to take charge of this collection, and to offer for the acceptance of the Society the cases in which they were now contained, if of any value to the Society.

Dr. A. A. Gould, Dr. John Bacon, and the Curators of Conchology and Mineralogy, were appointed this Committee.

The Treasurer gave notice that the sum of one thousand dollars had been received from the estate of the late Hon. T. H. Perkins, for the benefit of the Society, and offered the following order, viz.:

Ordered, That the sum of one thousand dollars received from the estate of the late Hon. Thomas H. Perkins, on account of a subscription for the purchase of the building now occupied by the Society, be invested by the Treasurer as a commencement of a fund, to be called the Building Fund, and that the income be annually added to the said fund.

The order was unanimously adopted.

The Secretary read a letter from Dr. James Lewis, communicating the following observations on a species of Limnæa, (*L. catascopium,*) which presents different appearances in different localities. The letter was accompanied by specimens.

At certain seasons of the year, Lymnæa catascopium may be observed in considerable abundance, in the water of the Erie

Canal, clinging to the stones of the embankment, at the margin of the water. At the close of navigation, each winter, the level of the water is reduced, so that usually there is scarcely more than a thin stratum at the bottom of the canal.

In the spring, before the opening of navigation, many of these Lymnææ may be found in the spaces between the stones of the embankment, far above the water, and in positions where it may be safely assumed they have passed the winter. A greater portion of the shells so found, will be observed to have the orifice of the shell closed with a thin transparent membrane, behind which the animal reposes, alive, awaiting the coming of the condition favorable for renewed activity. This fact may be one of importance to those persons who are interested in tracing the connection between *Lymnææ* and *Helices*, in which latter it is not at all uncommon to observe this peculiar membrane, or epiphragm.

Previous to the enlargement of the Erie Canal at Mohawk, the canal at the "upper lock" was about sixty or eighty feet north of its present position, and the former bed of the canal for a short distance, and the "old lock" now remain, as several puddles or pools of water, in which may be found many shells no doubt descendants of the ancestors of those which may be also found in the canal proper, at this time. It is worthy of remark, however, that those shells which are found in the most shaded places, amid the ruins of the "old lock" are most like the shells found in the canal; and those shells which are found more remote from the shade of the lock, and in warmer locations, are of a larger and coarser growth, and to one not acquainted with *these facts,* might appear to be different species. Those shells found most remote from the lock, are subject to various changes of conditions; the water frequently dries away, even so much that the mud becomes hard and fissured; the shells disappear, but reappear again in the spring, and reach a growth that is never seen in the shells found in the more equally tempered water of the canal.

The apparent differences between the shells found in the canal, and those found in those parts of the old canal bed most liable to changes, are as follows: —

The latter grow to nearly twice the length of the former. The canal shell is of a uniform color generally; the "old lock" shell exhibits two stages of growth ; the first in color and appearance much like the canal shell, and *equivalent to the adult shell found in the canal ;* the second stage of growth, separated from the first by a very distinct varix or cicatrix, is of a lighter color, usually of an ochraceous yellow, the surface of the shell checkered or *broken up* into irregular facets, evidently the result of the rapid growth of the animal, by which the shell was too rapidly enlarged, to be evenly solidified. The " old lock " shell is a less solid shell than the other.

Dr. Lewis's communication was accompanied by the following note from Mr. T. J. Whittemore.

Gray " is of opinion that the calcareous rim within the peristome of certain Lymnææ and Planorbes, is formed when the waters they inhabit are nearly dried up ; *or in winter*, *when they are affected by cold*, *preparatory to their secretion of a diaphragm* for their protection at these times," (see Haldeman's work on Lymniades,) and this was distinguishable in a variety of *L. fragilis*, marked D in his work, L. 7, Plate 6 ; and he further says " that the varieties D and E have the minute spiral lines, very distinctly marked, but the irregular reticulations are wanting ; when these are present, the surface is divided into a series of facets, which have been compared to those upon cut glass."

The remarks of Dr. Lewis are very interesting, particularly in regard to the growth and change in appearance of the *Lymnæa catascopium*, and appear by the shells to indicate that the two neighboring localities produce the same shell, although so different in appearance ; yet the old growth has the same appearance.

Mr. Bouvé called the attention of the Society to some points of interest in the Collection of Ornithichnites, recently purchased for the Society, deferring a more elaborate report to a future meeting. He remarked that the largest and most valuable slabs were then in the room, and of these he called attention to one upon which the impressions of rain drops were very numerous and distinct. Another, of coarser sandstone and of lighter color, exhibited rain drops in relief.

One, which was on movable supports, had been sent as a present to the Emperor of Russia, but having been improperly directed, was returned. One showed not only the foot prints of an animal, but the passage over its surface of a shell fish or a worm. One exhibited the stride of a gigantic animal, this stride being about nine feet in length. The largest of all had over sixty impressions of feet upon its surface. Mica can be seen upon the surface of many of these slabs, and Mr. Bouvé thought that this might account for the easy separation of these sandstones into layers. He suggested that in the process of deposition of this rock, mica might have been deposited in greater abundance at certain intervals than at others, and that in these places was the greatest tendency to splitting into layers.

Prof. Rogers remarked, that some of these specimens had a shining appearance, as if they were once covered with a kind of slime; finely comminuted mica would give the proper degree of density and plasticity for preserving slight impressions, and he had always been in the habit of looking for the best impressions on glazed surfaces.

Dr. J. B. S. Jackson observed that Mr. Marsh, who had collected the specimens in question, had called his attention to what he called "his books," that is, layers of stone in which the impressions grew less distinct towards the surface, upon which merely a line could be traced. This line had often been a guide to Mr. Marsh to search in lower layers. He supposed the impression to have been made in deep and soft mud, which settled in slowly after the foot was withdrawn.

Some discussion ensued as to whether certain of these tracks were made by birds or reptiles.

Mr. Bouvé thought they were made by birds. The articulations could be counted, and coprolites, which have on analysis been found similar to guano, are found with them.

Dr. Cabot thought that those referred to could not have been made by birds. Birds which walk in soft mud have widely spread toes to support them. An impression supposed to be that of the tarsus, could be plainly seen; but no wading bird touches the tarsus to the ground. He thought these particular impressions may have been made by reptiles, or by animals ranking between reptiles and birds.

Prof. Wyman remarked that Prof. Owen formerly entertained the opinion, that an impression exactly like one of the largest of these, was made by a reptile.

Dr. D. H. Storer presented a new species of Fish, from Captain N. E. Atwood, of Provincetown, and found in the harbor at that place, which he proposed to call *Sebastes fasciatus.*

SEBASTES FASCIATUS Storer.

Body elongated, not convex in front of dorsal fin as in the *Sebastes Norvegicus.* Four distinct dark, brown, tranverse bands upon the sides, the broadest at the posterior portion of the body. Length, $3\frac{3}{4}$ inches.

Fin rays as follows: D. 13–14. P. 20. V. 1–5. A. 3–7. C. 19.

A communication was received from Dr. W. I. Burnett, upon the Poison-apparatus of the Rattlesnake, as follows:

NOTES UPON THE POISON-APPARATUS OF THE RATTLESNAKE. BY W. I. BURNETT, M. D.

In the spring of 1853, I presented to the Society the results of some investigations of mine upon the development of the fangs, and the nature and mode of action of the poison of the common Rattlesnake. But these investigations were not complete in many points, as the specimens examined did not present all the characteristics of structure of this apparatus.

Since that time, in some parts of Florida, where these snakes are peculiarly abundant, I have enjoyed rare opportunities for the further study of this subject, and especially as to one or two doubtful points of some interest.

The specimen which yielded the most satisfactory results, was one of the largest I have ever seen, being $5\frac{1}{2}$ feet long, and 8 inches in circumference. It was a female, and contained 16 more or less matured eggs. The fangs were very prominent, being $\frac{7}{8}$ of an inch long from their apex to the point of their insertion in the sockets; the mucous fold below contained, on each side, seven supplementary fangs of a graduated size, and the development of which in their capsules I described in the previous paper. On the left side, there were two fangs attached, of equal size — the old one external, and the new one internal — this coexistence being due to the persistence of the old fang, until the relations of the new one should be fully established. The canal of this old fang was more or less obstructed, and it was evident that it had not been used for some time. The canal of the new fang, on the other hand, was pervious, but contained no poison. The duct of the poison gland did not appear to connect with the base of either fang, but lay between them, apparently in a state of transition from the base of the old fang to that of the new.

On the right side, there was only one fang fixedly attached, the next succeeding fang lying in its future socket, but its anchylosis not yet having taken place. Here, the duct of the gland communicated with the base of the fang, its fibres embracing, fan-like, the portion including the commencement of the canal of the fang, but not, as is stated in books, entering this canal. In this way the current of the poison would be direct and continuous from the duct to the external end of the fang where it is discharged into the wound.

It would appear, then, from this examination, that the succession of fangs takes place in the following manner :—The new fang appears behind, pushing upwards as it grows; posteriorly and somewhat internally to the socket of the old fang, it acquires its socket and becomes attached therein; as this attachment is becoming complete, it pushes still further forwards, at the same time crowding the old fang outwards, and finally takes its place more or less exactly. By this lateral pressure, the socket of the old fang is absorbed, and the fang itself is probably entirely removed at last, by falling out, or being broken off. But the interesting question which now arises, and one too on which there has been some obscurity, is: How, in this succession of fangs, does the transference of the poison-duct from the old to the new take place? From the appearances of the specimen in question, it would seem that, as the old fang is pushed aside, the expanded extremity of the duct on its base leaves it, and is finally transferred to the corresponding part of the new fang. There would therefore be a period during which the duct communicates with neither fang, but lies between them, as in the case in question.

If then, the appearance of a new fang took place simultaneously on both sides, the snake would be left, for a time, without an effective poison-apparatus; but, if the present case is a fair example, this does not occur; for, as above mentioned, there was only one fang attached on the right side, and the new fang lying behind would not probably have become anchylosed before the old fang on the opposite side had been wholly replaced by the new.

The phenomena here presented, of the succession of the fang-teeth, with subsequent adaptation of their vessels, appear to be quite like those of the succession of ordinary teeth in the higher animals.

The poison-gland, situated in the midst of muscles behind and below the eye, was of a fusiform shape, and of the size of a small almond. It was invested with a thick tunic of fibrous tissue, from which prolongations were given off inwardly, which embraced and supported each lobule of the gland.

The gland is botryoidal, and carefully dissected out from all its investing fibrous tissues, internal and external, it would quite resemble a bunch of grapes; each grape representing one of its lobules, and the free stem the main duct leading to the fang. As to the microscopic structure, each lobule is composed of the branchings of the pedicle by which it is connected with the main stem or duct. This ramification of canals occurs precisely as in other glands; but the tubes terminate cœcally. These tubes are composed of a basement membrane, covered internally with a single layer of epithelial cells. These cells are undoubtedly the secreting organs.

The connection of the glandular tissue with the vascular system, whereby the secretion is effected, is very extensive and complete. The investing fibrous tunic of each lobule is filled with a net-work of blood-vessels, and in this way the secreting tubes are brought in close contact with the vascular system. These vascular net-works are so dense, that they give the whole gland a very red, spleen-like aspect. This relation of the blood-vessels to the secreting tubes, is worthy of note, from its being exactly the reverse of that found in the kidneys. In these last, the Malpighian bodies consist of a sac-like dilatation of the end of the secreting tube around a knot of blood-vessels; while in the case in question, the blood-vessels surround in a capsular manner the secreting tubes.

The poison, examined microscopically, appeared only as limpid, hyaline serum, but I was surprised to find in it crystals resembling those of the ammonio-magnesian phosphate.

I may remark, finally, that a microscopic examination of the sheath of the gland showed no muscular fibres there, contrary to the statements of authors. (See Comp. Anat. by Siebold and Stannius, Vol. II. § 107.) But the poison is probably expressed forcibly into the fang by the pressure of the temporal muscle pon the gland during the act of striking.

The Corresponding Secretary read a letter from Mr Charles J. F. Binney, making a donation of Bird Skins to the Society.

The thanks of the Society were voted to Mr. Binney for his donation.

Mr. Elijah Swift, of Boston, was elected Resident Member.

March 15, 1854.

The President, in the Chair.

Dr. A. A. Gould made some remarks upon the collection of shells presented to the Society by the family of the late Col. Perkins. Upon examining the collection, he found there were many specimens of species not previously in the possession of the Society, and many specimens superior to those already in the cabinet. To one shell in particular, he called especial attention, the large Argonaut, commonly called *Paper Nautilus,* and which is the largest specimen known to exist. Its measurements are $11\frac{3}{4}$ by $7\frac{1}{2}$ inches; the next largest specimen, in the Museum of the College of Surgeons, London, measures $\frac{3}{4}$ of an inch less than this. This large specimen was brought from the Indian Ocean.

In the collection, is a series of Argonauts of different ages; some with and some without horns, but otherwise similar in the number of undulations and tubercles. These horns are often different on opposite sides of the shell, and are often wanting on one side. Many of the shells differ in symmetry in other respects, so as to render all external appearances doubtful marks in the determination of species belonging to this genus.

The animal has been found to have no fixed connection with the shell, and it has been a question if it were not a parasite. It has, however, been recently determined that the animal found in it truly belongs to the shell. It has the power of sinking and rising in the water; when crawling at the bottom or rising, the keel is uppermost; and upon reaching thesurface, the open portion of the shell becomes uppermost. The animal employs a part of its arms for motive power, and with the remainder the shell is clasped.

When the shell is broken, the animal has the power of repairing it by a secretion from the arms, as has been proved by experiment by Mrs. Powers, in Italy. It has been said that the females alone have shells, and then only at the time of depositing eggs; this idea seems to have been recently confirmed by specimens carried home by the English Exploring Expedition.

Dr. John Bacon exhibited a part of the collection of Minerals, which accompanied the collection of Shells. In the whole, there are somewhat more than 800 specimens, and of these about 400 are from the mines of Peru, and comprise many valuable gold and silver ores. Amongst them are an ancient Peruvian implement in silver ore, and a specimen presenting a polished surface, supposed to have been used as a mirror. Specimens of salt and water from the Dead Sea were also received with this collection.

Mr. T. T. Bouvé stated, that no better arrangement than the present could be made for the Greenfield Fossils. Though they were not in their proper place, nor in a good light to be examined, he thought they might safely remain where they are until accommodations could be provided for them.

Dr. Gould said he was reminded by circulars sent from the Natural History Society of Portland, that the Boston Society of Natural History had it in their power to furnish that Society with many duplicates from their shelves, particularly in the department of Conchology. He hoped that such of the duplicates belonging to the Society as might be selected, when the Portland Society of Natural History was ready to receive them, might be presented to that Society.

Dr. H. R. Storer stated that he had come to the meeting expressly for a similar purpose, to move that a set of the "Journal" of this Society be presented to the Portland Society of Natural History; and on his motion it was

Voted, That a complete set of the Journal of this Society be presented to the Portland Society of Natural History.

On motion of Dr. Gould, it was also

Voted, That a series of duplicate shells belonging to this Society be presented to the Portland Natural History Society, whenever they are prepared to select and receive them.

Mr. Bouvé remarked that probably it was not generally known that perhaps the next best specimens of the Ornithichnites of the Connecticut River Sandstone, after those in Boston, belonged to the Portland Society, and were destroyed when its Museum was burned.

Dr. Cornelius Kolloch, of Cheraw, S. C., and Dr. A. S. Baldwin, of Jacksonville, Fla., were elected Corresponding Members.

Rev. David G. Haskins, of Boston, and Mr. Robert M. Copeland, of Roxbury, were elected Resident Members.

DONATIONS TO THE MUSEUM.

A Sturgeon, from Minnesota; from Dr. Kneeland.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1854.

Annals of Science. Nos. 22, 23, 24, 25, 26. Cleveland, 1853–4. *Received in Exchange.*

American Journal of Science and Arts. Vol. 17, Nos. 49, 50. *Received in Exchange.*

Farmer's Companion. Nos. 1, 2, 3. Vol. 3. 8vo. Pamph. Detroit, March, 1854. *Received in Exchange.*

New York Journal of Medicine. Nos. 1, 2. Vol. XII. New Series. 8vo. Pamph. New York, 1854. *Received in Exchange.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. VI. No. 12. Index and Title page to Vol. VI.; and No. 1, Vol. VII. 8vo. Pamph. 1854. Philadelphia. *Received in Exchange.*

Denkschriften der Kaiserlichen Akademie der Wissenschaften. Vols. 4, 5. 4to. Jahresbericht des Wissenschaftlichen Vereins in Halle. Fünfter Jahrgang, 1852. 3 und 4 Hefte. 8vo. Berlin, 1853. *Received in Exchange.*

Zeitschrift für Gesammten Naturwissenschaften. January to July, 1853. 8vo. Halle, 1853. *Received in Exchange.*

Journal of the Geological Society of Dublin. Vols. 2, 3, 4, 5. 8vo. Dublin, 1839-53. *Received in Exchange.*

Bulletin de la Société Géologique de France. 2ième série. Tome X. Feuilles 17-22. (17 Jan.—4 Av. 1853.) 8vo. Paris. *Received in Exchange.*

Transactions of American Philosophical Society of Philadelphia. Parts 2, 3, Vol. VII., and Part 2, Vol. VIII. Vol. X. Part 3. New Series. 4to. Philadelphia, 1853. *Received in Exchange.*

Proceedings of the American Philosophical Society of Philadelphia. Vol. IV., Nos. 36, 37; and Vol. V. No. 43, and No. 50; July, Dec., 1853. *Received in Exchange.*

Mémoire sur les Phénomènes erratiques de la Suisse comparés à ceux au Nord de l'Europe et de l'Amérique, par E. Desor. 8vo. Pamph. 1852. *From the Author.*

Report on the Geology of the Lake Superior Land District. By J. W. Foster and J. D. Whitney. Part 2d. With Maps. 8vo. Washington, 1851. *From the Author.*

Descriptions of New Species of Reptiles, collected by the U. S. Exploring Expedition. By C. Girard. 8vo. Pamph. *From the Author.*

Geological Map of Keweenaw Point, Lake Superior. Mounted. By J. D. Whitney, assisted by S. W. Hill and W. H. Stevens. *From the Authors.*

Characters of New Genera of Plants, mostly from Polynesia. By Asa Gray. 8vo. Pamph. Cambridge, 1853. *From the Author.*

Destiny of the Solar System. By D. Vaughan. 8vo. Pamph. Cincinnati, 1854. *From the Author.*

Researches upon Nemerteans and Planarians. By C. Girard. 4to. Pamph. I. Embryonic Development of Planocera elliptica. Philadelphia, 1854. *From the Author.*

Illustrations of the Birds of California, Texas, Oregon, British and Russian America. By John Cassin. Nos. 1, 2, 3. 8vo. Pamph. Philadelphia, 1853-54. *Received from the Courtis Fund.*

American Almanac for 1854. 12mo. Boston. *Received from the Courtis Fund.*

Genera of Recent Mollusca arranged according to their Organization. By H. and A. Adams, Nos. 5-8. 8vo. Pamph. London, 1853. *Received from the Courtis Fund.*

Annals and Magazine of Natural History for January and February, 1854. London. *Received from the Courtis Fund.*

History of British Birds. By William McGillivray. 3 vols. 8vo. 1837-40. London. *Received from the Courtis Fund.*

Types of Mankind. By J. C. Nott, M. D., and George R. Gliddon. 4to. Philadelphia, 1854. *Received from the Courtis Fund.*

Genera of Recent Mollusca. By H. and A. Adams. Parts 9 and 10. 8vo. London, 1854. *Exchange with H. Cuming.*

Proceedings of Zoölogical Society of London. Parts 2, 3, 4. April to December. 8vo. Sheets. London. *Exchange with H. Cuming.*

Zeitschrift für Malakozöologie. Herausgegeben von K. T. Menke and L. Pfeiffer. Nos. 6-12, 1852; and 1-9, 1853. 8vo. Sheets. *Exchange with H. Cuming.*

Report on the Copper Mine of the North Carolina Copper Company in Guilford County, N. C. 8vo. Pamph. *From C. T. Jackson, M. D.*

Notices of New Species of Mosses from the Pacific Islands. By W. S. Sullivant. 8vo. Pamph. Cambridge, 1854. *From Prof. Asa Gray.*

Histoire Naturelle des Mammifères, avec des Figures originales, coloriées, dessinées d'apres des Animaux vivans. Par M. Geoffroy Saint Hilaire et Frederic Cuvier. 3 vols. Folio. Paris, 1824. *From Hon. F. C. Gray.*

Quarterly Journal of the Geological Society of London. Vol. X. Part 1. No. 37, for February, 1854. *Deposited by the Republican Institution.*

April 5, 1854.

The President in the Chair.

Dr. Hamel, of Russia, and many gentlemen, subscribers to the fund for the purchase of the Greenfield Fossils, present by invitation.

In pursuance of a vote passed at the previous meeting, the President nominated the following gentlemen as members of the Building Committee, viz.: Prof. Henry D. Rogers, Mr. Thomas T. Bouvé, Dr. N. B. Shurtleff, Mr. Francis Alger, Mr. James M. Barnard; and they were accordingly elected.

The Secretary read a letter from Dr. Kaup, of Darmstadt, addressed to the President, offering for sale some newly discovered fossil teeth and bones.

The President announced the donation, from Hon. Francis C. Gray, of the valuable work of Frederic Cuvier on the "Histoire Naturelle des Mammifères."

Mr. Bouvé made a full and minute report upon the Greenfield Fossils, and remarked upon each of the larger slabs in detail. The report was preceded by a lucid and comprehensive sketch of the Science of Geology, particularly in its bearings on the subject of Palœontology, as it exists at the present time.

Descriptions of three New Species of Fish from Massachusetts, viz.: *Pomotis obesus, Boleosoma fusiforme,* and

Esox ornatus, were received from Mr. Charles Girard, as follows:

Description of some New Species of Fish from the State of Massachusetts. By CHARLES GIRARD.

1. POMOTIS OBESUS. General form subelliptical, the head being of a perfect continuity with the dorsal and abdominal line of the body. Peduncle of the tail short. Greatest depth about the middle of the length, the caudal fin excluded. Mouth rather small, and its cleft, when shut, obliquely directed upwards. Dorsal fin composed of nine spiny rays, and eleven soft ones, the latter being elongated, the posterior ones extending beyond the base of the caudal. The anal has three spiny and eleven soft rays, the posterior ones extending likewise beyond the base of the caudal. Caudal fin posteriorly rounded, and composed of seventeen rays. Ventral fins composed of one spiny and five soft rays, their insertion being a little in advance of the pectorals; their tip extending beyond the anterior margin of the anal. The pectorals, composed of eleven rays, are subelliptical, rounded posteriorly, and extend as far backwards as the ventrals, that is to say, beyond the anterior margin of the anal.

D. IX. 11. A. III. 11. C. 2. I. 8. 7. I. 2. V. I. 5. P. 11.

The scales are proportionably larger, disposed upon sixteen rows across the line of greatest depth, and eight or nine rows on the peduncle of the tail. The lateral line forms a regularly arched curve from the upper angle of the opercular bone, to beneath the posterior margin of the dorsal fin, thence almost straight, and very obsolete, to the base of the caudal.

The ground color is light, transparent olive, with five or six vertical black bands. A tinge of rose color on the posterior part of the abdomen. Scales generally with a V-shaped gold marking, smaller and more like a spot, on the peduncle of the tail. Iris reddish brown, with a vertical bar of brown. Opercular apparatus, greenish golden; rest of the side of the head provided with golden lines and spots. A large and subcircular black patch is observed at the upper angle of the operculum, extending over the gill flap, upon which a double crescent is seen; this is golden at the base, with a horizontal blue or golden line below.

Total length, about four inches; greatest depth, one and three eighths of an inch.

Specimens were procured by S. F. Baird, from the fresh waters about Hingham, and in a branch of the Charles River, at Holliston.

2. Boleosoma fusiforme. The largest specimens which we have seen of this species, are nearly two inches long. Body slender and fusiform in shape, snout blunt. First dorsal fin not contiguous to the second. Caudal posteriorly rounded. The tip of the pectoral fins extends as far back as that of the ventrals.

Ground color yellowish brown, with crowded and irregular black spots distributed all over the back and sides. The dorsal fins are likewise spotted. Caudal fin barred with the same color; the other fins unicolor, similar to the color of the lower part of the body, which is somewhat lighter than the ground color of the back and sides.

Specimens were caught by S. F. Baird, at Framingham, in a tributary of the Charles River.

3. Esox ornatus. A small species, about seven or eight inches in length, having the general physiognomy of *Esox Americanus* and *Esox fasciatus*. The head forms a little less than the fourth of the total length. The lower jaw is longer than the upper one; both are provided with very small and acute teeth. The posterior extremity of the maxillary extends beyond the pupil. Caudal fin forked, composed of nineteen rays; ten to the upper, and nine to the lower lobe, with a few rudimentary ones above and below. Dorsal subquadrilateral, and composed of twelve rays and an anterior rudiment. The anal has about the same shape as the dorsal, and is composed of ten rays and an anterior rudimentary one. The anterior margin of that fin is situated a little behind the origin of the dorsal. Ventrals, situated on the middle of the space between the base of the caudal and the tip of the snout, elongated and composed of nine rays. Pectorals scarcely larger than the ventrals, containing fourteen rays.

D. 13. A. 11. C. 3. I. 9. 8. I. 2. V. 9. P. 14.

Twenty-eight to thirty longitudinal rows of scales may be counted from the insertion of the ventrals to the dorsal line.

Color, above and on the sides mottled with yellowish and dark brown, deeper above. Traces of vertical bands broken up into spots. Isolated scales, exhibiting greenish reflections; at other times, golden. A vertical black vitta beneath the eye; another from the eye to the snout. Iris, dark green. Inferior fins, red; upper ones margined with red. Length of specimen described, $7\frac{5}{8}$ of an inch. Head, from snout to posterior margin of operculum, $1\frac{7}{8}$ of an inch.

Specimens collected by S. F. Baird.

Dr. J. B. Cordeiro, of Boston, and Mr. Nathaniel H. Bishop, of Medford, were chosen Resident Members.

April 19, 1854.

The President in the Chair.

The President gave notice that the next meeting would be the regular Annual Meeting, for the election of officers, and other business.

Prof. H. D. Rogers and Dr. N. B. Shurtleff, were chosen a Committee to nominate officers for the ensuing year.

Mr. J. M. Barnard and Dr. Kneeland were chosen a Committee to audit the accounts of the Treasurer.

Prof. H. D. Rogers made some remarks upon the Cornwall Iron Mines, in Lebanon County, Penn., which he had lately visited. These mines have an almost unlimited source of supply, having been worked for the last eighty years, and still afford material to an increasing number of works. The two principal sources of iron in the United States, are hematite and the magnetic oxide of iron; these mines afford another copious source in the form of the brown hydrated oxide.

The President made some remarks upon the relation between the vegetable impressions of the coal beds, and those of the New Red Sandstone. In connection with this subject, Mr. Bouvé stated that the Sandstone slabs from the Connecticut Valley exhibit a large number of vegetable impressions.

In answer to a question by the President, as to the best received theory of the formation of coal, Prof. Rogers stated that it is generally admitted at the present day, that each bed of coal was an ancient peat deposit; that it was formed at a period when the climate was warmer than at present, and when the fall of rain was also much more abundant; when vegetation was rank and redundant, the plants abounding in cellular tissue, and evidently of quick and easy growth.

The Curator of Oölogy announced the donation of nine specimens of choice eggs from Florida, by Dr. Henry Bryant, of the following species:

Troglodytes Ludovicianus, Carolina Wren; *Quiscalus major*, Boat-tail Grakle; *Charadrius Wilsonius*, Wilson's Plover; *Tantalus loculator*, Wood Ibis; *Rhynchops nigra*, Razor-bill Shearwater; *Anöus stolidus*, Noddy Tern; *Sterna fuliginosa*, Sooty Tern; *Sterna acuflavida*, Cabot's Sandwich Tern; *Plotus anhinga*, Snake-bird.

Also a donation of twenty-four specimens by himself, viz.: — American Species: *Chordeiles Virginianus*, Night Hawk; *Acanthylis pelasgia*, Chimney Swallow; *Progne purpurea*, Purple Martin; *Myiobius crinitus*, Crested Flycatcher; *Ammodramus passerinus*, Yellow-shouldered Sparrow; *Ammodramus maritimus*, Seaside Finch; *Fringilla tristis*, Goldfinch; *Rallus crepitans*, Clapper Rail.

European Species: *Alcedo ispida*, Kingfisher; *Upupa epops*, Hoopoe; *Calamodyta palustris*, Fauvette Warbler; *Accentor modularis*, Hedge Chanter; *Turdus merula*, European Blackbird; *Enneoctonus collurio*, Red-backed

Shrike; *Corvus corone*, European Crow; *Fringilla carduelis*, European Goldfinch; *Fringilla cannabina*, Common Linnet; *Emberiza miliaria*, Common Bunting; *Columba livia*, Rock Dove; *Perdix cinerea*, European Partridge; *Glareola pratinicola*, Collared Pratincole; *Charadrius pluvialis*, Golden Plover; *Vanellus cristatus*, Lapwing; *Platalea leucorodia*, Spoonbill.

The Curator of Comparative Anatomy presented the skull of a wolf, from Florida, in the name of Dr. Bryant.

Prof. Rogers gave notice that he had been informed by Mr. Chesbrough, that the Cochituate Reservoir at Brookline would be drained in the course of the succeeding week, and that Mr. Chesbrough would be glad to give assistance to any members of the Society in collecting specimens. Prof. Rogers had seen, at the draining of the Fairmount Reservoir, in the mud left after the flowing off of the water, appearances similar to those exhibited by glacier action in Switzerland. Prof. Forbes had made out this analogy on a small scale, by means of soft solids conducted through troughs, but here the experiment was seen upon a grand scale, extending over an acre or more of ground.

Mr. Charles Eliot, and Mr. E. S. Holden, of Boston, were elected Resident Members.

May 3, 1854.

ANNUAL MEETING.

The President in the Chair.

The customary Annual Reports of the Treasurer, Librarian, and Curators were received and read; the following are abstracts:

The Curator of Comparative Anatomy reported, that during the last year, the increase in his department had been small. The additions have been — a skeleton of a loon ; crania of a wolf and porpoise ; cranium of a Sandwich Islander ; and about a dozen national skulls, deposited by the Curator.

The Curator of Comparative Anatomy took this opportunity to remind the members and friends of the Society, that a collection of national skulls would be a very desirable addition to the cabinet, and that it would not be very difficult, with their assistance, to obtain one. Many authentic specimens are in the possession of individuals who take no special interest in Ethnology ; many are in the possession of, or easily obtained by friends among Indians, in Australia, in California, and the Pacific Islands. If these could be collected, and added to those already possessed by the Society, a collection might be made of exceeding interest and value to the students of Anthropology, who are now so rapidly increasing in number. At any rate, the Society should possess a collection of the skulls of the *Aboriginal American Tribes*, who are now rapidly and forever fading away ; in a few years it will be impossible to obtain authentic specimens.

The Curator of Oölogy reported, that at the commencement of the year, the collection of eggs amounted to 240 specimens, belonging to 165 species, inclusive of six undetermined. During the year, 37 species have been added, of 33 species. The collection now contains the eggs of 198 species. Of these, 106 are North American ; 79, European ; 8, South American ; 2, African ; 1, Australian.

The Curator of Oölogy availed himself of the present occasion once more to solicit donations from members and others to this department. In the hope to stimulate others to aid him in making this collection more worthy of the Society, he had prepared a catalogue of the Society's collection, to be submitted for publication in the Proceedings to enable gentlemen to observe and supply its wants.

The Curator of Oölogy also announced the donation of three specimens of birds' eggs from Dr. Henry Bryant, viz. : Ephialtes asio, Caprimulgus Carolinensis, Pytilis cardinalis.

The Curator of Geology reported, that the portion of the cabinet under his charge was in good condition, and as well arranged as the present contracted space allotted to it would admit. This department had been enriched, during the past year, by the addition of a splendid collection of the Footmarks of Birds and other animals upon the Red Sandstone of the Connecticut Valley, and by a series of Silurian fossils from the State of New York; also, by the presentation of several fossils from various persons, as reported at the meetings of the Society.

The Curator of Botany reported, that the Herbarium was in good order. About 800 specimens had been added to the collection during the past year, obtained mostly by exchange from Pennsylvania, North Carolina, and Jamaica. A portion of these were presented by the Curator, a portion by Prof. Asa Gray, of Cambridge, and a valuable collection of Swiss Mountain Plants was received from Mr. B. F. Kendall.

The Herbarium now contains a large proportion of the New England plants; still there are many of the rarer species yet wanting, as well as some of those belonging to our Western border. The Curator is particularly desirous of obtaining a full suite of New England specimens, and he solicits the aid of those interested in Botanical pursuits.

The Curator of Icthyology reported, that the collection of Fishes remained nearly the same as at the last report, only a few specimens having been added.

The Curator of Herpetology reported, that in this department are contained, at the present time, about 480 specimens, classified as follows, viz.: Chelonians 50; Serpents 227; Saurians 122; Batrachians 81. Under the Curatorship of Dr. H. R. Storer, much progress was made in identifying and labelling the different species; the tortoises and batrachians having been nearly all labelled, and a large portion of the saurians. It is to be regretted that little progress has as yet been made in classifying the serpents, in consequence of the deficiency of the requisite books and plates. There are many valuable specimens belonging to the Society, from South America; some of which, in all probability, are undescribed species.

The Curator of Conchology reported, that during the past year, the principal donations to this department have been from the family of the late Hon. Thomas H. Perkins, and Dr. James Lewis, of New York.

The Librarian reported that there had been received 328 bound volumes, and 170 pamphlets and parts of volumes, being a considerable increase over the number of works received the preceding year. Of the bound volumes, 249 have been deposited by the Republican Institution.

Among the most valuable works presented to the Society, may be mentioned the splendid work of Geoffrey St. Hilaire and Fred. Cuvier, entitled, "Histoire Naturelle des Mammifères," 3 vols. folio, elegantly bound, from the Hon. Francis C. Gray.

The Librarian took this occasion to say a few words respecting the publication of the Journal of the Society, on which the continuance of its system of exchanges mainly depends. The intervals of publication are too long, four years having elapsed since the publication of Vol. VI. No. 2 ; within a few weeks only, Vol. VI. No. 3, has been published, and during this interval the subscription list has sensibly diminished, by death and other causes. The Librarian felt it to be very important that a large addition should be made to the subscription list, and if all the members of the Society would subscribe, two numbers a year might easily be published.

On examining the record of books borrowed from the Library since the last Annual Meeting, he found that 471 charges had been made ; a good evidence, if any were needed, that the collection is accomplishing its legitimate object.

Mr. Bouvé, from the Committee on the Purchase of the Greenfield Fossils, reported that the total amount of expenditure for their purchase and transportation, was $1,352.32 ; and that the sum of $57 only was now wanting to remunerate the Committee.

Dr. Shurtleff, from the Committee appointed to nominate officers for the ensuing year, reported the names of the following gentlemen ; being the same as those of the past year, with the exception of the substitution of the name of Dr. Bryant for that of Dr. Cabot, who declined reëlection,— as follows:

PRESIDENT,
John C. Warren, M. D.

VICE-PRESIDENTS,
Charles T. Jackson, M. D., and D. Humphreys Storer, M. D.

CORRESPONDING SECRETARY,
Samuel L. Abbot, M. D.

RECORDING SECRETARY,
Benjamin S. Shaw, M. D.

TREASURER,
Nathaniel B. Shurtleff, M. D.

LIBRARIAN,
Charles K. Dillaway.

CURATORS,

Thomas T. Bouvé,	*Of Geology.*
Francis Alger,	*Mineralogy.*
Waldo I. Burnett, M. D.	*Entomology.*
Samuel Kneeland, Jr., M. D.	*Comparative Anatomy.*
Jeffries Wyman, M. D.	*Herpetology.*
Thomas M. Brewer, M. D.	*Oölogy.*
Silas Durkee, M. D.	*Ichthyology.*
Charles J. Sprague,	*Botany.*
J. B. S. Jackson, M. D.	*Crustacea and Radiata.*
Thomas J. Whittemore,	*Conchology.*
Henry Bryant, M. D.	*Ornithology.*

CABINET KEEPER,
Charles Stodder.

The gentlemen nominated were elected to their respective offices.

On motion of Dr. Kneeland, the thanks of the Society were presented to Dr. Samuel Cabot, for his long continued and valuable services as Curator of Ornithology.

On motion of Dr. Bryant, the thanks of the Society were presented to the Committee on the purchase of the Greenfield Fossils.

A letter from Sir John Richardson to the President, referring to some points in the anatomy of the Mastodon, was read to the Society.

Dr. Kneeland read some extracts from an analysis, which he had made of the work of Messrs. Nott and Gliddon, on the "Types of Mankind," highly commending the work as one of extreme value, and favoring the view adopted by its authors, of the multiple origin of the human race.

May 17, 1854.

The President in the Chair.

The President laid upon the table, for distribution to members of the Society, copies of his recently published monography upon fossil impressions, entitled "Remarks on some Fossil Impressions in the Sandstone Rocks of Connecticut River."

Dr. Kneeland exhibited specimens of the bark, foliage, cones, and seed of the Wellingtonia gigantea, from the large tree recently cut down in California.

The bark was about seventeen inches thick, charred on the outside, and with indications on the inside that the layers nearest the wood did not exist on the specimen; so that it must have constituted at least three feet, and probably much more, of the diameter of this tree. It resembles the bark of the Southern Cypress, though it is less fibrous and stringy. The piece exhibited contained about twelve layers to the inch, making an age of two hundred and sixteen years, if each layer represents exactly a year's increase, all the layers being of about the same average thickness; this calculation, supposing the tree to be two thousand years old, and the annual increase the same, would give the bark the thickness of nearly one half the diameter of the tree; whereas, in the Philadelphia specimen, at the height of twenty-five feet, the bark was about one sixth of the diameter. Taking this ratio, which will probably be not far from the truth, [as the thickness of the annual layers of wood is greater in the youth of the tree, the diameter of the entire bark would be between five and six feet, supposing none to be lost by exfoliation; the probability is, however, that from constant exfoliation, the bark is no thicker now than it was five hundred years ago. The specimen of foliage is cypress-like, and is probably only one of the two forms common in trees of this family; it is well known that the deciduous cypress has two forms of leaves. The cones are oblong, and are said to have a thick woody axis; which cannot be fully verified, from the unwillingness of the owner of the specimens to have them cut into. They will, however, be submitted to Prof. Gray, and will doubtless serve to confirm or reject the genus *Wellingtonia*, which name has been given by Dr. Lindley.

The specimens were accompanied by a lithograph, taken at San Francisco, of the tree from which these specimens were obtained. It is one of many gigantic trees found near the head of Stanislaus River, on the Sierra Nevada, California. Its height was two hundred and ninety feet, its circumference ninety-six feet, and its diameter near the ground about thirty-one feet. The age was estimated at three thousand years, which, from the investigations of Prof. Gray on a larger tree of the same genus, is probably too great by at least one thousand years. The size and age of these trees is a matter of much interest; the one now on exhibition at Philadelphia was sound from the sap-wood to the centre, which is almost never the case in trees of other families, as the Oaks, which often attain a great size. The diameter of the tree in Philadelphia, at five feet from the ground, was over twenty-nine feet; at eighteen feet, fourteen and a half feet; at twenty-five feet, twelve and a half feet, the bark being two and a quarter feet thick; at two hundred feet, about five and a half feet, — its length being about three hundred and twenty feet. The section, at twenty-five feet from the ground, (without the bark over ten feet thick) has been hollowed out by fire and other means, to a shell of about four inches in thickness. A piece of this wood Dr. Gray found to contain, on an average, forty-eight annual layers to an inch; the semidiameter at this point being five feet two inches, (viz. at twenty-five feet from the ground.) Supposing the tree increased in diameter at the same rate during its whole life, there would be nearly three thousand annual layers; but Dr. Gray, in consideration of the greater thickness of the layers of a young tree, and from comparison of sections of the so-called Cypress of the Southern States, *Taxodium distichum*, (as given in detail in the Proceedings of the American Academy, Vol. 3, p. 96,) assigns about two thousand years as its highest probable age.

This tree is nearly allied to the *Redwood* of California, *Taxodium sempervirens*. Don, of late described under the new genus *Sequoia*, which is now growing in England, and rarely in this vicinity, where it is barely hardy. As we have now seeds of the Wellingtonia, it is hoped that ere long we shall have some young specimens of this gigantic conifer.

Prof. Wyman communicated the results of his recent researches upon the structure of the heart, and the physiology of the respiration in the Menobranchus and Batrachians.

The group of reptiles, known as Perennibranchiates, retain the gills throughout life, associated with rudimentary lungs; there has been a question as to the structure of the heart in this group, i. e. as to the existence of a single or double auricle. It has been pretty well determined that the *proteus* has but one auricle; the *axolotl* of Mexico has been found likewise to have only one auricle. Prof. Wyman had found the heart of the *menobranchus* provided with a single auricle and ventricle.

It has long been well known, that Batrachian reptiles respire partly by means of the skin, and this has been satisfactorily determined by the experiments of Edwards and others. Prof. Wyman had seen, in dissecting the vascular system of the frog, after minute injection with coloring matter, that the branch of the pulmonary artery described by Müller as going only to the occiput, actually sends all of its blood to the skin, a fact to which attention has been recently called by Bernard. There are also branches from the vertebral artery, coming off with the spinal nerves and going to the skin, and subserving the purspoes of respiration. It is difficult to say, at present, what is the exact analogue of this branch of the pulmonary artery.

The following communication from Mr. James Lewis was read:

Notes on Paludina decisa Say. *By* James Lewis.

Paludina decisa Say, is probably the only species of Paludina to be found in New England and the eastern portion of the State of New York.

It has been observed, that this species often presents specimens that are reversed. From several hundreds of specimens obtained in the Erie Canal, at Mohawk, Herkimer County, N. Y., for purposes of exchange, the embryonic young presented in one lot, a proportion of about one reversed shell to 92 normal; these were all taken from normal adult specimens. On another occasion, from a similar lot, the proportion was as 1 to 55.5; giving in the two between 1 and 2 per cent. of reversed specimens (young.) The embryonic young of reversed adults, gave as follows:

Large reversed	adult.	3	reversed	young.	13	normal.
Smaller "	"	2	"	"	12	"
Still smaller	"	0	"	"	12	"
" "	"	0	"	"	8	"

P. decisa obtained near Boston, Mass., first presented to my notice reversed specimens. The same thing has been noticed in other portions of New England. (See " Shells of Vermont, by C. B. Adams, A. M.") I have also noticed it in Paludina in Mohawk River, a variety of P. decisa, which, owing to the greater abundance of lime in the water, seldom has its spire truncated, as is seen in shells found in localities deficient in lime. (I would here remark, that samples of these shells of the normal form, sent to a friend in Boston, were pronounced P. integra Say.)

In the Erie Canal, these shells, favored by peculiar circumstances, attain a very large growth, some of them being $1\frac{9}{10}$ inches long, by $1\frac{1}{10}$ wide. They also present, within certain limits, considerable diversity of form and structure. Some of them present traces of an umbilicus, especially those specimens which are of the thinnest texture. The thin shells are sometimes more slender than the others.

The opercles of the shells present also considerable diversity of form ; in the largest (adults) the opercle is long and narrow, closing the mouth of the aperture, in length, but not in width. In the smaller shells, the opercle seems to close the shell completely, about one fourth of a turn back from the mouth of the orifice. This shell corresponds well with DeKay's description of P. integra. (See Invert. of N. Y.)

I have observed, that the structure of the animal in the reversed shell, is also reversed.

About twelve miles south from Mohawk, in Schuyler's Lake, are found great numbers of Paludina integra Say. The species, as thus exhibited, is seldom over one inch in length, the shell rather more slender than the specimens of P. decisa, which have come under my notice in the canal and river, at Mohawk, and I *have never seen a single reversed specimen among them*, notwithstanding I have carefully examined hundreds of specimens in various stages of growth, and at different times, to ascertain if they were present. I have also examined Paludina, in other small lakes and ponds having connection with the above-named lake, but have never seen a single reversed specimen among them.

From all I have been able to ascertain in relation to reversed specimens of Paludina decisa, I am disposed to consider this peculiarity as exclusively incident to this species ; and I regard its occurrence as a distinct indication that the shell is P. decisa Say, and also that the occurrence of occasional reversed specimens among dextral shells of this genus, is a clear indication of the species.

Prof. William B. Rogers communicated some observations recently made by him on the *natural Coke,* and the associated igneous and altered rocks of the Oölite coal region in the vicinity of Richmond, Virginia.

In the district on the north side of the James River, where the most valuable seam of coke has been explored, it is at present wrought by two vertical shafts. In that nearest the outcrop, the coke is reached at 112 feet from the surface, in the other at 207 feet, the dip of the coal measures being nearly west, and at a low angle. A third shaft, recently wrought, which lies nearer the margin of the basin, than either of the preceding, cuts the stratum of coke at the depth of 90 feet. A bed of whin stone, or coarse gray trap, is intercalated in the coal measures of this part of the basin, intersecting the two first mentioned shafts, but cropping out a little west of the third. This bed is met with in the deepest and most western of the shafts, at a distance of about 100 feet from the surface, and is more than 30 feet thick where it is cut through ; but in the next shaft, it is struck at a depth of less than 30 feet, and has thinned down to about half the preceding thickness.

One of the most remarkable effects produced by this igneous bed, is seen in the stratum of carbonaceous fire-clay which lies next beneath. This, which in the second shaft has a thickness of eleven feet, has been greatly indurated, and made to assume a columnar structure, by which the whole mass is converted into a congeries of closely packed five and six-sided prisms, often quite regular, usually about half an inch in diameter, and always at right angles to the lower surface of the trap. A portion of this bed, originally occupied by impure coaly matter, presents the same columnar structure, but the material is a compact plumbaginous coke, with much earthy matter intermixed. The general aspect of the gray part of this bed strongly resembles that of the coarser varieties of fire-brick, after they have been long exposed to intense heat. This is what might be expected, for in the bed in question, we have the very materials of fire-brick, and in the overlying trap we have a source of igneous action, which, in the originally molten condition of this substance, could not fail to work great changes in the contiguous strata. This columnar indurated clay, or natural fire-brick, when recently broken, emits a most offensive odor, partly that of sulphuretted hydrogen, and partly perhaps caused by a sulphuret of carbon.

At the depth of about seventy feet below the bottom of the trap, occurs the bed of natural Coke, for the mining of which chiefly these openings have been made. This interval below the fire-clay is occupied by bluish and drab argillaceous and sandy slates, with some worn sandstone, the former abounding in impressions of plants, among which may be noted Equisetum columnare, Zamites obtusifolius, and Tæniopteris magnifolia — forms which, many years ago, Prof. Rogers pointed out as marking the Oölite age of these coal-bearing strata. The baking action of the trap is curiously shown in all these fossils. The coaly matter of the stems and fronds, when closely examined, is seen to be blebby or blistered. It is in fact coke, which, while it retains the outlines and stronger markings of the plant, has in its partial fusion obliterated all the finer characters of the organized surface.

The coke, where it has been successfully mined, forms a bed about five feet thick, including but little slate, and presenting a nearly homogeneous mass of a bluish black color, uniformly vesicular, and light enough to float in water. It retains only a minute fraction of the volatile ingredients of the unaltered bituminous coal of this region, but it ignites readily, and burns like the compacter kinds of ordinary coke. Throughout the bed, but especially towards the top, it presents a partially columnar structure. Where this structure is marked, the coke is found to crepitate when heated. In some localities, on the south side of the James River, where the whole mass of coal and adjoining shale has been rendered completely columnar, the material, in the process of heating, breaks up with explosions like the crack of a pistol, at the same time projecting its fragments to some distance from the grate.

The gradually diminishing influence of the Trap bed, as we recede downwards, is illustrated by the section in one of the shafts which embraces a thickness of fifty feet of strata below the seam of coke above described. After passing through indurated fire-clay, lying immediately beneath the coke, we have a thickness of about twenty feet of slates, followed by a thin seam of semi-coke or coky coal — more bituminous below than at the top ; and after this, descending through some twenty feet more slates and sandstones, we come upon a bed of bituminous coal, which appears to have sustained no alteration beyond the development throughout the mass of a columnar structure. In the deepest of the three shafts, the seam now wrought under the intelligent direction of Col. Worth, corresponds to the coky coal above described, the lower layer retaining much of its original bitumen. In all these workings, the gradation of metamorphic influence is beautifully marked within a distance of less than fifty feet of strata, from the greatly altered shale or fire-clay, immediately beneath the Trap, through the successive slates and coke seams, to the unchanged bituminous coal at the bottom of the section.

Dr. Brewer exhibited the eggs presented by Dr. Bryant, at the last meeting. The egg of the Chuck-wills widow (*Caprimulgus Carolinensis*) is of considerable value, being quite difficult to procure.

June 7th, 1854.

The President in the Chair.

Letters were received and read from Prof. H. D. Rogers and Prof. Baird, of the Smithsonian Institution, relative to a collection of specimens for the Society, to be furnished by the Smithsonian Institution, and asking that a sum of money be placed at the disposal of the Institution, for the payment of their preservation and transportation.

On motion of Mr. Barnard, these letters were referred to a committee of three, viz. Prof. H. D. Rogers, the Treasurer, and Mr. Barnard, with instructions to report at the next meeting.

Dr. Durkee exhibited a piece of cloth, a part of the *envelope* of the *Peruvian Mummy*, the skull of which was presented to the Society at the last meeting. According to Quekett, in his lectures on histology, published as late as 1852, the enveloping cloths of Peruvian Mummies have been found to be composed of *cotton* only. In this specimen, no cotton fibres could be detected, and the texture was found to be of *hair or wool*, possibly that of the lama.

Dr. Cabot exhibited a unique specimen of a hybrid duck, a cross between the Golden eye and the Hooded Merganser (*Clangula Americana* and *Mergus cucullatus.*) This hybrid preserves the distinctive characters of each of the parent stock, although they belong to distinct genera. Dr. Cabot remarked upon the peculiarities of the bird, and gave some of its anatomical measurements, but deferred a full report upon the specimen to a future meeting.

Dr. J. B. S. Jackson exhibited and presented to the Society a large collection of objects which he had recently obtained in the western country. Amongst these were specimens of the Mistletoe, growing upon the locust tree (*Robinia pseudacacia,*) upon the banks of the Ohio, near Louisville. Dr. Jackson was informed that it is most common there upon the locust, maple, and elm, and that it is rarely if ever seen upon the oak, which is generally supposed to be its favorite tree. At sixteen miles below Louisville, it is so abundant that the trees are quite green with it all winter.

Dr. Jackson stated, on the authority of the guides to the Mammoth Cave, Ky., that craw-fish *with well developed eyes*, had been found in the waters of the cave, and that the *blind* fish had been found in the waters of Green River, outside of the cave, both alive and dead; evidence of a communication of Green River with, or its passage through the cave.

A letter was read from Dr. Samuel Kneeland, Jr., giving notice to the Society of his resignation of the office of Curator of Comparative Anatomy.

The thanks of the Society were voted to Dr. Kneeland, for his faithful services as Curator, and the Corresponding Secretary was requested to express to him the sincere regret of the Society at his departure from Boston.

Prof. Jeffries Wyman, after resigning the office of Curator of Herpetology, was elected Curator of Comparative Anatomy, in place of Dr. Kneeland.

Prof. Wyman, to whom were referred the reptiles belonging to the collection of Dr. T. H. Webb, reported, that a large proportion of them were from Mexico, and the southern part of the United States, and belonged to genera and species not yet described by systematic writers; that this Society has not the proper books and plates for their determination; and that as Prof. Baird, of the Smithsonian Institution, has already studied these reptiles, and has a complete library of works on herpetology, he advised Dr. Webb to send them to Prof. Baird, who had accordingly done so.

Dr. D. H. Storer read portions of a letter from Dr. W. O. Ayres, of San Francisco, upon subjects of Natural History. At the suggestion of Dr. Ayres, the Society voted to send a copy of the "Journal" and "Proceedings" to the California Academy of Natural Sciences, a newly established society of San Francisco.

The following gentlemen were elected Corresponding Members: Rev. A. Constantine Barry, of Racine, Wis.; Thure Kumlien, Esq., of Albion, Wis.; and William Hopkins, Esq., of Auburn, N. Y.

June 21*st*, 1854.

Dr. Silas Durkee, in the Chair.

Dr. Shaw exhibited specimens of the Coccus insect upon the locust tree, placed in his hands by Mr. C. J. Sprague. The small branches of the locust were completely covered by the insect. They were all females, each containing an immense number of ova, and are apparently of the same species as that which infests the grape vines in Boston, though the cotton-like secretion which envelopes the egg, is much less abundant in the Coccus of the locust.

DONATIONS TO THE MUSEUM.

May 3d. The eggs of *Ephialtes asio*, *Caprimulgus Carolinensis*, and *Cardinalis Virginianus;* by Dr. Henry Bryant. Two large specimens of Marine Vases, from the East Indies ; by Gustavus Tuckerman, Esq. The skull of a Sandwich Islander, obtained by exchange with the Boston Society for Medical Improvement. The skull of a Porpoise (*Delphinus delphis*) obtained in latitude 2 N. Nut from the West Indies; and a Clay-stone from Waterbury, Vt.; by Dr. Samuel Kneeland, Jr.

May 17th. The skull of a Peruvian Mummy, in good state of preservation, represented to have belonged to a person of royal blood, and to have been found in one of the royal tombs; also some Ears of Corn, found with the mummy; by Mr. N. H. Bishop. Several small articulates from Matanzas; some frogs in different stages of growth; some Gulf-weed, &c., by Dr. Samuel Kneeland, Jr. Specimens of Paludina decisa from the Erie Canal, at Mohawk, N. Y.; also specimens of the reversed Shell, and a Jar of the embryonic Young, natural and reversed, by Dr. James Lewis.

June 7th. A hybrid from a Golden-eye duck (*Clangula Americana*,) and a Hooded Merganser (*Mergus cucullatus*) ; by Henry D. Morse, Esq. Mistletoe from the Locust tree ; Encrinites and other fossils from the neighborhood of Louisville; specimens from the Mammoth Cave of Kentucky, consisting of Bats, Craw-fishes, Insects, &c.; also Carbonate of Lime in incrustations; also, Sand from the Artesian well at St. Louis, brought up from the depth of 2200 feet; by Dr..J. B. S. Jackson.

June 21st. A portion of a Maple tree from Goffstown, N. H., exhibiting two small branches fused into one; by Mr. Philip Lovejoy.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1854.

Beiträge zur Gesammten Natur-und Heilwissenschaft ; herausgegeben von Dr. W. R. Weitenweber. 4 vols. 8vo. Prag. 1838.

Dr. J. C. E. Hoser's Rückblicke auf sein Leben und Wirken. By the same. 8vo. Prag. 1848.

Der Arabischer Kaffee. 8vo. Pamph. Prag. 1837. By the same.

Aus dem Leben und Wirken des Herrn Dr. J. T. Holds. 8vo. Prag. 1847. By the same. *From the Author.*

Proceedings of the American Association for the Advancement of Science. Vols. 1 – 6. 8vo. *From the Association.*

Notices of the Meetings of the Royal Institution of Great Britain. Parts 1, 2, 3. 1851 – 53. 8vo. Pamph. London. *From the Royal Institution.*

Journal of the Royal Geographical Society. Vol. 23. 8vo. 1853.

General Index to the Second Ten Volumes of the Journal of the Royal Geographical Society. 8vo. Pamph. London, 1853. *From the Royal Geographical Society.*

Denkschriften der Kaiserlichen Akademie der Wissenschaften. Fünfter Band. Erste Lieferung. 4to. Wien, 1853. Mathematisch-Naturwissenschaftliche Classe. Sechster Band, 1854. Band xi. Mathematisch-Naturwissenschaftliche Classe. 8vo. 1853. Sitzungsberichte der Kaiserlichen Akademie, &c. Band ix. x. xi. 8vo. Wien, 1353. *From the Kaiserliche Akademie der Wissenschaften.*

Seventh Census of the United States. 1850. Cong. Doc. 4to. Washington, 1853. Finance Report, 1853-54. Cong. Doc. Washington. Congressional Report on Commerce and Navigation. 8vo. Washington, 1854. *From Hon. S. H. Walley.*

Catalogue of the Public Library of the City of Boston. 8vo. Boston, 1854. *From the City of Boston.*

Exploration of the Valley of the Amazon. By Lieut. Herndon. Part 1. 8vo. Washington, 1853.

Maps to Ditto. 1853.

Reports of Prof. Henry D. Rogers on Wheatley, Brookdale, and Charlestown Mines, Pennsylvania. 8vo. Pamph. Philadelphia, 1853.

Report on the Geology and Mining Resources of Part of Lackawana Coal Basin. By Prof. H. D. Rogers. 8vo. Pamph. Philadelphia. *From Prof. H. D. Rogers.*

Seventh Annual Report of the Regents of the University of New York, on the condition of the State Cabinet of Natural History, &c. 8vo. Pamph. 1854. Albany.

Sixty-seventh Annual Report of the Regents of the University of New York. 8vo. Pamph. Albany, 1854. *From the Regents of the University.*

New York Journal of Medicine. Vol. XII. No. 3. May, 1854. *From the Editor.*

Descriptions of New Fluviatile Shells of the United States. By J. G. Anthony. 8vo. Pamph. Cincinnati, 1854. *From the Author.*

Journal of the Academy of Natural Sciences of Philadelphia. New Series, Vol. II. Part IV. 4to. Philadelphia, 1854.

Proceedings of the Academy of Natural Sciences. Vol. VII. No. II. 8vo. Pamph. 1854.

Discourse in Commemoration of the Founding of the Academy of Natural Sciences of Philadelphia. By W. P. Foulke. 8vo. Pamph. Philadelphia, 1854. *From the Academy of Natural Sciences.*

Coal Measures of the South Joggins, Nova Scotia. By J. W. Dawson. 8vo. Pamph. London, 1853. *From the Author.*

Metamorphic and Metalliferous Rocks of Eastern Nova Scotia. By the same. 8vo. Pamph. London, 1850. *From the Author.*

Annals of the Lyceum of Natural History of New York. Vol. VI. Nos. 2-4. New York, 1854.

Appendix to the History of Vermont; Natural, Civil, and Statistical. 1353. By Zadock Thompson. 8vo. Burlington, Vt. *From the Author.*

Annual Report of the Trustees of the State Library of the State of New York. 8vo. Pamph. Albany, 1854. *From T. R. Beck.*

Gelehrte Anzeigen herausgegeben von Mitgliedern der K. Bayer. Akademie der Wissenschaften. Band 36, 37. München, 1853. *From the Akademie.*

Verhandlungen des Naturhistorischen Vereins der Preussichen Rheinlande und Westphalens. Zweites Heft. 8vo. Pamph. Bonn, 1853. *From the Naturhistorischer Verein.*

Information concerning the History, Condition, and Prospects of the Indian Tribes of the United States. By H. R. Schoolcraft. 4to. Vol. 4. Washington, 1854. *From G. W. Manypenny, Bureau of Indian Affairs.*

Bulletin de la Société Géologique de France. 2iéme série. Tome X. Feuilles 29-40 (16 Mai — 8 Septembre, 1853.) 8vo. Paris. *From the Société Geologique.*

Illustrations of the Birds of California, Texas, Oregon, and Russian America. By John Cassin. 8vo. Nos. 2-5. Philadelphia, 1853. *From the Author.*

Bulletin de la Société de Geographie. 4riéme série. Tomes V. VI. 8vo. Paris, 1853. *From the Société de Géographie.*

Farmer's Companion and Horticultural Gazette. Nos. 5, 6, Vol. III. No. 3, Vol. IV. 8vo. Pamph. Detroit, 1854.

Annals of Science, for April, 1854.

Silliman's American Journal of Science and Arts. Vol. XVII. No. 51. 8vo. New Haven, 1854.

Genera of recent Mollusca, by H. and A. Adams. Parts XI. XII. 8vo. London, 1854.

Archiv für Naturgeschichte. Gegründet von A. F. A. Wiegman. Fortgesetzt von W. F. Erichson. Sechstes Heft. No. 6. 8vo, Berlin, 1851. Fünftes Heft. Nos. 1-5. 1852. *Received in Exchange.*

Species Filicum. By W. J. Hooker. Parts 4, 5, 6. 8vo. London, 1853.

Annals and Magazine of Natural History. Vol. XIII. No. 75 for March, No. 7 for April, No. 77 for May, No. 78 for June, 1853.

Thesaurus Literaturæ Botanicæ. Curavit G. A. Pritzel. Fasciculi I.-VII. 8vo. Lipsiæ, 1854.

Index Volume of the American Journal of Science and Arts. 8vo. Pamph. New Haven.

Quarterly Journal of the Geological Society. Vol. X. Part 2. May, 1854. London.

Hortus Jamaicensis. By John Lunan. 4to. Jamaica, 1814. *Received from the Courtis Fund.*

Gazeteer of the United States. By T. Baldwin and J. Thomas. 8vo. Philadelphia, 1854.

Works of John Adams. Vol. IX. 8vo. Boston, 1854. *Deposited by the Republican Institution.*

July 5th, 1854.

Dr. C. T. Jackson, Vice-President, in the Chair.

Present by invitation, Mr. Jules Marcou, United States Geologist, and member of the Geological Society of France.

The Chairman announced to the Society the death of Dr. Waldo I. Burnett, which had taken place since the last meeting.

On motion of Dr. Abbot, it was Voted, That Prof. Jeffries Wyman be a Committee to draw up resolutions, expressive of the regret of the Society at the loss they have experienced in the death of Dr. Burnett, and also to prepare a notice of his life and scientific labors.

Dr. C. T. Jackson read an account of a new mine of Gold, Silver, Lead, and Copper, recently opened at Bridgewater, Vermont. The minerals at present known in this mine are as follows, viz.

Native gold in scales, and small irregular grains, in quartz, in black blende, and in other minerals of the vein; Argentiferous Galena; Black Zinc blende; Yellow Copper pyrites; Gahnite or Zinciferous Spinelle; Crystals of quartz in geodes; Brown oxide of Iron.

This mine is about twenty miles from the principal railroads leading to Boston and New York, and the produce of it will probably be brought to market by way of Woodstock and Hartland, as the country is less mountainous in that direction than towards Rutland. It is gratifying to find that Vermont may justly rank among the mineral States. Already extensive and valuable copper mines have been opened in Vershire and Corinth, and there is reason to believe that many other valuable mines of that metal will be opened along the line of the copper bearing rocks which extend from Strafford to Orange in a line a little west of north.

Dr. Jackson also exhibited specimens of Mexican Native Iron, from the neighborhood of Sonora, where they are sometimes used as blacksmiths' anvils and for corner stones to buildings. One specimen contained between five and six per cent. of Nickel, showing it to be meteoric. It is said that these masses are quite common, even of very large size, near Santa Rosas.

The Chairman likewise exhibited a fragment in bronze, of a Chilian instrument, probably a crowbar, It contained 7.615 parts of tin, the remainder being copper. This bronze is well adapted for such instruments as were to be hammer-hardened. Ancient Egyptians' bronze tools contain from 17 to 22 per cent. of tin.

The Corresponding Secretary read letters from various societies and institutions, acknowledging the reception of copies of the Journal and Proceedings of the Society, as follows: From Harvard College, Essex Institution, American Philosophical Society, Société de Géographie at Paris, Naturhistorischer Verein at Bonn, Bibliothekariat der K. Bayerischen Akademie, K. Akademie der Wissenchaften at Vienna : also from the office of Indian Affairs, accompanying the work of Schoolcraft on the Indian Tribes of the United States.

Prof. Lunsford P. Yandell, of Louisville, Ky., was elected Corresponding Member.

July 19, 1854.

Dr. D. H. Storer, Vice-President, in the Chair.

Prof. Henry D. Rogers presented a paper entitled, " A Description of New Species of Fossil Plants, from the Anthracite and Bituminous Coal Fields of Pennsylvania, collected and described by Leo Lesquereux, with Introductory Observations by Henry D. Rogers."

Referred to the Publishing Committee, for insertion in the next number of the Journal.

Prof. Jeffries Wyman, in accordance with a vote passed at the preceding meeting, read the following

NOTICE OF THE LIFE AND WRITINGS OF THE LATE DR. WALDO IRVING BURNETT.

Mr. President — From time to time Death has entered our circle, and taken from our number one and another of those who have been our most active associates, and to whom we have been bound by the ties of personal regard or of friendship. In nearly every instance they have been removed in full manhood, or even at a later period, when the labors of a life of the ordinary length had been nearly finished. But never before has there been taken from amongst us one who, in his devotion to natural science, has, in so brief a life, left so many memorials of zeal and industry as he, to whose memory we would now pay our tribute of respect.

Waldo Irving Burnett was born in the town of Southboro', Mass., July 12th, 1828. His father (the late Dr. Joel Burnett) was a man of distinguished excellence in his profession, and to the qualities of a good and useful citizen, united those of an ardent lover of nature, of whose works he was a close and faithful observer. Botany and Entomology especially received his attention, and without the aid of genial spirits, or the intercourse with kindred minds, were studied with no ordinary zeal during the few leisure moments which were left him after the demands upon his time by a laborious profession had been satisfied. His love of nature was transmitted to the son, and was manifested in early boyhood, when the observation and study of insect life took a strong hold upon his mind. His father experienced a just pride in witnessing these tendencies; but in place of encouragement, which he at first extended with delight, he was soon, though reluctantly, obliged to substitute restraint. His son's mind was too intently absorbed in his pursuits, and fears were excited lest his studies, prolonged into hours stolen from the usual period of repose, should be attended with disastrous results to his physical constitution. His passion, however, grew with his growth and strengthened with his strength, and in the face of all obstacles, through health and through sickness, from an early youth to his early grave, it was never abated.

He had not the advantage of a collegiate education; this he chose to forego, not from any indifference to its value, but from a sensitive unwillingness to subject his father to any unnecessary expenditure of his means. He gave early indications of great mental activity, and mastered with ease all the studies of the Academy; in mathematics, especially, he was unusually proficient, and drew from his teacher the confession that in this department he was no longer capable of giving him instruction; and it was the habit of other teachers in the neighborhood to send to young Burnett for the solution of difficult questions which they themselves were incompetent to master. Almost without assistance, at a later period, he made himself familiar with the French, Spanish, and German languages, and during the latter part of his life had made some progress in the Swedish.

At the age of sixteen he had become thoughtful beyond his years; and then commenced the development of those tendencies in his mind which ever afterwards were so conspicuous, and which continued to exert a controlling influence, viz.: the desire of gaining an insight into the nature of things, and of forming philosophical ideas and conceptions of natural processes, conceptions and ideas which can be obtained only by the exercise of the higher powers of the mind. Mesmerism, materialism, and theological questions occupied his thoughts, and were frequently written upon and discussed by him. On all of these he manifested independence and continuity of thought, and persistence in whatever direction his mind was turned. It was at this early age that his interest in the study of medicine commenced, when he accompanied his father in his professional visits, and witnessed the effects of disease, as manifested in the examination of bodies after death. Entomology now especially engrossed his thoughts, and nearly all his leisure moments were occupied in collecting, studying, and classifying insects. While yet in his sixteenth year, his father died. This event materially changed his prospects, and was met with firmness and decision, and in the course of the following year, finding that something must be done for his support, he commenced teaching school, and at the same time gave his attention to the study of medicine.

The subsequent years of his student life were spent under the direction of Dr. Joseph Sargent, of Worcester, with whom there grew up a warm mutual personal regard and friendship; in the Tremont Medical School in Boston, which has given to the profession so many zealous and productive laborers in medical science; and in the Massachusetts General Hospital. He was ardent and industrious as a medical student, but never allowed his attention to be withdrawn from the study of nature, the microscope becoming his constant companion, and a source of never-failing pleasure. As evidence of his ability, it may be stated that in two successive years he gained the annual prize offered by the Boylston Medical Society. The subject of the first essay was *Cancer*, which he treated with especial reference to its microscopic structure; and of the second, *The Sexual System, or the production of being, considered as to its physiology and philosophy.*

In 1849, at the age of 21, he graduated in medicine, and soon after visited Europe, where his attention, especially at Paris, was given almost exclusively to natural history and microscopic observation. The expectations of intellectual progress which he now looked forward to with so much interest, were soon doomed to severe disappointment. It was in Paris that he received the first serious warning that consumption, the disease which eventually destroyed his life, had already marked him for its early victim. After an absence of only four months, he reëmbarked for America, to receive the benefit of a more genial climate in one of the southern States, and each successive winter he passed either in Carolina, Georgia, or Florida, in order to avoid the inclement and uncongenial climate of New England. He had now no permanent location, was constantly shifting from place to place, to mitigate, as far as possible, the steady progress of his disease. Every thing seemed adverse to any thing like connected study. Nevertheless, it was during these few unsettled years that he accomplished an almost incredible amount of intellectual labor. He was incessantly occupied with his microscope; his mind was ever on the alert, and he allowed scarce a day to pass without some observation, without something added to his stock of acquired knowledge.

In the winter of 1851, he delivered at the Medical College in Augusta, Ga., a successful course of lectures on Microscopic Anatomy. In the summer of 1852 he prepared the principal work of his life, the Essay which received the prize from the American Medical Association. His two former prizes were competed for only by his fellow students; but the third, it is no small praise to say, was open to the competition of the whole medical profession throughout the country.

While yet a medical student he became an active member of the Boston Society of Natural History, and was soon after elected Curator of Entomology. In 1851 he was elected a member of the American Academy of Arts and Sciences — one of the youngest members ever admitted into that body. His communications to different scientific bodies and journals were very numerous and on a great variety of subjects, and give such evidence of industry and enthusiasm as cannot fail to excite our wonder and admiration. They are too numerous for analysis or even enumeration in this place; but some of the more important ones are found under the following list of subjects, which comprises those of about one third of the whole number of his memoirs and communications, and which serves to show that his mind was interested in a great variety of questions, and that whenever an opportunity for investigation presented itself, he was always ready with a cheerful heart and patient industry to enter upon his work.*

"*On the Hybernation of Insects, and its Relation to their Metamorphosis.*"

"*An Account of certain microscopic animals found in a person who died of an enlarged spleen.*"

"*On the external parasites of warm-blooded animals.*" This was a subject to which he had devoted much attention, and in illustration of which he had made large collections of specimens preserved for microscopic study.

"*On the Embryology of the Articulata,*" including remarks on the alternation of generations in the Humble-Bee, (Bombus

* His various scientific papers or abstracts of them may be found in the *Proceedings*, also in the *Journal of the Boston Society of Natural History*. In the *Proceedings of the Boston Society for Medical Improvement*, in the *Proceedings* and in the *Memoirs of the American Academy of Arts and Sciences*, in the *American Journal of Science*, in the *Transactions of the American Medical Association* for 1853, in the *Boston Medical and Surgical Journal*, and in the *American Journal of Medical Science.*

Americanus,) in which last he ascertained that three generations are produced from one impregnation.

" *On the luminous spots of the great Fire-Fly of Cuba.*"

" *Observations on the Seventeen-year Locust.*"

" *On Spermatozoa.*"

" *On the origin, development, and structure of the Kidneys throughout the vertebrated division of animals.*"

"*Notes on the Rattle-snake, relating to its dentition, to the physiological effects of its poison, and to alcohol as a remedy.*"

" *Some account of an Insect, (Rhinosia pometella,* Harris,) *and its recent injuries to the fruit and forest trees of New England.*"

" *On the development of Viviparous Aphides, or plant lice.*" This is a subject of great interest, and it was investigated with great ability. Since the days of Bonnet, it has been well known that several successive generations of Aphides are produced after a single impregnation. Dr. Burnett studied the successive generations as they first appear in the body of the parent as illustrated by the species infesting the hickory. If a fully developed, but wingless Aphis is examined in the spring, it is found to contain an embryo nearly mature ; and this embryo contains already the first germs of the third generation, in the form of single cells or a small number of cells inclosed in a sac. While a few germs are thus formed, others are formed by their subdivision from constriction, until the requisite number is obtained. When they have reached the size of about one three-hundredth of an inch, a yellowish mass forms at one extremity of the egg, and then commences the development of the parts of the insect, which eventually inclose the mass just mentioned. It is this last yellowish mass which furnishes the materials for the next generation. All this, it should be remembered, is effected without the aid of any distinct reproductive organs. There is no ovary or oviduct, but the embryos are developed in the cavity of the abdomen, and discharged through a genital opening merely. In view of the fact that the viviparous aphides are sexless, Dr. Burnett regarded their mode of reproduction as belonging to the gemmiparous type. Viewed in this way, the different broods cannot be looked upon as so many generations; but on the contrary, the whole suite, from the first to the last, that is, till the production of a winged Aphis constitutes but a single generation. This explanation by a species of budding seems far more satisfactory than that which supposes that either cells or nuclei of the first individual are transmitted by successive inclusions to the last. As this latter idea cannot be supposed to be the result of direct observation, and as no proof is adduced that identical cells and nuclei really pass from one generation to the other, the whole stands merely as an ingenious theory; while Dr. Burnett's explanation (and this view is not proposed for the first time by him,) is in accordance with direct observation. But, in accepting his view, we are compelled to admit the hypothesis, that the germinating force imparted to the first ova is transmitted to the successive broods without the aid of spermatozoa.

" *On the microscopic appearances presented in the intestinal discharges and muscular fibres of a patient who died of the epidemic cholera.*"

" *Tissue and its retrograde metamorphosis.*"

" *On the Geology and other points connected with the natural history of Florida.*"

" *Considerations on a change of climate by northern invalids, and on the climate of Aikin, S. C.*"

" *Considerations of some of the relations of climate to tubercular disease.*"

To these should be added his various critical notices of recent scientific publications in Silliman's Journal, which, in view of the short time he occupied the position of associate editor, were quite voluminous, and serve to give us a good idea of his powers of analysis and discussion.

There is no one of his productions, which embodies more of the results of his labors, than the prize dissertation, consisting of two hundred closely printed octavo pages, presented to the American Medical Association in the year 1851, and entitled " *The Cell, its physiology, pathology and philosophy, as deduced from original observations; to which is added its history and criticism. 'Natura in minimis maxima est.'* "

To those who are acquainted with modern physiology, it will be seen at once that he had selected a great subject, one which even the most accomplished minds might approach with distrust.

The nucleated cell! that minute organic structure which the unaided eye cannot discern, yet constituting the first stage of every living being, the seat of so many of the complex phenomena of animal and organic life, and the agent by which even the mind itself retains its grasp and exerts its influence upon the living structures with which it is associated. In entering upon so difficult a subject as this, it was not expected, nor is there any reason to suppose that he himself expected, that he should not lay himself open to criticism. The ablest living histologist, Kölliker, in speaking of the subject of the development of tissue, uses the following language: "Not only does histology not possess a single law, but the materials at hand from which such could be deduced are as yet relatively so scanty, that not even any considerable number of general propositions appear well founded." As laws and general propositions were among the especial objects of Dr. Burnett's researches, it will be seen at once that he has entered boldly into a contested field. But it is to follow him in his labors, and not to hold up to criticism his results, that we have at present to do.

His subject is discussed under the following heads:

1st. *Cell-genesis*, under which he treats of the origin of cells, and advocates a peculiar mode of development, which he claims as original with himself, and the result of his own observations.

2d. *Cell physiology*, or healthy function.

3d. *Cell pathology*, or diseased function.

4th. *Cell philosophy*, or 1st, the relations of cells to the teleological view of organization; 2d, the direct agency of cells in the production and manifestation of nervous power, the intellectual processes, &c.

The general results of his studies of cell life and cell genesis are in his own words as follows: "The great outstanding fact which appears before us as the result of these studies is, that there is fundamental unity of organization. This we have seen to consist in elementary particles, which in both animals and plants are formed upon a common plan. It was the opinion of Schwann and Schleiden, who truly originated this view, that this plan consisted in the preëxistence of a solid fundamental body, (the nucleus) around which is formed a membrane ultimately expanding and constituting the cell. It has been one of my objects to show, that this is not of universal application, by an attempt to demonstrate another mode of cell formation, which is that the fundamental idea of a cell is a simple vesicle, and that the nucleated cell is simply one cell containing another within its walls. With Schwann the nucleus is *exogenous* and *germinative* — with me the nucleus is *endogenous* and reproductive.

"The two conclusions of the studies of cell life are then, 1st. The existence of an elementary particle having an invariable unity of expression, *the cell*. 2d. The universality of the application of this particle for the formation of organized parts, *the tissues*."

In studying cells in relation to pathology, he regards this last as an erring physiology, and concludes, that, both as to their genesis and general aspect as cells, those which belong to abnormal cannot be distinguished from those belonging to normal conditions of life. The genetic and general relations of cells in physiology and pathology are therefore the same. Their difference does not relate to structure, but to their destiny. Physiological cells must be considered teleologically, but pathological ones have no ulterior object.

Each of the different heads of his dissertation he discusses with great ability, and gives ample evidence that he is not only familiar with the scientific labors of others, but that he is perfectly at home in the different departments of investigation which his essay involves. If it be allowable to express an opinion of its merits in general terms, it may be truly said that it gives evidence of wonderful zeal and industry in research, of acute powers of observation, and of great readiness in perceiving general relationships. It is in connection with this latter faculty that he seems the most liable to error. He appears to have partaken something of the spirit of Oken, and to have given way at times to the suggestions of the imagination, instead of subjecting himself to the severe mandates of reason, and the rigid rules of induction. This is naturally the fault of youth, and for which scientific minds, at the present time, with their tendencies to hasty generalization, may be justly said to be in part responsible. But in one who combined industry, a desire for truth, and an almost unlimited patience in observation, it might have been fairly anticipated that, sooner or later, the better and safer qualities of the mind would have eclipsed all others.

While constantly active as an observer, Dr. Burnett found time to engage in another service which occupied some of the latest hours of his life, and the non-completion of which was a source of anxiety to him in his last moments. This was the translation from the German, of the Comparative Anatomy of Siebold and Stannius. All who are familiar with the published volume, will not fail to see in it another proof of his industrious habits as exhibited not in the translation merely, (itself in this case no ordinary labor) but in the numerous additions to science which, scattered far and wide through scientific journals, have been brought together, and in the contributions he himself has made from his own stores of accumulated observations.

The last scientific investigation to which his time was devoted was into the natural history of the *Orange insect*, which is so destructive to the orange trees of Florida. The habits of this insect he had studied during his last winter's residence in Florida, and had prepared a memoir in reference to it for the American Association for the Advancement of Science, but his ill health prevented his attending their recent meeting.

Such is an imperfect sketch of the scientific labors of our late associate. It only remains to consider his life from another point of view, in regard to its moral aspect. Of this I do not feel justified in treating at length, as my relations to him were not sufficiently intimate to speak from personal observation; but from all I can learn from his associates, from his fellow-students and his more intimate friends, he was a kind and affectionate son and brother, one who enjoyed to an unusual degree home and all its associations; he was a man of a truly benevolent heart, into which irreverent thoughts seemed to gain no admission, or from which they certainly obtained no expression. In all of his studies of nature, he seems to have had a pervading perception of God in his works, and often in eloquent words gives expression to his feelings, when some new manifestation of divine wisdom was uncovered to his inquiring mind.

Dr. Burnett's zeal and devotion could not fail to awaken a warm interest wherever he went, among those with whom he associated. He became acquainted with the leading naturalists of the country, and obtained from them and others, willing aid and counsel, as well as respect for his great acquirements. To them he always felt warm feelings of gratitude. But there was one, to whom, more than all others, he was especially grateful, a friend and relative, who at an early period, perceived the indications of uncommon promise for the future, and who with kind heart and benevolent purpose aided and encourged him in all his undertakings.

He had religious faith and religious hope. To a speculative mind like his, it seemed almost a matter of necessity that the momentous questions which the problem of life involved, should sooner or later have been presented for examination and discussion, and that before any settled convictions could be reached, they should have found him perplexed and in doubt. Doubts and perplexities in his mind did exist, but eventually they gave way and were replaced by faith and hope, which lightened his burden when, weary and exhausted, he approached the end of life. He had been long accustomed to look upon death and to talk about it as an event that he must meet at an early period. But death, if not imminent, is something that all look forward to calmly and without emotion, and when we speak of it we are not sure that we give utterance to our most solemn feelings and convictions. But there is one moment when, if ever on earth, the heart, if it opens itself, does so without disguise, if it give utterance, does so without reserve; it is that dread moment when death approaches so near that there is no alternative but to look upon earthly life as finished, its account made up, and when all that remains for the mind to dwell upon, is the dissolution of the body and the realization of another life. A few days before he died, our late associate returned, after a winter's absence, to the home of his family, his bodily health exhausted, his energies prostrate. At first he entertained the hope that as before, rest and quiet might restore him, partially at least, to his usual health, and that he might have yet another opportunity of continuing those labors which he so fondly cherished; but his fast declining strength, the anxiety of those around him, the announcement of his physician and his own quick perceptions soon told that life was drawing to a close, and that for him the great moment was near. In all this he was calm and serene, conversed on the approaching separation without faltering, gave utterance to expressions of deep affection to those who were bound to him by the ties of kin, uttered his prayer for forgiveness, and expressed the solemn conviction, which now rose paramount to every other, that if there yet remained much for him to live for, there was yet far more to die for. On Saturday morning, July 1st, a few days before the completion of his twenty-sixth year, he died.

We cannot but sensibly feel, that in his death we have lost an associate of no ordinary talents; we can point to no other member of our Society, and to not more than one other naturalist in our country, who has given such proofs of zeal and industry, and who, in so short a life, has accomplished so large an amount of scientific labor. Had he been spared to future years, we cannot but feel the assurance that he would have acquired for himself a far higher place and a still more honorable name in the annals of science. Let us cherish his memory and profit by his example.

The following resolutions, prepared at the request of the Society by Prof. Wyman, were unanimously adopted:

Resolved, That the members of the Boston Society of Natural History have learned with deep regret the death of Dr. Waldo Irving Burnett; that, in his decease, we have lost a most active and zealous associate, and science an ardent, disinterested, and productive laborer.

Resolved, That to the family of our late associate, we would offer our deep sympathy for their affliction, in the loss which they have sustained by the early death of one, with whose memory is associated so much of honorable devotion and noble self-sacrifice.

On motion of Dr. S. L. Abbot, it was voted, that Prof. Wyman be requested to prepare a copy of the Notice and Resolutions for publication in the Proceedings of this Society and Silliman's Journal; also voted, that out of respect to the memory of the deceased, the Society do now adjourn.

August 2, 1854.

Dr. D. H. Storer, Vice-President, in the Chair.

The Chairman read a letter from Dr. William O. Ayres, of San Francisco.

Dr. Ayres states that a species of *Leuciscus*, is not unfrequently found in the markets of that city weighing twenty-five or thirty pounds. The following items, relating to one of the huge trees of California, derived from Dr. Bigelow, of San Francisco, were also furnished by Dr. Ayres: "The tree lies on the ground, having fallen many years since. From the base to the point where it is broken off, it is found to be three hundred and ten feet; all beyond this was burned, probably by the Indians, but fragments lie scattered along to the distance of a hundred and fifty feet, and from the size of these fragments, Dr. Bigelow feels confident the tree must have been at least five hundred feet high. At the base it is, by estimation, one hundred and ten feet in circumference, and at the end of the three hundred and ten feet mentioned above, it is by measurement forty feet in circumference. This is almost as much beyond, in size, the great tree which has attracted so much notice, as that is beyond trees of common size."

The Chairman also presented the following communication from Dr. Ayres:

ON A METHOD OF PREVENTING THE RAVAGES OF THE "SHIP-WORM."

A plan for the preservation of submerged timber from the attacks of the "Worm," has been devised by Mr. James G. Swan, formerly of Boston, and now of Shoal Water Bay, W. T. He claims that it is both cheap and effectual; and having been appointed by the California Academy of Natural Sciences to investigate the matter, I wish to present to you the conclusions reached by us. We find that a marine railway to which it was applied, remains at the end of eighteen months perfectly sound, while timber by its side, of the same species of wood, has within that period twice required renewal, having been fairly "riddled" by the *Teredo*. We could find no reason to doubt that the protection was entirely due to the preparation recommended by Mr. Swan.

It is simply the application of a mixture of Asphaltum (one hundred parts,) sulphur (forty parts,) and arsenic (twenty parts,) used as a paint; the asphaltum being melted, the other materials stirred in, and the whole applied hot, with a common brush; the wood must of course be dry.

If this proves to be as effectual as the trial here seems to promise, the value of the discovery can scarcely be overrated. Cannot the Society draw to it the attention of those interested, and thus secure for it a thorough testing?

Mr. Swan's first experiments were made at Charlestown, Mass., about ten years since, and he claims that they were equally successful there, but he made no efforts then to publish his results.

Dr. Kneeland exhibited to the Society three skulls of American Indians, presented in the name of Dr. Josiah C. Nott, of Mobile, a Corresponding Member, viz.: the skulls of an Osage Chief from Arkansas, a Creek Chief from Georgia, and a Choctaw youth from the Alabama River, a few miles above Mobile.

Besides their value as authentic specimens of the above tribes, these crania are interesting as coming from three points far distant from each other, and yet showing the same characteristic Indian conformation; adding to the proofs, if any are necessary, of Dr. Morton's views, that the American nations form one great family, having the same physical conformation, and differing from all the other great human families.

The *Osage* skull is quite typical of the Indian conformation; having a low, receding forehead, prominent vertex, and flattened occiput; a short antero-posterior diameter, a wide interparietal diameter, and a narrow frontal diameter — large quadrangular orbits; prominent nasal bones (differing in this respect from the Mongolian skull); high and broad cheek bones; large nasal opening; strong upper jaw, and deep palatine fossa caused by its downward elongation. The general shape is quadrangular; the character of the bone heavy and ivory-like; the smooth space on each side occupied by the temporal muscle, both in this and the Creek skull, seems more than usually prolonged backwards, indicating a corresponding size and power in this muscle, which may possibly be characteristic of the race; all the muscular attachments are uncommonly well marked.

The *Creek* skull is one of very fine proportions, and indicates a brain superior to that of ordinary individuals. The forehead is broad and high, the vertex prominent, and the occiput flat; in other respects it comes near the usual Indian type. From age, the bones are less dense and strong than in the Osage skull; the absorption of the alveolar processes detracts from the Indian appearance of the jaw, and gives the face a more vertical facial angle; the nasal bones are uncommonly prominent, and show marks of disease, apparently from a cut; in many places the sutures are entirely obliterated. This is evidently the skull represented in Figs. 302 and 303, p. 442, of Nott and Gliddon's "Types of Mankind;" a Chief who died while a prisoner, near Mobile, in 1837.

The young *Choctaw* skull, as far as the shape and proportions of the cranium are concerned, might well pass for Caucasian; but the width between the eyes, the quadrangular orbits, the high cheek bones, the prominent jaw, and especially the deep palatine fossa, betray the lower type which in this specimen would not be recognized from a retreating forehead, prominent vertex, or flat occiput; it resembles more a female than a male skull. There is a depression at the posterior third of the sagittal suture, no occipital protuberance, a fine hamular process, a remarkable development of the vaginal process on both sides, and of the bony processes generally.

The measurements of these skulls were as follows:

	Capac. Int. cub. in.	Long. D.	Par. D.	Front D.	Vert. D.	I. M. Arch.	I. M. Line.	Oc. Front. Arch.	Hor. Periph.
OSAGE.	79½	6.6 in	5.7 in.	4.3 in.	5.2 in.	14.8 in.	4 75 in.	13.75 in.	19.5 in.
CREEK.	92	6.9	5.7	4.6	5.4	15.5	4.75	14.4	20.4
CHOCTAW.	66½	6.5	5.1	4.	4.75	12.5	4.1	13.	18.7

The examination of the first two skulls shows a narrowness in the frontal portion of the skull corresponding to the seat of the intellectual faculties, and a great width in the parietal portion, corresponding to the phrenological organs of caution, secretiveness, destructiveness, &c., or the animal propensities ; indicating a weak intellect and a strong animal propensity in the American Indian compared with the white races. This difference in the relative size of different portions of the brain is represented, in a somewhat exaggerated form however, in plates 353 and 354, (p. 464) of Nott and Gliddon's " Types of Mankind."

A line drawn through the auditory meatus upwards shows that the greater part of the brain is anterior, indicating the comparatively feeble development of the social and domestic affections. In the African, most of the brain is posterior to this line ; in the Mongolian, it is about equally divided.

The third series of measurements is of little value in determining the characters of the Indian skull ; the subject of them was not an adult, and had not reached the age when the brain has completed its development, which is about the age of 16 years ; the period of second dentition had been about completed, indicating an age not authorized by the size and shape of the skull. [It is not stated by the donor whether the individual was a woman or a half-breed, either of which would explain some of the peculiarities.]

The thanks of the Society were voted to Dr. Nott for his donation of valuable crania.

Dr. Durkee called the attention of the Society to a collection of insects, principally Acari and other parasites, about 600 in number, prepared by the late Dr. Burnett. He stated that these specimens are mostly mounted on glass slides for the microscope, and the collection is apparently in good order, and contains many new and undescribed species, a portion of them from England and France, the whole collection being very valuable.

On motion of Mr. J. M. Barnard, a committee of three, consisting of Drs. Durkee, Abbot, and Gould, was appointed to purchase these insects at a cost of not over fifty dollars, or to obtain a refusal of them for the Society.

Mr. Barnard, from the Committee to whom was referred the letter of Prof. Baird, of the Smithsonian Institution, reported, that the Committee recommend to the Society to appropriate the sum of $300 for the purposes mentioned in the letter of Prof. Baird.

After some debate upon this subject, the report of the Committee was referred to the Council.

Mr. Samuel L. Fletcher, of Cambridge, was elected Resident Member.

August 16, 1854.

Dr. Charles T. Jackson, Vice-President, in the Chair.

Extracts from a letter of Prof. L. P. Yandell, of Louisville, Ky., to Dr. J. B. S. Jackson, thanking the Society for his election as Corresponding Member, and offering to contribute Geological specimens, were read to the Society.

Mr. Whittemore called attention to the large number of glow worms now to be found in the neighborhood of Milton, and asked if they were a new species.

Prof. Wyman remarked that he had seen, some years ago, at West Cambridge, glow worms of peculiar character, with luminous spots upon each segment.

September 6th, 1854.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. Durkee, for the Committee appointed to purchase the collection of Acari and other insects belonging to the estate of Dr. Burnett, reported that the purchase had been made at a cost exceeding, by ten dollars, the sum appropriated. The report was accepted, and the purchase ratified. Dr. Durkee exhibited the collection to the Society, and was requested to take charge of it.

September 20, 1854.

The President in the Chair.

Prof. Jeffries Wyman gave an account of some observations on the development of Anableps Gronovii, a viviparous fish from Surinam.

He described the external conditions of development of fishes in general, as manifest in the oviparous and viviparous species. The latter are divided into two groups; the first including those species in which the egg enters the oviduct before the development of the embryo begins; the second includes all such as have a gestation almost wholly ovarian. In the former group are found Spinax, Carcharias, Torpedo and other Plagiostomes; in the second, Anableps, Pœcilia, Blennius, and Embiotoca. Prof. Wyman had examined the ovarian eggs of Anableps, and found them surrounded, after they had acquired a certain size, by a transparent space limited by thickened stroma which formed a distinct closed sac. The egg was free in this sac, as the mammiferous ovum is in the Graafian vesicle.

The youngest embryos examined were less than four fifths of an inch in length, and had the yelk-bag attached; this last was covered with papillæ, arranged in a linear series, but which were not vascular as stated by Valenciennes. Another series of fœtuses were more than an inch in length, and resembled the preceding, except that the eye had begun to assume the peculiarity of the adult, viz., the dumb-bell-shaped pupil.

Other fœtuses from a third fish were two and a quarter inches in length, about one fourth the length of the parent. The yelk-bag had disappeared, but the abdomen still presented a fissure, or linear umbilicus, extending from between the pectoral fins to near the anus, separating the ventral fins from each other. These last fœtuses had escaped from their ovarian sacs, and were contained in the oviduct, which was very much enlarged. The cornea had become divided as in the adult.

It was obvious from comparison, that the older fœtuses consisted of a larger mass than that of the younger ones with the yelk-sac. In other words, the fœtuses had grown at the expense of other materials than those contained in the yelk. This additional nourishment could only be derived from the fluids secreted from the vessels of the parent into the cavity of the embryo-sac, and their subsequent absorption by the fœtus. Such a mode of nutrition exists in Torpedo, Embiotoca, and Blenny.

Referring to some allusions in Prof. Wyman's paper, in relation to the mode of development of *Embiotocoidæ*, Mr. Charles Girard said he had recently examined several genera and species of that remarkable group of fish, and, were his observations not to appear soon in print,* he should feel more at liberty to enlarge upon that subject. Within the body of the species to which he gave the name of *Embiotoca lineata*, he found young, three inches in total length and one inch in depth, exhibiting a structure of the dorsal and anal fins, similar to what is said to exist in *Rhacochilus toxotes*;† the posterior margin of the caudal being truncated, whilst it is more or less crescent-shaped in the adult. An elongated jet black spot was also observed towards the base of the anterior portion of the soft part of the dorsal fin. In *Holconotus rhodoterus*, as many as sixteen young were detected, being about an inch or a little less in total length. The vitelline abdominal sac was still present, leading to the inference that they had but recently escaped from the egg-shell. Their general form was slender and elongated ; the head being rounded anteriorly and deeper than the body, and the snout much less

* Proc. Acad. Nat. Sc. of Philad. Vol. VII. August, 1854.

† Amer. Journ. of Sc. Second Series. Vol. XVII. 1854, p. 387.

prominent than in the adult. The ventral fins were more developed than in the parent; the caudal was rounded off, its central rays being the longest. The soft portion of the dorsal and of the anal, proved likewise proportionally higher than in the adult, and extended posteriorly to the very base of the caudal, perhaps beyond that region.

Among the zoōlogical features of the family of *Embiotocoidæ*, a marked ventral area had been spoken of as one of the most characteristic. Mr. Girard said that in several members of that group which he had examined, that character was not found. He, nevertheless, wished it to be understood that he did not undervalue the researches of others upon that ichthyic group, simply giving here the result of his own investigations.

The family of *Embiotocoidæ*, Mr. Girard further remarked, seem to have representatives in the fresh — as well as in the salt — waters of California, according to recent accounts,* in which several genera are characterized and given as inhabitants of the Sacramento River.

A letter from Sir John Richardson to the President, on some points in the osteology of the Mastodon and Fossil Elephant, was read to the Society. It inclosed a page from the "Zoölogy of the Herald," now in course of publication in London, with the following comments:—

At page 102, it is stated that the scapula of the Mastodon does not exhibit the remarkable depression which characterizes the fragmentary shoulder-bones found at Swan River. Since I have (through the kindness of the author) had an opportunity of consulting Dr. Warren's excellent work on the *Mastodon giganteus*,† I have discovered this assertion to be erroneous; a depression in the same part of the shoulder-blade of that species being noticed in the text by that gentleman, and figured in his large plate. The probability therefore is, that the Swan River bones belonged to the *Mastodon giganteus*, and that the range of that species

* Proc. Acad. Nat. Sc. of Philad. VII. July, 1854.

† Description of the *Mastodon giganteus*, by John C. Warren, M. D. Boston, 1852.

must be extended northwards in Rupert's Land to the fifty-second parallel of latitude, while the provisional geographical designation of *Elephas Rupertianus* must be expunged.

The depression in question was most likely designed to afford a firmer attachment to the central fasciculi of the *infra-spinatus* muscle ; and a similar one, though not so sharply defined, exists in the scapula of an Indian fossil elephant from the Seewalik hills, deposited by Dr. Falconer in the British Museum and Haslar Hospital, the parts in question being in them smooth and convex.

The error of my former notice above alluded to, arose from an inspection of Mr. Koch's skeleton of the Mastodon now in the British Museum, whose shoulder-bones exhibit no such depression. Neither is this character visible in two other scapulæ purchased by the same institution from Mr. Koch as bones of the Mastodon ; all the four scapulæ having merely some roughness, but no hollow in that part of the infra-spinal surface. From this fact, one might be led to conclude that the concavity in question is merely an individual peculiarity, and does not occur generally in the species ; but it is rare to meet a mere osteological variety so perfectly alike in form in the two limbs as it is in our Swan River scapulæ, and, as we presume it to be, in both shoulder-blades of Dr. Warren's Newburgh Mastodon ; for had it been otherwise, that accurate observer would have mentioned it. And the matter admits of another explanation.

Mr. Koch's skeleton, when first brought from America for exhibition in this country, had its parts not only misplaced, but composed of the bones of more than one individual, there being at least five vertebræ too many in the spine. It may therefore be, that the two scapulæ now forming part of the skeleton of the British Museum Mastodon, and the two detached ones, are in reality bones of the American fossil Elephant, of which a cranium of great size was purchased by the Museum from Mr. Koch. Dr. Warren has shown that the *Mastodon giganteus* and the great fossil Elephant were coeval (*op. cit.* p. 142) ; and Mr. Koch may have dug up the remains of both animals from the same deposit. Not the least doubt rests on the authenticity of every part of Dr.

Warren's skeleton of the Mastodon, — the account of its discovery and disinterment being quite clear.

The Swan River scapulæ belonged to an individual of intermediate size, between the Cambridge (Massachusetts) Mastodon and Dr. Warren's.

The President observed that it would be very satisfactory, if it could be well established that a depression exists in the infra-spinal surface of the scapula of the Mastodon and not in that of the Elephant. This he had found to be the case with the Mastodons here, and on this account Sir John Richardson transfers the Elephas Rupertianus to the Mastodon.

Prof. Jeffries Wyman stated that the "Impression of a doubtful sixth toe in some Batrachian footprints," spoken of by President Hitchcock, might be explained by the presence of a tubercle which exists upon the inside of the great toe in this class of animals. Cuvier speaks of a tubercle in this position supported by a single bone. Prof. Wyman has seen in several skeletons, prepared by Mr. Fletcher of the Scientific School of Cambridge, this tubercle supported by a chain of three bones. It is doubtful if these bones are to be considered as true phalanges; they are more probably, as Cuvier suggests with regard to the single bone, tarsal bones out of place.

Mr. Girard remarked that many Batrachians have two tubercles, one on the great and one on the little toe, so that two supernumerary impressions might in some instances be made.

The President exhibited a small slab from Turner's Falls, bearing upon its upper surface ripple-marks of two different characters, evidently made at different times, and impressions of a doubtful nature. The President, in a late visit to the Connecticut Valley, had obtained from Mr. Field many fine specimens of fossils, and had been shown by him a magnificent surface of rock, half the size of the library-room of the Society, completely covered with impressions. This rock, however, was *in sitû*, and it was considered impossible to remove the surface in a single piece. Mr. Field has succeeded the late Mr. Marsh in this work, and is much interested in the discovery of fossil impressions. He is disposed to perfect himself in science, and will soon be enabled to turn to good account the discoveries he may make.

Mr. White presented specimens of erratic rocks bearing fossils, from Mt. Katahdin, Me.

Dr. C. T. Jackson remarked that they were of Silurian origin. The south shore of Lake Superior is covered with erratic rocks containing fossils, and this had led to error in studying the geology of Lake Superior.

Prof. Wyman said he had seen on the coast of Labrador, considerably above the sea, fossils in erratic rocks of Silurian origin.

Dr. Durkee called attention to a number of valuable works, recently purchased for the Society from the estate of the late Dr. W. I. Burnett.

Dr. Storer presented the third number of his work on the Fishes of Massachusetts.

Dr. Storer had received, since the last meeting, a large shark, (*Carcharias Atwoodi,*) seven feet in length, from Capt. Atwood of Provincetown. It has been figured and described.

Mr. S. D. Shaw, of East Bridgewater, was elected a Resident Member.

DONATIONS TO THE MUSEUM.

August 2d. Three crania of American Indians; by Dr. Josiah C. Nott, of Mobile, Ala. A specimen of *Chameleo tigris* and several birds eggs; by Mr. N. H. Bishop.

August 16th. Two petrified eggs from the guano of the Chincha Islands; by Capt. J. B. Hildreth. A model, in wood, of the Giant's Causeway; by Mr. Henry B. Stanwood. Eggs of *Natica heros*, from Great Point Light House, Nantucket; by Mr. Frederick Vinton. A bundle of roots of peculiar form, developed inside of a pump-log; by Mr. Furst.

September 6th. Nest of *Tanagra rubra*, and a specimen of Copper ore from Coquimbo; by Mr. N. H. Bishop.

September 20th. Specimens of erratic rocks bearing fossils, from Mt. Katahdin, Maine; by Mr. White. Baltimore Oriole, *Yphantes Baltimore*, egg of the domestic goose, and eggs of the Chameleon; by Mr. N. H. Bishop.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPTEMBER 30, 1854.

Report of the Commissioner of Patents for 1853. Part I. Arts and Manufactures. 8vo. Washington, 1854. *From Hon. S. H. Walley.*

Transactions of the Wisconsin State Agricultural Society. 1852. Vol. 2d. Madison, 1853. *From J. A. Lapham.*

Recherches sur les Roches globuleuses. Par M. Delesse. 4to. Pamph. *From the Author.*

Legislative Reports on the Geology of the State of New York. 1838 - 40. 8vo. Pamph. Albany. *From R. C. Beck.*

Catalogue of the Lyceum of Natural History of Williams College. 8vo. Pamph. Williamstown, Mass. *From the Lyceum.*

Notice of the Types of Mankind. By John Bachman, D. D. 8vo. Pamph. Charleston, 1854. *From the Author.*

Report of the Trustees of the Free Public Library of the City of New Bedford. 8vo. 1853 - 4. New Bedford. *From T. A. Greene.*

Descriptions of new Reptiles from California. By Edward Hallowell, M. D. 8vo. Pamph. Philadelphia, 1854.

Descriptions of new species of Reptiles inhabiting North America. By the Same. 8vo. Pamph. Philadelphia, 1854.

On a new genus and two new species of African Serpents. By the Same. 8vo. Pamph. 1854. *From the Author.*

A Week on the Concord and Merrimack Rivers. By Henry D. Thoreau. 12mo. Boston, 1849.

Walden; or Life in the Woods. By the Same. 12mo. Boston, 1854. *From the Author.*

Report on the New Water-works of Montreal. 8vo. Pamph. Montreal, 1854.

Report on the Sewerage of Montreal. By C. M. Tate. 8vo. Pamph. Montreal. 1854.

Twenty-sixth Annual Report of the Natural History Society of Montreal. 12mo. Pamph. Montreal, 1854. *From L. H. Latour.*

New York Journal of Medicine. New Series. Vol. XIII. Nos. 1, 2. New York, 1854.

American Journal of Science and Arts. Vol. XVIII. Nos. 52, 53. New Haven, 1854.

Farmer's Companion. Vol. IV. Nos. 1, 2, 3. Detroit, 1854.

New Orleans Medical and Surgical Journal. Edited by Bennet Dowler, M. D. Vol. XI. No. 1. July, 1854.

Smithsonian Contributions to Knowledge. Vol. VI. 4to. Washington, 1854.

Report of Special Committee of Board of Regents of the Smithsonian Institution. 8vo. Pamph. Washington, 1854.

Proceedings of the American Philosophical Society. Vol. VI. No. 51; January to June, 1854. 8vo. Philadelphia.

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. VII. No. 3. 8vo. Philadelphia, 1854.

Mémoires de la Société de Physique et d' Histoire Naturelle de Genéve. Tome XIII. 4to. Genéve.

Bulletin de la Société Géologique de France. Tome X. Feuilles 23 - 28. (4 Avril—16 Mai, 1853.) 8vo. Paris.

Bulletin de la Société de Geographie. 4riéme série. Tome VII. 8vo. Paris, 1854. *Received in Exchange.*

Genera of Recent Mollusca, arranged according to their Organization. By H. and A. Adams. Part XIII. 8vo. London, 1854.

Zeitschrift für Malakozöologie. Herausgegeben von K. T. Menke, M. D., and L. Pfeiffer. Nos. 10 - 12. 8vo. 1853.

Malakozöologische Blätter für 1854. Als Forsetzung der Zeitschrift für Malakozöologie. Herausgegeben von denselben. 8vo. pp. 1 - 80. *Exchange with H. Cuming.*

Systema Saurinarum. Exposuit Chr. Godofredus Nees ab Esenbeck. Dr. 8vo. Berolini, 1836.

Ferns of Jamaica. By James McFadyer, M. D. 8vo. London, 1837.

Annals and Magazine of Natural History. Vol. XIV. Nos. 79, 80. London, 1854.

Cyclopœdia of Anatomy and Physiology. Part 44. June, 1854. 8vo. London. pp. 33 - 160. *From the Courtis Fund.*

Récherches sur la Structure Intime du Poumon de l'Homme et les principaux Mammifères. Par M. Rossignol. 4to. Pamph. Bruxelles. 1846.

Histoire Generale et Particulière des Anomalies de l'Organization chez l'Homme et les Animaux. Par M. Isidore Geoffroy Saint-Hilaire. 8vo. 3 Tomes avec Atlas. Paris, 1832.

Chemistry of Vegetable and Animal Physiology. By G. J. Müller. Translated by Dr. P. F. H. Fromberg. With Introduction and Notes by J. F. W. Johnston. 8vo. London, 1849.

Beiträge zur Mikroscopischen Anatomie und Physiologie des Ganglien-Nervensystems des Menschen und der Wirbelthiere. Von Carl Axman. 8vo. Pamph. Berlin, 1853.

Cours de Physiologie fait à la Faculté de Medecine de Paris. Par P. Berard. Vols. 2, 3. 8vo. Paris, 1848.

Manuel de Physiologie. Par J. Mueller. 2 Tomes. 8vo. Paris, 1851.

Introduction to Modern Classification of Insects. By J. B. Westwood. 2 vols. 8vo. London, 1839.

Owen on Parthenogenesis. 8vo. London, 1849.

Practical Treatise on the Use of the Microscope. By John Quekett. 8vo. London, 1848.

Monographia Anoplurorum Britanniæ. By Henry Denny. 8vo. London, 1842.

Rudolph Wagner's Icones Physiologicæ. Erlaüterungstafeln zur Physiologie und Entwickelungsgeschichte. Vollständig neu Bearbeitet und Herausgegeben von Alex. Ecker. 4to. Leipzig. Pamph. 1852. *Purchased from the Library of Dr. W. I. Burnett.*

Encyclopædia Britannica. 6th edition. Vols. 1 – 5. 4to. Boston, 1854.

Works of Fisher Ames. Edited by his son, Seth Ames. 2 vols. 8vo. Boston, 1854.

Sketches of the Lives and Judicial Services of the Chief Justices of the Supreme Court of the United States. By G. V. Santvoord. 8vo. New York.

Lives of the Queens of Scotland. By Agnes Strickland. Vol. IV. 12mo. New York, 1854.

History of Russia. By Walter K. Kelley. 12mo. Vol. I. London, 1854.

History of the Jesuits. By G. B. Nicolini. 12mo. London, 1854.

History of Magic. By Joseph Ennemoser. From the German, by William Howitt. 2 vols. 12mo. London, 1854.

Journey to Central Africa. By Bayard Taylor. 12mo. New York, 1854. *Deposited by the Republican Institution.*

October 4, 1854.

The President in the Chair.

In the absence of the Recording Secretary, Dr. Abbot was chosen Secretary *pro tem.*

Arenicola natalis, Girard.

Mr. Charles Girard stated that, as early as 1849, he had found the genus *Arenicola* amongst the Annelids of Chelsea beach. During one of his most recent rambles there, on the fifth of September last, he again met with several specimens, about six inches long, being somewhat smaller than those with which he first became acquainted of that genus. They were greenish brown anteriorly, and brownish green posteriorly ; provided with thirteen pairs of branchial tufts, the anterior and posterior ones being less developed than those in the middle of the series. Six pairs of rudimentary podal appendages were to be observed in front of the foremost branchiæ ; the caudal region slender, and constituting about two fifths of the entire length, and composed of from forty-five to forty-seven rings, narrowest posteriorly ; its surface covered with roundish granules of a warty appearance, from near its origin to its tip. The body, properly so called, and the cephalic region, were smooth, the latter exhibiting an irregular meshwork of lines, visible to the naked eye. Proboscis granular. Dorsal region marked by a conspicuous smooth line, which, upon the cephalic region, subdivides into a left and right branch, uniting again anteriorly. The name of *Arenicola natalis* is proposed to distinguish henceforth this species. Its affinities are with *A. piscatorum*, having the same number of podal appendages and gills. The cephalic region, however, instead of being so decidedly club-shaped as in the latter, is rather tapering, as well as the caudal region. The reticulation of its anterior region, and the dorsal line alluded to above, will serve as specific features.

Mr. Girard said he had also found on Chelsea beach a specimen of *Placobranchus*, about a quarter of an inch long, rather stout, blunt anteriorly, and tapering posteriorly, and of a deep greenish hue. He regretted that, on being carried home, the animal died, and thus a more complete description of it he could not now furnish. He would affix to it the name of *Placobranchus simplex*, being the first species of the coast of the United States to which a name had been applied, and he would avail himself of another opportunity for a critical examination of its specific characters.

Mr. Girard further remarked that while at Cambridge, he came across a specimen of *Storeria Dekayi*, the abdominal region of which presented a hue very similar to that of *Storeria occipito-maculata* ; it was salmon-colored throughout, a little lighter under the throat and head. The sides of the body were reddish-brown, whilst the middle or dorsal region exhibited a dusky or grayish band, extending from the head to the tip of the tail, and margined with a blackish-brown line, in the midst of which the first series of black spots ran, disappearing, however, upon the tail. The lateral series of spots was not conspicuous, and was only visible distinctly during the act of respiration.

Prof. Wyman remarked that it had probably been frequently noticed by members of the Society, that, at the present season of the year, the common housefly may be frequently seen hanging dead from the ceiling or attached to any surface on which it may be lying, by a filamentous white substance ; and that a white powder, in greater or less quantity, is frequently seen dotted over the neighboring surface. On examining this substance, he had found the insect to have fallen a victim to a parasitic plant growing upon its surface. The white powder proved to be the spores of the parasite. The whole interior of the fly was found to be filled with a similar plant, and probably, from the different way in which it develops itself, of a different species from that on the surface. The internal parasite starts from a spore, and grows by elongation from one or both sides of a sphere, this latter remaining in the middle or at one end. Prof. Wyman exhibited magnified drawings of these parasites, as they appear under the microscope, in their various stages of development.

Prof. Wyman also exhibited a dried preparation of the vocal apparatus of the Howling Monkey of South America. This apparatus has before been described, and consists, in the main, of the same parts as in man, with the addition of a new muscle, now for the first time mentioned, and a peculiar structure of the hyoid bone; the whole apparatus being enormously magnified, and much larger than in man. The muscle not heretofore noticed is a Costo-thyroid, outside of the Sterno-thyroid muscle, and entirely distinct from it.

The President again called the attention of the Society to an inexplicable impression on the Sandstone slab, bearing ripple-marks, which he had exhibited at the previous meeting. He exhibited, in connection with it, several impressions of fossil fish, vegetables, &c., but no resemblance could be traced between them sufficient to account for the impression in question. He stated that he had recently received from the same locality, Turner's Falls, a large slab, bearing very distinct impressions of Coniferæ.

The Committee appointed to nominate candidates for the vacant curatorships, reported — that it is inexpedient at present to fill those offices. The report was accepted.

October 18, 1854.

The President in the Chair.

The President gave a brief history of the *Zeuglodon*, exhibited a specimen of the teeth, and monographs upon this subject by Koch, Carus, and Müller. The first specimen of Zeuglodon was brought before the public by Dr. Koch several years since, and exhibited under the name of *Hydrarchos*, in New York and Boston. This specimen was represented by Dr. Koch to be comparatively perfect, and to contain the bones of one animal only; but Prof. Wyman detected falsifications or mistakes in several portions of the skeleton, and satisfied himself that the bones belonged to different individuals. This specimen was sold to the king of Prussia for a large sum, (in the neighborhood of fifteen or twenty thousand dollars,) and is now in his possession. Prof. Carus considered it a veritable specimen, and published his monograph upon it as such.

A second skeleton of the Zeuglodon is now in Boston, and belongs to the President of this Society. It is about seventy feet long, and numbers about forty vertebræ, many of them quite perfect. There is a good portion of the cranium and lower jaw, a perfect os humeri, etc.

A third skeleton, the most remarkable of all, is represented by Dr. Koch to have been the second found by him. This specimen, which measured one hundred and twenty feet, and had a very perfect head, was carried from this country to Dresden, and afterwards exhibited in Breslau and Vienna.

In connection with this subject, the President exhibited Pontoppidan's figure of the Sea-serpent, and observed that he believed in the existence of such an animal, that there were many well-authenticated facts in favor of its existence, and that very possibly the Zeuglodon and the Sea-serpent are anatomically similar.

Dr. C. T. Jackson communicated some chemical researches, which he had recently made on the composition of the scales of the Gar-pike.

He stated that he had discovered fluorine as one of their components, and had etched glass with the fluo-hydric acid, eliminated from the ashes of the scales by the action of sulphuric acid. The analysis was yet incomplete, but he would state that the scales contain 45.2 per cent. of animal matter, destructible by heat, and that the mineral matters consist of phosphate of lime, fluoride of calcium, and phosphate of magnesia, with some carbonate of lime. The proportion of lime, in 100 grains of the ashes, was 45.1 per cent., and of magnesia 8.8 per cent., while the phosphoric acid, already separated in this preliminary or qualitative analysis, was 29.96 per cent.

A complete analysis will soon be finished, and reported to this Society.

He remarked that the search for fluorine was suggested by an idea communicated to him by Mr. C. Girard, that the scales of fishes were "supposed to be anatomically homologous with the enamel of teeth," an idea that now is sustained by chemical analogy.

Dr. J. B. S. Jackson exhibited the leaves and pods of the

Castor-oil plant, (*Ricinus communis,*) raised this season in Dorchester, from seeds brought from the West.

A letter was read from Mr. Charles Girard, asking exchanges for Sir William Jardine, of specimens of Fossil Footprints of America, for those of Annandale, Scotland, figured in the work of Sir William, on the "Ichnology of Annandale." Referred to the former Committee on the Greenfield Fossils.

The Corresponding Secretary announced the reception of the following letters, viz: —

From Thure Kumlein of Wisconsin, Rev. A. C. Barry of Wisconsin, and Prof. L. P. Yandell of Louisville, acknowledging the reception of diplomas as Corresponding Members. From the Academy of Natural Sciences of Philadelphia, Smithsonian Institution, and from L. A. H. Latour of Montreal, acknowledging the receipt of the Proceedings of the Society. From the Regents of the University of New York, presenting the Octavo Geological Reports of that State, and acknowledging the receipt of the Proceedings. From the California Academy of Natural Sciences, presenting the Proceedings of that Society, and requesting an interchange of publications. From the Natural History Society of Williams College, acknowledging a donation of books, &c., and from S. W. Woodhouse, presenting the Report of the Zuni Expedition.

November 1, 1854.

The President in the Chair.

Present also by invitation, T. S. Hunt, Esq., of the Geological Commission of Canada.

The Secretary read a letter from Dr. William O. Ayres, of San Francisco, to Dr. Storer, offering to the Society a description of Californian Fishes, the commencement of a series which he hopes to continue.

He remarked, that "a very large proportion of the fishes of California are, without doubt, as yet undescribed; many of them present a singular grouping of characters, and a thorough examination will probably result in numerous modifications of what have been deemed established generic divisions, extending some and limiting others. My own researches are already sufficient to indicate this."

NEW SPECIES OF CALIFORNIAN FISHES, BY WILLIAM O. AYRES, M. D.

In our markets, we find fishes constantly offered for sale, in great numbers, under the names of *Rock Fish* and *Rock Cod.* They bear always a high price, and constitute one very important item in the sum total of our fisheries, and of course in the resources of the State. They are taken in rocky localities along the coast and in the Bay of San Francisco, and the title — Rock Fish — applies to them very well. One more inappropriate, on the contrary, than that of Rock Cod, could scarcely have been selected, inasmuch as they are very widely removed from the family in which the Codfishes are classed. Four distinct species of them we have already detected here, all belonging to the genus *Sebastes;* three of these are believed to be new. We were not previously aware of the existence of more than one species of this genus (*S. Norvegicus*, Cuv.) in the United States — it is the *Hemdurgan* of the Massachusetts Bay fishermen. Two of our species are very closely allied to each other; a description is accordingly given of the one which appears most nearly typical (*S. nebulosus*); and of the other (*S. ruber*), the points of specific distinction from *nebulosus* alone are needed.

SEBASTES PAUCISPINIS, Ayres.

Length five and a half inches; *depth* one inch and one tenth;

length of *head* one inch and seven tenths, being a trifle less than one third the total length. *Form* elongated, much compressed.

Scales very small, covering all parts of the fish except the fins, the throat, and the space anterior to the eyes.

Spines of the head, not largely developed. The preoperculum has about five, distinct, flat, sharp; the largest about a line in length. The operculum has two, distinct but small; the membranous part projects slightly beyond them. The suborbital, on its anterior inferior border has three or four, quite small. The other parts of the head have none, except that a slender inconspicuous ridge along the border of each parietal bone is free at its tip. A very small spine at the summit of the humeral cincture.

The *lower jaw* is longer than the upper, and projects beyond it in such a manner that when the mouth is closed it prolongs the line of the dorsal aspect of the head. The line of closure of the mouth is very oblique upwards; the gape large, so that the point of the maxillary lies beyond the middle of the eye.

Teeth fine, crowded, and even, in the lower jaw, on the intermaxillaries, the vomer, the palatine bones, and the pharyngeals; those on each superior pharyngeal are in three patches.

Lateral line following nearly the curve of the back.

The spinous part of the *dorsal*, arising above the opercular angle, is an inch and a half in length; the rays increase in height to the fourth, which measures eleven twentieths of an inch, as do the two succeeding, and thence the height decreases; the last ray seems to constitute rather a part of the soft dorsal, it is higher than the one preceding. The soft portion of the dorsal is an inch in length, half an inch in height; height diminishing posteriorly.

Anal about coterminal with the dorsal, rounded, six tenths of an inch in length; height equal to the length.

Pectorals rounded, one fourth of an inch in length, nine tenths in height, destitute of any thickened membrane, the four lower rays simple.

Ventrals even with the pectorals, three fourths of an inch in height.

Caudal somewhat concave, three fourths of an inch in height.

D. 13 – 13 ; A. 3 – 7 ; V. 1 – 6 ; P. 15 ; C. 12.

Color plain reddish-brown above, lighter beneath.

SEBASTES NEBULOSUS, Ayres.

My description is drawn from a specimen thirteen inches in length, weighing two pounds and a half, which may be deemed about their average size.

Form compressed ; head large, four inches in length ; greatest depth an inch anterior to the opercular angle, being there equal to the length of the head ; body tapering thence to the tail ; width of the head two inches and three fourths, width decreasing posteriorly.

Scales covering the body, operculum, preoperculum, suboperculum, suborbitals, and top of the head to the anterior border of the orbit.

Head spinous ; a row of five spines forming a crest on each side of the head, viz : a nasal spine, one at the anterior superior border of the orbit, one on the summit of the orbit half an inch in length, one posterior to the orbit three tenths of an inch in length, one posterior to this and nearer the median line, eight tenths of an inch in length ; the last three are horizontal, and are merely strong ridges with a free spinous apex ; the preoperculum is bordered with (commonly) five flat spines about two tenths of an inch in height ; the opercular bone ends in two flat, strong, free spines, the upper one being a fourth of an inch in length ; the membranous operculum projects about four tenths of an inch beyond these ; the suboperculum terminates posteriorly in a concealed spine ; even the anterior suborbital shows on its inferior border an indication of spinous points ; the bones of the humeral cincture exhibit three well-marked spines.

Eyes an inch in longitudinal diameter.

Nostrils immediately anterior to the eyes, the anterior orifice having a membranous prolongation of its posterior border, two tenths of an inch in height.

Teeth fine, and crowded in the lower jaw, on the intermaxillaries, the vomer, the palatine bones, and the superior and inferior pharyngeals ; those on the superior pharyngeals are in three patches on each side.

Lateral line nearly straight.

Dorsal fin arising a little anterior to the opercular angle; the spinous portion is four inches and a half in length, the spines stout and strong, increasing in length from the first, which is only six tenths of an inch, to the fourth, which is two inches high, the height diminishing thence posteriorly; the soft portion of the fin is two and a half inches in length, rounded, an inch and a half in height. The anterior portion of the spinous part of the fin presents a beautiful serrated appearance, from the fact that the membrane is attached to the anterior border of each spine at some distance from the summit.

The *anal* fin, terminating two inches from the caudal, is an inch and three fourths in length, which is not quite equal to the height of the soft rays.

Pectorals rounded, two inches and a half in height, three fourths of an inch in length; the inferior rays are thickened, undivided, free at their tips.

Ventrals a little posterior to the pectorals, rounded, two and one fourth inches in height.

Caudal slightly rounded, an inch and a half in height, three inches wide when expanded.

Small scales extend far up on all the fins.

Branchial rays, seven.

D. 13–13; A. 3–8; V. 1–5; P. 7–10; C. 11.

In *color*, this fish is finely mottled with dusky yellow and dark brown; on the fins the latter hue predominates, and the lighter mottlings have rather a bluish aspect.

SEBASTES RUBER, Ayres.

This species is very closely allied to *S. nebulosus*, but may be thus distinguished. *S. ruber* has the crests of the orbits scarcely elevated above the surface of the head; in *nebulosus* they are very prominent, forming quite a deep furrow between them; — *ruber* has a pair of small flat spines on the top of the head not found in *nebulosus;* they are before, and a little within the last pair mentioned in that species; — *ruber* has all the spines less strongly developed than *nebulosus;* — in *ruber* the thickness and bulk of the head, as compared with the entire fish, are decidedly less than in *nebulosus* ;—*ruber* has the anterior inferior border of the operculum serrated ; in *nebulosus* it is plain ;—*ruber* is of a bright red color, nearly uniform, except that it grows lighter beneath ; *nebulosus* is clouded, as described ;—*ruber* grows to a greater size, often weighing ten to twelve pounds ; *nebulosus* seldom exceeds four pounds.

Sebastes ruber, var. parvus, Ayres. This is distinguished from the typical form, by having the head more depressed, with the top more flattened, the spines of the head more slender, the lower jaw longer, the body more compressed, and the color dark brown ; it is also always of small size, seldom exceeding half a pound in weight.

This will probably yet require to be separated from *ruber*, as a distinct species. It is exceedingly abundant here.

S. ruber is closely allied to *S. Norvegicus*, Cuv. It is, however, distinct by the proportions of the fins, the length of the lower jaw, the size of the head and development of its spines, and the form of the tail.

Sebastes variabilis, Cuv.

Under this name I place a species of *Rock Fish*, which is not uncommon in the markets, of a plain blackish-brown color, lighter beneath, with no spines on the top of the head, except occasionally a slight indication of a nasal spine, with the edge of the suborbitars nearly smooth, and having a weight of one to two pounds. Cuvier's specimens were derived from the Aleutian Islands, and the only transcript of his description in my possession is so brief, as to render it a little uncertain whether our fish is identical with his ; it may yet prove distinct. The fin-ray formula agrees closely.

Of the *Rock Fish* which have been here described, *S. ruber* is the most abundant, and the most important commercially ; it is consumed in large quantities daily, and is, like the others, an excellent fish. *S. nebulosus* is less numerous, though still quite common. *S. variabilis* cannot be considered common, and of *S. paucispinis* I have seen but a few specimens.

Centrarchus maculosus, Ayres.

This species is very common in our markets, where it is sold under the name of Perch, as are also several of the viviparous fishes. It is brought from the waters of the Sacramento and San Joaquin, and is one of our most esteemed fishes. The specimen from which my description is taken is of about the average size ; it is eight and three quarters inches in length.

Form oval, compressed ; greatest height two inches and nine tenths, just behind the pectorals. Back arched ; forehead slightly concave ; length of the head equal to the height of the body.

Scales large and firm, covering all parts except the fins, the top of the head, the throat, and the space anterior to the eyes.

The posterior angle of the operculum is rounded and furrowed, presenting the appearance somewhat of a large scale ; the edges of the preoperculum, interoperculum, suboperculum, scapular bone, and anterior suborbital are also finely denticulated.

Lateral line nearly concurrent with the back ; number of scales in its course about forty-two.

Teeth fine, even, and crowded in the lower jaw, on the intermaxillaries, the vomer, palatine bones, and pharyngeals.

The *dorsal* fin arises a very little posterior to the opercular angle. The spinous portion is two inches and one fourth in length, arched, highest at about the eighth ray, (three fourths of an inch,) the first rays very short ; the last spinous ray seems to constitute rather a part of the succeeding soft portion of the fin, and is higher than the rays preceding it. The soft part of the dorsal is rounded, one inch and one eighth in both length and height.

The *anal* is coterminal with the dorsal. The spinous portion is eight tenths of an inch in length, the spines increasing in length to the last, which is nine tenths of an inch high. The soft part of the fin is an inch in length, the height being a little greater. The spines of both anal and dorsal are stout and strong, those of the anal especially.

Pectorals rounded, an inch and a half in height.

Ventrals fan-shaped, an inch and one tenth in height.

Caudal slightly concave, an inch and three tenths high.

D. 13–11 ; A. 6–10; V. 1–5; P. 15; C. 16.

Color, when dead, dark grayish brown on the upper parts, becoming lighter beneath, with large, irregular, dark blotches on the sides, extending both above and below the lateral line. The fins resemble in color the part of the body on which they are situated; the living fish I have not had an opportunity of seeing.

The only *Centrarchus* with which this need be compared is the *æneus*, Le S. The resemblance here is indeed close, and *maculosus* may without doubt be considered the representative in our Pacific region of *æneus* in the Eastern. The Californian fish may be distinguished by the more arched dorsal outline, (that of the forehead being, on the contrary, concave,) by the greater height of the spinous portion of the dorsal fin, as compared with the soft rays of the same fin, by the difference in position of the origin of the anal fin, by the form of the opercular angle, and by the colors.

In one or two points this species fails to comply with the definitions of the genus *Centrarchus*, as hitherto given. And we may here remark that our researches have already proceeded far enough to show that a complete investigation of Californian ichthyology will probably result in numerous modifications of established genera, extending perhaps the limits of some, while those of others will be narrowed.

Morrhua Californica, Ayres.

The *Tomcod*, as this species is called by our fishermen, is without doubt closely allied to *Morrhua pruinosa*, Mitch., the Tomcod and Frostfish of our Atlantic coasts, and may be deemed its representative here. It differs from it, however, in form, in the relative proportions of the head, in the position and size of the fins, &c. A description, touching the points in which it is distinguished from *pruinosa* is therefore all that is needed.

The specimen employed is seven inches in length ; about their average size.

The length of the *head* is one fourth of the total length; in *pruinosa* it is only about one sixth.

The protrusion of the abdomen is much less, as compared with the bulk of the body posterior to it, the vertical diameter at the origin of the third dorsal being two thirds of the greatest depth, while in *pruinosa* it is only one half.

The *first dorsal* is one inch in height, three fourths of an inch in length, acutely triangular, the first ray longest.

The *second dorsal*, separated from the first by an interval of one fourth of an inch, is one inch in length, seven tenths of an inch in height.

The *third dorsal*, distant half an inch from the second, is nine tenths of an inch in length, three fourths of an inch in height.

The *first anal*, originating opposite the termination of the first dorsal, is one inch and a half in length, which is just double the height.

The *second anal*, one fourth of an inch from the first, equals the last dorsal in length, and is coterminal with it; it is half an inch high.

The *pectorals* are more pointed than in *pruinosa.*

The *ventrals*, corresponding in situation, are nine tenths of an inch in height, first and second rays free at tip, second longest.

Caudal nearly even.

The *lateral line*, arching somewhat above the pectoral, does not assume a straight course till nearly opposite the end of the second dorsal.

Color commonly plain greenish-brown above, lighter on the sides, silvery beneath ; irides silvery.

D. 12 – 16 – 18 ; A. 23 – 20 ; P. 20 ; V. 6 ; C. 26, with about eleven short ones.

M. Californica is abundant in the Bay of San Francisco, and along the coast.

Labrus pulcher, Ayres.

This species, one of the finest of our fishes, makes its appearance in the markets about the first of August, and continues in season till near the close of February. They are sold by the fishermen, under the name of Blackfish, and are also not unfrequently called Sheepshead. Specimens are often seen weighing eight to ten pounds. My description is taken from one sixteen and a half inches in length, weighing two pounds and a half.

Form very similar to that of *Tautoga Americana.* Greatest depth one fourth the total length. Length of the head, five inches and one fourth. Forehead protuberant, especially in large individuals, from an accumulation of fat immediately above the eyes.

Lips thick, loose, and fleshy.

Teeth on the intermaxillaries and in the lower jaw alike, consisting externally of a single row, stout and conical, of which the two anterior pairs are much larger than the others, and project forward; within this external row is a band of blunt, rounded teeth, not arranged in regular rows, scarcely projecting above the membranes. No teeth on the palatine bones or the vomer. Teeth on the pharyngeals, merely flat tessellated tubercles; on the inferior pharyngeal, a few of the anterior ones are distinct, conical.

Edges of the *operculum* and *preoperculum* destitute of spines or serrations. *Scales* deeply imbedded, not conspicuous, elongated, subquadrangular, covering the body, the operculum, the preoperculum, and the suboperculum; extending but slightly on the vertical fins.

The rays of all the fins are enveloped in a thickened, partially opaque, membrane.

The spinous portion of the dorsal fin is four inches and four tenths in length; the spines are stout and strong, and each one is continued by a fleshy prolongation, one to two fifths of an inch in extent, thus making the height of this portion of the fin about an inch and a fourth. The membranous portion is two inches and one fourth in length, rounded, two inches and one fourth in height of the central rays.

The *anal* fin, coterminal with the dorsal, is two and three fourths inches in length, two and a half inches in height.

The *pectorals* are nine tenths of an inch in length, two inches and three fourths in height.

The *ventrals*, a little posterior to the pectorals, are four tenths of an inch in length, two inches and one fourth in height.

The *caudal*, slightly concave, is two inches and a half in height of the external rays, four inches in breadth when expanded.

D. 12 – 10 ; A. 3 – 12 ; P. 18 ; V. 1 – 5 ; C. 14.

In *color*, this fish is commonly of a dark blackish-brown, lighter beneath, with the chin nearly white. In many specimens, a broad vertical red band encircles the body, from the angle of the operculum half way to the caudal fin ; this character, however, is not constant.

Labrus pulcher is not taken in our immediate vicinity. Those sold in our markets are brought chiefly from near San Diego, and I am not able to learn that the species is found north of Point Concepcion. Indeed, there is reason to believe that that Cape will be shown, by future observation, to indicate a sort of barrier in our maritime Fauna, separating the north from the south.

This species is somewhat closely allied to *Tautoga Americana*, (of which it may perhaps be deemed the Pacific representative,) though the arrangement of the teeth, and the scaly surface of the operculum and preoperculum, will not allow it to be included in the same genus. It is distinguished from *Lachnolaimus* by the structure of the pharyngeal teeth, and from *Cossyphus* by the scaling of the fins, and the smoothness of the preoperculum.

The following communication from Dr. Ayres, on the American Hydras, was also presented.

At the first November meeting of the Society, in 1850, (Proc. Bost. Soc. Nat. Hist., Vol. iii, page 354,) Prof. Agassiz gave specific names to two species of Hydra found in the vicinity of Boston. He accompanied the names, however, with no descriptions, basing them simply on the assumption that but two American species existed, one brown and one green, corresponding to two European types. In California, I have found another brown Hydra, quite distinct from the one so common in New England. The name *carnea*, proposed by Prof. Agassiz, has therefore no means of identification, except our local knowledge of the animal for which it was intended. But rather than introduce new names, we will retain those mentioned by him, through restricting their application. Our American Hydras, therefore, as at present discovered, are three.

1. *H. gracilis*, Agass. Very small, of a bright green, closely

allied to *H. viridis*, but much more extensible. Found in the eastern part of Massachusetts, probably in other parts of the Eastern States.

2. *H. carnea*, Agass. Larger than the *gracilis*, of a light reddish brown color, allied to *H. fusca*, but having the tentacula shorter. Found in Massachusetts and Connecticut very abundantly; much more common than the last.

3. *H. tenuis*, Ayres. About the size of the *carnea*, which it resembles in color, and to which it is allied, but from which it differs in the same point and to about the same degree as *carnea* differs from *fusca*; the tentacula are much less developed, having not more than about half the size of those of *carnea*. In microscopic structure it resembles *carnea* as closely as that does *fusca*. It is found very abundantly near San Francisco, Cal.

Whether we shall yet detect, on the Pacific side of the mountains, a green species to represent *H. gracilis*, or perhaps others entirely distinct, is left for future research.

Dr. Durkee exhibited, under the microscope, the rostrum or sting of the common Mosquito, (*Culex pipiens.*)

Dr. Durkee remarked that one of the most remarkable features in the anatomy of the mosquito is, that the parts which constitute the mouth are elongated so as to form a beak extending horizontally like that of some birds. The beak or sting is about half the length of the body, and to the unassisted eye appears to be very simple in its structure. When examined with the microscope, however, it is found to be composed of seven different parts, which are comparatively stout on one edge. These parts vary in length, and can be separated from each other without much difficulty. They are broad at the upper part, where they are united to the head, and they gradually taper to a point. One of the parts is a tubular canal or groove, in which the others are lodged when the proboscis is not in use. Dr. Durkee stated that he had not been able to find any appearance of teeth, except on the two longest pieces; in these he had found them near the tip. The two longest pieces, also, are marked by transverse lines, extending from one edge to the other, throughout their whole length.

Mr. T. S. Hunt, upon being introduced to the Society by Dr. Bacon, made some remarks upon the continuation of the metamorphic rocks of the New England States, into Canada East; upon the composition of Dolomites, the different theories of their formation, &c., and gave his own theory of their production.

The President, from the Committee appointed to consider the proposal of exchange of geological specimens, with Sir William Jardine, of Scotland, reported, that after consultation with Mr. Bouvé, they had concluded that it was inexdedient to make such exchange at present.

The President remarked that some time since he had stated that, though a matter of great doubt, he thought it probable that, at some time, the *impressions of insects and their tracks* would be found in solid rock. Since making that observation, he had received several small slabs, upon which are tracks, apparently, if not really made by insects, which resemble the tracks of the cricket, cockroach, or beetle. Upon several specimens, these tracks are of the same width and general appearance; and the individual foot prints, if they may be so considered, are alike in all the specimens. These specimens were from the banks of the Connecticut. One of the slabs likewise presented an impression very much like that of a spider's body and extremities.

Mr. Bouvé said that he had seen tracks of the cricket upon the sand of the sea shore, of similar appearance to the impressions in question.

Messrs. Samuel S. Wilson and George H. Marden were elected Resident Members.

November 18, 1854.

The President in the Chair.

Dr. Durkee read a paper on the structure and habits of the *Culex pipiens,* or Mosquito. Speaking of the mandibular apparatus, he remarked:

"Upon the two mandibles, as described by Westwood, I have succeeded in bringing out the teeth at the tip. There are ten on each mandible or jaw. The jaws have also transverse lines, extending from one edge to the other, throughout their whole length. These markings are extremely delicate, and look not unlike the teeth of a sickle, and are not found on any of the other pieces, which appear to be perfectly smooth, and terminate in an extremely sharp point. The two flat, button-like bodies, at the extremity of the lower lip, are united to the latter by means of a joint."

Dr. Durkee had verified the observation of Cuvier and other naturalists, that the male Mosquito does not suck blood, not being furnished with an apparatus for the purpose. He had also followed out the process of reproduction in these insects, in all its details, confirming the observations heretofore made. The unusual abundance of these insects in the city of Boston, during the past summer, and their unusual scarcity in the surrounding country, he ascribed to the better opportunity afforded in the city for their multiplication, in the numerous wells and cisterns in disuse from the supply of Cochituate water, while in the open country the prolonged drought had dried up their usual breeding places.

Mr. James A. Dupee presented a large and handsome specimen of Native Copper, from Huron Mine, Portage Lake, Lake Superior, in the name of Messrs. Dupee and Perkins. He observed, that it had been a question whether the deposits in this place were in veins or pockets. The great width of the deposits had caused many intelligent miners to question whether they would hold out; but now they have sunk several hundred feet, and the mineral is still found. This specimen was taken from a vein twenty feet in width.

Dr. Brewer presented a specimen of Bituminous Shale (called coal) from the city of Lawrence, Kanzas. Upon analysis by Mr. F. B. Storer, it was found to contain 65 per cent. of carbon, 30 per cent. of inorganic matter, and the remainder water, &c. Though not particularly valuable, it burns, and deserves the name of coal.

Dr. Brewer also reported upon a Fossil Egg, from the Chincha Islands, referred to him for examination. He supposed it to be the egg of a Penguin, though it cannot be determined with certainty. It was petrified by long exposure to guano.

December 6, 1854.

The President in the Chair.

The Secretary read a letter from Sir John Richardson to the President, correcting a statement which he had made, with regard to the presence of a head of an *American Fossil Elephant* in the British Museum. He stated that he could find no large or complete cranium of a Mammoth of American origin, but that there is a very considerable fragment of the alveolar process of the upper jaw, containing a very large tooth, little worn. A mandibular molar and two other smaller molar teeth accompany it. They purport to come from San Felipe, Texas, and to have been described in the

American Journal of Science and Arts, for March, 1846, by Prof. Carpenter; but no *elephant* remains are there described, though other fossils from the same locality are noticed.

The President remarked that he was surprised when Sir John originally made the statement alluded to, because efforts had been made to find the cranium of the Mammoth in America without success. The structure of the summit of the cranium is much more cellular in the Mammoth than in any other species of Elephant or in the Mastodon, and for this reason it is much more liable to decay. Portions of the lower jaw and teeth of the Mammoth have been found in America, but no cranium.

The President exhibited a cast of the head of the great Spelæan Bear. This fossil bear was discovered a few years ago in caverns in Germany, and afterwards in England and in Belgium, near Liège. Bones of other animals, and even of men, have been found with them, and it has been a question if the human bones were fossil or recent. The greater number of naturalists now believe them to be of comparatively modern origin. The skull of the Spelæan bear is much longer, in proportion to its width, than the skull of the living American species, from the State of Maine, with which the specimen was compared. Its teeth are not so fully developed, and there are found, in the space between the molars and cuspidati, no premolars; whereas, in the other species, there are one and sometimes two premolars. Hence it may be inferred that the Cave bear lived probably on vegetable rather than animal food.

Dr. Gould presented "*A Paper on the Orange Insect,*" drawn up from Notes made by the late Dr. W. I. Burnett.

Dr. Gould observed, that during the winter of 1853–4, the last which Dr. Burnett spent in Florida, our lamented associate undertook, among other researches, to investigate the structure and natural history of the Orange Insect. This is a minute insect of the Coccus tribe, which, within a few years, has so invaded the orange groves, as almost totally to destroy them. The essay commenced by him was left in a very imperfect state; and it is conjectured that he had prepared other materials so as to illustrate his paper with delineations in detail, but which are either in other hands or have been lost.

For the execution of his purpose, Dr. Burnett visited a place called Mandarin, formerly of considerable wealth, where, it is said, twenty vessels might at once be sometimes seen loading, but now in ruins. In 1837–8 Mr. Robertson carried to that place, from New York, two small orange trees, about two feet in height, bearing fruit about the size of an egg, with the insect upon them. The first year it was not known what they were; but in three years they had spread over the whole point. The annual yield at this time was about 1,500,000 oranges, worth about $10 a thousand. The orange growers reported that the orange insect would spread, during July and August, to the prickly ash. Dr. Burnett did not observe this, but noticed the same insect on the lemon.

The insect has eight segments, besides the triangular head piece. The females are from $\frac{1}{25}$ to $\frac{1}{20}$ of an inch in length. They usually contain from 8 to 15 eggs, the development of which continues all winter. The males are from $\frac{1}{35}$ to $\frac{1}{30}$ of an inch in length, and are winged. The wings lie over each other horizontally on the back, when at rest. They are two only, but behind them are halteres, consisting of a single joint, with a process curved like a shepherd's crook. The wings consist, as usual, of flattened cells. The legs have the middle pair shortest; tarsus one-jointed; abdomen rounded, (eight-jointed) with a teat-like process at the end, from which extends a long style, composed of two semi-canals. The mouth and oral apparatus is rudimentary, though the antennæ are ten-jointed and highly developed. The internal organs of nutrition are deficient or rudimentary, in this respect, corresponding with the oral parts. The eyes are four, two on each side; the eye proper is oval, situated laterally, and consisting of a solid body, $\frac{1}{1500}$ of an inch in diameter, perfectly structureless, imbedded in a dark red pigment, and covered with a thin cornea. The accessory eyes are anterior and lateral from the others, and of the same structure. The young, when excluded, are not fully formed, but remain under the shield of the mother, until developed, and able to crawl away; but as she may move along during oviposition, the embryos may be found behind or around her. The fact that one side of a leaf is frequently found covered with the scales of males almost exclusively, would seem to favor the idea that they are produced as a distinct brood; and another fact also, that among a hundred specimens, old and young, examined during the winter, almost all were females; and when, by chance, one male was found, others were certain to be near.

Dr. Gould presented the following communication from Mr. William Stimpson: —

ON SOME REMARKABLE MARINE INVERTEBRATA INHABITING THE SHORES OF SOUTH CAROLINA. BY WILLIAM STIMPSON.

ACTINIA PRODUCTA, Stimpson.

The low, sandy, and muddy shores of the Carolinas, are inhabited, in conjunction with a multitude of other animals of various classes, by a peculiar family of *Actinoid Polyps*, adapted, by their structure, to live in such apparently unfavorable localities. They are, like other species of the genus, attached to some object, such as a stone or shell, but this object is buried in the mud or sand often to considerable depth; and the cylindrical body of the animal, capable of great elongation, can thus either reach the surface of the mud and expand its tentacula, in search of food, or retire within it for protection. It is usually thus concealed during the retreat of the tide. On our coasts there are many species which have such habits, the most remarkable of which is that here described. It is about three inches long, and three fourths of an inch wide, in a contracted state, when it usually presents constrictions, more or less marked and varying in position, as in *Holothuria.* Its base is often attached eight or ten inches below the surface of the mud, and it must therefore have the power of elongation to this extent, when it is of a lengthened clavate form. Its color is a transparent yellowish-green. It has twenty equidistant longitudinal striæ or folds, indicating the partitions within, which meet at a point on the base of the animal, where there is no well-defined disk of attachment, but a globular, inflated appearance, as in *Edwardsia.* On the anterior third of the body, the longitudinal folds are more prominent, and each studded with a row of small elevated papillæ, which are numerous and closely arranged. These papillæ are largest toward the anterior extremity, and gradually diminish in size posteriorly, disappearing at about the middle. The tentacula are twenty in number, corresponding to the folds of the body, and are short, stout, enlarged and rounded at their extremities, which are covered with white dots. Five of these tentacula usually stand erect, the remaining ones curving over and alternating by threes with the erect ones. The animal retracts its tentacula very slowly when disturbed.

This species is found on the flats near Fort Johnson, S. C., near low water mark, in considerable numbers. Its position is indicated after the tide has retired, by little cracks on the surface of the mud, which radiate from a small central hole.

Lepton longipes, Stimpson.

The genus *Lepton* has already been noticed on our shores, a species from Florida having been described by Mr. Conrad. The specimens found have almost invariably been single valves, cast up on the beach, and such have been often seen on the shores of South Caroliaa. In March, 1852, Lieut. Kurtz and myself had the pleasure of discovering several animals of this genus alive, and of ascertaining its station. It lives in sand or mud, on the flats, near low water mark, at the depth of a foot below the surface, and generally occupies the holes of marine worms and fossorial crustacea. This species, from the great length of its foot, may be styled *L. longipes.*

Considering the confined nature of the places it inhabits, we are at once surprised by the activity it exhibits, and the high development of its organs. With its peculiar foot, when expanded, it can creep like a gasteropod, and when thus progressing, with its two long anterior cirri or tentacles waving in advance, it strongly recalls that higher order of mollusks.

The shell is half an inch in length, subtriangular, but somewhat rounded, slightly compressed, smooth and polished, broad anteriorly, and sloping at the posterior dorsal margin; the beaks elevated, and the lower margin nearly straight. The animal is everywhere white, nearly transparent. The mantle expands much beyond the margin of the shell, and is open in front, with undulated but unfringed margins. The anterior tentacles are two in number, simple and somewhat longer than the shell. A single ong posterior cirrus arises from the mantle on the dorsal surface, and is kept in continual motion like the anterior ones. The foot is a large, powerful organ, and may be expanded to a length equalling twice that of the shell. The margins of its sole are smooth, and it can be expanded, both horizontally and vertically. Posteriorly, it has a conical process or heel, which bears an opaque byssal gland at its extremity, secreting a glutinous substance, by which this portion of the foot adheres to external objects. There is no true byssus, although this adhesive substance may be slightly drawn out; but, on the other hand, the pedal process itself may be so extended as to form a mere thread, several times the length of the shell; and I have often seen the animal, when at rest, suspended in this singular way.

This species was found at Fort Johnson, in Charleston Harbor, and has since been ascertained to exist on many parts of the coast in that neighborhood.

Ancistropus sanguineus, Stimpson.

The animal now to be described is one of the numerous examples of the family *Gephyrea* of Quatrefages, which occur on our Southern coast. It appears to be by no means an uncommon form, as I have seen examples of the same genus from Florida and the West Indies, and the species called *Syrinx papillosus* in Forbes's "British Starfishes" is probably closely allied to it; but it seems to have as yet received no generic appellation, although its distinctive characters are well-marked. It is allied to *Echiurus* in its anatomy and in possessing the anterior hooks, but differs from that genus by the absence of posterior setæ, and of the proboscidiform anterior extremity.

This species inhabits holes in the mud near low water mark, often at the depth of two feet below the surface. Its form when taken is that of an elongated cylindrical sac, bent like a siphon; but it soon commences contracting violently at various points, after the manner of the *Holothuriæ*, and frequently destroys itself by rupturing the integument near the middle of the body. It is four inches in length, and two fifths of an inch in diameter. Its color is blood red, and it is everywhere covered with prominent fleshy papillæ, between which are often distributed minute, wart-like rugosities. A depressed line runs along the middle of the ventral surface, throughout its length. The mouth, situated at the anterior extremity, is slightly protractile, in the form of a membranous cup or short tube, and is surrounded by three or four narrow concentric rings. The papillæ in the vicinity of the mouth also show a tendency to circular arrangement, but further than this there are no indications of annulation upon the surface of the animal. On the ventral surface, near the anterior extremity, two slight prominences, one on each side of the median line, bear the slender flattened hooks, which arise from their muscular sheaths, precisely as in *Echiurus*. The intestine terminates posteriorly in an anal pouch or cloaca, and the branchial cæca empty into this pouch, instead of into the intestine above it. In other particulars the internal structure is much like that of *Echiurus*, as described by Quatrefages,* except that, in my specimens, only two generative sacs could be made out, which opened externally just behind the hook-pouches.

For this animal I propose the generic name *Ancistropus*, with the following character: —

Corpus elongatum, utriculare, cylindricum, papillosum; uncinis duobus anticis instructum. Proboscis nulla. Os simplex, terminale, in tubulum membranaceum protractile. Anus in extremitate corporis caudali locatus.

Thalassema Americanum, Stimpson.

The body of this species is short and thick, cylindrical anteriorly, and globosely rounded behind. The color is blood red, but becomes whitish posteriorly; ten narrow, longitudinal, whitish bands are conspicuous in the living animal, and the body is often covered with minute white dots. The surface is nearly smooth,

* Voy. en Sicile, ii., 226.

but when contracted the body is covered with transverse wrinkles, composed of minute rugosities, which are much the largest toward the posterior extremity. On the ventral surface there is a longitudinal, depressed line along the middle. A pair of small, slender hooks, usually retracted within their sheaths, are found close together, below, anteriorly, one on each side of the median line. The produced labium, or spoon-shaped oral process, which makes this genus so remarkable, is largely developed, and half as long as the body, even when contracted; but it can be extended to two or three times this length, and proportionally increased in breadth. It then resembles a broad curving membrane, of a transparent whitish color, with undulating margins and a somewhat pointed extremity. Its edge is distinct and transparent, giving it the appearance of being surrounded by a marginal vessel. Its curvature, and undulating sides, are caused by the central portions being less extensible than the other parts. This organ is kept in constant motion, and its concave or lower surface is often applied to the surface of other bodies, like the foot of a gasteropod. It is easily detached from the body, and in that condition retains its vitality for some time. When found separate it might easily be mistaken for some strange *Planaria*.

The length of this singular animal was two inches, including the labium; the greatest breadth of the body, half an inch. It forms its holes in indurated ferruginous sand, about six inches below the surface, in the third subregion of the littoral zone. Specimens occurred at Fort Johnson, in Charleston Harbor, in March, 1852.

Arenicola cristata, Stimpson.

The species here described was found by Lieut. Kurtz and myself on the shore of Maurice's Island, inside of Pelican Point, at the entrance of Charleston Harbor. It is a large and fine worm, probably the largest of its genus, as it grows to a length of sixteen inches, with a thickness of one inch. It is rather surprising that so large an animal should have been overlooked, especially as it is not uncommon in the localities where it occurs. It is the second species of the genus occurring on our coast, for *A. piscatorum* is now known to be an inhabitant of Massachusetts Bay.

The body is divided into about twenty-four principal rings (*segmenta*), the first seventeen of which are distinguished by as many narrow, elevated, circular ridges, more strongly marked above than below. Before the first of these ridges there are three secondary rings (*annuli*); between the first and second there are also three; between the second and third, and the remaining ridges there are four, or rarely five. The ridges of the first six rings bear on each side of the back a small pencil of setæ, consisting of two flattened brushes, of which the anterior is much shorter than the posterior. These pencils gradually increase in size posteriorly, and each is placed in a membranous sheath, which is retractile. The uncinate setæ are placed in an elongated row on the side of the ridge beneath the sheath of the superior ones.

The ridges of the next eleven rings bear not only the setæ of two kinds, but also the branchial tufts, which are largest on the middle rings, and very small on the first, — increasing in size posteriorly. These branchiæ are highly contractile, and when expanded, extend in the form of a semicircle from a cavity on the inner side of, and posterior to, the pencil of setæ. Their semi circular base consists, in the larger tufts, of about twenty main tubes joining each other laterally; these tubes then diverge and give off branches, the chief of which are alternate on the sides of the main trunk. The branching is then continued indefinitely.

The posterior rings of the body are not so distinctly marked with ridges as the anterior ones, and bear neither setæ nor branchiæ; but they usually present a variable number of short, thick, cutaneous processes, of the same color as the body. The thickness of the body is nearly the same throughout, there being no anterior enlargement, as is seen in the European species. The proboscis is short, covered with small papillæ, which have their abrupt sides presented outward or backward, and are arranged in very regular longitudinal rows, about twenty-four in number. The color of the animal is a rich, dark green, of various shades, often approaching to brown on the middle of the body. A dark-colored median line extends along the ventral surface. The circular ridges are of a light brown color; the setæ of a bright golden hue; the branchiæ, dark crimson; and the proboscis, reddish-brown.

It occurred in the third and fourth subregions of the littoral zone, living in holes in the hard sand, which it had excavated to a length of two feet. These holes were exactly adapted in width to the thickness of the animal, and were not furnished with a lining of any kind. They extended obliquely downward, being at first perpendicular, but curving so as to become almost horizontal; the lower extremity was about one foot below the surface. The locality where they were found was not exposed to the action of breakers, but was within the harbor, so that a slight deposit of mud covered the sand in which they lived. All the specimens were found in their holes, with the anterior extremity downward, and when taken, were trying to escape by digging still further into the sand, which is effected by continued rapid evolutions of the proboscis. The specimens, when handled, gave out a greenish coloring matter, which stains the skin in such a manner that it cannot be removed for many days.

During the latter part of March, we frequently observed in and about the holes of these worms, great quantities of a soft, transparent jelly, filled with minute brownish specks, which proved to be eggs.

ACOËTES LUPINA, Stimpson.

The species of the genus *Acoëtes* are remarkable for their great size, and also for inhabiting tubes, contrary to the general habits of the *Aphroditaceæ*; — the members of this family, with the exception here noticed, being better fitted for a wandering life, than Annelides of any other order, except the *Amphinomiaceæ.* The species here described is distinguished from its congeners, by the smallness of its scales, and does not yield to them in point of size, being often two feet and a half in length. It may be described as follows: —

Body vermiform, thick, flattened below, and somewhat convex above. Head very small, with two large pedunculated eyes, and five tentacles, three of which, above the eyes, are short, and two, below the eyes, long and tapering. Proboscis surrounded, at its extremity, with a margin of fleshy teeth, forming an upper and a lower row, the middle process in each row being larger than the others. Maxillæ four in number, forming a superior and an inferior pair, those of each pair so joined as to form, apparently, a single jaw, denticulated along its margins, with two strong teeth in front; these jaws move vertically upon each other, as in vertebrates. The first pair of feet bears scales; the second pair, cirri; the third and fourth pairs, scales; after which the feet throughout the body bear, alternately, cirri and scales. The cirri are short, thick, and pointed. The scales are so small as to leave the middle of the back, one third of its width, bare; they overlap each other slightly, in the same direction as in the genus *Lepidonote*, and not as in *A. Pleei.* Both the cirrigerous and squamiferous pinnæ have one or more additional tubercular or cirriform processes on the dorsal surface. The pinnæ, or feet, are not separated into dorsal and ventral rami; the setæ being all set in a single thick lobe, in front of which, above, arises a smaller, compressed, non-setiferous lobe. The setæ are of three kinds: first, a few simple capillaries; next, a cluster of strong, broad setæ, shaped at the end like a chopping-knife; lastly, and inferiorly, a plume of long, slender setæ, thickened and inversely barbed near their extremities. The inferior cirrus is as long as the superior one, but more slender. Color, reddish-brown, with a crimson median line on the inferior surface; setæ golden; cirri vermilion; scales light brown, punctate with black, and with bright sulphur-yellow margins. The specimen described is two feet in length, and seven eighths of an inch in breadth.

It inhabits a blackish tube, of a tough, glutinous structure, very thick, and composed of several layers, the exterior of which are very much mixed with mud. This tube is found in the sand or mud, descending into it perpendicularly, for a depth equalling the length of the animal. Its extremity does not project above the surface, where a small aperture only is observable. Its diameter is much greater than the thickness of the worm, which is thus enabled to turn end for end in it. It was thus frequently captured with its head downward, and its tail at the aperture of the tube, and it would seem to assume this position whenever disturbed. In taking its prey, it does not wholly leave its tube, but suddenly darts out its anterior extremity, seizing with its powerful jaws the small crustacea and soft mollusca upon which it feeds. It was found at low-water mark, on the flats in Charleston Harbor.

Dr. Gould also read extracts from a letter from Mr. Stimpson, describing interviews which he had recently had, in Australia, with distinguished naturalists, MacLeay and Macgillivray among others; and a letter from Mr. Sylvanus Hanley, of London, requesting an interchange of publications with the Society. Mr. Hanley's letter was referred to the Publishing Committee.

Dr. Cabot read a paper on a specimen of "*Wild Hybrid Duck*," propagated between the *Clangula Americana*, (Whistler, or Golden-Eye,) and the *Mergus cucullatus*, (Hooded Merganser,) of which the following is an abstract: —

This specimen was shot in the neighborhood of Scarborough, Me., by Mr. Caleb Loring, Jr., in May last, and exhibited to the Society in June, by Dr. Cabot. Mr. Loring, in his "shooting journal," says, the bird came in alone, passed his decoys, and a small flock of Whistlers, and alighted alone, on a part of the feeding-ground usually occupied by the Whistlers. In diving, the duck went down perpendicularly, like the Whistler, and not like the Mergus, which dives obliquely, and comes up at a distance from the place where it goes down. The supposed hybrid, which was evidently approaching adult age, resembles the Mergus most in the feathers and dermal parts, and the Clangula in the hard parts.

Dr. Cabot showed that the hybrid resembles the Mergus, in the shape and directions of the serrations projecting above the edge of the bill; in the terminal ungues on the lower and upper mandible; in the relative position and form of the nasal opening; in the relative length of the bill; in the form of the head and crest; and in the color of the plumage of the head. It resembles the Clangula in having a curved, instead of a straight edge, to the upper mandible; in the prolongation of the serrations below the edge of the lower mandible, and above the edge of the upper, approaching the sifting apparatus of the Clangula, and differing from the simple toothed form in the Mergus. It partakes about equally of both parents, in the width of the bill and in that of the tongue, though approaching rather more to the Clangula in the length of the œsophagus and proventriculus, and in the dimensions of the stomach, vitelline remnant, and trachea. The tympanum of the Clangula sends two bony plates up on the front and back of the trachea, rendering it perfectly inflexible to the distance of an inch ; this does not exist at all in the Mergus, and only to the extent of a quarter of an inch in the hybrid. The tracheal dilatation is about an inch long in the Mergus, two inches in the Clangula, one and a half inches in the hybrid. In the Mergus, it becomes flat when stretched, and does not become elongated more than any other part of the trachea ; in the Clangula, owing to the oblique arrangement of the rings, its long and transverse diameter are both increased ; in the hybrid, its posterior surface is somewhat flat, and it is not elongated more than any other part of the trachea. The posterior surface of this part, in the Mergus, is membranous, and soft ; in the Clangula and hybrid, the rings of the dilatation are firmer throughout their circumference than those of the trachea elsewhere. Rings of the dilatation in the Mergus, 15, very much flattened, and extending only half around the circumference ; in the Clangula, 19, firm, almost bony, complete ; in the hybrid, 14, not so firm, and somewhat flattened posteriorly. The last half inch of the trachea in the Mergus, has a pent-house ridge, forming an acute angle on its anterior aspect, which is wanting in the Clangula, and present, in a slight degree, in the hybrid. Left bronchus in the Clangula, $\frac{8}{16}$ of an inch across ; in the hybrid, $\frac{5}{16}$; in the Mergus, $\frac{3}{16}$; the left being the larger in the two former, and the right in the latter. The middle and outer toe of the hybrid are the longest ; the Mergus has the middle the longest, and the Clangula the outer. It resembles the Mergus in the markings of the secondaries of the wings, and those on the flank ; in the commencing appearance of the dark half collar, between the neck and shoulder, extending round toward the median line of the breast ; in the descent of the dark feathers low down upon the neck ; in the slight appearance of the white coloration of the wing coverts ; in having eighteen, instead of sixteen tail feathers, as in the Clangula ; in the size and proportions of the scapula ; and in the size and arrangement of the scales of the tarsus. It resembles the Clangula in the size and proportions of the sternum, furcula, clavicle, occiput, pelvis, and femur; in short, of all the bones except the scapula.

Dr. Cabot, in conclusion, stated, that if this bird is to be named as a distinct species, from these characters, and from the peculiarities and measurements of the viscera also, he would call it *Clangula mergiformis*. The testes of the specimen had been examined under the microscope, by Prof. J. Wyman and himself, but although much swollen, being half an inch in length, no spermatic particles could be found.

Dr. Charles T. Jackson exhibited some chlorophyl, or the green coloring matter of plants, which he had obtained from the Cochituate water.

Dr. Jackson also gave the following result of an analysis of *Allophane*, from Tennessee: water, 37.7; alumina, 41.0; silica, 19.8; lime, 00.5; magnesia, 00.2. This mineral is essentially, as will be seen, a hydrated silicate of alumina. Traces of phosphoric acid are likewise found in it.

Remarks were made by Drs. Gould, Abbot, and Durkee, upon the vegetable forms, principally Diatomaceæ, seen with the microscope in Cochituate water.

The Corresponding Secretary read a letter from Dr. James Lewis, of Mohawk, N. Y., dated Nov. 15th, 1854, accompanying a paper on Cyclas, Lymnea, &c., from which the following is an extract: —

"In addition to what I have observed respecting the variations of certain Lymneæ, I might say, that the effects of *locality*, *temperature*, and other things, on the forms of shells, seem to be equally apparent in other shells. I have found that all those shells which abound equally in the Erie Canal and the Mohawk River at this place, have local peculiarities, by which I can determine at a glance, almost, which of the two localities a certain number of shells may have been taken from.

"I have had my attention called to a peculiar form of the *Alasmodon marginata*, Say, from Ohio, (known as *A. truncata*, Say,) by a remark in a letter from one of my correspondents, who says, that 'Mr. Lea is of the opinion, that this *truncata* is the *female*.' The same shells are found here in the Mohawk River, and are all about one form, without any appearance of the truncation or shortening of the posterior, often seen in shells from Ohio. Having examined the *animals* as well as the shells, I am prepared to say, that the female differs from the male in form, only in being a very little more inflated. A careful examination of some Ohio shells, very much truncated, leads me to the conclusion that the shortening is incident to the shell only in certain localities, where the currents bear along substances that, coming in contact with the edges of the valves of the shell, break them down; and the result is, the growth of the shell is retarded at that point, and the efforts of the animal are directed to the renewal of the broken portion, while the growth of the shell proceeds regularly in those portions which are concealed in the mud, in which the animal partially buries itself. An inspection and comparison of the two forms of the shell will show the correctness of the above views.

"I have been anxious for some time to ascertain whether those shells known as *Lymnea reflexa*, and *L. umbrosa*, are confined to any particular geological sections, and, if so, what is the nature of those sections, or regions? I have some suspicion, that they are not specifically different from those shells we call *L. elodes;* but as I have no localities furnishing these shells, I am not able to arrive at any conclusions.

Physa.

"In comparing shells known as *P. elongata*, Say, from Massachusetts, New York, Ohio, and Michigan, I think I discover certain differences which may have escaped observation heretofore. The shells from Michigan have a suture somewhat flattened, like the suture of *P. ancillaria*, Say, while those from Massachusetts and New York have a very deeply impressed suture, and are smaller, &c., &c.

"If a further examination and comparison of these shells should reveal a specific difference, I would suggest, for the eastern shells, the name *P. elongatina.*"

REMARKS ON CYCLAS AND LYMNEA. BY DR. JAMES LEWIS.

Cyclas.

The genus *Cyclas* may be divided into three groups, having the following distinguishing features : —

First Group. Shells robust and somewhat ponderous ; surface usually marked with strong ridges, which, in some species, assume a very regular development on the beaks, or embryonic portion of the shell ; epidermis rather coarse, and often of a dark color, though this feature is liable to considerable change in the same species.

Examples. *C. similis*, *C. solidula*, *C. fuscata*, *C. distorta*, &c.

Second Group. Shells less robust, but moderately firm ; surface generally smooth, though the lines of growth are usually somewhat conspicuous ; valves usually inflated ; epidermis finer than in the preceding group, and often marked by zones of strongly contrasting colors.

Examples. *C. elegans*, *C. occidentalis*, *C. cardissa*, &c.

Third Group. Shells thin and fragile, and often translucent ; beaks usually elevated above the hinge margin, in a conspicuous manner, and surrounded by the embryonic portion of the shell, which is distinctly separated from the rest of the shell, by a deeply indented line ; surface of the shell very smooth, and the lines of growth frequently so fine as not to be easily distinguished ; epidermis fine, and sometimes zoned by delicate shades, but not often by strongly contrasting colors.

Examples. *C. transversa, C. partumeia*, *C. securis*, &c.

Lymnea.

In an article on *Lymnea,* that I presented to the Society a few months since, some remarks were offered, showing the specific identity of two forms of *Lymnea* found in contiguous localities. The forms previously alluded to are, first, a variety recognized as one of the forms of *L. catascopium*, Say ; second, a variety which some of my correspondents recognize as *L. emarginata*, Say.

Since identifying these forms as mere local varieties of one species, my attention has been drawn to another local modification of the shells I am induced to regard as a variety of *L. catascopium*, to explain which, requires an allusion to the localities in which the shells are found.

These shells, having the form of *L. catascopium*, abound in the Erie Canal, at Mohawk, Herkimer Co. N. Y. From the canal, many other contiguous waters, (pools, ditches, and creeks,) derive many of the shells that abound in them; and more especially is this shown at certain places where the waste waters from the canal find their way into small shallow streams, either through waste gates, or over the sides of aqueducts, that have their sides no higher than the greatest fulness of the canal requires.

Into a small stream, known as Fulmer's Creek, (Mohawk, N. Y.) considerable waste water from the canal is discharged, bearing along small chips and bits of flood wood, having upon them the germs, or young of *Physa*, *Lymnea*, &c., and these find a resting-place at various spots along the shallow portions of the stream, and, under the modification of a very different locality, assume a very different form of growth from what may be observed in the locality where they originated. (It may be well to remark, that in that part of the creek above the canal, there are no shells of any kind, while below, they are somewhat numerous.)

In comparing the two forms of shells found in the canal and creek, the following characters will be found most conspicuous.

In the canal, the shells have but a few whorls, and those rapidly enlarged; the aperture about as long as the spire; the shells somewhat ponderous, but less so than may be observed in *L. catascopium* in more favorable localities. In the creek, the shells assume the elongated spire and increased number of whorls observable in *L. elodes*; the aperture, instead of being about equal to the length of the spire, is frequently about one third the length of the whole shell, sometimes a little less; and generally, those shells found in the creek, are such as would at once be considered *L. elodes*, though there are a great number of forms to be found intermediate to the two forms most remote. The effect of locality, in addition to the modification of form, is also to change the color of the shell; those in the canal, when cleaned of the dark pigment usually found on them, being of a light yellowish horn color, not remarkably translucent, except in the less ponderous shells; while those found in the creek are of a darker color, the surface somewhat modified by longitudinal bands, of a light brown color, inclining to purple; the shells become also more translucent.

The inference from these observations is, that those shells known by the names of *L. catascopium*, *L. emarginata*, and *L. elodes*, are modifications of one type or species, in which we discover the influence of locality, temperature, &c., in varying the method of development.

Dr. Shaw exhibited a specimen of *Bituminous Coal*, from the Straitsville mines, Perry Co. Ohio. These mines have been recently opened, and it is proposed to introduce the coal to the Eastern market. It is estimated that it can be delivered in New York at seven dollars per ton. It contains only about two per cent. of inorganic matter. About forty per cent. of gas can be obtained from it, of good illuminating power, the residuary coke being also of good quality, and the process, at least when tried on a small scale, free from caking. A horizontal shaft, twelve feet square, has already been opened two hundred feet in one vein, and without reaching either the top or the bottom of the vein. Cannel coal, and several ores of iron, are found in the same neighborhood.

The Corresponding Secretary read letters from the Verein zu Beforderung des Gartenbaues zu Berlin, dated Sept. 25th, 1854, proposing an exchange of publications; Société Royale des Sciences de Liége, dated July 8th, 1854, presenting a volume of its Memoirs, &c.; from the Same, — from the American Philosophical Society, dated Oct. 20th, 1854, — and the Royal Society of Sciences at Göttingen, dated July 2d, 1854, acknowledging the reception of publications of this Society; K. Akademie der Wissenschaften zu Wien, dated

July 7th, 1854 ; K. Bayerische Akademie der Wissenschaften, dated July 30th, 1854, asking that missing plates of the Society's Journal may be supplied to them ; K. Akademie der Wissenschaften zu Wien, dated March 11th, July 18th, and August 10th, 1854, presenting its publications.

Prof. B. Jaeger, of Providence, present by invitation, made a few remarks, and presented a copy of his work on the "Life of North American Insects." The thanks of the Society were voted for the gift.

The Committee appointed to nominate officers for the two vacant Curatorships, reported, — That they nominate Dr. J. Nelson Borland to fill the Curatorship of Herpetology ; and Dr. Borland was accordingly elected.

Mr. Roswell Field, of Greenfield, and Rev. P. H. Greenleaf, of Madison, Indiana, were elected Corresponding Members, and Messrs. Charles L. Andrews, and L. M. Sargent, Jr., of Boston, Resident Members.

December 20, 1854.

The President in the Chair.

Prof. J. Wyman referred to the commonly received explanation of the manner in which birds retain their position in roosting. Bovelli attributed the bending of the toes to the mechanical action of the salient angles, over which the flexor tendons passed. Prof. Wyman thought this gave, at best, but a partial explanation ; for, while roosting, the body requires to be accurately balanced, since, at every act of respiration, the centre of gravity must necessarily be changed, and the requisite adaptations can be effected by muscular action only. In those Waders which roost on one leg, the balancing of the body becomes a matter of still greater nicety; and in these, too, the tibia is not flexed upon the tarsus, therefore the tension of the tendons, as stated by Bovelli, would not be effectually produced. In bending the leg of a dead bird, the toes do not adapt themselves to the surfaces on which they rest. He thought the explanation must be found in reflex muscular action, an explanation which had been suggested to him by Dr. S. Cabot.

A letter was read from Mr. Roswell Field, of Greenfield, Mass., thanking the Society for his election as Corresponding Member.

Dr. A. A. Gould presented the result of an examination of some deep dredgings off the coast of Georgia and Florida, by the officers of the Coast Survey, as follows: —

Swainson, (in Lardner's Cabinet Cyclopedia, 1840,) indicates the genus *Pedicularia* for some small patelliform shells, of an irregular outline, conforming to the bits of coral from which they were taken. He describes them "as, in general, oval, without a distinct apex, with a callous, prominent rim, placed on one side only of the inner surface." His specimens were from Sicily, and he calls them *Pedicularia Sicula*. Mr. J. E. Gray, commenting upon it, (Ann. & Mag. Nat. Hist. 1846, p. 428,) says the same thing was described by Philippi, under the name of *Thyreus paradoxus*. Mr. Gray, from an examination of a dried animal, considers it allied to Concholepas, which the shell, though so small, greatly resembles. We have now specimens obtained off the coast of Georgia, from the extraordinary depth of 400 fathoms, in company with two or three other minute shells. It is evidently a species of Swainson's genus, and enables us to give more fully the characters of the genus. The apex, though somewhat obtuse, is well marked, very much like that of *Concholepas* on the left side, at the upper third. It is well indicated in this species by the delicate radiating lines of the surface, departing from it, and rendering the whole exterior minutely and beautifully cancellated. The shelf on the left, or columellar side is not simply a partition, as in *Crepidula* or *Navicella*, but a true columella, and if broken transversely across, shows an entire volution of the shell around it. At the upper termination of this columella is always found a small notch or canal, and at the anterior extremity is a shallow canal as in *Concholepas*. In short, its structure and habit seem to be those of the shell well known as *Purpura monodonta*, Quoy, or *P. madreporarum*, and which Dr. Gould refers to the genus *Leptoconchus*, (Mollusca of Exploring Expedition.) Whatever may be the true genus, Dr. Gould thinks these two shells are clearly allied. Until further light, however, he would prefer to have it retained under Swainson's genus, and called *Pedicularia decussata*.

Shell small, solid, irregular, in general elongated oval, with a prominent obtuse apex on the upper third of the left side, inclining laterally. Surface finely decussated with concentric or radiating lines; outer lip thickened, and somewhat revolute ; inner lip sharp, straight, with a submarginal groove. Length, $\frac{1}{6}$ inch. Breadth, $\frac{1}{8}$ inch.

Dr. Gould also communicated a description of several new species of land and fresh-water shells, as follows : —

NEW SPECIES OF LAND AND FRESH-WATER SHELLS FROM WESTERN (N.) AMERICA.

HELIX ÆRUGINOSA. Testa globoso-conica, solidula, umbilicata, indentata et minutissimè granulata, coloribus rufo-olivaceis et flavis variegata et fasciâ fuscâ cincta ; anfractibus 7 convexis : apertura rotundato-ovata ; labro reflexo, incarnato ; fauce lividâ. Diam. $1\frac{2}{5}$ poll. ; axis $\frac{4}{5}$ a $\frac{9}{10}$ poll. Brought from San Francisco by Dr. Bigelow.

Has the general form and coloring of *H. Townsendiana*, Lea, and the aperture of *H. tudiculata*, Binney. The former has a different aperture, revolving striæ, and is destitute of a band ; the latter is not umbilicated ; and neither have a granulated surface.

HELIX INFUMATA. Testa magna, discoidea, biconvexa, ad peripheriam obtusè carinata, latè umbilicata, supra infumata et rugis minutis obliquis asperata, infra nigerrima, nitida et minutissimè granulata ; anfr. $6\frac{1}{2}$ convexiusculis : apertura rhomboidea ; labro rufo, basi reflexiusculo ; fauce sericeâ, lilacinâ, propè labrum fuscescente. Diam. $1\frac{1}{2}$; axis $\frac{4}{5}$ poll. Brought from San Francisco by Dr. Bigelow.

Has about the form and color of *H. plicata*, Born, without its complicated aperture. It might at first be mistaken for *H. Nuttallii*, Lea, but is distinguished by its lenticular form, smoky black color, and its peculiar rasp-like and granulated surface.

Physa bullata. Testa mâgna, ovato-ventricosa, tenuis, fragilis, lucida, cornea : spira elevata, acuta ; anfr. 6, ultimo inflato ; suturâ benè impressâ : apertura latè ovata, $\frac{5}{6}$ long. testæ adequans ; labro tenui, rufo submarginato ; columellâ valdè flexuosâ, callo indutâ. Long. 1 poll. ; lat. $\frac{10}{20}$ ad $\frac{11}{20}$ poll. Found in Oregon, by Dr. J. G. Cooper.

Distinguished by its large size, inflated form, and delicate structure ; sometimes the form is somewhat cylindrical. It accords most nearly with Haldeman's pl. 3, fig. 9, which was given him as *P. Sayi*, Tappan. It is much more delicate, and less polished than *P. heterostropha*, Say, and the aperture is less elongated.

Physa humerosa. Testa subrhomboidea, solidula, polita, albida : spira acuta ; anfrac. 5 tabulatis : apertura $\frac{1}{2}$ ad $\frac{2}{3}$ long. testæ adequans, posticè rotundata ; labro expanso ; columellâ vix plicatâ, callosâ, ferè perforatâ. Long. $\frac{1}{2}$ ad $\frac{7}{10}$ poll. ; lat. $\frac{3}{8}$ poll. Found by Dr. Thomas H. Webb, and by W. P. Blake, in the Colorado Desert and at Pecos River.

The broadly tabulated whorls, with the acute, elevated spire, and foldless pillar clearly distinguish this species. It is like *P. tabulata*, Gould, and the variety figured by Haldeman, as *P. ancillaria*, (fig. 7,) which he regards as a monstrosity ; the deep suture and simple columella distinguish it from that species.

Physa virgata. Testa modica, solidula, glabra, elongato-ovata, cinerea olivaceo longitudinaliter virgata : spira elevata, acuta ; anfrac. 4 – 5 benè discretis : apertura lunata, $\frac{2}{3}$ longitud.

testæ adequans; columellâ modicè plicatâ, valdè callosâ; faucibus luteo-rufescentibus. Long. $\frac{2}{5}$; lat. $\frac{1}{4}$ poll.

Found by Dr. T. H. Webb, in the River Gila, and near San Diego.

Quite remarkable, as being the only species yet known which has variegated coloration. The stripes are found on some part of every shell, and many are prettily ornamented throughout. In size and proportions, it may be compared with *P. microstoma*, Haldeman.

Planorbis ammon. Testa magna, discoidea, subconica, subtiliter striata; latere sinistro latè et profundè concavo, anfractus quatuor obtusè carinatos exhibente; latere dextro concavo, anfr. duos cum dimidio rotundatos monstrante: apertura ovato-triangularis, interdum utroque valdè expansa: axis $\frac{5}{8}$ ad 1 poll.; diam. $\frac{1}{4}$ ad $\frac{1}{2}$ poll.

Found by Dr. T. H. Webb, in the Cienaga Grande, or Colorado Low Desert, and also by Mr. W. P. Blake.

The specimens differ greatly in size, and in the development of the aperture; but all agree in the peculiar slope of the outer volution, giving them a conical or dome-shaped form when lying on the left side. Fully developed specimens are much like *P. corpulentus*, Say, but the shape of the volution and aperture differ, and the striæ are less coarse, and more like *P. glabratus*, Say.

Planorbis gracilentus. Testa discoidea, compressa, albida, concinnè striata; latere dextro planulato; latere sinistro modicè concavo; utrinque, anfrac. 4 rotundatis, anfr. externo ad peripheriam obtusè angulato: apertura perobliqua, rotundato-ovalis. Axis $\frac{1}{8}$ poll.; diam. $\frac{1}{2}$ poll.

Found by Dr. T. H. Webb, in the great Colorado Desert low lands.

No North American species, of equal size, can be compared with this well marked, wheel-shaped species. Very small specimens are like large specimens of *P. deflectus*, Say. A species from the Nile is very similar.

Amnicola protea. Testa, elongata, gracilis, variabilis; anfr.

7 – 8 rotundatis, profundè discretis, simplicibus vel liris volventibus et costis longitudinalibus variè ornatis et clathratis: apertura ovata; labro continuo, simplici, anfractum penultimum vix attigente. Long. (exempli maximi) $\frac{3}{10}$; lat. $\frac{1}{10}$ poll.

From the Colorado Desert (Gran Jornada) Dr. T. H. Webb; W. P. Blake.

Peculiar from its large size, and slender form, though differing greatly in its relative proportions. It differs from all others, in being variously sculptured with revolving ridges and longitudinal folds, like most Melaniæ.

Amnicola longinqua. Testa parva, elongato-ovata, glabra; apice obtuso; anfract. 5 rotundatis; suturâ profundâ: apertura elliptica, posticè rotundata; columellâ valdè arcuatâ, sub-perforatâ. Long. $\frac{1}{8}$; lat. $\frac{1}{10}$ poll.

Found in the Colorado Desert (Cienaga Grande) by W. P. Blake.

In form, it is much like *A. Cincinnatiensis*, Hald., or like *A. galbana*, or like miniature specimens of *Paludina ponderosa*. It has a bleached or chalky color, probably from exposure, like the other species found on the Cienaga Grande; a region which is immersed a portion of the time, and dry the remainder, and was once, apparently, an extensive marsh, or shallow lake.

Dr. Gould observed that certain modes of sculpture of shells obtain in certain regions of the globe, and often serve to a practised eye to determine their locality. The Helices here described have the indented surface so usual in California and Oregon species.

DONATIONS TO THE MUSEUM.

October 4th. A specimen of Gold Ore, from Bridgewater, Vt., and a specimen of Lead Ore; by Rev. Theodore Parker. Several joints of the Basaltic columns of the Giant's Causeway; by Mr. Henry B. Stanwood. A mass of Quartz Crystals; by Mr. C. R. Thayer.

October 18th. A specimen of Short-eared Owl; by Mr. Thomas H. Hinckley, of Milton. A specimen of Cannelton Coal, and a specimen of Coral from San Juan d'Ulloa; by Mr. T. J. Whittemore.

November 1st. A specimen of rock, bearing dendritic markings, from Dorchester, Mass., near Neponset River; by Mr. Edward Wigglesworth. Specimens of Millet, purporting to have been produced from ancient Egyptian seed; by Mr. James W. Paige.

November 15th. A specimen of Native Copper from Huron Mine, Portage Lake, Lake Superior; by Mr. James A. Dupee. A specimen of Bituminous Shale, from the city of Lawrence, Kansas; by Dr. T. M. Brewer.

December 6th. Specimens of *Esox reticulatus*, from Charles River; carefully prepared and presented by Mr. Charles J. Sprague.

December 20th. Bones of a young Tiger; by Dr. J. C. Warren. Skins of *Accipiter Cooperi*, Cooper's Hawk; *Hypotriorchis columbarius*, Pigeon Hawk; *Otocoris alpestris*, Shore Lark; *Mniotilta virens*, Black-throated green Warbler, and *Regulus calendula*, Ruby-crowned Wren; by Mr. Thure Kumlien. Eggs of *Gallinula chloropus*, common American Gallinule; *Podilymbus Carolinensis*, Pied-billed Grebe; *Tetrao cupido*, Pinnated Grouse; *Pterocyanea discors*, Blue-winged Teal; *Hydrochelidon fissipes*, American Black Tern; and the nest of *Icterus xanthocephalus*, Yellow-headed Blackbird; by the same. Skins of *Columba palumbus*, Ring Pigeon; *Pica caudata*, Magpie; *Accipiter nisus*, Sparrow Hawk; *Ramphastos erythrorhynchos*, Red-billed Toucan; by Dr. F. J. Bumstead. *Otus Wilsonius*, Long-eared Owl; *Lanius septentrionalis*, Northern Shrike; *Accipiter fuscus*, Slate-colored Hawk, 2 specimens; *Dolichonyx orizivora*, Bobolink; *Rallus Virginianus*, Virginia Rail; *Gallinago Wilsonii*, Common American Snipe; by Mr. Emanuel Samuels. Specimens of *Stigmaria ficoides*, *Sigillarià*, and *Calamites*, from Cumberland, N. S.; by Mr. W. W. Greenough.

BOOKS RECEIVED DURING THE QUARTER ENDING DECEMBER 31, 1854.

Descriptions of New Fishes collected by Dr. A. L. Heerman. By Charles Girard. 8vo. Pamph. Philadelphia, 1854. *From the Author.*

History of the Fishes of Massachusetts. By D. H. Storer. 4to. pp. 91-130. Boston, 1854. *From the Author.*

Report of the Superintendent of the Coast Survey, for 1852. 4to. Washington, 1853. *From A. D. Bache.*

Report of Special Committee of the Regents of the Smithsonian Institution. 8vo. Pamph. Washington, 1854. *From Hon. S. H. Walley.*

The Same. *From the Smithsonian Institution.*

Archiv für Naturgeschichte. Gegründet von A. F. A. Wiegmann. Fortgesetzt von W. F. Erichson. Herausgegeben von Dr. F. H. Troschel. 1, 2, 3, 4, 5, 6. 1852-4. *From Dr. F. H. Troschel.*

Archives de Physiologie de Therapeutique et d'Hygiène. Sous la direction de M. Bouchardat. No. 1. Janvier. 1854. 8vo. Paris. *From the Author.*

Auffindung von Quecksilber in der Luneburgischen Diluvial Formation. Mitgetheilt von T. Fr. L. Hausmann. 8vo. Pamph. *From the Author.*

On Signor Carlo Matteucci's Letter to H. B. Jones, Editor of Dr. Du Bois Reymond's Researches in Animal Electricity. By Emile du Bois Reymond. 8vo. Pamph. London. *From the Author.*

Illustrations of the Birds of California, Texas, Oregon, British and Russian America. By John Cassin. No. 7. 8vo. Philadelphia, 1854. *From the Author.*

Life of North American Insects. By Prof. B. Jaeger, assisted by H. C. Preston. 8vo. Providence, 1854. *From the Author.*

Wegweiser für die Besucher des K. Botanischen Gartens in München. Von Dr. C. Fr. Ph. von Martius. 12mo. München, 1852. *From the Author.*

Ueber das Klima von München. 4to. Pamph. 1851. Von Carl M. Kuhn. *From the Author.*

History of the Kine Pox. 8vo. Pamph. 1800. *From Dr. A. L. Tirrell.*

Report of an Expedition down the Zuni and Colorado Rivers. By Capt. L. Sitgreaves. 8vo. Washington, 1854. *From Hon. Charles Sumner.*

Report of City Surveyor of Montreal. 8vo. Pamph. 1853. Annual Report of the Treasurer of the City of Montreal. 4to. Pamph. 1854. *From L. A. H. Latour.*

Report on the Coast Survey during 1852. 4to. Washington. Statistical View of the United States. By J. D. B. DeBow. 8vo. Washington, 1854. *From Hon. William Appleton.*

Report of the Astronomer Royal, to the Board of Visitors. 4to. Pamph. London, 1854.

Regulations of the Royal Observatory, Greenwich. 4to. Pamph. London, 1852. *From the Smithsonian Institution.*

Annals and Magazine of Natural History. Vol. XIV. No. 81, Sept. 1854.; No. 82, Oct. 1854; No. 83, Nov. 1854.

Leçons sur les Phénomènes Physiques des Corps Vivants. Par C. Matteucci. 12mo. Paris, 1847. *From the Courtis Fund.*

Quarterly Journal of the Geological Society. Vol. X. Part 3. August, 1854. 8vo. London.

Proceedings of the Academy of Natural Sciences of Philadelphia. 8vo. Vol. VII. Nos. 4, 5.

New Orleans Medical and Surgical Journal. Vol. XI. No. 2, for Sept. 1854; No. 3, for Nov. 1854.

Proceedings of the California Academy of Natural Sciences. Vol. I. pp. 1–10. 8vo. San Francisco.

American Journal of Science and Arts. No. 54, for November, 1854. 8vo. New Haven.

Michigan Farmer. Edited by R. F. Johnstone. 8vo. Nos. 10, 11, and 12. Vol. XII. Detroit, 1854.

New York Journal of Medicine and the Collateral Sciences. No. 69. Nov. 1854. New York.

Mémoires de la Société Royale des Sciences de Liége. Tome 9ième. 8vo. Liége, 1854.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften zu Wien. Band XII. January – April, 1854. Also Band XI., No. 10, for December, 1853. Denkschriften der K. Akademie der Wissenschaften. Band VII. 4to. Wien, 1854.

Verhandlungen des Vereins zur Beförderung des Gartenbaues in den Königlichen Preussichen Staaten. I. – XII. 8vo. 1353 – 4. Berlin.

Erst Säcularfeier der Königlichen Gesellschaft der Wissenschaften zu Göttingen am 29 sten November, 1854. 4to. Pamph. Göttingen, 1854.

Transactions of the Cambridge Philosophical Society. Vol. IX. Parts 1-3. 4to. Cambridge, 1851-3.

Gelehrte Anzeigen. Herausgegeben von Mitgliedern der K. Bayer. Akademie der Wissenschaften. XXXVIII. München, 1854. *Received in Exchange.*

Encyclopædia Britannica. 4to. Vol. 6. Boston, 1854.

History of the United States. By George Bancroft. Vol. VI. 8vo. Boston, 1854. *Deposited by the Republican Institution.*

January 3, 1855.

The President in the Chair.

The President presented to the Society, a copy of his recently published volume, entitled, "Genealogy of Warren."

The following communication was received, and read, from Mr. I. A. Lapham, of Milwaukee, Wisconsin:

ON THE NUMBER OF TEETH OF THE MASTODON GIGANTEUS. BY I. A. LAPHAM, OF MILWAUKEE, WISCONSIN.

Much interest was imparted to the Annual Exhibition of the Wisconsin State Agricultural Society, for 1854, by a fragment of the lower jaw bone of the extinct *Mastodon giganteus*, found buried six feet deep in the ground, at a place known as Terre Coupée, Michigan, by Mr. A. H. Taylor. It was the right ramus, and a small portion of the extremity of the left, with three teeth, the anterior one much worn, especially on the exterior side. Its entire length is 26 inches; its height and thickness is 6½ inches, measured opposite the space between the last two teeth. The posterior elevated portions of the jaw are broken off; and also the pointed extremity, where no traces are to be seen, either of the small tusks that belong here, or of their cavities. The line of the teeth has something of a spiral direction, the posterior being directed obliquely inwards, the middle one more nearly parallel with the general direction of the bone, while the anterior tooth has a slightly outward direction.

The anterior tooth consists of six mastoid processes, forming three transverse ridges, interrupted by a central depression ; but the three inner processes are worn off obliquely, and the outer half of the tooth is worn down to the base of the eminences. Where the enamel is worn off, the dentine or bony matter within, constituting the main body of the tooth, is covered with a black, very hard, horny layer ; the hardness of this thin coating aids the mastication of food, and materially retards the detrition. This tooth is 4.2 inches long, measured over the inner row of cusps, and 3.8 inches over the outer row ; its breadth anteriorly is 3 inches, posteriorly 2.8 inches ; its circumference 14 inches. There are two fangs, but the posterior one appears to be made up by the union of two. The tooth is loose, easily removed from its place in the alveola, and the extremities of the fangs are much abraded ; the bone appears to be filling the socket from below, so that this tooth is clearly deciduous, and would soon have been shed.

The next or middle tooth in the specimen exhibited, is the largest and most prominent of the three, the length being 6.8 inches, breadth 3.6 inches, circumference 19 inches. It has four ridges, or eight cusps, and the rudiment of another ridge on the posterior end. The three inner cusps are most worn, the anterior inner one having entirely disappeared. This tooth is pressed closely against the anterior tooth, as if crowding it forward, while it stands entirely separate from the one behind. It is loose, but cannot be removed from the socket.

The posterior tooth is evidently in a growing condition. It has four transverse ridges, each divided, in the usual manner, into two cusps ; the last ridge is nearly hid beneath the bone, not having yet fully crowded itself out. The two anterior cusps are by far the largest and most elevated ; and the tooth is much the largest and broadest in front. This tooth is but very little worn, and only on the two anterior prominences. Its breadth over the anterior cusps is 3.6 inches ; over the last exposed cusps, 2.9 inches ; its length is about 6 inches, though this, and the circumference cannot be accurately measured, on account of the concealment of the posterior extremity.

The aperture below the middle process of the front tooth is ovate, 1.1 inches long and $\frac{3}{4}$ of an inch high ; the posterior side being the smaller. The aperture near the anterior extremity of the jaw, has a subquadrangular form, a little more than half an inch long, and a little less than half an inch in height.

The portion of the left branch of the jaw remaining, extends back to the origin of the first tooth, exhibiting the broad, smooth channel, or groove, occupied by the tongue. The abrupt deflection of this groove anteriorly, and the want of a beak, or prolongation of the bone in front, excludes this fragment from the *Mastodon longirostris ;* and the proportionate breadth of the teeth, as clearly indicates that it does not belong to the *Mastodon angustidens.* I therefore conclude that the specimen belongs to the *M. giganteus.*

On referring to works on the *Mastodon giganteus*, I find it stated, that there are six molar teeth in each branch of the jaws. These teeth are produced at different times, those in front being shed, while others are forming behind. Of these teeth the *fifth* * corresponds with the first, in the specimen before me. This indicates an animal of considerable age, having already shed four teeth on each side of each jaw, or sixteen teeth in all. The middle tooth in the specimen, corresponds with that of the *sixth* and last, as described by Dr. Warren, so that the posterior tooth is one not before observed in any of the bones heretofore found.

If we admit that the teeth advance as the animal increases in age, those in front being shed, while others are formed in the posterior portion of the jaw, I see no good reason why this process may not be continued indefinitely, and the ultimate number of teeth be regulated by the age and healthful condition of the individual. In this view of the subject, there are no permanent molars. Disease or death may arrest the process of dentition, at any stage of its progression ; and there may be instances, where the last formed tooth is considerably advanced, without the formation of others behind. Such animals would soon become toothless. Other individuals, of more vigorous growth, may be sup-

* As described in "The Mastodon giganteus of North America," by John C. Warren, M. D. Boston, 1852. p. 68. I am indebted to the liberality of the author, for a copy of this superb and truly excellent work.

posed to attain the seventh, or, in extreme cases, even a greater number of teeth, without the least change in the laws that govern this process.

Cuvier states the number of molar teeth, in the *Mastodon giganteus,* as four in each branch of each jaw;* the formula being:

Incisive, $\frac{2}{0}$; Canine, $\frac{0}{0}$; Molar, $\frac{8}{8}$.

The late Dr. Godman, of Philadelphia, discovered two additional tusks in the lower jaw of the male; † so that his statement of the dental system would be,

Incisive, $\frac{2}{2}$; Canine, $\frac{0}{0}$; Molar, $\frac{8}{8}$.

Dr. Hays, of the same place, discovered a fifth ‡ molar tooth in each branch of the jaws, or

Incisive, $\frac{2}{2}$; Canine, $\frac{0}{0}$; Molar, $\frac{10}{10}$.

He suggested the probability of the existence of a sixth molar; and Dr. Warren § informs us, that subsequent discoveries have confirmed this suggestion; the teeth known to him being,

Incisive, $\frac{2}{2}$; Canine, $\frac{0}{0}$; Molar, $\frac{12}{12}$.

He further informs us, that numerous specimens support the opinion, that the number of molar teeth is twenty-four, and no more.

But it has been very clearly shown above, that, at least in one case, there was one more molar tooth, being the seventh, and that the system, as now determined, is as follows:

Incisive, $\frac{2}{2}$; Canine, $\frac{0}{0}$; Molar, $\frac{14}{14}$.

Mr. Charles Stodder read some extracts from an article in the American Journal of Science and Arts, Vol. XIX. p. 55, (taken from the Comptes Rendus, June 2, 1854,) entitled, "Report to the Academy of Sciences, Paris, on the *Researches relative to Earthquakes*, of M. Alexis Perrey; by the Commission M M. Liouville, Lamé, and Elie de Beaumont, reporter."

* Ossemens Fossiles. Tome I. 1821.
† Tr. Am. Phil. Soc. New Ser. III. p. 478. 1830.
‡ Tr. Am. Phil. Soc. New Ser. IV. p. 317. 1831.
§ The Mastodon, &c. p. 66. 1852.

" The Academy has charged us with reporting on a memoir, presented March 21st, 1853, by M. Alexis Perrey, Professor in the Faculty of Sciences, at Dijon, *On the Relations which may exist between the Frequency of Earthquakes and the Age of the Moon*, and on a note presented the 2d of January, *On the Frequency of Earthquakes relatively to the times of the Moon's passing the meridian.*

" If, as is now generally supposed, the interior of the earth is in a liquid or pasty state, through heat, and if the globe has, for its solid part, only a crust comparatively very thin, the interior liquid mass must tend to yield, like the surface waters, to the attractive forces exerted by the sun and moon, and there must be a tendency to expansion in the direction of the radius vectors of these two bodies; but this tendency encounters resistance in the rigidity of the crust, which is the occasion of fractures and shocks. The intensity of this cause varies, like that for the tides of the ocean, with the relative position of the sun and moon, and consequently with the age of the moon ; and it should also be noted, that as the ocean's tides rise and fall twice in a lunar day, at periods dependent on the moon's passing the meridian, so in the internal fluid of the globe, there should be two changes a day, the time varying with the same cause.

" Without entering now into more details, it will be easily conceived, that if the mobility of the internal mass of the globe plays a part in the production of Earthquakes, there must be some dependence, admitting of study, between the occurrence of an Earthquake and the circumstances which influence the action of the moon on the whole globe, or on any place or portion of it; that is, the angular distance with the sun, its actual distance from the earth, and its distance from the meridian of the place; or, in other terms, the age of the moon, the time of perihelion, and the hour of the lunar day.

" These considerations, which have not escaped M. Perrey, have, beyond doubt, inspired the idea of the twofold work which we have been charged to examine ; and they have obtained for the views, the interested attention of M. Arago and many other men of science. They have involved on the part of the author, the determination of the precise date and period of the moon, for each Earthquake on record, and even for each shock of which Earthquakes may consist — a work of vast labor.

" M. Perrey has tabulated all the Earthquakes recorded since 1801, and ' by discussing the catalogues which he has formed, shows by three ways, independent of one another, the influence of the course of the moon on the production of Earthquakes,' viz: —

1st. " That the frequency augments on the syzygies."

2d. " That the frequency augments in the vicinity of the moon's perigee, and diminishes towards the apogee."

3d. " That the shocks of Earthquakes are more numerous when the moon is near the meridian, than when 90 degrees from it."

But in each of these results, he finds some " minor " and some " large anomalies."

Some years since, Mr. Stodder read before this Society a paper on the *Changes of the Surface of the Earth.* In this paper he proposed the hypothesis, that the centrifugal force of the diurnal rotation of the earth, acting on the fluid interior mass (if such is the condition of the interior) of the earth, was the cause of Earthquakes, and that if there has been any change in the position of the poles of the earth, that the centrifugal force, which gives the earth its spheroidal form, in changing the form of the earth to correspond with the new position of the poles, is sufficient to account for all the geological phenomena of the fracturing of strata, elevation of mountain chains, &c.; and that no other cause has yet been assigned, that is adequate to such effects. This paper, he supposed, has failed to convince any geologist of the soundness of the arguments it presented, and had probably been forgotten by those who heard it. For himself, he had, as yet, seen no reason to change his views, as then set forth; the progress of geological science, investigation, and discovery, had produced no new arguments against the hypothesis, and he had met with nothing of essential importance in its favor, to be added to the original reasoning, until he saw the article from which he read the above extracts. The fundamental idea of the hypothesis of Mr. Stodder and that of M. Perrey is the same, viz: that the mobility of the internal mass of the globe plays a part in the production of Earthquakes. Each assigns a different cause, it is true, for the motion of the fluid, but both causes exist, and must exist together. If there be a tidal movement of the fluid interior, as M. Perrey appears to have established, there may also be a centrifugal movement; each may be capable of breaking the solid crust of the globe, or, in other words, of causing Earthquakes. Mr. Stodder suggested, that the anomalies, which M. Perrey found, were caused by the centrifugal force, and not by the tidal force.

Dr. Charles T. Jackson remarked, that if the sun and moon exerted a tidal action upon the fluid matters of the interior of the globe, as they do upon the ocean waters, that it ought to be manifested by the rising and falling of the liquid lavas of volcanoes, especially in those great volcanic openings in the Sandwich Islands. If this were true, it would give more probability to M. Perrey's hypothesis, as explained by Mr. Stodder. He would ask Dr. Charles Pickering, who was familiar with these volcanoes, whether, at Kilauea, or at any of the other craters in those volcanic islands, any regular periodicity was observable in the rising and falling of the liquid lavas, and, if so, whether they correspond to the times of the moon's phases?

Dr. Pickering replied that he was not aware of any regular periods of elevation and subsidence of these lavas. He was under the impression that they were quite irregular.

Prof. William B. Rogers said, that he had been greatly interested in reading the Report of M. Perrey's researches, and was pleased to see them brought to the attention of the Society. Referring to the suggestion of Dr. Jackson, as to the value of observations at Kilauea, in evidence of the tidal motion of the fluid interior of the globe, he remarked, that while there was much ingenuity in the idea of thus converting the insular volcanic mountain into a vast tide gauge for measuring the movements of the fluid nucleus of the globe, we have no right to anticipate any obvious correspondence between the fluctuations of level in the liquid of the crater, and the tidal movements beneath the earth's crust. Supposing a connection to exist, the channels must be variable and tortuous, and often probably connected with cavities containing gas and vapor, and having numerous and changing outlets. From this would arise great and variable resistances, retarding, diverting, and even arresting the movement propagated from below, just as when the ocean tides are transmitted through narrow and ramifying passages, or when they reach open spaces through different channels and in opposite phases, we find the tidal phenomena greatly modified, and sometimes even entirely destroyed.

Recurring to M. Perrey's researches, Prof. Rogers remarked, that the results, if confirmed by a fuller induction, would be of the utmost importance to geological theory: first, by setting at rest any doubts that may exist as to the igneous fluidity of the interior of the globe; and secondly, by demonstrating the great thinness of the earth's crust, which alone could make it sensitive to the tidal movements of the molten mass beneath. Such tenuity of the crust had long since been urged by Prof. H. D. Rogers and himself, as inferable from the arched and folded structure of mountain chains, as well as from the wavelike motion in earthquakes; but geologists are still far from being agreed on this, and the allied points relating to internal heat. Even the general fact of an increasing temperature, as we descend below the surface, although leading directly to the inference of an intense heat within the earth, has not been accepted by all, as proving the existence of a *fluid nucleus*, and among those who admit the latter conclusion as demonstrated, there are many who contend that the solid crust, instead of being some thirty miles, cannot be less than eight hundred miles in thickness.

This last estimate of the thickness of the earth's crust, deduced by Prof. Hopkins, of Cambridge, Eng., from mathematical considerations connected with the precession of the equinoxes, had apparently been accepted by Sir Charles Lyell as a basis of geological argument, but Prof. Rogers looked upon it as belonging to a class of inferences, which are more of the nature of ingenious mathematical exercises on physical problems, than expressions of the facts or laws of nature.

Such problems often involve mechanical conditions, too various and complex to be amenable even to the most profound analysis; so that, to bring them within his grasp, the mathematician is compelled to resort to simplifying hypotheses, and in doing so, departs, often greatly, and to an unknown extent, from the actual physical conditions of the problem. Prof. Rogers maintained that conclusions so derived, however true as logical deductions from the premises, are not to be received as demonstrated physical facts. Should the correspondence of Earthquake phenomena with those of the tides, be confirmed by further comparisons, to which M. Perrey has been invited by the French Academy of Sciences, it would furnish a proof of the igneous fluidity of the interior of the globe, and of the yielding thinness of its inclosing shell, too conclusive to be weakened by any calculations deduced from hypothetical data.

Prof. Rogers then alluded to the late experiments of Hopkins and Fairbairn, to determine the influence of pressure upon the melting point of solids. As we know that pressure augments the temperature necessary to vaporize liquids, it has become a question of interest, bearing upon the internal fluidity of the globe, to ascertain if it has a like effect upon the temperature at which solid bodies become fluid. According to Hopkins and Fairbairn, such an effect actually occurs with spermaceti, wax, sulphur, and stearine, but has not yet been detected in certain other very fusible solids experimented upon. Should it prove to be a general law, applicable also to mineral masses, which is yet far from being demonstrated, we should have to admit a higher internal temperature than would otherwise be needed to maintain the interior in a fused state; but this addition would, most probably, form but a small fraction of the whole temperature.

In regard to the influence of centrifugal force in causing earthquakes, Prof. Rogers remarked, that such effect could only arise from a *variation* of the centrifugal force, and therefore of the earth's velocity of rotation. But the uniformity of this rotation is so nearly perfect, that a change amounting to even a fraction of a second in a day, would be too startling an occurrence to escape astronomers. Hence, any variations of centrifugal force that may arise must be comprised within extremely narrow limits. Even at the equator, where this force is greatest, its proportion to gravity is very small, and when we consider that any admissible fluctuation of its intensity must be a very minute fraction of the whole force, and hardly more than an infinitesimal part of the force of gravity, the effect of such change, even at the equator, must be regarded as entirely inadequate to those extensive movements, and permanent changes of level, attending earthquakes.

Dr. Jackson thought, that if there were regular periods in the rising and subsiding of lavas, even though not corresponding in times with tidal movements, it might possibly be imputed to attractions of the heavenly bodies, as the theory of M. Perrey seemed to require; for if the operation of the attraction of the sun and moon acted as a dynamical force sufficient to produce Earthquake phenomena, by its influence on the liquid lava beneath the earth's crust, it ought to be adequate to produce an outpouring of lavas from the open vents of volcanoes, especially in those having such very fluid lava as that of Kilauea.

Dr. Jackson also remarked, that the gradual transportation of earthy matters from elevated lands into the ocean bed, must, in a more gradual, and, perhaps, imperceptible manner, continually disturb the balance of our spheroid of revolution, requiring the compensating force of elevatory movements to counteract this disturbance of the equilibrium. That when the difference of level had become sufficiently altered to be adequate to overcome the resistance of the earth's crust, a paroxysmal elevation might take place, and land be suddenly elevated, with all the phenomena of an earthquake, as happened in Chili in 1834.

Mr. Bouvé, Dr. Jackson, and Prof. Rogers expressed the wish that Mr. Stodder would bring his essay again before the Society, that this subject might be more fully discussed.

Dr. Bryant stated that he saw, the first of January, at Cohasset, Mass., *Sylvicola coronata*, Yellow-crowned Warbler, and *S. parus*, Hemlock Warbler. He had never before seen them, in this region, later than the middle of November.

Dr. Phineas M. Crane, of East Boston, and Mr. Samuel H. Scudder, of Boston, were chosen Resident Members.

January 17, 1855.

The President in the Chair.

The Committee appointed to revise the By-Laws of the Society, reported : —

" That they herewith present a copy of the Constitution and By-Laws, in which are embodied all the alterations which have been made from time to time, so as to exhibit our code as it now exists.

" They have seen no occasion to introduce any new provisions, nor any, except a few verbal, alterations, and marks of punctuation, to render the import of the By-Laws more clear.

" They recommend that the Constitution and By-Laws, as they now stand, be printed at the close of the current volume of the Journal."

On motion of the Cabinet Keeper, the report of the Committee was accepted.

The Committee having in charge the subject of a New Building for the uses of the Society, reported : —

That it would be useless to attempt, at this time, in the face of such a general depreciation of property as now prevails, the procuring of the requisite funds for carrying out the purpose of securing a more commodious edifice. They have, therefore, confined their attention to gathering suitable plans, and hints for plans, for the desired museum. For this purpose they have opened correspondence with gentlemen in Europe, and sought information of others at home ; and they are particularly happy to state, that they have secured the attention to this matter of a young Boston architect, now pursuing his studies in Europe. They think the information to be obtained in this manner, will be very valuable at a future day, when the Society shall have found means wherewith to build.

The report of the Committee was accepted, and is on file.

Dr. A. A. Hayes and Dr. John Bacon communicated the result of some researches upon Cochituate Water, and upon the oily matter and crustacea contained therein.

Dr. Hayes described the experiments, by which he had demonstrated, early in November last, the presence of an *Oily Substance* diffused through the water, to which is due its peculiar odor and fishy flavor. The oil thus obtained, was evidently of animal nature. It was of a light yellow color, presenting both oleic and stearic acids. Its specific gravity was the same as that of lard oil. Alcohol dissolved it without residue. A solution of carbonate of soda saponified it when warm. With sulphuric acid, it blackened, and chlorine changed its color to dark brown. It assumed a solid state at 80° or 90° F. Treated with carbonate of soda, when the soap was decomposed, an odor resembling that from adipocire (a fatty substance resulting from decomposing animal bodies) was generally perceptible. Specimens of the oil, in different states of purity were exhibited, and the matter affording it, in various stages of decay, was offered for examination. This matter, which was collected upon cotton filters, being found by Dr. Hayes to consist of minute animals, many of them alive, and easily distinguished with the aid of a magnifying lens, or even with the unassisted eye, he placed some in the hands of Dr. Bacon for microscopic examination.

Dr. Bacon at once detected the source of the oil, and the nature of the animals from which it is derived. He found them to be minute *Crustaceans*, containing the oil in form of globules, which can be easily seen through their transparent shells. By means of ether, he removed the oil from the bodies of these animals, whilst in the field of the microscope, thus viewing the whole process. Dr. Bacon has even gone further than this. He collected upon a cotton filter, from a few gallons of water, a large quantity of the crustacea, washed them so as to free them perfectly from all other substances, and then placed them in distilled water. After a short time, they communicated to the distilled water the odor and taste of the impure lake water, and upon the death of the animals, the oil was diffused through the water so as to render it greasy to simple ocular inspection.

At the time the impurity of the water was first noticed, Dr. Bacon had observed the large amount of oil in these crustacea, though, at that period, the animals were very probably not so abundant as at present, and he had suggested this as a possible cause of the difficulty.

It being determined, then, from chemical and microscopical evidence, that the impurity of the Cochituate water is owing to the presence of the crustacea, Dr. Hayes made some remarks, of a practical nature, in relation to a remedy for the evil. It is well known, that in lakes and other waters, all living animal and vegetable forms exist in a definite relation to each other. If the fish be withdrawn, vegetation, and the smaller forms of animal life become predominant. If, by any means, the food of the living inhabitants be increased, one or more species rapidly multiply. In Lake Cochituate, the great increase which has taken place in the food of the crustacea, has led to an excessive multiplication of the species; probably, a change in their ordinary habits has been induced by the presence of oily food (like the remains of fish) in the water, which, as scavengers, they select. Dr. Hayes proposes, that fish, of all the species found in the New England Lakes, be introduced into Lake Cochituate and the Reservoir at Brookline, so as to stock them fully, and that these waters be protected, by legislative action, from the visits of anglers at all times. These oily crustaceans, which are the food of fish, will then be reduced to their natural proportion, and the water become clear and pure. While the impurities exist, it is prudent for families to use for drinking, and if possible, for cooking, only such water as has been passed through a filter. Even coarse, temporary resorts of this kind, will remove much that is offensive, while the better filters completely purify the water.

The Corresponding Secretary announced the reception of the following letters, viz: —

From the Cambridge Philosophical Society, (Cambridge, Eng.) presenting its Transactions, Vol. IX., Parts I., II., III.; — from the Regents of the University of the State of New York, dated

Dec. 18th, 1854, acknowledging the donation of the Proceedings of this Society, Vol. V., pp. 16 to 80 inclusive; — from the Naturhistorischer Verein der Preussichen Rheinlande und Westphalens, dated Bonn, Oct. 30th, 1854, acknowledging the donation of the Boston Journal of Natural History, Vol. VI, Nos. 1, 2, 3, and Proceedings, Vol. IV. pp. 1 – 384; — from the Bibliothekariat der K. Bayer. Akademie der Wissenschaften, dated Munich, July 30th, 1854, presenting its own and other publications, requesting that deficiencies in its copies of this Society's publications may be made up to it, and asking for duplicate copies of publications presented hereafter; — from the Société de Physique et d'Histoire Naturelle de Genéve, dated November 9th, 1854, requesting a continuance of the exchange of publications with that Society, which has been interrupted for some time past; — from W. H. B. Thomas, Esq., of Philadelphia, dated Nov. 28th, 1854, proposing an exchange of books, &c.

The letter from the Bavarian Academy, at Munich, was referred to the Publishing Committee, with authority to act in the premises.

Dr. A. A. Hayes presented specimens of the famous Cannel Coal, from Torbanehill, Scotland, known as the Boghead Gas Coal; also a specimen of Cannel Coal from the Straitsville Mines, in Ohio. He remarked that it is one of the most bituminous of Cannels. In fracturing it, it often breaks into large rectangular masses, so that it has been quarried for building purposes. Its exterior is brown, sometimes yellowish, and it resembles somewhat trap rock.

February 7, 1855.

The President in the Chair.

The President exhibited the portion of a lower jaw of a *Mastodon giganteus*, containing a supernumerary tooth, referred to at previous meetings of the Society, and made the following communication: —

The Society may recollect that, two or three meetings since, I made a statement on a case of supernumerary tooth in the *Mastodon giganteus;* and, at the last meeting but one, I laid before the Society a communication on the subject from my friend, Mr. Lapham, of Milwaukee, which has been already published. This very curious anomaly is now in my possession, and I have the pleasure of laying it before the Society for their inspection and opinion.

When this jaw was received by me, I readily distinguished the characters of the fifth tooth, and also of the sixth. Behind the latter, were seen the first two ridges, and part of a third protruding through the bone, and behind these were indications of other portions of the tooth, which could not be examined. In order to fully display the concealed part, I determined to remove a sufficient portion of the bone to expose the body and the fangs of this tooth. This was done, not without reluctance, as it might have disturbed and loosened the additional tooth, and obscured its relations. It was, however, happily accomplished without altering the connection to surrounding parts, and after the operation the tooth remained secure in its situation, and capable of being only slightly moved. A horizontal incision, six inches long, was made opposite the roots of the tooth, on the inner side of the jaw; this was joined at its anterior extremity by another incision, about four inches long, also by a similar one at the posterior. Then, by a chisel introduced in a vertical direction, between the maxillary ridge and the tooth, the alveolar process was cut off, though not without much labor and difficulty. When the bone was removed, the very extensive alveolar cavities, and the large, long, curved fangs, with the great dimensions of this concealed tooth, were exposed.

The number of teeth belonging to the *Mastodon giganteus* was for some time undetermined. In my publication on the *M. giganteus*, I have shown that, by the labors of Cuvier, Hays, and others, this number has been established to be twenty-four, *i. e.* six on each side of each jaw, excluding the tusks, which are considered as incisor teeth. Of these, there are in the upper jaw two abortive, which perish in their sockets, and two which attain a great size. In the male, also, there are two tusks in the lower jaw, one of which usually perishes before the adult age, and the other attains a length of about twelve inches, or one foot. As the number of the teeth and their character determine the importance of any supposed extra tooth, it is necessary to settle this point, and show it distinctly, which we are happily able to do by two specimens. The teeth of the *Mastodon* are so large and heavy, that the whole number can never be developed, nor exhibited in the same jaw at the same time. They are naturally and necessarily divided into two sets, primary and secondary.

The primary teeth on each side of each jaw are three in number, and are shown in a specimen of a jaw of a calf-mastodon. The first of these is very small, and its crown has two ridges. The second is somewhat larger, and has two ridges and a half; it is generally said to have but two; it will be perfectly obvious to you, that it has more nearly three than two, thus approximating the *M. angustidens* and *longirostris*, in which this tooth has three ridges. The third tooth is larger than the second, and has three crown ridges. These three teeth constitute the first series, the primary, or milk-teeth.

The second series, or permanent molars, so called, though they are not all entitled to this epithet, are three in number. The first of these has three ridges, like the last named, but differs from it in being larger. The second tooth in the series is still larger than the first, and contains the same number of ridges. The third tooth in the second series is larger than the preceding, contains four ridges and a talon, or heel; in the lower jaw, occasionally, it has five ridges. This completes the entire set of one side of one jaw, and shows us, in the whole, in the two jaws, twenty-four teeth. This is the greatest number which has ever been known to anatomists; neither Cuvier, De Blainville, Hays, nor any other anatomist, has seen an instance of any additional tooth in the *Mastodon giganteus*. Professor Owen, in regard to the *M. angustidens*, and Dr. Kaup, in regard to the *M. longirostris*, have shown, that there is in the upper jaw a small vertical tooth, which takes the place of the second milk molar. No such tooth is seen in the upper, nor in the lower jaw of *M. giganteus*, and this tooth is entirely different in situation, form, and anatomical relations from the other teeth, either of the primary or permanent series. Some anatomists have thought, that the Elephant might have a greater number of teeth than twenty-four, if it lived long enough, but this has not yet happened within the knowledge of scientific men, and we are therefore obliged to content ourselves with twenty-four in the elephant, as in the *Mastodon*. Mr. Corse, in his paper on the elephant, in the Transactions of the Royal Society for 1799, gives a plate, representing a seventh tooth, and behind this is a cavity, which he thinks might have contained an eighth ; but Professor Owen remarks upon it, that if a tooth had existed, there would have been some remains of the calcified plates ; and neither does he express his belief in the existence of a seventh tooth.

The specimen before you is an exception to the general law. We find behind the sixth tooth, or ultimate molar, another tooth similar to the sixth, about equal in size, and having the same configuration ; it has four ridges and a talon in the crown. The four ridges are each divided into two cusps or points, in both the sixth and seventh teeth. The talon has, in the seventh tooth, three points, which, in the sixth, are less distinctly marked. The fangs of this seventh tooth are very long, and are curved to a considerable degree ; there are two fangs supporting the first ridge ; there are also two supporting the second ridge, and these are curved backwards ; the others, belonging to the two posterior ridges and talon, are united in one common mass. The cusps of the ridges in the seventh tooth are not worn, except that on the anterior and outer part of the tooth ; in truth, the other cusps do not appear to have been fairly developed, and, of course, could not have been in use, and, therefore, are not worn. This tooth is situated nearly in a line with the sixth, and there is not that degree of irregularity which is generally found in regard to the undeveloped sixth tooth. This shows, that this tooth was on the point of coming into action with all its attributes. The sixth tooth had already done some work ; the two anterior cusps are much worn ; those of the second and third ridges moderately worn, and those of the fourth ridge very little. Both the sixth and seventh teeth were slightly movable in their sockets.

The tooth in front of the sixth deserves your attention, because it presents the characters of the fifth tooth perfectly well marked, and also because it is undergoing the process of exclusion, and is ready to fall from its socket. This fifth tooth is very much worn; the cusps on the side, have, in a great degree, disappeared, and instead of their irregularities, a smooth, lustrous surface appears. So much was this tooth worn, that an absorption of its fangs has already taken place, so that it is readily removable from its socket, and exhibits a beautiful illustration of the process which nature adopts in order to discharge the useless and worn-out teeth. A portion of the anterior fang of this tooth remains in its socket, corresponding with the fang of the tooth, though both had their asperities removed by absorption.

The jaw in front of this shows no trace of the fourth, or any other tooth. The cavities of the three milk-teeth are entirely filled, and a sharp ridge exists in their place; the same is true of the fourth tooth. So that, of the six original teeth, four have disappeared, and two remain; and to the two latter is added the supernumerary. The anterior extremity of the left side, which alone remains, presents the same appearances; the three milk molars, and the first permanent molar have disappeared, and a portion of the socket of the fifth tooth only is visible.

The jaw is pointed and wedge-like, and exhibits no appearance of a mandibular tusk.

I hope to have the opinion of the Society on the character of this tooth. It is a new case in *Mastodon giganteus*, and we have to consider, whether it is a *lusus naturæ*, such as is found sometimes to occur in the human body; or whether it is an instance of the power of the system to develop a new tooth in extreme age, as in the case of the elephant spoken of by Corse; or whether it is the result of a law established by nature for the development of additional teeth to a certain definite amount.

Dr. A. A. Hayes read the following communication, on the Saline Incrustations of the "*Mauvaises Terres*," of Kansas: —

Last autumn, I received a parcel of "efflorescences," from the soil of the Desert, between the head waters of the Missouri River, bordering on the eastern flank of the Rocky Mountains, from Lieut. Grover, U. S. A., who conducted a party engaged in a reconnoissance of that region. The earth of many square miles of surface is covered by a gray saline frosting, which exists so abundantly, that vegetation does not appear, and the features of sterility are so widely displayed, as to constitute a true desert.

Chemical analysis proved the efflorescence to be sulphate of soda, with minute traces of sulphate of lime, and common salt, mixed with fine sand, to which the gray color was due ; no other saline compound was present. The sulphate of soda was nearly anhydrous, being in fact Thenardite, but evidently formed from a hydrous salt by dessication. No distinct crystals were included in the specimen received.

The occurrence of this salt, as an abundant exudation from the soil, is interesting in a mineralogical view ; and its presence, under the form of an efflorescence, illustrates the physical law, in accordance with which saline waters rise through the soil, and in evaporating from the surface, leave their saline parts at that point, thus forming deserts.

It has been long known to me, that the water of the Missouri River contains sulphate of soda, and the presence of this salt in the water occasions a change in the composition of the water of the Mississippi River, after these waters become mixed, below St. Louis.

The water of the upper Mississippi contains a large amount of organic matter, of a kind which, in changing its composition, out of contact with air, attracts oxygen powerfully, and will decompose oxidized bodies. The dark color of the buried silt is due to the presence of sulphuret of iron, formed from the oxide of iron of an ochreous clay, reduced and rendered a sulphide of iron, by the presence of sulphates of soda and lime in the water.

So abundant is this organic matter, that the silt of the Mississippi water, after having been kept ten years, has the power of decomposing alkaline sulphates, and forming sulphide of iron with the sulphur of the sulphate, while the soda in presence of carbonate of lime and carbonic acid is eliminated as a sesqui- or bicarbonate, of soda.

Below St. Louis, the turbid water of the Mississippi contains, as its characteristic salt, the bicarbonate of soda; and its suspended matter being deposited by rest, we always find in the clear water this alkaline salt, constituting a large part of the whole saline matter. I have been able to trace the steps of the production of the bicarbonate of soda from the sulphate of soda, by the silt of this river in my vessels. The sulphide of iron, also produced at the same time, oxidizes in free air, becoming oxide of iron and free sulphur. Sulphates are not the final result of the oxidation of basic sulphides usually. The clay-colored cliffs and banks of the Mississippi exhibit the oxidized state of the small portion of iron oxide, one of its constituents, while the dark, and even black, color of the buried mass beneath the surface, is due to the reduced, and generally sulphuretted, state of the iron; a condition caused by the changing organic matter. Until the discovery of the existence of sulphate of soda in the soil washed by the tributaries of the Mississippi, its origin in the water was a subject of doubt, and in this connection the new fact becomes important.

Regarding the immense body of water discharged by the Mississippi, as a diluted solution of bicarbonate of soda, which falls into a warm ocean containing lime salts, easily decomposed by the soda salts, we have chemical action on an extended scale. The result of this action must be some form or forms of carbonate of lime, fitted either for the habitations of shell-building fish, or for consolidating calcareous rocks.

Returning to the first exhibition of chemical change, we see the influence of the minute quantity of organic matter, dissolved in the water — a constituent so small in weight that it has been generally neglected in the analysis of waters — and yet, under favorable circumstances, becoming a sufficient cause in bounding a coast line with cliffs, or even producing a rock formation.

Prof. William B. Rogers remarked upon the interesting bearings of the communication read by Dr. Hayes. The fact of the entire deoxidation of sulphuric acid, on the great scale in nature was, he said, well exemplified in the tertiary clays and sands of extensive districts in the marl region of Maryland and Virginia. Some of these deposits contain, even now, so much free or only partially neutralized sulphuric acid as to impart to the mass a strong acid flavor and reaction. The shells originally imbedded in them having been entirely removed by the solvent action of the acid, have left in the clay and sand innumerable hollow casts, beautifully impressed with the external markings of the fossils, while the sulphate of lime formed by this reaction has been accumulated often in large groups of selenite crystals in the lower and comparatively impervious layers. In many cases, the residuary sulphuric acid, in the presence of much diffused organic matter, has been wholly deprived of its oxygen, and reduced to the condition of sulphur, so that, over wide areas, these ancient, and now effete marl beds, exhale a sulphurous odor, and yield a sensible amount of sulphur when exposed to heat in a close vessel.

Prof. Rogers then referred to the acid and alkaline springs of the slate formations of the Appalachian belt, as depending on the development and reactions of sulphuric acid. The former class of springs, always containing an excess of this acid, along with earthy and other sulphates, were observed to originate in belts of slaty rock, containing no carbonate of lime, either diffused or in the shape of interpolated layers. The latter issued from slates rendered more or less calcareous by the presence of fossil shells and plates of limestone. The sulphuric acid evolved by the oxidation of the iron pyrites abounding in both these varieties of slate remained, in the former case, in part uncarbonized, and was carried off by the waters of the so called *Alum Springs;* but in the calcareous slates the effect was different. Here, reacting with the carbonate of lime, it became neutralized, and, at the same time, set free an immense amount of carbonic acid. This agent, favored probably by pressure due to the depth, as well as by relative quantity, dissolved out a portion of the carbonates of lime and magnesia of the slates, and by reacting on the salts of soda, always present, formed the carbonate of that base. The percolating water thus became impregnated with earthy and alkaline carbonates, and with an unusual amount of silica, due to the solvent action of the latter, and in this way, as he conceived, were formed the well known *alkaline springs* of these slate regions.

Dr. Cabot, in reply to a question of the President, as to the present distribution of Pinnated Grouse, (*Tetrao cupido*,) stated, that he had never known of but one specimen having been shot in Massachusetts, and that was on Cape Cod, where it might have flown from Martha's Vineyard or Nashawena. The Pinnated Grouse inhabits Martha's Vineyard, and the island of Nashawena, Long Island, certain portions of New Jersey, Delaware, Maryland, and Pennsylvania; the barrens of Kentucky, and the plains and prairies of some of the Western States. It is said also to be found upon an island on the coast of Maine, an assertion the truth of which is doubted by Dr. Cabot.

The other species of grouse in the New England States, are the Canada Grouse, (*Tetrao Canadensis*,) and the Willow Grouse, (*Lagopus albus*.) The Canada Grouse is common in Maine, the northern parts of the White Mountains, and in Northern Vermont. From Northern Vermont to Iowa and Minnesota, they are not to be found. They inhabit these States, but between Iowa and Minnesota and the Rocky Mountains, again they do not exist. The Willow Grouse inhabits the northern parts of Maine.

The Ruffed Grouse, (*Tetrao umbellus*,) is the Partridge of the Eastern States. It is described as a true Grouse by Audubon, but should properly be considered as a Bonasia. The flesh of Bonasia is white; that of true Grouse is dark.

Dr. Hayes presented a series of specimens of Coal and Iron Ore, from Straitsville, Ohio. The deposits are situated in the immediate neighborhood of each other, and can readily be worked together. It is anticipated that they can be furnished in Boston, at market prices, less than those ruling at present.

February 21, 1855.

The President in the Chair.

Extracts from a letter from Mr. Roswell Field, of Gill, Mass., to Dr. H. I. Bowditch, were read to the Society. Mr. Field informs the Society, that he has lately quarried a sandstone slab, which he considers the most valuable one yet obtained, having upon it about two hundred foot-prints, and five or six tracks.

Dr. Bryant called the attention of the Society to the present condition of the Entomological Collection, and the want of a Curator for this department. Expressing a willingness to take charge of the collection for the present, he was requested by a vote to do so.

Mr. C. J. Sprague read the following paper on *Ranunculus micranthus* (Crowfoot; Buttercup) : —

The *Ranunculus micranthus*, of Nuttall, belongs to the western border of the Mississippi, and probably extends to the Pacific ; as Torrey and Gray describe, doubtfully, a Californian variety. It has been found also near Lake Superior ; but this was, I believe, its eastern limit, until I discovered it growing plentifully on a rocky, shady, springy, wooded hill in Melrose, about seven miles from Boston. At first sight, it would be mistaken for *R. abortivus*, for which, indeed, I first collected it ; but on a closer examination it presents certain differences. The radical leaves of *abortivus* are cordate-reniform in outline, with a deep sinus, and a regularly crenate border ; those of *micranthus* are rhombic-ovate, truncate at base, with large and irregular lobate serratures. They are generally entire in *abortivus*, although they are sometimes three-lobed, and even ternately parted ; in *micranthus*, this division is very common, and almost constant. The leaves of the latter are also more numerous and more clustered, the divisions of the stem leaves narrower, and the whole plant is of a more slender, diffuse, and pliant habit. The principal distinction, however, is the thin, soft hair which clothes it all over; while *abortivus* is invariably smooth. The *micranthus* grows at Melrose in dense tufts, of a dozen or fifteen stems with interlaced, fibrous roots, but entirely distinct. The stems branch more commonly from the base than in *abortivus,* which is apt to send up a single stem, branching above. The smaller specimens of *abortivus* most nearly resemble *micranthus,* though the leaves are then apt to be all entire.

The occurrence of this species in such abundance in one little spot on our Atlantic border, the only locality known, except the Lake Superior one, east of the Mississippi, is very interesting. It suggests the idea that, after all, the *micranthus* may be merely a variety of *abortivus*, which is common all over the country, developing itself more extensively at the West. The points in which they differ are certainly those in which plants are most likely to vary. The division of leaves is by no means a certain specific difference. No characteristic is more variable. The outer covering of plants varies exceedingly with soil and exposure; so much so, that many varieties, now included under one species, were originally described as distinct on this account. The Lake Superior specimen of this *Ranunculus* is intermediate in this respect, having but little hair, and also entire leaves, with the lobate serratures peculiar to *micranthus.* The only thing which gives particular weight to this covering, as a specific character, in this instance, is that the Melrose plants grow in just that locality which would cause its disappearance rather than its growth. Mr. Nuttall says: " distinguished from *R. abortivus*, which it much resembles, by the constant hairiness of the stem, calyx, and petioles, as well as by the very different form of the primary leaves." The hairiness does certainly exist as a distinction, but certain leaves of *abortivus* are as deeply cut as those of *micranthus;* and so far as outline goes, these might constantly be exchanged without altering to the eye the general appearance of the plants. I should wish to examine a greater number of specimens from different localities, to decide conclusively whether or not they are radically distinct species. At any rate, they approach each other so nearly in certain forms, as to require careful examination.

Prof. Jeffries Wyman made some remarks on the *Fœtal Zygæna*, (Hammer-headed Shark,) presented at the preceding meeting by the Secretary.

The specimen is six and a half inches long. It has the general form and appearance of the adult, except that the outline of the head is less regular. All the fins are well formed ; between the pectoral fins is the remnant of the pedicle of the vitelline sac. This specimen (the history of which is not known) was probably taken from the oviduct, as the external branchial fringes which exist, in the early periods, in all *plagiostomes*, are still persistent. An opening was made into the abdomen, but the parts were not in condition for minute dissection ; no trace of an internal portion of the vitellus was found. No teeth are developed, but there exists, both in the upper and lower jaw, a deep dental groove.

Prof. Wyman also gave an account of some observations which he had recently made on Hybernating Insects.

He had examined chrysalids of the common Mud Wasp, a species of *Pelopæus*, and found that they were not frozen during the coldest weather. On the morning of February 7th, when the thermometer had been $-18°$ F. and had risen to about $-8°$ F., they were still unfrozen, and when removed from their pupa cases, made obvious muscular motions. The pupa preserved its usual transparency and flexibility ; when crushed upon the surface upon which they rested, the fluids of the body instantly became opaque and were congealed. The question naturally presents itself, as to the source of the heat which enables them to preserve their temperature, when exposed to so low a degree of cold. The non-conductors by which they are surrounded, consist of a casing of mud, and within this a tightly woven, but thin, silky cocoon. It would seem that so small a body, exposed to cold so intense, must have an internal source of heat. Prof. Wyman had also examined the eggs of the Moth of the Canker-worm, and found their contents unfrozen.

Dr. A. A. Hayes read an extract from a letter of Dr. C. F. Winslow, of San Francisco, on Earthquakes.

Dr. Winslow had recently spent a short time in investigating the geology of Acapulco, Mexico, and the earthquake phenomena, of which that place is peculiarly the focus. He states that he found, in accordance with his previous theory, that the shocks were more numerous there as winter approaches, and during December and January. The earth passes its perihelion about the last day of December. His theory is, that an increasing condensation of the matter of the globe, and its contraction as it approaches the sun, augments necessarily the tension of the fluid mass embraced within its crystalline or consolidated crust. A repulsive action necessarily ensues between the molecules of the molten mass, and the mobility of this mass so acts, here and there, as to rupture the crust and allow the melted earth to insinuate itself between strata, or vertically through the entire crust, in the form of dykes, or to be forced out of volcanic openings. Dr. Winslow bases his hypothesis upon the following data: The increasing weight of the atmosphere, from September to January; the increasing rapidity of the pendulum during the same time; the autumnal increase of water in springs, wells, and rivers, independently of rain; the increasing frequency and violence of earthquake and volcanic phenomena during autumn and winter.

The President remarked, that at the last meeting of the Society, in connection with the subject of a supernumerary tooth of the Mastodon, he had stated, that it was the commonly received opinion that supernumerary teeth are not rare in man. Since that time he had examined the subject further, but had not been able to find on record, any well-authenticated cases of human supernumerary teeth. Hunter says, very distinctly, that no such teeth exist, and nothing satisfactory is to be found in Owen or Bell upon the subject. A French author of a work on odontology, says he saw a woman, after her first and second set of teeth had fallen, cut four new incisors; but the author says these were not supernumerary teeth, but belonged to the second set, having never previously been cut. Boyer says there are no instances of human supernumerary teeth. Corse, who wrote on the teeth of elephants, and who had great opportunities of study in India, says, elephants have sometimes a seventh and eighth tooth, or two supernumerary teeth, in each half of each jaw. But Corse is not very clear as to his terms, especially as to the term ridge; so that what he considers the seventh and eighth teeth, may be the fifth and sixth.

Dr. N. C. Keep stated that he had seen a number of supernumerary teeth in man. In several instances, he had seen duplicate lateral incisors on one side; he recollected three cases, where both the natural teeth and the duplicates corresponded well with the laterals of the other side, though the duplicates did not match so perfectly as the others. He had seen a case of two cuspidati or eye teeth on one side. Most of the extra teeth which he had seen, were located in the forward part of the jaw, in or near the portion occupied by the milk teeth. His impression was, that he had seen an extra biscuspis, but he was quite certain that he had not seen an extra molar. Most of the supernumerary teeth he had seen were irregular and unsightly; they were frequently conical. He had recently seen a case, where two teeth had come between and on a line with the central incisors; in other cases, they had protruded from the alveolar arch or bony palate behind the front teeth.

Three cases of the union of two teeth had come under his observation. In one, the two central incisors of the upper jaw, milk teeth, were fused into one; in another, a central and a lateral incisor were united; in a third, two laterals, one of which was supernumerary, were united.

He had known many cases of delayed teeth being cut late in life, and he mentioned a case occurring within the past year, where a canine tooth had been cut by a person over fifty years of age. In another case, a lady, from thirty-five to forty years of age, cut two canine teeth of natural appearance, which, he satisfied himself, were delayed teeth.

In answer to an inquiry, Dr. Keep replied, that in cases of so-called double teeth extending completely around the jaw, as far as he had observed, the double point or edge had been produced by attrition of the antagonizing teeth. He also remarked, that he had casts, showing the entire absence of the second dentition in adults, which he should be happy to show to the Society.

Prof. Wyman stated that in a skull of a *Troglodytes Gorilla*, which he had examined some time since, there was a supernumerary tooth behind the third molar or wisdom tooth. This fourth molar had not quite pierced the bone, but was on the point of doing so. He also stated that he had in his possession a cat's skull, with a supernumerary permanent molar in the lower jaw.

There are instances on record of all the teeth being united by the roots. Plutarch says, that Pyrrhus, King of Epirus, had a set of teeth in this condition.

Dr. J. N. Borland remarked, that he had been acquainted with two brothers, one of whom had never cut a tooth, and the other only three, imperfectly developed. They were scrofulous, and one of them died at the age of 25 or 26.

The Curator of Conchology stated, that he had recently prepared and labelled for the Cabinet, 22 species of shells, from Southwick and Westfield, Mass.; 20 species of Fresh Water American Shells; 256 species of Land and Fresh Water Shells, from Europe.

A flask of water from a well in Dorchester, containing a variety of animalcules and worms, was referred to Drs. Durkee and Bacon for report.

March 7, 1855.

The President in the Chair.

A letter was read from Mr. Roswell Field, of Greenfield, addressed to the President, giving some description of the sandstone slab recently discovered by him. The letter was accompanied with a plan of the slab, and the impressions upon it. Mr. Field states, that there are about 130 sets of tracks, or 260 impressions, generally very perfect, but in some the fore foot is wanting. The tracks, he thinks, are batrachian, but whether all were made by batrachians of the same species is doubtful.

Dr. Charles T. Jackson presented a copy of the Report of the Cochituate Water Board, and said, that as he was not present at a former meeting of the Society, when Dr. A. A. Hayes made a communication upon the Impurity of the Cochituate Water, he would avail himself of the present opportunity to make a few remarks upon the subject; which he proceeded to do as follows: —

In presenting to the Society a copy of the Report of the Cochituate Water Board, containing the Reports of Prof. Horsford and myself, on the composition of the water of the lake and of that delivered by the aqueducts in Boston, I would take the opportunity of recording my dissent from the views presented to this Society on this subject by my friends Dr. A. A. Hayes and Dr. John Bacon.

From careful analyses, and researches made by myself, I am convinced that the taste and odor of Cochituate water are not due to the presence of oil of fishes, either in a separate state or in the bodies of *Cyclopean crustaceans*, but are due to decomposing vegetable matters, such as the mucilage and albuminous matters of plants, as indicated by the presence of the associated chlorophyl and myrica wax and oil contained in it.

1st. The specific gravity of oil of fishes is such, that it would float on the surface of water, and be seen as a film on its surface; while, in fact, we find the matter containing the oil in the deep waters of the lake, and not on the surface.

2d. The oil which is extracted from the myrica wax found in the water, is soluble in alcohol, whereas fish oil is not soluble in it. So far as the properties of oil extracted from Cochituate water are known, it is identical with the oil which alcohol dissolves from myrica or bayberry wax, which is generally found as a glazing on green leaves and twigs of most plants.

3d. That the taste and odor are not due to the presence of Cyclops, would appear from the fact, that while the *crustaceans* were most abundant, the water had no bad taste or odor, and when the waters were most strongly flavored, the *cyclopeans* were very rarely found, they not being then in season.

By direct experiment, I could not produce the peculiar smell and taste of the Cochituate water when I mingled a large number of *cyclopeans* in pure, distilled water; nor could others, whom I requested to taste of it, discover any such taste, as it has been alleged they would give to distilled water.

It is true, that when a very large mass of the living *crustaceans* is put into a very small quantity of water, and is allowed to become putrid, they give the odor of putridity to the water; but this is not a fair *crucial* experiment, and the experiment fails to produce results identical with the well-known cucumber taste.

The minute quantity of oil which these crustaceans contain, and which, I doubt not, they generally contain, is not a sufficient cause for the flavoring of the great quantity of water contained in Cochituate Lake. There has no proof yet been presented, that this oil is fish oil, or any animal oil, but its chemical properties will ally it more closely with the oils known to exist with the wax of green foliage.

There cannot be a doubt of the fact, that, from some cause, there has been a larger portion of recent vegetable matter introduced into the waters of Cochituate Lake, for the presence of chlorophyl has not been before noticed in the water.

Dr. Hayes admits the presence of "*a neutral body which resembles mucilage from gum*," and of "*a gelatinous mass*" sufficient to close the meshes of cotton cloth. This I believe to be mucilaginous and albuminous matters in a state of decay or change, the change ultimately resulting in the formation of crenic acid.

It is well known, that water into which a bouquet of flowers has been placed, for even a few minutes, becomes charged with mucilaginous and albuminous matters, so that it becomes putrid, and has a bad odor and taste. We know, also, that a similar bad taste and odor is communicated to water that stands for some time in a new wooden pump, or in casks, and that this flavor and odor disappear by spontaneous changes, and confervæ appear in the purified water. This is the precise change we observed in Cochituate water.

I object to the notion that this rich green chlorophyl (a specimen of which Dr. Jackson exhibited) is the result of mixtures of different colored oils from cyclopeans! Such a result is *impossible!*

Berzelius, in his Traité, tome VI. p. 504–5, French ed., 1850, states, that the sp. gr. of myrica wax is 1.015, which will account for the fact that we find it in the water, near the bottom of the lake.

That myrica wax yields oil soluble in alcohol, and that this oil contains oleine and stearine, Berzelius also states, p. 505, "By cold alcohol, we extract *oleine* from the wax of myrica." "Boiling alcohol dissolves it in small quantity; the solution, by cooling, deposits *stearine*." "It deposits *stearine* in small, colorless scales, while the solution of *oleine* remains colored green by the whitened wax of myrica."

Thus, we find myrica wax yields oil to the very solvent employed by Dr. Hayes, and which was also used by me in some of my experiments. Nothing has yet come to prove this oil, found in Cochituate water, to be other than the oil usually found with the wax of myrica, and of green leaves colored by chlorophyl, which is generally accompanied by this fat vegetable matter, consisting of a mixture of wax and oil.

I see no reason to doubt that the oil found in the structure of these cyclopeans came from the same source, and until proofs are presented of its derivation from fishes, I shall adhere to my original opinions.

Dr. Bacon observed, that as to the question of the animal or vegetable nature of the oil which Dr. Hayes had found, and which he had himself directly extracted from the bodies of the crustacea, it should clearly be considered *animal*. The oil, as seen under the microscope, was not contained in the alimentary canal, but in the tissues external to it, and beneath the carapace. Whatever the original source of the oil might have been, it had become assimilated in the animal, and was analogous to the adipose tissue of other animals. As to the objection that no oil in the lake rises to the surface, Dr. Bacon observed, that the oil might be principally confined to the bodies of the crustacea; and that in his experiments with the oil in distilled water, it did not for several days, and then only in small quantity, rise to the surface; a fact to be explained by its existence only in very minute globules.

Dr. A. A. Gould remarked, that whether it be proved or not, that the present impurities of Cochituate water are owing to the oil of these crustacea, the fact that those now found in the water contain a large quantity of oil, is a valuable discovery, and should be put upon record. He had been accustomed to examine and delineate these animals for many years, and had never before found oil in them, at least in such quantity as they now contain.

Dr. Durkee said there appeared to be some objections to all the theories that had been advanced in explanation of the singular condition of Cochituate Lake during the last five or six months. He thought that scientific observations should extend over a longer period of time than they had as yet embraced. Perhaps years may elapse before a true and complete solution of the phenomena connected with the impurities of the lake will be arrived at. It is not improbable, that the peculiar taste and odor of the water may be due, in part at least, to causes of a geological character.

Dr. Durkee read the following report: —

The bottle of water sent to the Society, a few days since, by Mr. J. W. Foster, and referred to Drs. Durkee and Bacon for microscopical examination, was taken from a well recently dug, and adjacent to his house on the turnpike, near Centre street, in Dorchester. The well is situated in low ground, and is about eight feet deep, at which depth water flows into it quite freely. The quantity sent for examination was eight ounces. In it were found some twenty worms, varying in length from the tenth to the fifth of an inch, all alive, and of one species, and known under the scientific name of *Planaria*. Two kinds of crustaceous animalculæ were also found in considerable quantities, viz., the *Cyclops* and the *Cypris*, all in an active state, but containing neither oily matter nor ova, except two or three of the cyclops, in which were seen a few small oil globules. No confervoid, or other vegetable remains were found.

If the specimen of water sent by Mr. Foster, is a fair sample of the contents of his well, it can hardly be considered sufficiently pure for culinary purposes.

Dr. Gould, in the absence of Dr. Hayes, read the following "Report on a Specimen of Fossilized Egg, from the Guano Islands, off the coast of Peru, by Dr. Augustus A. Hayes:"—

The specimen which is the subject of this report, was referred to Prof. Jeffries Wyman, who had it divided, partly by saw, and partly by fracture. Finding that its further examination belonged to chemical inquiry, he kindly placed it in my hands for examination and description.

The form of the original mass was ovoid, the circular outline having been reduced by compression, about one third. Externally rough, from adhesions, there were smooth parts, from which a thin layer could be removed, which, when cleaned, had the organized structure of egg shell, although partly changed in chemical composition. In the examination of one half of the specimen, fragments of shell were found, crushed into the mineral occupying the cavity. The color of the mass was nankin-yellow externally, deep yellow and reddish brown within. The compact parts scratched calcareous spar, its general hardness fully equalling that of this mineral. The fracture of the mass exhibited a crystalline structure, most remarkable near the centre, where the yelk may have decomposed. The crystals, in no case distinct, presented an aggregate of flat, plumose prisms, radiating from centres; these have a marked pearly, or satin-like lustre, and readily divide along natural joints.

The odor of the mineral is the same as that of guano, while its taste is saline, leaving a pungent impression. Soluble in water, excepting some sand, lime soap, and remains of shell; the solution is light yellow in color, and gives, by appropriate tests, the reactions of sulphuric acid, ammonia, and potash, being slightly acid.

The chemical analysis of the most pure parts of the crystalline portion, demonstrated the interesting fact, that this mineral is a double sulphate of ammonia and potash, a compound hitherto unknown as occurring naturally.

100 parts afforded : —

Moisture	1.00
Sulphate of Potash	51.66
" " Ammonia	38.25
" " Lime	1.17
Phosphate Magnesia	1.08
Soap of Lime and Carbonate of Lime	2.20
Ferruginous Sand	4.30
	99.66

The atomic proportion of sulphate of ammonia for 51.66 sulphate of potash, is 40.84, and when we dissolve this mineral in water, and allow the impurities to subside, the clear fluid affords crystals in groups, which have this composition.

Other parts of the mass contain more sulphate of potash, even so much as 70 per cent., being obviously a mixture.

The lustre, and perhaps the plumose form of these crystals, is due to the presence of the other compounds at the moment of their formation. It was found that pure crystals, dissolved in water containing guano, presented the same peculiarity as they assumed the solid form. There are, in this connection, some points which need further elucidation, and for this purpose a portion of the specimen has been retained.

The occurrence of salts of potash, instead of soda salts, in the guano of the rainless climates, has been alluded to by chemists, but I have nowhere met with the fact stated, that these guanos, however ammoniacal, and, in consequence, *apparently* alkaline, are truly always acid in their reactions.

Regarding this mineral as affording a beautiful illustration of the withdrawal of a definite compound of soluble salts, from a putrefying mass, through which they were distributed unequally, it becomes connected with the more permanent and perfect forms having earthy constituents. In any system of mineralogy, it will take a place with potash salts, as a double sulphate of potash and ammonia bases.

In accordance with the practice of naming such minerals with reference to their origin, I have adopted the name *Oöguanolite*, for this body.

Dr. N. C. Keep exhibited a number of casts in plaster, of supernumerary and abnormal human teeth. These casts were referred to by Dr. Keep in his remarks at the last meeting.

A number of Fossils, from Germany, were exhibited to the Society. The owner wishing to dispose of them, they were referred to a committee, consisting of the President and Mr. Bouvé.

The Corresponding Secretary announced the reception of the following letters, viz: —

From the American Philosophical Society, dated January 16, 1855; — from the Geological Society, Dublin, Nov. 8, 1854; — from the Zoölogical Society, London, Oct. 23, 1854; — from the Royal Institution, London, Oct. 13, 1854; — from the Entomological Society, London, Nov. 10, 1854, returning thanks for the donation of the Society's Publications; — from the Geological Society of London, Nov. 2, 1854, acknowledging the receipt of the Society's Publications; — and from Mr. Crouch, of Portland, Me., Dec. 28, 1854, offering to sell a collection of the Snakes of Maine.

The letter of Mr. Crouch was referred to the Corresponding Secretary.

A letter was read from Mr. C. J. F. Binney, offering his aid in interesting the agents of the Boston Submarine Wrecking Company, in obtaining specimens of shells, &c., for the cabinet. Referred to Dr. Gould.

March 21, 1855.

The President in the Chair.

The President, from the Committee appointed at the last meeting, to inquire into the expediency of purchasing of Mr. Roswell Field, a large slab of Quadrupedal Impressions, reported: — That the slab was found near Connecticut River, on the borders of Greenfield, a few months since. It is somewhat irregular in form, one side being about 6 ft. long; a second, 4 ft. 4 in.; a third 3 ft.; a fourth, 6 ft. The slab is a beautiful gray shale; the impressions upon it number 260, constituting 130 pairs of tracks. The tracks are quadrupedal, and appear to be those of a bratrachian reptile. A portion of the slab accompanied the report, which, taken in connection with the plan, gave an idea of its form, size, thickness, and color, and of the form and size of the impressions. The Committee are of the opinion that this is the most remarkable specimen of *quadrupedal impressions* which has been obtained in the United States, and as the Society possesses the most remarkable specimen of *biped impressions* which exists, they are of the opinion that, by some means which the wisdom of the Society may suggest, it may be obtained and added to their collection.

The President stated, that Mr. Bouvé proposed going to Greenfield, so that it was not advisable to act in the premises until he had made personal examination of the slab.

The President stated that he was informed, that Mr. H. H. Gillum, of Portland, Conn., had a collection of fossil impressions of birds and quadrupeds, which he wished to dispose of, as he was obliged to leave the United States. Mr. Gillum was willing also to deposit them in the cabinet of the Society until his return, provided the expenses of transportation were paid. This matter was referred to the committee just named.

Prof. Jeffries Wyman exhibited a preparation of the wing of the "Winter," or Pin-tailed Duck, (*Anas acuta*,) showing a peculiar arrangement of the bones and ligaments, by which, when the wing is fully extended, all the segments of this extremity are fixed, and retained in position, independently of muscular action; also, when the forearm is flexed on the humerus, the hand is by the same act flexed on the forearm; or the contrary when the forearm is extended.

The structure of the articulations of the elbow and wrist is such, that during flexion and extension, the radius advances and recedes upon the ulna, carrying with it the upper carpal bone, and this last the hand; in this way flexion and extension of the bones is effected. The lower carpal bone is attached to the upper by strong ligaments; consequently, when the upper carpal bone is drawn over the extremity of the ulna as the radius recedes, the lower one is drawn up between the hand and the extremity of the ulna, and acting as a wedge, maintains the hand extended, until it is displaced by the reversed action of the radius.

Prof. Wyman found the normal number of the phalanges of the thumb (viz., two) in this species of duck, and also in a Bald Eagle which he had recently dissected; in each, however, the thumb was terminated by a nail, which, in the eagle, assumed the form of a needle-shaped spine.

Dr. A. A. Hayes presented the following communication upon Cochituate Water, in reply to the communication of Dr. C. T. Jackson, presented at the last meeting: —

I take this opportunity of presenting to the Society two copies of a paper, by Dr. Bacon and myself, which was read at a meeting of the American Academy, January 11th, 1855; and of which an abstract was given to this Society, January 17th. This paper was referred to by Dr. Charles T. Jackson, in a communication made at the last meeting.

As both Dr. Bacon and myself have confined ourselves within the limits which observation and experiment have set to research like this, upon the altered condition of Cochituate water, we have learned with surprise that our friend, Dr. Jackson, has expressed his dissent from our conclusions, and, in so doing, has considered them in the light of "*views.*"

Presuming that we may have omitted particulars of interest in connection with this subject, we beg the indulgence of the members while we remark on the grounds of Dr. Jackson's dissent.

1st. On referring to our paper, it will be found, that the oil exists in the bodies of the crustaceans, combined with lime, or lime and ammonia, and that it floats on water after it has been eliminated by acids. The conditions under which it separates spontaneously and attaches itself to other surfaces, are described also. A part of the difficulty met with by Dr. Jackson arises from his taking no notice of the fact stated, that nearly the whole of the oil exists in the altered state of oily acids, and, as is well known, when in this state, it dissolves to small extent in water.

2d. Dr. Jackson states, that "fish oil is not soluble" in alcohol! As the fish oils do dissolve even in small quantities of alcohol, and the concurrent statements of all eminent chemists have long since established this fact, any reasoning based on a supposed insolubility of this oil must be fallacious.

3d. The difficulties thrown into the path here, in relation to the abundance of cyclops not producing the odor, are more apparent than real. It is an *assumption*, that the water has at any time had the present taste, when "the cyclopeans were very rarely found, they not being then in season." In placing so decided a negative on this statement, we rest on our own observations, continued through most of the days since October last. It must be apparent to every one, that if such a statement could be sustained, no further suppositions would be necessary, and we are sorry that no evidence is adduced in any way supporting it. In the remarks made on what we deem a crucial experiment, it is evident that our language has been misinterpreted. We have stated, as a result of experiment, that the matter fully removed from a given portion of water, leaving it odorless and tasteless, will, when placed in the same water, give it the original odor and taste in full intensity. As there is no matter concerned in this simple experiment other than the odorous body on the one hand, and the odorless water on the other, it becomes a crucial experiment. The suggestion leading to it, was the simple one which arises in every analytical experiment. Pursuing this experiment further, we have found that the odorous matter thus separated from the water, is almost wholly made up of the bodies of living and dead crustaceans, filled with oil, having the odor of fresh water fish. In repeating this experiment, it is essential that the crustaceans be collected without exposure to violence, and failure to obtain a like result may be referred to a want of attention in this particular. The experiment was many times repeated by us before it was stated, and it has since become an established truth. When, therefore, we find the statement, "I could not produce the peculiar smell and taste when I mingled a large number of living and dead crustaceans in pure, distilled water," we think that very few living crustaceans could have been present, and that the matter was taken after its odor had passed away, which readily occurs. The point that "the minute quantity of oil which these crustaceans contain, is not a sufficient cause for the flavoring of the great quantity of the water," was early entertained by ourselves, and it was only after a suite of experiments, demonstrating the adequacy of the cause, and after careful search had failed to show other influences, that we accepted the results as a fact in science. Thus determined, it cannot be assailed by argument or supposition, and an objection becomes valid, only after it has been shown that the crustaceans, *containing oil*, do not give odor and taste to the water.

Dr. Jackson, after investigating, arrived at the conclusion that the "wax and vegetable oil came from fermenting foliage." "It is *probable*, therefore, that we may be able to trace the peculiar taste of Cochituate water to some such source." In the first part of Dr. Jackson's paper, we find the expression of his present belief, "that the taste and odor of Cochituate water" "are due to decomposing vegetable matters, such as the mucilage and albuminous matters of plants, as indicated by the presence of the associated chlorophyl and myrica wax and oil contained in it." As the statement is also made, that "from careful analysis and researches made by myself, I am convinced," we will look at the analyses. The first is of a sample of water which afforded of matter dried at 212° F. 3 $\frac{18}{100}$ grains from an imperial gallon. Therefore, 100.000 parts afforded 4 $\frac{54}{100}$ parts. Among the constituents, carefully stated, we find no mention of mucilage and albuminous matter — the water was tasteless. The second sample has "the flavor of water in which cucumbers have been soaked, but has not any perceptible odor." This sample afforded 4 $\frac{60}{100}$ grains from 100,000, and among the substances found are chlorophyl, wax, and oil ninety-three one thousandths of one grain! no mucilage or albuminous matter. This sample was drawn 19 feet below the surface of the lake. Another sample, 49 feet below the surface, "a little more charged with the cucumber taste," afforded 4 $\frac{57}{100}$ grains from 100,000; "and was, in all respects, like that obtained at the depth of 39 feet." Another analysis of water, recently from the pipes, showing "an oily film on the surface of the water," afforded 4 $\frac{43}{100}$ of dry substance, but no mucilage or albuminous matter; on the contrary, we have the statement that it consists of "the usual vegetable matters of the water." On another page, it is stated that "the vegetable matter consists of the usual organic acids of the soil, which are combined with the earthy bases, lime, &c." In vain, therefore, do we look for the mucilage and albuminous matter in the analyses; but it is a significant fact in this connection, that the cucumber taste, which the analysis started with, nowhere appears in the results.

Failing to find in the analyses any support for the conviction expressed, we turn to the "researches." First, it is distinctly asserted, that myrica wax "found in the water" is, with the oil contained in it, and associated chlorophyl, an indication of "mucilage and albuminous matter" .... "that we find the matters containing the oil in the deep waters of the lake." The oil extracted from the Cochituate water "is identical with the oil which alcohol dissolves from myrica." Then follows a quotation from Berzelius, Traité, tome VI. p. 504 – 5, to prove that myrica wax is heavier than water, "*which will account for the fact, that we find it in the water near the bottom of the lake.*" "Nothing has yet come to prove this oil found in Cochituate water to be other than the oil usually found with the wax of myrica."

We will digress a moment, to allude to Dr. Jackson's quotation from Berzelius, which does not exactly represent the meaning of the author, but conveys the impression that "oleine," as known to chemists, exists in myrica wax. While Berzelius states, that "by cold alcohol we extract the oleine of the wax of the myrica," meaning the *particular kind* of oleine, peculiar to that wax, as one of a class he was describing at page 500, where he states "that it is probable, also, that the oleine which they contain is not always the oleine of the oleate lipylique."

We have entered at some length into the subject of myrica, because the mucilage and albuminous matters are "indicated by the presence" of this body. The only other evidence given of their existence is, that "Dr. Hayes admits the presence of a neutral body, which resembles mucilage from gum." We esteem this good authority, and accept the statement as true, although Dr. Jackson's analyses nowhere show the presence of such a body. The "gelatinous mass" mentioned by Dr. Jackson, is shown by the microscope to consist of the bodies of crustaceans.

The wax-bearing berries of the *Myrica cerifera* are lighter than water, and would float on its surface, as is shown by the specimens now exhibited, which are seen floating on water in the vessel before us. They consist of a considerable proportion of woody matter compared with the amount of wax which coats them, and where the wax occurs in the water, the woody matter should be found also. The odor which the wax exhales, closely resembles that of cloves, being very agreeable, and the wax of the ripe berries is often perfectly white. If the wax referred to as the source of the oil "having the properties of oil extracted from Cochituate water," be the myrica wax as described by Berzelius, we are met at the outset by the well-known fact that this is *a manufactured article;* and we know of no recorded instance of the occurrence of myrica wax, or any body having similar properties, in a natural water. Indeed, the more we examine this view of the subject, the greater the difficulties appear, and we are forced to the conclusion that the analyses and researches do not prove the presence in the water, or the lake, of either the plant, berries, or wax of the *Myrica cerifera.* Allowing that the analyses in two instances show the presence in the dry matter of a green-colored body, the source of this substance in a clear water must be the minute vegetable organisms suspended in it. It cannot be traced to the coating on the larger aquatic plants, because it can be separated from them by chemical operations only, in which about one hundred parts, by weight, of green plants are required to furnish one of the green wax. Chlorophyl cannot give the peculiar flavor to the water, as it has *neither odor nor taste*, and cannot be dissolved in water.

If mucilaginous and albuminous matters, in a state of decay, could exist in the water at the freezing point, and be the cause of its odor and taste, it would be impossible to render the water pure by the use of filters of coarse texture, as is every day done. The hundreds of cooks who every day use the stone-ware filters, purify the water by a sponge, which must be daily cleaned, by the removal of the bodies of crustaceans containing oil. No other substance, having taste and odor, is separated from the water in this operation. Very few confervæ or other vegetable organisms are found at the present low temperature, while the taste and odor were never more offensive at the localities from which we take the water. The varying intensity of taste and odor, in different parts of the city, and also at different points in the lake, is alone a sufficient refutation of the hypothesis of a vegetable impregnation. The constant circulation due to changing temperature, can have no effect to remove from one portion of the water its dissolved matter and transfer it to another. There has been constant reference to the sudden local changes of taste within the city, which find a probable explanation in the occasional swarming of the crustaceans, which is a matter of observation. Any hypothesis resting upon the presence of an unusual quantity of autumnal leaves in the lake, would be met by the observed fact, that the trees still retain their leaves to an extraordinary amount. It would also have the obstacle to overcome, that the taste and odor of the water are the same as are afforded by the oil and crustaceans found in it.

We are able to report some further observations, which bear on points of scientific interest. Through the kindness of Prof. William B. Rogers, Dr. Bacon has examined the crustaceans from Fresh Pond, where the water has not been affected, and found them in the normal state ; that is, containing only a small amount of oil. The water of Round Pond, in Haverhill, represented to be affected like the Cochituate, afforded to Prof. Horsford, who exhibited them to us, similar crustaceans to those found in the Cochituate, and, like them, *gorged with odorous oil.*

We have been informed by intelligent persons, who are feeding the crustaceans on fat, that they retain their oil, and thrive remarkably ; while experiments now in progress indicate that when fed on flour, they gradually lose their oil.

We consider this subject as of scientific interest; and the research thus far continued, has shown us that there are more important points beyond, which are worthy of investigation by this Society.

Dr. Jackson objected to the tone and character of Dr. Hayes's rejoinder. He dissented from the statement that the *Cyclopean crustaceans* give the peculiar taste to the water, for he had faithfully tried the experiment, and found no such taste as the Cochituate water possessed when it had the peculiar cucumber flavor. He said, that Dr. Bacon had stated to the Society, that the oil globules seen in the crustacea are not in the stomach or alimentary canal of those animals, and Dr. Bacon, who was present, assented to this remark of Dr. Jackson. The minute oil globules are part of the natural fatty structure of the crustacea. Furthermore, no proof has ever been presented that this oil has the taste observed in Cochituate water. A fixed oil would remain for any length of time in the water. How, then, does the water become tasteless, on being kept in a demijohn for a few days?

The mucilaginous and albuminous matters from plants undergo decay, and change rapidly into crenic acid. How, then, could it be expected, that those matters, in their altered state, could be separated in any other form ? Putrefactive fermentation destroys their peculiar and recognizable qualities : and volatile products, giving an odor extremely fugitive and evanescent, and crenic acid, are the results.

Dr. Jackson objected to any partial statement of his researches, and referred to his entire report. In it will be found, on page 51st, the statement of the presence of " mucilaginous matters," which Dr. Hayes seems to have overlooked. Mucilage of plants contains, also, a portion of albuminous matter, which is also soluble in water, and undergoes speedy putrefactive changes.

Dr. Jackson was satisfied that the microscopic crustaceans have nothing to do with the peculiar taste of Cochituate Lake water. They were as abundant when the water had no bad taste as they have ever been since, and when the water again becomes pure, they will undoubtedly be found as abundant as ever.

Dr. Jackson read, from the sixth volume of Berzelius's Chemistry, the following passages, to justify his quotation: —

"Par l'alcool froid on retire l'oléine de la cire de myrica. L'alcool bouillant la dissout en petite quantité, et la solution dépose, par le refroidissement, de la stéarine. L'alcool froid n'en dissout qu' une petite quantité; mais il ne faut que 4 grains d' alcool bouillant pour la dissoudre; par le refroidissement il se dépose de la stéarine en paillettes incolores, tandis que la solution d' oléine reste colorée en vert par de la cire de myrica blanchie." Berzelius, *Traité de Chimie*, tome VI. p. 505. 2d ed. Paris, 1850.

Translation. By cold alcohol, we extract oleine from the wax of myrica. Boiling alcohol dissolves it in small quantity, and the solution on cooling deposits stearine. Cold alcohol only dissolves it in small quantity; but it only requires 4 grains (parts?) of boiling alcohol to dissolve it; on cooling, it deposits stearine in colorless scales, while the solution of oleine remains colored green by the whitened wax of myrica.

Dr. Gould remarked that these investigations relative to Cochituate water, had a scientific interest quite independent of their bearing on the cause of the offensive taste in the water. A general inquiry into the geological structure of the Cochituate Basin, and the vegetables, animals, and minerals found in it, in connection with a systematic determination of the organic matters in the water, and its consequent modifications for economical purposes, would be an appropriate one for this Society, and might result in conclusions important both to science and the community.

Prof. William B. Rogers thought this a good suggestion, and that it would not have a tendency in the least to reflect upon the elaborate examinations and analyses already made. The plan being also favored by the President, Prof. H. D. Rogers, Prof. Wyman, and others, on motion of Dr. Gould, it was voted,—

That a committee of seven be chosen, to be nominated by the Chair at the next meeting, composed of members proficient in Chemistry and the several branches of Natural History, and to be called the "Cochituate Committee," whose duty shall be to make observations in their several departments, for a prolonged period, on the physical constitution of the Cochituate Basin, to coöperate in a general plan, and to report from time to time as they may deem expedient.

DONATIONS TO THE MUSEUM.

January 3d. A specimen of petrified Guano, very rich in Phosphate of Lime; by Dr. C. T. Jackson. Specimens of *Picus martius*, Great Black Woodpecker; *Otus vulgaris*, Long-eared Owl; *O. brachyotus*, Short-eared Owl; *Gallinula chloropus*, common Gallinule; *Scolopax rusticola*, European Woodcock; *Tinnunculus alaudarius*, Kestril; and *Ortygometra* ———, Rail; by Dr. F. J. Bumstead. A young Boa Constrictor, and a specimen of *Botaurus lentiginosus*, American Bittern; by Mr. E. Samuels. A specimen of *Mergus serrator*, Red-breasted Merganser; by Mr. Caleb Loring, Jr. *Mus leucopus*, White-footed Mouse; *Arvicola Pennsylvanica*, common Field Mouse; *Condylura cristata*, Star-nosed Mole, and *Vespertilio noctivagans*, Silver-haired Bat; by Dr. Henry Bryant. A specimen of *Fungia tenuis*, Coral; by Mr. Charles L. Andrews.

January 17th. Specimens of Cannel Coal, from Torbanehill, Scotland, known as the Boghead Gas Coal; and Cannel Coal, from the Straitsville Mines, Ohio; by Dr. A. A. Hayes. A skeleton of the female *Cobaya aperea*, Guinea Pig; by Mr. Samuels. A collection of Fossils from the cliffs of Pianura, a post-town on the top of the Appennines; by Dr. H. R. Storer. A specimen of *Tetraodon turgidus*, Blowfish; by Mr. L. M. Sargent, Jr.

February 7th. A series of specimens of Coal and Iron Ore, from Straitsville, Ohio; by Dr. A. A. Hayes. A specimen of *Zygæna subarcuata*, Hammer-headed Shark; by Dr. B. S. Shaw.

February 21st. A specimen of *Accipenser brevirostris*, Short-nosed Sturgeon, caught just within Boston harbor; by Dr. Silas Durkee. A specimen of *Sebastes Norvegicus*, Norway Haddock; by Mr. Samuels. A specimen of *Bubo Virginianus*, Great Horned Owl; by Dr. Samuel Cabot, Jr. A specimen of *Salamandra venenosa*, Violet-colored Salamander; by Mr. George H. Marden. A specimen of *Emys angulata;* by Mr. C. J. Sprague. A specimen of *Emys insculpta*, and one of *E. picta;* by Dr. J. N. Borland. Four Hindoo Skulls; by Dr. Francis Minot. A specimen of Asbestos, from Chester, Vt.; by Mr. John G. Long.

March 7th. Specimens of *Ptilosomus Senegalensis*, Senegal Magpie; *Cypselus apus*, European Swift; *Picus major*, Great Speckled Woodpecker; *Corvus monedula*, Jackdaw; *Otus tetrix*, Little Bustard, (2 specimens); *Erythacha rubicula*, English Robin; *Fringilla cœlebs*, Chaffinch; *Turdus iliacus*, Red-winged Thrush; *Larus fuscus*, European Black-backed Gull; *Buteo lagopus*, Rough-legged Falcon; *Philomachus pugnax*, Ruff; *Ibis falcinellus*, Bay Ibis; *Accipiter nisus*, European Sparrow-hawk; *Garrulus glandarius*, European Jay; *Recurvirostra avocetta*, Avocet; *Phalaropus hyperboreus*, Phalarope; *Chrysotis Amazonicus*, Yellow-cheeked Parrot; *Conurus virescens*, Variegated-Winged Parrot; by Dr. F. J. Bumstead. 11 skins of Australian Birds, viz: *Ptilnorhynchus holosericus*, Satin Bird; *Podiceps gularis*, Grebe; *Campephaga melanops*, Caterpillar Catcher; *Anthochœra mellivora*, Wattle Bird; *Anthochœra carunculata*, Gill Bird; *Tropidorhyncus corniculatus*, Bald-headed Friar; *Melliphaga sericea*, White-tufted Honey-Eater; *Psophodes crepitans*, Coachwhip; *Acanthylis caudacuta*, Australian Swift; *Turdus* ———, Thrush; *Melliphaga maculata*, Honey-Eater; by Mr. C. J. F. Binney. A collection of several hundred rare and valuable Insects, and other objects, from Burmah; by Mrs. Benjamin. A specimen of *Salamandra venenosa*, Violet-colored Salamander; by Mr. C. J. Sprague.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1855.

Genealogy of Warren, with some Historical Sketches. By John C. Warren. 4to. Boston, 1854. *From the Author.*

Sixteenth Triennial Festival of the Massachusetts Charitable Mechanic Association. 8vo. Pamph. Boston, 1854. *From the Association.*

Wardian Cases for Plants, and their applications. By Stephen H. Ward, M. D. 8vo. Pamph. London, 1854. *From the Author.*

Actes de la Société Linnéenne. Livraisons 1 – 6. 8vo. Paris, 1853 – 5. *From the Société Linnéenne.*

Nineteenth Annual Report of the New York Institution for the Blind. 8vo. Pamph. New York, 1855. *From the Institution.*

Rectification of Conrad's Synopsis of the Family of Naiades of North America. By Isaac Lea. 8vo. Pamph. Philadelphia. *From the Author.*

Report of Cochituate Water Board to the City Council of Boston. 8vo. Pamph. Boston. *From Dr. C. T. Jackson.*

Illustrations of the Birds of California, Texas, Oregon, British and Russian America. 8vo. No. 8. By John Cassin. Philadelphia. *From the Author.*

On a Remarkable Change in the Composition, &c., of Water, supplied to the City of Boston, from Lake Cochituate. By A. A. Hayes, M. D. 8vo. Pamph. *From the Author.*

Archives du Muséum d'Histoire Naturelle. Tome VII. Livs. 1, 2. 4to. Paris, 1853 – 4. *From the Muséum.*

Six Articles upon the Smithsonian Institution, from the Boston Post. 8vo. Pamph. Boston, 1855. *From the Editor.*

Address at the Anniversary Meeting of the Royal Geographical Society. By the Earl of Ellesmere. 1854. 8vo. Pamph. London.

Proceedings of the American Philosophical Society. Vol. VI. No. 52. July to December, 1854. 8vo. Philadelphia. *From the Society.*

Proceedings of the California Academy of Natural Sciences. pp. 7 – 17. 8vo. San Francisco, 1855. *From the Academy.*

Victoria Regia, with account of its Discovery and Introduction into Cultivation. By J. F. Allen. Folio. Boston, 1854. *From the Author.*

Proceedings of the Academy of Natural Sciences of Philadelphia. 8vo. Vol. VII. Nos. 6 and 7. 1854. *From the Academy.*

Del Trapano-Sega. Memoria di Gaetano Giovanini. 8vo. Pamph. Bologna. *From the Author.*

Repertorio Italiano per la Storia Naturale. Cura J. J. Bianconi. 8vo. Pamph. Bononiæ, 1853. Fascie 1, 2. *From the Author.*

Notices of the Meeting of the Members of the Royal Institution of Great Britain. Part 4. 8vo. Pamph. London, 1854.

List of Members of ditto, 1854, with Report of Visitors for 1853. 8vo. Pamph. London. *From the Royal Institution.*

Exploration of the Valley of the Amazon. By W. S. Herndon and L. Gibbon. Congressional Report. Part 1. 8vo. Maps. Washington, 1854.

Congressional Globe. Vol. 28. 3 Parts. Also Appendix to ditto. 4to. Washington, 1854. *From Hon. S. H. Walley.*

Synopsis of the Classification of British Palæozoic Rocks. By A. Sedgewick. 4to. Pamph. 1851.

Geologie der Schweiz. Von B. Studer. 12mo. Bern. 1851.

Annual Report of the Superintendent of the Coast Survey. 8vo. Sketches accompanying the Same. 4to. Washington, 1852. *From Prof. H. D. Rogers.*

Une Dernière Ascension des Alpes. Par Edouard Desor. 8vo. Pamph. Neuchatel, 1854.

Notice sur les Echinides. Par E. Desor. Neuchatel, 1853. 12mo. Pamph.

Du Climat des États Unis. Par E. Desor. Neuchatel, 1853. 12mo. Pamph. *From the Author.*

Memorie dell' Academia delle Scienze del' Instituto di Bologna. Tomes 1 – 4. 4to. Bologna.

Rendiconto delle Sessioni dell' Academia delle Scienze, &c. 12mo. Pamph. 1847 – 53. 7 Nos. *From the Academia delle Scienze, &c.*

Saggia di Meteorologia. Da A. Palagi. 4to. Pamph. Bologna. 1850.

Sulle Variazioni Electrichi. Nota di A. Palagi. 8vo. Pamph. *From the Author.*

Annals and Magazine of Natural History. Nos. 84, 85, 86, 87. 8vo. London, 1854 – 5.

American Almanac for 1855. 12mo. Boston.

Die Infusionsthiere auf ihre Entwickelungsgeschichte, untersucht von Dr. Friedrich Stein. 4to. Pamph. Leipzig, 1854.

Beiträge zur näheren Kenntniss der Schwimmpolypen (Siphonophoren) von Dr. Carl Gegenbauer. 4to. Pamph. Leipzig, 1854. *From the Courtis Fund.*

Archiv für Naturgeschichte. Gegründet von A. F. A. Wiegman. Fortgesetzt von W. F. Erichson. III. 1854. 8vo. Berlin.

New Orleans Medical and Surgical Journal. Vol. XI. No. 4. January, 1855.

Michigan Farmer. Vol. XIII. No. 2. Detroit.

Silliman's American Journal of Science and Arts. No. 56. March, 1855.

New York Medical Times. No. 6. Vol. IV. March, 1855. New York.

New York Journal of Medicine and Collateral Sciences. Vol. XIV. Nos. 1 and 2. March, 1855. New York.

Genera of Recent Mollusca. By Henry and Arthur Adams. Nos. 14-20. 8vo. London, 1854-5.

Thesaurus Conchyliorum. By G. B. Sowerby, Jr. Part 2, 1842. Part 15, 1854. 8vo. London.

History of British Mollusca and their Shells. By Edward Forbes and Sylvanus Hanley. Part 32. 8vo. London. *Exchange.*

Memoirs of Napoleon, his Court and Family. By the Duchess d'Abrantes, (Mad. Junot.) 2 Vols. 8vo. New York, 1855.

Notes on Duels and Duelling. By Lorenzo Sabine. 8vo. Boston, 1854.

Memoirs of Celebrated Characters. By A. De Lamartine. 2 Vols. 12mo. New York, 1854.

Encyclopædia Britannica. Vol. VII. 4to. Boston, 1854. *Deposited by the Republican Institution.*

April 4, 1855.

The President in the Chair.

The President, in accordance with a vote passed at the last meeting, nominated the following gentlemen as members of the "Cochituate Committee," viz.: — Dr. A. A. Gould, Prof. Wm. B. Rogers, Prof. H. D. Rogers, Dr. C. T. Jackson, Dr. A. A. Hayes, Prof. Jeffries Wyman, Dr. John Bacon. These nominations were confirmed by the Society. Prof. H. D. Rogers then declining to serve upon the Committee, on motion of Dr. Jackson, Dr. Silas Durkee was chosen to fill his place.

A letter was read from Rev. P. H. Greenleaf, of Madison, Indiana, returning thanks for his election as Corresponding Member, and presenting a communication on a great flight of wild pigeons which had come under his observation, from which the following is an extract: —

OBSERVATIONS ON THE FLIGHT OF THE AMERICAN PASSENGER PIGEON, AT MADISON, IND., MARCH, 1855.

On the afternoon of Friday, March 9, 1855, I observed the sky, in distant spots, obscured by singular looking clouds, or patches of clouds, and soon discovered that they were living flocks. At first they were so distant as to be scarcely perceptible; but as they advanced, and became more distinct, the eye was gratified by the view of *immense masses of birds*, moving in regular lines of array, in distinct companies, and evidently obeying some strong impulse. The front line moved somewhat lower, as it approached, yet still was high in the air, and formed a flock of *more than a mile in length*, and from one quarter to one third of a mile in breadth. It covered about one third of the whole visible horizon in its centre, in length, and resembled in its movements a ground swell at sea, or the progress of a great serpent. Its continuity as a line was unbroken, and yet it seemed to have two divisions, with centres slightly advanced, as if about to form the letter V, and having a centre-bird in command of each portion as its leader. The numbers were so great that the sound of their flight was like the roar of a distant water-fall, or the rushing of the wind through the leafless trees; and as I measured their speed in movement, by comparing it with that of the steamer Jacob Strader, a packet 325 feet long, then moving up the river, it did not seem much to exceed that of the steamer. I was struck with the strong and rapid flight of these little birds against the wind, and as compared with that of migratory birds I had seen in the neighborhood of Boston. They evidently had an object, and were intent upon it. There seemed to be no stragglers; no lagging behind; no uncertainty of flight. The wavy motion of the line in various directions, I attributed to the occasional shots from below, or perhaps to the presence of some bird of prey; but nothing seemed to break the continuity of the line of flight. When scared from their course by the sportsmen, they invariably circled back to the general line, as if obeying some magnetic law; and the course of a disturbed flock would sometimes be like festoons on a line. On inquiry of residents here, I was told they were pigeons proceeding to a rendezvouz near Vincennes, the shire town of Knox County, Ind., and situated on the east bank of the Wabash, lat. 38° 42′ N. and long. 10° 28′ W., 120 miles S. W. of Indianapolis, 168 W. N. W. from Cincinnati. Their flight, when undisturbed, was evidently in that direction. Flock after flock continued to be passing, until 5 o'clock, P. M., when public services at Christ Church obliged me to leave the observation ; but it is said, they continued until nightfall. The next day an occasional flock passed, until a heavy rain drove them to the earth, and then the trees in the neighborhood fairly broke down, it is said, in some cases, from their weight. The rain on Sunday prevented their flight, and the sportsmen were busy ; but on Monday I could not find a single straggler. The specimens brought to town proved the bird to be the "*Ectopistes migratorius*," or Passenger Pigeon.

Prof. H. D. Rogers exhibited a number of fossil impressions occurring in the red shale, or carboniferous red sandstone, next underlying the anthracite coal measures of Pennsylvania. A portion of them are identical with specimens found some years ago, by Isaac Lea, Esq., of Philadelphia, in the same geological horizon, and by him attributed to Reptilians ; others are from a horizon 1,300 feet lower. These specimens also present a series of impressions, not observed by Mr. Lea in his specimens, consisting of the right and left feet, and apparently the fore and hind feet, of a small species. Prof. Rogers had not yet formed definite conclusions as to their nature, but they are obviously Reptilian. They occur invariably upon surfaces which appear to have been slimy and exposed to the air ; some show the spots which are attributed to rain drops ; others, trickling water marks and wave marks. The slimy surface is attributed by Prof. Rogers to the finest clayey deposit from the ocean, at different intervals, giving the rock the tendency to scale off in thin layers. The thickness of the carboniferous red sandstone is estimated by Prof. Rogers at 3,000 feet ; some of these specimens came from a depth of 2,000 feet in that formation, and appear to be the oldest vestiges of reptilian creatures yet found in the palæozoic rocks of America. The position of the footprints discovered by Dr. King is 1,000 or 1,500 feet above the base of the conglomerate, or first member of the coal measures, while these described by Prof. Rogers extend, as has just been stated, some 2,000 feet below that geological horizon.

Longitudinal markings, looking like trails, probably of mollusca, are often found in these rocks, and were exhibited by Prof. Rogers. The most common of these impressions is about half an inch in breadth, and consists of three separate lines of corrugations, the central band having the corrugations exceedingly minute. Towards one margin of the trail there is invariably a narrow, sharp groove, two or three inches in length, which runs out by a gentle curve towards the edge of the trail, and another commencing within the margin, and terminating likewise by a slight inflection in advance of the first. These, it was suggested as possible, may have originated from the edge or lip of the shell of the crawling mollusk, grooving the softened mud.

After describing, in a general way, the reptilian footprints in the carboniferous red sandstone of Pennsylvania, assigning the positions which they occupy in the formation, Prof. H. D. Rogers proceeded to offer some reflections, showing the bearings of our present knowledge of the footmarks in the ancient strata generally, on certain cardinal doctrines of geology, especially on the theory of a progressive development in the extinct inhabitants of the earth. He called attention to the fact, that associated with the earlier bird tracks, there are none ascribable to quadrupeds, or any mammalian creatures, while in company with those of the earlier reptiles, occur none attributable to birds. The first birds seem to have appeared about the close of the Triassic or dawn of the great Oōlitic period of the middle secondary ages, and no mammalian animals have left either their prints or their skeletons in strata of a date so old; while of neither bird nor mammal is there print or vestige of any kind in the still more ancient deposits of the carboniferous and yet earlier rocks, in which the tracks and bones of reptiles and fishes, and the trails and shells of mollusks are of frequent occurrence. Such successive disappearance of the traces of the higher forms of life with the advance of geological time, is one of the clearest proofs we can have of a progressive elevation in the scale of structure of the races successively created. The law of successive appearance of the footprints, is quite as conclusive as that of the parallel introduction of the actual skeletons and remains of the creatures themselves; it is perhaps of even more weight, as precluding all discussion upon the differences in degree of destructibility of the bones or carcases of the several classes of animals which peopled the ancient world. Some of the bird-tracks and reptilian footprints left on the once soft surfaces of the old rocks, are as clear and legible imprints as any impressed yesterday on surfaces of moist mud or sand, by the creatures of corresponding structure. Once buried and sealed up, their preservation has been independent of the lapse of time. This law of a progressive rise in the character of the footprints, like that so generally recognized in regard to the organic remains themselves, distinctly refutes the view urged by Sir Charles Lyell, and some other disciples of the Huttonian theory of the earth's history. Fancying a uniformity in the series of past changes in the animate and inanimate world, they contend that the evidence in support of the theory of the progressive development of organic life is inconclusive, on the ground that the higher forms being inhabitants of the land, we ought not to look for their remains in strata of marine or aqueous origin, but must suppose they were never entombed. But the negative evidence from footprints is of positive force, when it appeals to appearances in the imprinted surfaces of the rocks, which show that they were exposed in a moist state to the air, above the level of the waters, and in situations as accessible to mammalia as to birds, and in the case of the still earlier formations, as accessible to both mammalia and birds as to the reptiles, which left their tracks in such numbers upon them.

Prof. H. D. Rogers also adverted to the superior value of the evidence afforded by such unequivocal shore marks as those of the footprints, and the markings which usually accompany them, over that of the "ripple markings," so generally appealed to by geologists as the signs of the ancient water levels or sea margins of the globe. Explaining, in accordance with the suggestions of Babbage, how these latter may be produced under *deep water*, by the elastic undulation of the fluid moulding the movable sediments into wave-like grooves and ridges, having the semblance of the ripple transmitted to the bottom of shallow waters by the wind, he showed how easily this appearance in the strata may lead geologists to erroneous inferences as to prolonged subsidences of the earth's crust where the phenomenon abounds. The footprints of birds and reptiles on the rocks, give evidence which is less fallacious, for they indicate, without any ambiguity, that they were impressed in marine or tidal strata, while these were yet moist, and were intermittingly exposed, wet, to the air, and covered up. They are, therefore, among our best records of the ancient water levels of the continents.

In a discussion which arose, concerning the possible modes in which the small round imprints, usually ascribed to rain drops, may have been produced, Prof. H. D. Rogers threw out the suggestion, that they may perhaps have been formed, in certain cases at least, by a sprinkling of spray from waves breaking on a beach. That these so-called rain spots should so usually accompany those surfaces which bear other independent evidences of a shore origin, is an argument in favor of this view, while the fact that the insulation or sparseness of the spotting is almost invariably such that only a very light and most transient sprinkling of rain could produce it, militates, he thought, against the rain hypothesis. The objection is all the stronger, too, when we reflect, that in those early periods of the world, the atmosphere was, from every evidence, more humid than it is at present, and the rains necessarily, therefore, were heavier.

The President observed that he was disposed to consider them the result of rain. The impressions are very generally found, their number is immense, and they are vertical, oblique, single, double, treble, &c., precisely the characters of rain-drop impressions in recent clay, in specimens from the Connecticut River, now in his possession.

Prof. Wm. B. Rogers remarked, that he had made experiments to determine the effect of raindrops on soft plaster. He found that a slight fall of rain produced a very striking resemblance to the fossil impressions, but that a further action of the shower tended to obliterate the first impressions. If these are to be considered rain drop impressions, it must be assumed that they were caused by a fleeting shower, and not by a continuous rain. Perhaps they were caused by water in the form of spray.

Dr. C. T. Jackson thought that they were really impressions of rain drops from a fleeting shower, which had escaped obliteration.

Prof. Wm. B. Rogers stated that he had recently examined two specimens of lignite, one from the coal-bearing rocks near Richmond, Virginia, and another from the New Red Sandstone of North Carolina. He had found, in the comparison of these specimens, another fact in confirmation of the view that these two strata are of the same geological age.

Dr. C. T. Jackson agreed with Prof. Rogers in this view. The identity of geological age was proved by the identity of the fossil flora of the two regions, and would probably be more fully illustrated by comparison of the fossil fishes and saurians of the two localities. Dr. Jackson remarked, that the sub-heterocercal character of the tails of fishes found in the sandstone and slate of Connecticut River, in New Jersey, Virginia, and North Carolina, seemed to give plausibility to the theory of their being more recent than the strata of the coal formation, and of the New Red Sandstone rocks of Europe, and most nearly allied them with the Lias groups of strata of Europe, in which coal of a similar character is found to that now worked in Virginia and North Carolina. Prof. Emmons has found well-preserved bones of Saurian reptiles in the Sandstone of Dan River, North Carolina, and Sauroid fishes and Saurian coprolites abound in those strata.

The following letters were read, viz: —

From the Société de Géographie de Paris, Oct. 30, 1854, returning thanks for the Publications of the Society, and requesting that volumes 1 to 5 of the Journal may be supplied; — from the Société d'Histoire Naturelle du departement de la Moselle, returning thanks for those of the Society's publications which had been received, requesting that deficient numbers may be supplied, and promising to send in exchange the Bulletin of that Society, then in course of publication ; — from the Academia delle Scienze dell' Instituto di Bologna, May 20, 1854, returning thanks for the Journal, Vols. 1 to 4, and for the Proceedings, 1846 to 1853.

The letters of the Geographical Society, and of the Society of the Department of the Moselle, were referred to the Publishing Committee.

April 18, 1855.

The President in the Chair.

The President reminded the Society that the next meeting would be the Regular Annual Meeting of the Society, and that in accordance with custom, a Committee should be appointed to nominate officers for the ensuing year. Accordingly, Drs. Durkee, Shurtleff, and Abbot were appointed a Committee for this purpose.

The President stated that he had received from Mr. Field a beautiful and peculiar specimen of Fossil Rain-drops, which he would now exhibit. As this subject had been discussed at the previous meeting, it would not be amiss to point out some of the specimens, which presented the different forms of the rain-drop impressions. He would be able to exhibit four or five different impressions. The first would show the most common form, caused by the rain falling perpendicularly. This was a section of a sphere of various sizes, all regular.

A second form was produced when the rain fell obliquely, in consequence of which one edge of the impression was more elevated than the other, and might have an oval shape.

A third form was when the impression was very superficial, and at the same time very large. This appeared to be produced by a heavy drop falling perpendicularly on a thin stratum of shale or sandstone, which, being prevented from penetrating, spread itself superficially ; of this two specimens were exhibited, one belonging to the Society, the other to the President.

A fourth kind of impression was shown in the specimen now sent by Mr. Field. Instead of a rounded impression, the drop produced one of an oblong form, from a heavy shower descending obliquely, and turning up the sand or mud in ridges, like small ripple marks. Such was the fact in the specimen exhibited from Mr. Field.

A fifth form, of which many distinct impressions are found, is in relief, caused by the impression being conveyed from the upper surface of one slab to the lower surface of another.

Some eminent geologists question whether these impressions are the effect of raindrops, or of some other agent. The principal grounds on which such a question could be based, would be the apparent probability of a subsequent shower obliterating the marks of one which preceded, and thus one shower effacing the traces of another.

This difficulty is not a serious one, however, if we suppose, what was probably the fact, that while the greater number of impressions were effaced, some would have the advantage of a long drought to dry and harden. There is another method of explaining the preservation of these marks, without the supposition of a long-continued drought. Some impressions might, from the heat of the sun, harden sufficiently in a few hours, to prevent the adhesion of newly blown sand, which might thus cover and protect instead of effacing them ; so that when the shales or sandstones were split open, the cast of the rain drop would be retained. Such is no doubt the manner in which many fossil impressions have been preserved. The President remarked that he could not, however, avoid repeating the observation frequently made, that while the earliest and most labored productions of man have disappeared, the slight impressions of rain drops, ripple marks, and delicate zoöphytes have come down to us from a remote period.

Dr. C. T. Jackson observed, that one of the specimens exhibited was especially interesting, as it exhibited the rain drop impressions in the tracks of birds' feet.

Dr. C. T. Jackson exhibited a specimen of Allanite, a mineral discovered recently in a new locality at Manchester, N. H., by Mr. William S. Wilder. It was one of the largest crystals Dr. Jackson had seen. It contained the oxides of cerium, didymium, and lanthanium. Dr. Jackson has an analysis of the mineral in progress.

Prof. W. B. Rogers exhibited to the Society, two specimens of Lignite, which had been referred to at the preceding meeting; the one from the Middle Secondary Rocks of Lancaster County, Pennsylvania, where it had been found by Prof. H. D. Rogers, and the other from the Coal-bearing Rocks of eastern Virginia.

These specimens are interesting, not only as examples of the beautiful preservation of woody structure in Lignite, but as affording additional evidence of the close relationship between the groups of strata in which they are respectively found.

Both specimens are jet black, and, when broken transversely to the fibre of the wood, present the smooth, conchoidal fracture, and the lustre of anthracite coal. The longitudinal surfaces exhibit the structure of the woody stem as perfectly as the finer varieties of silicified wood, and what is chiefly important, the details of structure are the same in both specimens. The most prominent characters under the microscope, are, —

1. The mass consists of elongated cells, with areolar markings, and includes few or no proper ducts.

2. These cells are intersected by thin, medullary plates, composed of short cells, with similar, but more scattered markings.

3. The areolæ of the elongated cells are arranged in a single, very rarely a double row, on each of the two faces which are parallel to the medullary plates, but are entirely absent from the other faces of the cells.

In all these particulars, as well as in the dimensions of the cells, and the size and form of the areolæ, Prof. Rogers considered the structure of these Lignites as closely agreeing with that of the fossil coniferous wood described and figured by Witham, under the name of *Peuce Huttonia* and *P. Lindleiana.* This fossil genus, almost identical in woody structure with the modern pine, was found by Witham to be restricted to rocks of the Oölitic period. Hence the characters of these Lignites, while they furnished a new evidence in favor of the view which Prof. Rogers has heretofore maintained, of the near affinity in time of the so-called New Red Sandstone, or Triassic rocks of this country, and the coal-bearing deposits of eastern Virginia and North Carolina, helped to confirm his conclusion that both these belts belong to a period corresponding to the lower part of the Oölite or Jurassic series of Europe. Prof. Rogers added that these Lignites appear to be identical in structure with that variety of silicified wood, found in the coal-bearing rocks of eastern Virginia, to which he had formerly referred when speaking of the Jurassic age of these deposits.

Prof. H. D. Rogers called attention to the numerous and extensive deposits of Lignite reported as occurring in the region of the Upper Missouri, and within and beyond the Rocky Mountains, and stated that probably several of the reputed localities of bituminous coal, that, for instance, near Fort Bridger, laid down as a true coal basin, by Capt. Stansbury, are but lignite deposits of a modern geological age. Stress has been laid, by Col. Benton and others, on the occurrence of coal in the Rocky Mountains, in connection with the great question of an eligible railroad line westward to the Pacific; and there can be no doubt the discovery of true coal fields in the far interior of the continent is a matter of national interest. The wide diffusion of strata of the age of the Carboniferous Limestone lends likelihood to the belief in their existence, but we are greatly in want of scientific evidence.

The lignites exhibited this evening, from the rocks of the Oölitic age, of Virginia and Pennsylvania, show us how easily such specimens may be mistaken for true coal, by any but initiated observers.

Prof. H. D. Rogers made a brief verbal communication, illustrating the geology of the eastern base of the Rocky Mountains, and showing the insufficiency of any evidence yet brought in from that region by explorers, as published by Mr. Marcou, for the introduction of a group of rocks of Oölitic or Jurassic age, into the geological map of that geologist, in the district of the Raton Mountains. He inquired of Dr. Jackson, who had inspected Mr. Marcou's specimens, whether any fossils exist to authenticate his views.

Dr. Jackson replied, that he had no doubt of the fact, that Mr. Marcou possessed abundant evidence to sustain his views with regard to his geological discoveries among the Rocky Mountains. Dr. Jackson had examined his geological map, in which the position of each group of rocks was represented by colors; he observed the Jurassic and Cretaceous rocks were represented upon that map, and he saw numerous well characterized cretaceous fossils, in the collection brought home by Mr. Marcou from the Rocky Mountains. He also had seen a large collection of fossils of the Carboniferous Limestone, amongst which were *Spirifer pecos*, numerous *Producti*, and *Terebratulæ.* Also specimens of Opalized Wood, from a petrified forest in the New Red Sandstone, which is seen overlying the Carboniferous rocks. As to the Jurassic rocks, Marcou was especially qualified for correct observations, as he is the author of an admirable Memoire on the *Jura Salinois*, a work published, in quarto, by the Geological Society of France. Mr. Marcou expects, as soon as his health is restored, to publish his geological map and observations on the geology of his great section across this continent, and since he will have any aid he may need from the most eminent palæontologists of Europe, to whose inspection all his fossils will be submitted, there is not the slightest chance of his falling into any error, with regard to the geological age of the rock formations which he has explored. Mr. Marcou is now sick, and is at Salins, in the Department of the Jura, his home. We shall probably see his Memoire on the Geology of the Rocky Mountains, in the Bulletin of the Geological Society of France.

Dr. A. A. Hayes presented the following communication, on the chemical characters of the water which enters the sea, at some depth below the city of Boston: —

At a former meeting of this Society, I described the chemical changes, through which the sulphate of soda found on the tributaries of the Missouri River, becomes converted into bicarbonate of soda, after its solution mixes with the waters of the Mississippi, which are charged with organic matter in a state of change. The fact of principal importance in connection with what is to follow is, the flow of so large a body of water containing in solution bicarbonate of soda, into the ocean, which contains dissolved several lime and magnesian salts.

As this might be considered an unusual occurrence, favored by certain local causes, the object of the present paper is to point out other instances, where, from similar changes, the water flowing below the surface, and constituting the drainage of the country, is largely composed of a solution of the bicarbonate of soda.

The subterranean waters of the peninsula of Boston, have at the depth of about 140 feet, a remarkable uniformity of composition, and the flow towards the shore line is abundant. Like the water of the lower Mississippi, they are turbid, holding in suspension finely divided carbonate of lime and iron, and hydrate of silicic acid; affording, when greatly heated, a precipitation of hydrated carbonate of lime, due to the instantaneous decomposition of sulphate of lime, by a solution of bicarbonate of soda present. The latter salt is in these cases always in excess; so that the whole mass of the drainage, at about the same level, has a marked alkalinity, and belongs to the class of alkaline waters.

Numerous observations have shown that this water is covered by a compact marl-earth, which has so large a proportion of clay that it effectually divides the upper drainage from the lower, or alkaline water, which, from its depth below the surface, can enter the harbor water only at some distance from the shore. When attempts have been made by continuous pumping for many days, to exhaust the supply, or overcome the flow of the water at one point, the wells or borings at contiguous points have shown a reduction of volume in the water; but a reflux of the ocean water through the same channels has been effected only where, after several days, a very large volume of water had been pumped from one opening. This fact establishes our knowledge of a continuous flow of alkaline water towards the sea from the shore line, while the depth of the stratum under which it flows, shows that it is overlaid by the mass of sea-water near the shore. A continuation of solid marl stratum below the water near the shore, would prevent any intermixture of the alkaline water with the sea-water at that point, and allow it to gradually mix only when the soundings are about twenty-five fathoms. There is no cause apparent, which would prevent a continued suspension of the minutely divided matter, until the turbid water mixes with the sea-water. In the cases of pumping referred to, the water, after some days, became more turbid than at the commencement of the trials, leading to the conclusion that turbid water occupied every part of the submarine channels of flow.

Proceeding to the more distant sources of this water, I have resorted to chemical analyses of the waters from various points in the vicinity of Boston, and the evidence that this water enters the strata in the country back from the neighboring city of Charlestown, is almost conclusive. Many of the open wells of that city contain a clear water, having bicarbonate of soda in excess over the earthy salts also contained in it, and I have found that the argillite and clay beds contain sulphates of lime and soda, as well as silicates of soda and potash. At a future time, I shall place before the Society the experimental demonstrations, which render these facts relating to the presence of the sulphates in the argillite palpable to the eye; remarking here, that the well understood decompositions and recompositions explain, in a simple manner, the production of bicarbonate of soda or potash.

The occurrence of fresh water forced up from below the ocean, along the border of our Southern States, has been frequently described. I have observed phenomena in several places among the West India Islands, illustrating this flow from the land under the water of the ocean, where the elevation of volcanic mountains was considerable.

The mere presence of fresh water at the bottom of the ocean infiltrating through the slime, or sand, would be sufficient to induce chemical changes by the disturbance of electrical relations. While the surface and mass of the ocean water, absorbing oxygen from the air, would be positive to a stratum of sea-water mixed with fresh at the bottom, decompositions of oxidized bodies into simpler forms of matter would take place near the line where they blended. I am disposed to consider the presence of organic matter, either carried in solution from the land, or taken up from the silt and sand by the fresh water, as the more active cause of decomposition of oxidized bodies. The formation of sulphurets of metals, from metallic masses which have been deposited at the bottom of the sea, on soundings, is more simply explained by this mode of action also.

The existence of a drainage flow of turbid water, or a water containing bicarbonate of alkalies, or alkaline earths, along a coast line, would account for the green color of sea-water on soundings near coasts. The division of blue water into many thin portions between reflecting surfaces, produced by the presence of suspended solid particles, alters its color to the hue which, by contrast, is called green. These solid, though finely divided particles, would be far more abundant in the case of the flow of alkaline waters, for the mixing of such waters with the ocean would be followed by the constant decomposition of the lime salts of the ocean water, and the production of carbonate of lime in the hydrous, gelatinous form, passing into the state of opaque particles, and precipitating continuously.

A natural cause for the production of carbonate of lime, by precipitation from the lime salts held in solution by sea-water, is thus acting along the coast line of this and probably other countries. The influence of the minute quantity of organic matter contained in drainage water in producing chemical changes of importance, is rendered apparent in this connection by its power of decomposition in the absence of oxygen sources.

In tracing so much in detail the action of drainage water, whether that of rivers or subterranean flow, my purpose is to render this and a similar action taking place in sea-water itself, a basis for some interesting generalizations which will follow.

Prof. Jeffries Wyman gave the measurements of the internal capacities of four East Indian Crania, presented to the Society recently by Dr. Francis Minot. They were severally as follows: —

86 — 72 — 67 — 66 cubic inches.

The one measuring 67 cubic inches is somewhat deformed, being flattened latero-posteriorly. The one measuring 66 cubic inches appears, from the teeth and general contour, to have belonged to a female. 66 cubic inches is the minimum of what may be called a normal skull.

Prof. H. D. Rogers alluded to the statements made by travellers amongst the Rocky Mountains, of the great size of the skulls of the lowest races of the American Aborigines, called " Root Diggers."

A male specimen of European Widgeon, (*Mareca penelope*,) obtained in Quincy Market, and brought from Philadelphia, was exhibited by Dr. Bryant. He had seen last year, two specimens in the market, from Virginia ; he had also seen two specimens in New York. Dr. Bryant also remarked, that a specimen of European Green-winged Teal, male, (*Querquedula crecca*,) had been sent to Mr. Samuels, to be mounted, a short time since. The bird was shot in Massachusetts, and was the first specimen he had ever seen in this State, though he had seen several in New York, where they were first pointed out to him by Mr. John Bell, the celebrated taxidermist.

Mr. Francis H. Storer was chosen Resident Member.

May 2, 1855.

ANNUAL MEETING.

The President in the Chair.

The records of the last meeting, and of the Annual Meeting of 1854, were read by the Secretary, and approved.

Reports of Curators were read as follows: —

The Curator of Comparative Anatomy would respectfully report, that the Cabinet of this department came under his care during the present year, immediately after the resignation of Dr. Samuel Kneeland, by whom it was left in excellent order, the different specimens being in good condition, and the larger proportion of them labelled.

During the present year some valuable additions have been made; among them, three Indian Crania, from Dr. J. C. Nott; four crania from the East Indies, from Dr. Francis Minot; and two crania, one Chinese and the other Loo Choo, deposited by Dr. J. N. Borland.

Several skeletons, prepared by Mr. Samuels, have also been added to the collection by his donation.

The Curator would call the attention of the Society to the fact, that the Cabinet of Comparative Anatomy has been somewhat injured, and will doubtless be still more injured, by the dampness of the cases in which it is contained. This evil is the result of the external circumstances of the building, for which there seems to be no remedy so long as it is screened from the light and heat of the sun, and from a free ventilation, by the neighboring structures, unless the Society are willing to incur much additional expense in heating and other care of their collections. The Curator would further add, that the Cabinet under his care is now too large to be well displayed in its present accommodations, so as to render it as useful as it should be, practically, to scientific students.

The Curator of Ichthyology reported, that the department of Ichthyology has undergone but little change during the past year. Two specimens only have been added to the collection.

The Curator of Conchology reported, that in the department under his charge but little progress has been made during the past year, except in the preparation of specimens for the Cabinet.

Three hundred species have been labelled, and the greater part of them have been placed in labelled phials, ready for the Cabinet, and a catalogue of the same furnished to the Society.

No donations have been made to the Society in this department, except a small collection of 22 specimens from Westfield and Southbridge.

Of the 300 species above named, 256 are from Europe, land and fresh water shells; 20 were presented by Mr. Prime; and 22 are from Westfield and Southbridge Ponds, land and fresh water shells.

The Curator of Ornithology reported that the collection under his care is in as good order as can be expected. During the last year it has been increased by the addition of 74 specimens, most of which were new to the Cabinet. Donations have been received from the following gentlemen: —

Dr. S. Cabot	1 specimen.
" F. J. Bumstead	41 "
Mr. C. J. F. Binney	11 "
" E. Samuels	10 "
" N. Robbins	1 "
" H. D. Morse	1 "
" Thure Kumlien	8 "
" T. H. Hinckley	1 "

Among the most valuable specimens presented, he would mention the hybrid between the Hooded Merganser, (*Mergus cucullatus*,) and the American Golden Eye, (*Clangula Americana*,) presented by Mr. H. D. Morse, on which a report was read before the Society by Dr. Cabot. The European Widgeon, (*Mareca penelope*,) from the vicinity of Philadelphia, presented by Mr. Samuels, and a variety of the Pigeon Hawk (*H. columbarius*,) presented by Mr. Thure Kumlien, of Wisconsin. Six mounted birds were presented by Dr. Bumstead, who also gave the Curator permission to select from his collection of skins any specimens that were desirable for the Cabinet. 35 have already been mounted and presented in his name, and probably as many more will be, the ensuing year. The Curator has commenced a catalogue of the specimens, arranged according to Gray; but from the limited number of books of reference in the library, fears that he will be unable to make it perfect.

The Curator of Oölogy reported, that the specimens under his charge are in good order; are all classified, labelled, and attached to cards. During the year, donations have been made by Dr. Henry Bryant, Mr. N. H. Bishop, Mr. Kumlien of Wisconsin, Mr. Samuels, and from Dr. F. J. Bumstead.

The following donations are of species the eggs of which are new to the collection: — Eggs of *Caprimulgus Carolinensis*, *Ephaltes asio*, *Cardinalis Virginianus*, from Dr. Bryant; eggs of *Tetrao cupido*, *Hydrochelidon plumbea*, *Gallinula galeata*, *Podilymbus Carolinensis*, *Pterocyanea discors*, from Mr. Kumlien; nest of the *Agelaius xanthocephalus*, from Mr. Kumlien; nest and eggs of *Pyranga rubra*, from Mr. Bishop; eggs of *Rusticola minor*, *Astur Cooperi*, from Dr. Bumstead; and the eggs of *Meleagris gallopavo*, *Enicocichla aurocapillus*, *Corvus Americanus*, *Buteo lineatus*, *Hæmatopus palliatus*, *Quiscalus macrourus*, from Mr. Samuels.

The collection contains the eggs of 209 ascertained species, 16 of which have been added during the year.

The collection of nests has been partially arranged, and before the end of the year ensuing, the Curator hopes to complete the arrangement of those in the possession of the Society.

The Curator would once more solicit the aid of members, who pass the summer in the country, or enjoy any facilities for making collections, to increase the number of the eggs of the birds of Massachusetts, in the collection of the Society.

The Curator of Botany reported the Herbarium to be in excellent condition. Several hundred species of native and foreign plants have been added during the year, all of which have been affixed to paper and properly labelled. Some of the best and most perfectly prepared specimens were received from I. A. Lapham, Esq., of Wisconsin, and one parcel of nice South European plants was sent from Cambridge by Prof. Gray.

Since the last Annual Meeting, the Curator has prepared a catalogue of the plants in the Society's Herbarium, which now represents the Flora of the Northern States pretty fully, although still wanting in some hundreds of species.

No reports were received from the Curators of Geology, Mineralogy, Herpetology, and Crustacea and Radiata.

Dr. Durkee reported that the portion of the Entomological Collection in his charge, formerly belonging to Dr. Burnett, was in good condition.

The Librarian reported, that during the past year 75 bound volumes have been added to the library, including 22 purchased by the Republican Institution. 170 pamphlets and parts of works have also been added. All the pamphlets, and nearly half of the bound volumes, were received by donation.

The number of volumes borrowed during the year is 320. The library now contains about 3,500 volumes.

It has been suggested by many of those most frequently using our books, that a card catalogue should be made for more convenient reference to them. Such a catalogue is certainly desirable, but its preparation will take more time than the present Librarian can give in addition to the other duties of his office.

Should the Society decide that it is necessary to have one, it will be easy to find some competent person to prepare it for a reasonable compensation.

In connection with this subject, it may be stated that the library is now large and valuable enough to require some restrictions in regard to the mode of borrowing its books.

The Librarian is present, daily, from 9 to 12 o'clock, and members of the Society coming during those hours can obtain what they want, if we have it. But a custom has prevailed to some extent during the past three or four years, of taking out books in the absence of the Librarian, and frequently without charging them on the record books. Generally, the books borrowed in this way are returned, but sometimes we suffer loss, and know not where to look for lost property.

Would it not be expedient for the Library Committee to prohibit the taking out of books during the absence of the officer having charge of them, and to take such other measures as they may deem necessary for the preservation of the library?

Some change in the room containing our library is desirable. Since the erection of the new theatre, the room has been dark and damp; uncomfortable for those occupying it, and injurious to the books. If there is any fair prospect of a new building for the Society, it would, of course, be inexpedient to expend any money in altering the present one; but if we are to continue here, the interest of the Society will require better accommodations for its books, and for those who use them.

The Treasurer reported, that during the year ending this day, he had received for the Society,

On general account	$891.00
On account of Courtis Fund	993.00
To which add balance of last year . . .	66.39
Making a total of	$1,950.39
The expenditures during the same time have been	$1,652.18
Leaving a cash balance on general account of .	$298.21

Besides the above, there remains in the treasury a balance of $143.26 due the Lloyd Fund, subject to the order of the Curators for the purchase of books. If it should meet the approval of the Society to transfer this amount to the general account, and place it at the disposal of the Librarian, it would simplify the accounts, and be expended according to the intention of the donors.

The Building Fund has been invested in ten shares of the capital stock of the Bank of North America, and the annual proceeds of the same, deducting the premium paid for the said stock, has been added to the fund according to an order of the Society.

Mr. Sprague and Dr. Kneeland were appointed a Committee to audit the accounts of the Treasurer.

The Committee on Nominations reported the following list of candidates for officers, and they were unanimously elected: —

President,

John C. Warren, M. D.

Vice-Presidents,

Charles T. Jackson, M. D., and D. Humphreys Storer, M. D.

CORRESPONDING SECRETARY,
Samuel L. Abbot, M. D.

RECORDING SECRETARY,
Benjamin S. Shaw, M. D.

TREASURER,
Nathaniel B. Shurtleff, M. D.

LIBRARIAN,
Charles K. Dillaway.

CURATORS,

Thomas T. Bouvé,	*Of Geology.*
Francis Alger,	*Mineralogy.*
Jeffries Wyman, M. D.	*Comparative Anatomy.*
Silas Durkee, M. D.	*Ichthyology.*
Charles J. Sprague,	*Botany.*
Thomas M. Brewer, M. D.	*Oölogy.*
Henry Bryant, M. D.	*Ornithology.*
Thomas J. Whittemore,	*Conchology.*
J. Nelson Borland, M. D.	*Herpetology.*
John P. Reynolds, M. D.	*Crustacea and Radiata.*
H. K. Oliver, Jr., M. D.	*Entomology.*

CABINET KEEPER,
Charles Stodder.

Prof. William B. Rogers communicated the discovery, in a new locality in Virginia, of the so-called Posidonomya, which he has previously found at various points in the Mesozoic Rocks of Pennsylvania, Virginia, and North Carolina. The fossils occur at a point one mile due west of the junction of the Bannister and Dan Rivers, near the Southern limit of the State, associated with carbonaceous shales, impure coal, and sandstones. Prof. Rogers stated that he had long been aware of the existence, in this vicinity, of sedimentary rocks, probably belonging to the period of the Chesterfield and Prince Edward strata, regarded by him as of Jurassic age, but until lately he had not been able to procure fossil evidences of the identity of these deposits. Through the kindness of Mr. K. Gilliss, a resident of the neighborhood, he has recently obtained specimens which are conclusive on this point. As in nearly all the other localities, these fossils occur in a dark and somewhat bituminous slate, between the thin laminæ of which they are very closely crowded. They are evidently identical with those found in the Chesterfield coal measures, and the other Middle Secondary districts of North Carolina, Virginia, and Pennsylvania, referred to in former communications.

The Bannister tract lies in a direction south by west, and at a distance of about 45 miles from the localities in Cumberland and Prince Edward Counties, where the Posidonomya was first discovered in association with characteristic plants of the Chesterfield coal measures. It is placed, therefore, in the line of the Mesozoic rocks in Virginia, and serves more nearly to connect this with the Eastern or Deep River Belt of North Carolina. The rocks of this group, near the centre of Prince Edward County, form an oval outlying patch, less than a mile in diameter, not far from the southern end of the principal belt, and there are indications of one or more similar outliers between this and the Bannister. These facts, in connection with the topography of the intervening country, favor the opinion that this middle belt was once continuous as far as the southern boundary of Virginia, beyond which it may have united with the prolonged tract which includes the Deep River deposits of North Carolina.

Prof. William B. Rogers next communicated some observations, made within the past year, in regard to the metamorphic influence of Trappean rocks on the adjacent sedimentary strata, and exhibited a series of specimens from Prince William County, Virginia, illustrating these phenomena. The tract whence the specimens were taken is part of the great belt, extending continuously from New Jersey far into Virginia, which has commonly been designated as of the New Red Sandstone or Trias, but which Prof. Rogers, on the evidence of fossils, has more recently inferred to be closely allied to the rocks of the Eastern and Middle belts of Virginia, and therefore, in a geological position, somewhere about the base of the Jurassic series. The shales and sandstones of this region are intersected by numerous dykes of Trap, varying from a few feet to several hundred feet in breadth, of which, and of the adjacent sedimentary rocks, some good sections have recently been disclosed by the railroad cuttings. These show a nearly vertical position of the clefts through which the igneous matter has been erupted, and indicate their general direction to have been a little east of north.

The strata penetrated by the Trap are nearly horizontal, and appear to have suffered no considerable tilting or other disturbance of position from the intruded igneous mass. It would seem that, prior to the ingress of the molten matter, numerous nearly parallel cracks were formed in the horizontal strata, which were then filled from beneath without much further displacement.

In the vicinity of the dykes, the shales and sandstones present various degrees and kinds of alteration. The red shales are transformed into a dark purple or bluish gray semi-crystalline mass, often of flinty hardness, and greatly increased density. These are specked with shot-like forms, or interspersed with larger rounded segregations, including crystalline minerals more or less perfectly developed, and presenting the aspect of certain kinds of amygdaloid. The sandstones are greatly indurated, and, in some instances, the more sandy shales, where touching the Trap, are converted into a close-grained, milky quartz, which forms a narrow ribband on each side of the dyke. These great alterations in the mineral characters of the strata are, however, not traceable far, in a horizontal direction, from the walls of the Trap dykes. Often within twenty feet, the horizontal rocks display their usual characters almost unchanged.

The most remarkable exhibitions of igneous influence observed in this particular district, were traced over wide spaces of the sedimentary rock, *in which no dykes were seen.* In these localities, the altered beds lying horizontally are in some places covered by disintegrated Trap, forming a coarse gray Trappean sand, which, followed to some distance, is observed to pass into masses of globular and stratified Trap, evidently overlying the other rocks, at a level corresponding to that at which the altered surface is seen exposed. From this fact, and the observed more rapid disintegration of the Trap than the adjacent altered rocks, Prof. Rogers concluded that much of the surface now uncovered was once overflowed by the Trappean matter, and that it was the intense and continued heat *of this great incumbent mass of igneous material*, which produced the extensive and remarkable alterations over large spaces where no dykes are to be seen.

Prof. Rogers then referred to what he considered a yet more curious effect of the Trap on the adjoining rocks, which, although observable at other localities, he had not elsewhere seen so clearly exhibited. While, as before remarked, no decided tilting of the strata was noticed in the immediate vicinity of the dykes, he observed that a structural condition had been induced in the horizontal beds, which might easily lead an unpractised observer to suppose that this had been forced into almost vertical dips. These rocks, where in contact with the Trap, are traversed by vertical joints, or cleavage planes, so close to one another as to divide the mass into a system of narrow prisms or plates parallel to the walls of the dyke. These planes of division, caused no doubt by the Trap, are distinctly perceptible at the distance of twenty or more feet on either side of even a narrow dyke, and are so decided within a few feet, as almost completely to mask the original planes of stratification. They thus present the appearance of very deeply dipping beds on each side of the dyke, as if suddenly bent upwards by the ascending eruptive mass.

Dr. Charles T. Jackson read the following extracts from a letter of M. Elie de Beaumont, dated Paris, March 23d, 1855 : —

"I have seen, with much pleasure, in the Daily Evening Traveller, that the Boston Society of Natural History has given its attention to the results of the researches of M. Alexis Perrey on Earthquakes, and to the brief report which I made to the Academy on the subject. If I had found opportunity, I should have sent you the report. You have yourself presented, on this subject, considerations which appear to merit the attention of travellers, who have occasion to observe volcanoes where the lava flows freely in a continuous manner. Travellers might also compare the days of eruptions, with those of the moon's phases, according to the method employed by M. Perrey in earthquakes.

"You will see in the Comptes Rendus, that M. Gaston Planté has discovered at Meudon, near Paris, the remains of a gigantic bird, which is nearly as large as those which left their footprints in the New Red Sandstone of Connecticut River.

"This unexpected discovery will perhaps interest American Geologists, and diminish the incredulity with which many persons have, for a long time, opposed (erroneously, I think) the interesting discovery of Ornithichnites.

"We have established in Paris a Meteorological Society, on a plan analogous to that of the Geological Society of France, and shall collect and compare meteorological observations made in all countries of the world. We shall be happy to have collaborators in America, and to exchange publications with the Scientific Societies of Boston."

A letter was read from Dr. Gundlach, of Havana, Corresponding Member, asking instructions. Referred to the Corresponding Secretary.

Dr. Gould, in referring to the report of the Librarian, stated that the Library had been for some years increasing, and was now quite large and very valuable. He thought the time had arrived when a Catalogue should be made, and he consequently moved that the Council be requested to take into consideration the preparation of a Catalogue of the Library. Voted accordingly.

May 16, 1855.

The President in the Chair.

Mr. Sprague presented a plan for the better lighting and airing of the Library Room, by closing the two south windows and opening one in the rear. He estimated the expense at seventy-five or one hundred dollars. The subject was referred to the Council.

The Curator of Herpetology, who was absent at the Annual Meeting, reported his department of the Cabinet to be in good condition. Twenty-five specimens have been added to the Cabinet during the year. Considerable progress has been made towards an accurate classification of the specimens.

Dr. Durkee exhibited under the microscope the blood globules of the frog, as well as the circulation of the blood in the capillaries of the web of the foot. He remarked that he had observed the circulation of the blood in a minute portion of the lung, for twenty minutes after its separation from the remainder of the organ. Hassall states that the tongue of a frog, when cut out and placed in water, shows the capillary circulation for more than twelve hours.

Dr. Durkee also exhibited some of the vegetable growths in Cochituate Water.

A letter from Dr. Kneeland was read, presenting several specimens in the name of Dr. M. W. Weld; among others, a Perch. The following is an extract: —

"The fish in alcohol is a Perch, thrown out alive from the hydrant in Bedford Street, near the Latin Schoolhouse, last week. It seems to me that some provision ought to be made, either at the pond, or the reservoir, to prevent the entrance of such large fishes as this into the water-pipes. There have been of late more instances than usual of large fishes taken from the pipes. These fishes could not return to the reservoir, and would very soon perish and contaminate the water. Very few of the fishes which are thus brought into the pipes would escape from the hydrants, and unknown numbers would be left to perish in the water. Whether the general cause of the impurity of the Cochituate Water be vegetable or animal, it seems very likely that many of the local cases of fishy taste may be caused by the entrance of dead fish into the pipes. It has often happened that the water in a street shall be very pure, while that in a neighboring locality, or even at a few doors distance shall have a very fishy taste and smell. Had not this fish escaped in the way he did, his body would have probably become impacted in some pipe, and have contaminated all the water filtered through its decaying flesh; and perhaps led the occupants of the house to wonder why their next door neighbor should have pure water, while they were drinking an infusion of fish."

The letter of Dr. Kneeland was referred to the Cochituate Committee.

Prof. H. D. Rogers exhibited and explained a New Geological Map of the United States, recently completed by him. The surface delineated extends from the Atlantic to the Pacific, including the regions explored in the late expedition to the West. It is based wholly upon reliable, and the most satisfactory authorities, and nothing which is at all speculative has been introduced; it is intended for the new edition of Johnston's Physical Atlas, now publishing in Edinburgh, as an accompaniment to the Map of Europe, by Murchison and Nicol.

Dr. C. T. Jackson presented, in the name of Mr. Henry A. Hildreth, of New York, two specimens of anthracite coal, brought from Japan by the United States steamship Mississippi. This coal was made use of by the steamship almost exclusively on her return voyage from Japan.

Prof. H. D. Rogers remarked that these specimens were very interesting, on account of the peculiarity of the cleavage structure, exhibiting the characters of anthracite passing into bituminous coal.

At the request of the President, the Recording Secretary read to the Society a "Notice of Shoals of Dead Fish observed on the passage between Mirimachi, New Brunswick, and the port of Gloucester, England," communicated to the Edinboro' New Philosophical Journal, April, 1855, by the Rev. W. S. Symonds, with some remarks by Sir William Jardine.

Extracts from a paper, by Robert Harkness, Professor of Geology in Queen's College, Cork, "On Annelid Tracks in the Equivalents of the Millstone Grits in the Southwest of the County of Clare," were also read to the Society, and illustrated by specimens in the possession of the President.

The Committee appointed to audit the Treasurer's accounts, reported as follows, and the report was accepted: —

The Committee appointed to examine the Treasurer's books, respectfully report, that they have attended to that duty, and have found the accounts to agree with the statement made in his report. The balance of available funds now on hand is $441.47, which, added to an amount of $105 received for assessments since the report was made, makes a cash balance in hand of $546.47. There is also an amount due from members for back assessments, of which the Treasurer thinks he may be able to collect from $250 to $300 before another year has past.

A Specimen of *Buteo lineatus*, (Red-shouldered Hawk,) and a specimen of *Guiraca ludoviciana*, (Red-breasted Grosbeak,) were presented in the name of Mr. E. Samuels. The Hawk was an old male, shot on the nest, in Milton, Mass. Two eggs were taken from the nest, establishing the fact of this bird's hatching in this State. The Grosbeak had peculiar red markings upon the shoulders.

Dr. Francis M. Lincoln was elected Resident Member.

June 6, 1855.

The President in the Chair.

The President exhibited a large and fine specimen of Quartz, from Beyrout, Syria.

The President also exhibited a Gray Sandstone Slab from the Connecticut River, having impressions on both surfaces.

The slab was about two feet square, and an inch thick, and displayed interesting markings on both its surfaces. One of these was covered with three different kinds of impressions; the first consisted of striæ, such as would be made by sweeping the whole surface with a broom, or a mass of sea-weed resting on it; the second consisted of two sets of tracks, one of them very strongly expressed, the other faintly, which might have been made by the progression of a crustaceous animal, a crab; these tracks were composed of oblong eminences and depressions, the whole extent of which was about two feet, by an inch and a half in width; they might have been made by sea-weed, or the passage of fishes. The third set of impressions was of large, faintly expressed eminences, probably half-obliterated ripple marks. Besides these, there were two or three sets of deep impressions in pairs, apparently of some animal, and long elevated lines, probably of mud-cracks, so called. No bird-tracks were visible on this surface.

The other surface was less regular, but smooth, bright, and shining; the principal impression, or appearance, consisted of an excavation about fifteen inches long, and an inch wide, dividing into two branches. This has been suggested by Mr. Field, on the ground of an idea of Mr. Lea, the distinguished Geologist, of Philadelphia, to be the trace of some mollusc as *Unio*, in its passage across the strand. There were also various rounded eminences, some of them an inch in diameter, which may have been fossil fruits,—some excavations, apparently made by organic substances, and a number of tracks of annelides. No bird-tracks were discoverable on this surface.

The stone is dense, from being well charged with oxide of iron, and contains objects of interest which would well bear another examination.

Mr. C. J. Sprague exhibited a specimen of a Fungus, (*Uredo effusa,*) growing upon the rose plant in the vicinity of Boston.

Dr. C. T. Jackson observed, that the fungus was composed of a series of irregularly shaped cells, some globular, and others angular, of an orange-red tint. Upon the application of nitric acid, the outer portions of the cells became transparent, whilst in the interior a mass of granules was developed. Caustic potash, on the other hand, made the granules indistinct.

Dr. Durkee thought the angular form of the cells was due to compression.

Mr. Sprague thought it might be owing to drying.

Dr. J. N. Borland gave the following account of the feeding of a large Boa Constrictor, (on exhibition in this city,) measuring about twenty feet in length: —

The Boa was in a state of considerable activity, looking about him as if for prey. In this condition, a large-sized adult rabbit was introduced into the cage at one o'clock precisely. The rabbit seemed unconscious of his enemy. The serpent threw back his head and coiled firmly his prehensile tail, remaining fixed in this position, and occasionally emitting a sharp hiss, for three minutes. At this time the rabbit approached the head of the serpent after smelling along his body, when the Boa, with great and sudden violence, threw himself on his victim, seizing the rabbit's head in his mouth, and at the same time coiling his tail around its body. Remaining in this position ten minutes, during which the rabbit was killed, the process of deglutition commenced. This operation consisted in alternately unhooking first one side and then the other of both upper and lower jaws, inserting further along in the body of the rabbit its recurved teeth, and then retracting. During the process of swallowing, there was a free flow of saliva, but the serpent did not lick the animal nor cover it with saliva as may be the case when swallowing larger animals. The whole process was concluded, and the animal in the stomach of the serpent at 10 minutes before 2 o'clock, or in 50 minutes. The feat appeared to have been easily accomplished, and there is no doubt that he could have swallowed a much larger animal. The points most worthy of notice are the seizure by both extremities of the Boa, and the free flow of saliva, instead of the process of licking the victim, as is described.

The Committee on the Library presented a report on the proposed change in the windows of the library room. Referred to the Council.

June 20, 1855.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. Durkee gave an account of some of the habits of the common Bull-frog, (*Rana pipiens,*) several of which animals he had been watching at his house during the last few weeks.

The animal exhibits a remarkable degree of precaution in seizing its food. If a living worm, or a dead one in motion, is placed in his way, he darts at it, thrusts out his tongue so as just to touch the worm, and then retreats. If every thing appears favorable, he soon returns, with a bold spring, and seizes his prey. He then holds it between his jaws for a few moments before swallowing it, the worm during this time struggling to escape. He uses the fingers of both his anterior extremities with admirable dexterity and effect, in getting the worm fairly into the cavity of his mouth, and retaining it in the centre. At the moment of deglutition, he closes his eyes and stretches himself upwards. The frog exhibits extreme nervous susceptibility. If a worm or bug crawls sufficiently near to touch him, he betrays no little impatience, and gives a jerk or kick with his feet, until the intruder is out of the way.

Dr. Brewer remarked, that he had known the large Bull-frog to seize and swallow young ducks.

Prof. William B. Rogers observed, that the frog was very susceptible to the enticement of motion. He had often caught them at the South, simply by agitating a hook and line baited with red tape.

Rev. Theodore Parker stated that he had a fact worthy of note in the habits of the New England Bear. At Lake Willoughby, in Vermont, are a couple of fine bears secured in this manner: To a pole fixed vertically in the ground is attached a beam, in such a manner as to permit of its horizontal motion. To each extremity of the beam one of the bears is secured by a chain. As is the custom with these animals, they are in continual motion; but what is remarkable, this motion is always in one direction, whether in the large circle around the central pole, or in the small circle around their chains. They move from the East towards the North, and from the West towards the South, and never in the contrary direction. When started in the contrary direction by interference of bystanders, their course is voluntarily changed when the restraint is removed.

Prof. William B. Rogers stated, that in a recent letter from Prof. Dana, of New Haven, he had been informed that a new fossil plant, a species of *Clathropteris*, had been discovered in the Connecticut River Sandstone, and would be described in the July number of Silliman's Journal. The new species is analogous to a specimen in the possession of the President, and would tend to prove the proximity in the geological series, if not the actual identity, of the Connecticut Valley series with the Liassic Rocks of some of the Southern States.

The Curator of Oölogy exhibited five specimens of birds' eggs, from the Philippine Islands, presented by Dr. Kneeland at the last meeting. The species of these eggs is unknown, with the exception of one, viz: *Gallinula phœnicura.*

The Curator of Oölogy also presented, in the name of Mr. E. Samuels, a nest of the Canada or Tree Sparrow, (*Zonotrichia monticola,*) containing two of the eggs, and an egg of the common Black-billed Cuckoo, (*Coccyzus erythrophthalmus.*) This is the first instance known of the Canada Sparrow breeding in Massachusetts. The bird was seen upon the nest by Mr. Samuels. The Canada Sparrow is common in this State the present season.

The thanks of the Society were voted to the Smithsonian Institution, for a specimen of *Spermophilus Beecheyi,* from San Francisco, Cal.

The thanks of the Society were also voted to the Smithsonian Institution, for the extensive facilities and privileges afforded to this Society in forwarding copies of its Journal and Proceedings, as well as in other exchanges of publications.

The thanks of the Society were also voted to Dr. M. W. Weld, of Boston, for a collection of insects.

DONATIONS TO THE MUSEUM.

April 4th. Two Serpents, *Varanus bivittatus* from Java, and *Hydrophis nigrocinctus* from the China Sea; by Dr. G. H. Otis, U. S. N. A specimen of *Strix nyctea*, Snowy Owl; by Mr. E. Samuels.

April 18th. A human skull from Shanghae, and one from the Loochoo Islands; by Dr. J. N. Borland. Specimens of *Hypotriorchis subbuteo,* Hobby Falcon; *Perdix cinerea,* European Partridge; *Caccabis saxtailis,* Rock Partridge; *Fringilla chloris,* Green Finch; *Lagopus mutus,* Ptarmigan; *Caccabis rubra,* Red-legged Partridge; *Anthus campestris,* Field Pipit; *Lanius meridionalis,* Southern Shrike; *Ruticilla phœnicura,* European Redstart; and *Nyctale Acadica,* Acadian Owl; by Dr. F. J. Bumstead. *Mareca penelope,* European Widgeon; *Querquedula Carolinensis,* Green-winged Teal; by Mr. E. Samuels. A male specimen of *Nycticorax nævius,* Night Heron; by Mr. Charles W. Lovett, Jr. *Fuligula mariloides,* Small Blue-bill; by Mr. Nathan Robbins. Specimens of the following Echinoderms, viz: *Lobo-*

phora truncata, Mergui ; *Encope Stokesii*, Panama ; *Dendraster eccentricus*, California ; *Arachnoides placentula*, Burmah ; *Brissus carinatus*, La Paz ; *Rotula Rumphii*, Liberia; by Dr. A. A. Gould.

May 2d. A specimen of *Sciurus vulpinus*, Fox Squirrel; by Mr. C. J. Sprague. *Mustela pusilla*, Small Weasel; by Mr. E. Samuels. A Sperm Whale Tooth; by Miss E. S. Quincy.

May 16th. Specimens of *Picus varius*, Yellow-bellied Woodpecker; *Buteo lineatus*, Red-shouldered Hawk ; *Guiraca Ludoviciana*, Red-breasted Grosbeak; *Larus marinus*, Black-backed Gull; by Mr. E. Samuels. A specimen of *Podiceps cornutus*, Horned Grebe; by Mr. Caleb Loring, Jr.

June 6th. A Boa Constrictor, a Crested Iguana, a young Crocodile, two Serpents, a Tortoise, a Fish, twelve Birds' Eggs, a number of Beetles in alcohol, and a collection of Butterflies, all from the Philippine Islands; by Dr. Samuel Kneeland, Jr. A specimen of *Ardea virescens*, Green Heron, and Crania of a domestic Cat and Dog; by Mr. E. Samuels. A specimen of *Siren lacertina*, Lizard-like Siren, from Wilmington, N. C.; by Dr. J. N. Borland. A box of Minerals; by Mr. O. V. Hills, of Leominster.

June 20th. Nest and two Eggs of *Zonotrichia monticola*, Canada or Tree Sparrow; Egg of *Coccyzus erythrophthalmus*, Black-billed Cuckoo; by Mr. E. Samuels. Nest and Eggs of *Parus atricapillus*, Black-capped Titmouse or Chicadee; by Dr. Samuel Cabot, Jr. Nest of *Zonotrichia graminea*, Bay-winged Finch; by Dr. T. M. Brewer.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1855.

Proceedings of the National Institute, Washington, D. C. Vol. 1. No. 1. New Series. 8vo. Pamph. 1855. *From the National Institute.*

Report of the Superintendent of the Coast Survey. 4to. 1854. Washington. *From A. D. Bache.*

Continuation of the Review of " Nott and Gliddon's Types of Mankind." By John Bachman, D. D. No. 2. 8vo. Pamph. Charleston, 1855. *From the Author.*

Geology of the Coal and Iron of Cheat River, Va. By Prof. W. B. Rogers. 8vo. Pamph. 1854. New York. *From the Author.*

Ueber die fossilen Fische aus der Braunkohle des Siebengebirges. Von Dr. F. H. Troschel. 8vo. Pamph. *From the Author.*

Fossil Foot-marks of the Red Sandstone of Pottsville, Pennsylvania. By Isaac Lea, LL.D. Folio. Philadelphia, 1855. *From the Author.*

Rapport sur les Travaux de A. Perry relatifs aux Tremblements de Terre. 4to. Pamph. Paris, 1854. *From M. Elie de Beaumont.*

Second Annual Report of the Secretary of the Massachusetts Board of Agriculture. 8vo. Boston, 1855. *From C. L. Flint.*

Report on the Geology of the Coast Mountains. By Dr. John Trask. 8vo. Pamph. Sacramento, 1855. *From the Author.*

Proceedings of the Academy of Natural Sciences of Philadelphia. 8vo. Vol. VII. No. 8. 1855. *From the Academy.*

Thirty-fifth Annual Report of the Mercantile Library Association. 8vo. Pamph. Boston, 1855. *From the Association.*

Report on the Agriculture and Geology of Mississippi. By B. L. C. Wailes. 8vo. Philadelphia, 1854. *From the Author.*

Transactions of the Wisconsin State Agricultural Society. Vol. III. 1853. 8vo. Madison, 1854. *From I. A. Lapham.*

Trübner's Bibliographical Guide to American Literature. 8vo. London, 1855. *From the Author.*

Proceedings of the American Philosophical Society. Vol. VI. No. 53. Philadelphia, 1855. *From the Philosophical Society.*

Report on the Fishes of the New Jersey Coast. By S. F. Baird. 8vo. Pamph. Washington, 1855. *From the Smithsonian Institution.*

Annual Report of the Trustees of the State Library of New York. 8vo. Pamph. Albany, 1855. *From the Trustees.*

Transactions of the Albany Institute. Vol. III. 8vo. Albany, 1855. (Catalogue.) *From the Institute.*

Message of the President of the United States, and Congressional Documents, Part 2d. 1854-5. 8vo. Washington.

Constitution of the United States. 8vo. Washington, 1850.

Patent Office Report. Part 2. Agriculture. Washington, 1854.

Exploration of the Valley of the Amazon. Part 2d. By Lieut. L. Gibbon. Congressional Document. 8vo. Washington, 1854. Also Maps. *From Hon. S. H. Walley.*

Sixty-eighth Annual Report of the Regents of the University of New York. 8vo. Pamph. Albany, 1855.

Eighth Annual Report of the Regents of the University of New York on the Condition of the Cabinet of Natural History. 8vo. Pamph. 1855. Albany. *From the Regents of the University.*

A System of Anatomy for the Use of Students in Medicine. By C. Wistar, M. D. Third Edition. Notes and Additions, by W. E. Horner, M. D. 2 Vols. 8vo. Philadelphia.

Treatise on Epidemic Cholera. By A. Tardieu. From the French, by S. L. Bigelow, M. D. 12mo. Boston, 1849.

General Principles of the Philosophy of Nature. By J. B. Stallo. Boston, 1848.

Physiological Researches upon Life and Death. By X. Bichat. 8vo. Philadelphia, 1809.

McCulloch's, J. R., Universal Gazetteer. 2 Vols. 8vo. New York, 1843.

Scientific Miscellany. 8vo. Boston, 1825.

Book of Nature. By J. Mason Good, M. D. 2 Vols. 8vo. Boston, 1826.

General Anatomy applied to Physiology and Medicine. By Xavier Bichat. From the French, by George Hayward. 3 Vols. 8vo. Boston, 1822.

Library of Entertaining Knowledge. Insect Transformation. 3 Vols. 16mo. London, 1830-31.

Considerations Générales sur l'Anatomie Comparée des Animaux Articulés. Par H. Straus-Durckheim; avec Planches. 4to. Paris, 1848.

Arcana Entomologica; or Illustrations of New, Rare, and Interesting Insects. 2 Vols. 8vo. London, 1841 – 45.

Moral Philosophy; or the Duties of Man, considered in his Individual, Social, and Domestic Capacities. By George Combe. 16mo. New York, 1851.

Philosophical Criticism of the Natural Laws of Man. By G. Spurzheim, M.D. 16mo. Boston, 1833.

A Treatise on Digestion and the Disorders incident to it, which are comprehended under the term Dyspepsia. Adapted for General Readers. 12mo. Boston, 1837. *From the Heirs of Dr. W. I. Burnett.*

Rafinesque, New Flora of North America. Parts 1 – 4. 12mo. Philadelphia, 1836.

————, Trees and Shrubs of North America. 8vo. Pamph. Philadelphia, 1838.

————, American Grove of Trees and Shrubs. 8vo. Pamph. 1838.

————, Life of. Travels and Researches in North America and South of Europe. 12mo. Pamph. Philadelphia, 1836.

————, American Manual of the Grape Vines and the Art of Making Wine. 12mo. Pamph. Philadelphia, 1830.

————, American Manual of the Mulberry Trees. 12mo. Pamph. Philadelphia, 1839. *Exchange with W. H. B. Thomas.*

Bulletin de la Société de Geographie. 4riéme serie. Tome VIII. 8vo. Paris, 1854.

Popular Lectures on Geology. By K. C. Von Leonhard. 12mo. Baltimore, 1839.

Synopsis of the Family of Naiades of North America. By T. A. Conrad. 8vo. Pamph.

Second Annual Report on the Geological Exploration of the State of Pennsylvania. By Prof. H. D. Rogers. 8vo. Pamph. 1838.

New York Medical Times. Nos. 7, 8, 9. Vol. IV. 8vo. Pamph. New York, 1855.

Proceedings of the California Academy of Natural Sciences. Vol. I. pp. 23 – 26. 8vo. Pamph. 1855.

Michigan Farmer. Vol. XIII. No. 5. May, 1855. Detroit.

New York Journal of Medicine. Vol. XIV. No. 3. New York, 1855.

Silliman's American Journal of Arts and Sciences. Second Series. No. 57. May, 1855. No. 58. July, 1855.

Jahrbücher der K. K. Central-Anstalt für Meteorologie und Erdmagnetismus. Von Karl Kreil. I Band, 1848 – 9. Band II. 1850. Herausgegeben durch die Kaiserliche Akademie der Wissenschaften. 4to. Wien, 1854.

Sitzungsberichte der K. Akademie der Wissenschaften. Band XII. pp. 727 – 1096. Band. XIII. pp. 1 – 6844. 8vo. Wien, 1854.

Zeitschrift für die Gesammten Naturwissenschaften. Herausgegeben von dem Naturwissenschaftlichen Vereine für Sachsen and Thuringen in Halle. 8vo. August, 1853, to October, 1854. Berlin.

Verhandlungen des Naturhistorischen Vereines der Preussischen Rheinlande und Westphalens. Elfter Jahrgang. Bogen, 25 – 31. Tafel X. Viertes Heft. 8vo. Bonn, 1854.

Transactions of the Linnæan Society of London. Vol. XXI. Part 3. 4to. London, 1854.

Proceedings of the Same. Nos. 52–58. 8vo. 1853–4. Also Anniversary Address before the Same, by Thomas Bell, 1854.

Journal of the Academy of Natural Sciences. New Series. Vol. III. Part. 1. 4to. Philadelphia, 1855.

Notes sur les Larides. Par S. A. Le Prince C. L. Bonaparte. 8vo. Pamph. *Received in Exchange.*

Archiv für Naturgeschichte. Gegrundet von A. F. A. Wiegmann. Zwanzigster Jahrgang. Viertes Heft. Berlin, 1854.

Annals and Magazine of Natural History. April, May, and June, 1855. 8vo. London.

Quarterly Journal of the Geological Society. Vol. XI. No. 42. 8vo. London, 1855.

Lamarck, M. Illustrations des Genres Botaniques. 3 Vols. 4to. Paris.

Meisner, L. F. Plantarum Vascularium Genera. 2 Vols. in 1. Folio. Lipsiæ, 1836–43.

Fisher, J. B., Synopsis Mammalium. 8vo. Stuttgardtiæ, 1829.

Addenda, Emendanda et Index Synopsis Mammalium. 8vo. Stuttgardtiæ, 1830.

Westendorp, G. D. Polypiers Flexibles de la Belgique. 1ére Livraison. 4to. Courtrai, 1853.

Kützing, F. I., Phycologia Generalis, oder Anatomie, Physiologie, und Systemkunde der Tange. 4to. Leipzig, 1853. *Received from the Courtis Fund.*

Augustine Age of France. By Rev. J. F. Astié. Translated by Rev. E. N. Kirk. 12mo. Boston, 1855.

History of Turkey. By A. De Lamartine. 12mo. Vol. I. New York, 1855.

Lives of Queens of Scotland. By Agnes Strickland. Vol. V. 12mo. New York, 1855.

Chemistry of Common Life. By J. F. Johnston. 2 Vols. 12mo. New York, 1855.

Works of Edmund Burke. Vol. I. 12mo. London, 1854. (Bohn's British Classics.)

Cyclopædia of Anatomy and Physiology. Edited by R. Todd. Part 45. pp. 161–272. London. *Deposited by the Republican Institution.*

July 25, 1855.

Dr. Charles T. Jackson, Vice-President, in the Chair.

The regular days of meeting in July, falling upon Independence and Commencement days, by order of the President, one meeting only was held during the month, specially appointed for July 25th.

Dr. Gould presented a paper by Dr. W. Newcomb, of Albany, describing five species of *Achatinella,* as follows: —

1. Achatinella physa. A. testâ sinistrorsâ ad apicem acuminatâ, infra valde inflatâ; striis obliquis rudi modo signatâ; anfr. 6, quinque inferioribus plano-convexis, ultimo perinflato et obsoletè carinato; suturâ simplici et valde impressâ; columellâ brevi, sub-callosâ, latâ et umbilicum profundum quodammodo tegente, aperturâ magnâ, semi-ovatâ; labro infra sub-reflexo, tenui et supernè simplici; colore e fusco albo, interdum flammulis flavis notato; internè ad citri similitudinem subluteo. Long. $\frac{18}{20}$ poll.; lat. $\frac{12}{20}$ poll. *Hab.* Hawaii.

Shell sinistral, pointed at the summit, strongly inflated below, rudely striated obliquely; whorls six, first five flatly convex, the last largely inflated, and obsoletely carinated; suture simple and deeply impressed; columella short, slightly callous, broad, and partially covering a deep umbilicus; aperture large, semi-ovate; lip sub-reflected below, thin and simple above; color of a dingy white, occasionally marked with yellow flammules, internally of a light lemon yellow.

Originally described in Zoölogical Proceedings, London, 1854, plate 24, fig. 64, in an immature state.

2. A. undulata. A. testâ sinistrorsâ vel dextrorsâ, sub-solidâ, acuto-conicâ, nitente, politâ, longitudinaliter et spiraliter cum striis per-pusillis insculptâ; anfr. 6, rotundis et supernè marginatis; suturâ bene impressâ; aperturâ sub-ovatâ; columellâ brevi in plicâ contortâ; labro acuto intus incrassato; colore testæ sub-olivaceo, lineis et vittis longitudinalibus paulisper undulatis castaneis intersecto, rarè fasciis nigris transversis notato; columellâ et aperturâ albidâ. Long. $\frac{12}{20}$ poll.; lat. $\frac{6}{20}$ poll. *Hab.* Waialua, Oahu.

Shell sinistral or dextral, rather solid, acutely conical, shining, polished; with longitudinal oblique fine striæ; microscopically spirally striate; whorls six, rounded and marginal above; suture well impressed; aperture sub-ovate; columella short and plicately twisted; lip acute, thickened within; color light olive, alternating with slightly undulating chestnut lines and bands, rarely marked by transverse black fasciæ; columella and aperture white.

3. A. NIGRA. A. testâ dextrorsâ, globosâ, acuminatâ, subsolidâ; anfr. 6, inferioribus inflatis, superioribus subulatis, duorum supremorum superficie striis longitudinalibus et liris irregularibus volventibus in cicatrices rudes designatâ; suturâ simplici bene impressâ; aperturâ rotundato-ovatâ; columellâ brevi, in dentem lamellarem terminante; colore flavo albido; epidermide tenui nigro. Long. $\frac{14}{20}$ poll.; lat. $\frac{9}{20}$ poll. *Hab.* E. Maui.

Shell dextral globosely, acuminate, rather solid; the two lower whorls inflated, the superior ones subulate; whorls six, the last two cut up on the surface into rude cicatrices by longitudinal striæ crossed by revolving elevations, irregularly distributed; superior whorls flattened, with closely crowded strong longitudinal striæ; suture simple, well impressed; aperture, round ovate; columella short, terminating in a lamellar tooth; color yellowish white, with a thin black epidermis.

4. A. TETRAO. A. testâ sinistrorsâ, acuto-conicâ, infra inflatâ; anfr. 6, rotundis; suturâ profundâ; aperturâ sub-ovatâ; columellâ brevi, latè plicatâ; colore albo, epidermide tenui cum undis nigris vel fuscis obtecto; vittâ suturali latâ carmineâ; aperturâ intus albâ; columellâ et regione vicinâ rubrâ vel aurantiacâ. Long. $\frac{15}{20}$; lat. $\frac{9}{20}$ poll. *Hab.* Ranai.

Shell sinistral, acutely conical, pointed at the summit, inflated below; whorls six, rounded; suture deep; aperture sub-ovate; columella short, and broadly plicate; color white, covered by a thin epidermis, with black or brown undulations, often so dense as to cover most of the shell; a broad sutural carmine band is a constant character; aperture within, white; columella and adjoining portion of the base of the shell, pink or orange.

This shell has been confounded with *A. picta*, Mighels, from Maine, by my European correspondents. In addition to the presumptive evidence afforded by a difference in habitat, the measurements constantly differ, the adult *picta* giving $\frac{18}{20}$ by $\frac{9}{20}$

of an inch. The markings, also, vary constantly, and the animals present much more striking characters of dissimilarity than the shells.

5. A. SUCCINCTA. A. testâ obeso-conicâ, tenui, nitente, corneâ ad longit. striatâ ; anfr. 7, planè convexis, supernè subrugosis, non marginatis ; suturâ leviter impressâ ; aperturâ lateovatâ ; columellâ profundè excavatâ, brevi, in dentem latum plicatum terminante ; labro simplici, intus sub-incrassato ; anfr. ultimo interdum fasciâ mediâ latâ, obsoletâ ; albidâ, aut lineâ exiguâ suturali revolvente ejusdem coloris. Long. $\frac{10}{20}$; lat. $\frac{5\frac{1}{2}}{20}$ poll. *Hab.* Ewa, Oahu.

Shell obesely conoid, thin, shining corneous, longitudinally striate ; whorls seven, flatly convex, slightly rugose above, not margined ; suture but slightly impressed ; aperture broadly ovate ; columella deeply excavated, short, terminating in a broad plicate tooth ; lip simple, slightly thickened within, with or without a broad obsolete white central band on the last whorl, or a fine revolving sutural line of the same color.

Dr. Kneeland read a paper on the *Sterility* of many of the varieties of the *Domestic Fowl,* and of *Hybrid Races* generally, as follows : —

The strange mania which has of late years manifested itself for unnatural crosses in birds and quadrupeds, might, if properly investigated, and with an eye to science rather than to gain, lead to many interesting facts bearing upon Hybridity. I do not refer to the impositions passed upon a public always ready to be cheated, but to the real, *bonâ fide* crossings of allied and remote species.

There was a time when most Naturalists believed that all our varieties of domestic stock, as of cattle, sheep, goats, dogs, fowls, &c., were derived, each genus respectively, from a single wild original ; and that man's care, or rather his abuse, had obtained from this the numerous existing varieties. In the present state of our knowledge, we think we are justified in saying that the varieties of cattle, of the dog, &c., have been produced by the crossing, natural and forced, of several more or less nearly allied species; for instance, who shall dare to decide between the Asiatic Buffalo, the European Aurochs, and Cuvier's extinct species, as the undoubted wild original of the varieties of our cattle? Whence the necessity of reducing all varieties to a single stock, endowed with great powers of variation, especially when there are several wild species each equally entitled to be considered the original? It seems to me that the simplest view of the case is the best, viz: that these varieties are the result of the mingling of many species, guided by the wants or caprices of man. In other words, I believe that no *one* wild original can lay claim to the origination of the varieties of our cattle, of our sheep, of our goats, of our dogs, of our barn-yard fowls — and, to carry the opinion to the legitimate consequences, that no *one* species of Man can lay claim to the paternity of all the human varieties.

The reasons for this opinion have been often stated to the Society, and need not be repeated here; some new observations will only be added in confirmation. And yet, with this belief in the diversity of origin of our domesticated animals and the human races, it seems to me that *Hybridity* is a true *test* of *specific difference.* It is an axiom with some, that *different species* will not produce fertile offspring, and hence, to them, the fact of the production of such offspring proves that the parents belong to the same species. On the contrary, Dr. Morton makes different *degrees* of Hybridity, the offspring being more prolific according to the nearness of the species; thus making Hybridity no test of specific difference. Of these two opposite opinions I prefer the first. By a Hybrid race, I do not understand an offspring prolific for a few generations, and then gradually dying out, or feebly supported by crossing with the original stocks, — but a race capable of propagating itself, without deterioration, or without any assistance from either of the parent stocks. Such a race, I maintain, the world has never seen, and never will see, under the present laws of animated nature. You may take any part of the animal scale, from a barn-yard monster to a Mulatto, and the fact is the same — they cannot hold their own; they must and do return to one or the other of the primitive stocks, or must die out, unless crossed by the pure originating blood.

The subject which suggested these remarks is the sterility and deterioration of some of the highly-bred varieties of our domestic fowls. It has become quite a general source of complaint by many farmers in this section of the country, who in times past had plenty of eggs, and to spare, from a small number of common fowls, that, since the origin of the mania which has happily been called the "Hen Fever," they have found themselves, with their improved gigantic breeds, unable to procure any thing like their usual supply of eggs from the same number of birds; and that they have not only raised the birds at the expense of several dollars a pound, but have been obliged to buy eggs for family use. This has become such a source of annoyance and pecuniary loss that it deserves to be considered. It is a natural consequence of forcing birds from different countries and of different origins to propagate a hybrid offspring, for this very reason prone to degeneration, which is increased by the impossibility of crossing the hybrids by the supposed pure originals. The size of the birds seems to be obtained in this case at the expense of the reproductive powers. The admixture of different original species, and breeding "in and in," have been carried beyond the limits fixed by nature, and deterioration is the result.

To ascend from birds to man — what we have seen in our domestic fowls, we find occurring again in the Mulatto, and other hybrid human races.

The Mulatto is often triumphantly appealed to as a proof that hybrid races are prolific without end. Every physician who has seen much practice among Mulattoes knows that, in the first place, they are far less prolific than the blacks or whites; the statistics of New York State and City confirm this fact of daily observation; — and, in the second place, when they are prolific, the progeny is frail, diseased, short-lived, rarely arriving at robust manhood or maturity; physicians need not be told of the comparatively enormous amount of scrofulous and deteriorated constitutions found among these hybrids.

The *Colonization Journal* furnishes some statistics with regard to the colored population of New York City, which must prove painfully interesting to all reflecting people. The late census showed that while all other classes of our population in all parts of the country were increasing in an enormous ratio, the colored were decreasing. In the State of New York in 1840, there were 50,000; in 1850, only 47,000—in New York City in 1840, there were 18,000; in 1850, 17,000. According to the New York City Inspector's Report, for the four months ending with October, 1853: —

1. The Whites	present	Marriages	. . . . .	2,230
" Colored	"	"	. . . .	16
2. The Whites	"	Births	. . . .	6,780
" Colored	"	"	. . . .	70
3. The Whites	"	Deaths about (exclusive of 2,152 among 116,000 newly arrived emigrants, and others unacclimated).		6,000
" Colored exhibit deaths			. . . .	160

giving a ratio of deaths among acclimated whites to colored persons of 37 to 1, while the births are 97 whites to 1 colored. The ratio of whites to colored is as follows: —

Marriages, 140 to 1; Births, 97 to 1; Deaths 37 to 1.

According to the ratio of the population, the marriages among the whites during this time, are three times greater than among the colored: the number of births among whites is twice as great. In deaths, the colored exceed the whites not only according to ratio of population, but show 165 deaths to 76 births, or 7 deaths to 3 births, more than two to one.

The same is true of Boston, so far as the census returns will enable us to judge. In Shattuck's Census of 1845, it appears that in that year there were 146 less colored persons in Boston than in 1840, the total number being 1842. From the same work, the deaths are given for a period of 50 years, from 1725 to 1775, showing the mortality among the blacks to have been twice that among the whites; of late years Boston probably does not differ from itself in former times, nor from New York at present.

In the Compendium of the United States Census for 1850, p. 64, it is said that the "declining ratio of the increase of the free colored in every section is notable. In New England, the increase is now almost nothing"—in the Southwest and the Southern States, the increase is much reduced; it is only in the Northwest that there is any increase, "indicating a large emigration to that quarter."

What must become of the black population at this rate, in a few years? What are the causes of this decay? They do not disregard the laws of social and physical well-being any more than, if they do as much as, the whites. It seems to me one of the necessary consequences of attempts to mix races; the hybrids cease to be prolific; the race must die out as Mulatto; it must either keep black unmixed, or become extinct. Nobody doubts that a mixed offspring may be produced by intermarriage of different races — the Griquas, the Papuas, the Cafusos of Brazil, so elaborately enumerated by Prichard, sufficiently prove this. The question is, whether they would be perpetuated if strictly confined to intermarriages among themselves; from the facts in the case of Mulattoes, we say, unquestionably not. The same is true, as far as has been observed, of the mixture of the white and red races, in Mexico, Central and South America. The well-known infrequency of mixed offspring between the European and Australian races, led the colonial government to official inquiries, and to the result, that in 31 districts, numbering 15,000 inhabitants, the half-breeds did not exceed 200, though the connection of the two races was very intimate.

If any one wishes to be convinced of the inferiority and tendency to disease in the Mulatto race, even with the assistance of the pure blood of the black and white races, he need only witness what I did recently, viz: the disembarkation, from a steamboat, of a colored pic-nic party — of both sexes — of all ages, from the infant in arms to the aged — and of all hues, from the darkest black to a color approaching white. There was no *old Mulatto,* though there were several *old Negroes;* many fine looking Mulattoes, of both sexes, evidently the first offspring from the pure races; then came the youths and children, and here could be read the sad truth at a glance. The little blacks were agile and healthy looking, the little Mulattoes, youths, and young ladies, further removed from the pure stocks, were sickly, feeble, thin, with frightful scars and skin-diseases, and *scrofula* stamped on every feature and every visible part of the body. Here was Hybridity of human races, under the most favorable circumstances of worldly condition and social position; and yet it would have been difficult, and, I believe, impossible, to have *selected*, from the haunts of crime and poverty, more diseased and debilitated individuals, than were presented by this *accidental* assemblage of the victims of a broken law of Nature.

Such facts and sights as the above convince me that Hybridity is a true test of specific difference; and that admixture of species, in man or animals, must end, sooner or later, in deterioration and extinction — very soon, if unmixed with the pure stocks, and later, if thus mixed, — that, at any rate, extinction of the hybrid race is its doom, either by death or absorption into the parent races. For wise purposes, which we can know but imperfectly, the Creator permits, as we see, different races of men and animals to produce fertile offspring *inter se;* thus far, and no farther, can man go in his attempts to mingle species, which change perceptibly within narrow limits, and then perish, or return to their origin. One of the consequences of the above opinion is, that the *genus* Homo consists of *several species.*

Dr. Durkee stated, that as there had been discussions upon the manner in which the common earth-worm makes its appearance in reservoirs in the open air, he would say that he had recently observed an earth-worm ascending eight or ten inches, and then descending, by a motion of portions of its body at a time, evidently adhering to the sides of the reservoir by means of its glutinous excretion. This is only one instance, and he would not pretend that the occurrence is always to be explained in this manner.

Dr. C. T. Jackson, after giving the names of some minerals to be presented to the Society, remarked, that there were peculiar appearances belonging to minerals from any given locality, in shade, color, or other properties, which would, in many instances, enable an experienced mineralogist at once to decide, by a simple examination of the specimens, from what locality they had been taken. These appearances could not be given in text-books, but might be learned in the cabinet and in the field.

Dr. Jackson also remarked upon the laws of association in minerals, as existing in all countries, irrespective of latitude or longitude. Certain minerals generally accompany each other;

consequently, when one is found in a certain rock, another may be looked for with a considerable degree of certainty in the same rock. A knowledge of the laws of association of minerals is very useful to young mineralogists, and may be studied in the cabinet, as well as the peculiar appearances of minerals from different localities.

Dr. Jackson also gave a brief account of the fossilized skeleton of a large Cetacean, recently brought to this city from Maine, by Dr. Hamblin.

It being thought advisable to provide for the better care of the mineralogical collection, temporarily, during the pressing business engagements of the Curator, on motion of Dr. Durkee, it was voted, that some member of the Society, in the absence of the Curator, for the present season, be requested to take charge of the mineralogical collection. By vote, Mr. Francis H. Storer was requested to perform this duty.

Mr. Sprague exhibited a beautiful collection of Fungi growing upon plants, collected by him during this summer.

Mr. Sprague, from the Committee on alterations in the Library room, reported, that the proposed changes had been made, and were a great improvement to the room. The expense was $107.84.

August 15, 1855.

Dr. Charles T. Jackson, Vice-President, in the Chair.

The following communication, from Rev. Francis Mason, Corresponding Member, was read by the Secretary, to whom it was addressed: —

"My Dear Sir, — I will thank you to present to the Society, in my name, the accompanying *Laterite brick*, from the valley of theSitang, in Burmah.

" Though a common rock in India, laterite has not found a place either in our dictionaries, or the treatises on geology ; and it has occurred to me, that specimens may be wanting in your collections. Under the surface of the earth, it is a stiff, porous clay, with or without quartz pebbles ; but, on exposure to the atmosphere, it becomes ' as hard as a rock.' In its soft state, it is cut into large pieces, shaped like bricks, of which the accompanying is a specimen, and is then used for building purposes; more especially for pagodas, steps, and to pave paths. Hence the name laterite, from *later*, a brick. Its singular power of hardening, on exposure to the atmosphere, does not arise from the presence of lime, but is attributed to six per cent. of silica that it contains, in a soluble state, dissolved by potass.

" Laterite ridges are the first rocks that appear in the deltas of the rivers in Burmah. Not a pebble is found in the Irrawady, on coming up from the sea, till Rangoon is reached, which is built at the base of the first ledge of laterite in the delta, rising one hundred and sixty feet above the river. The name of the city is Ran-gung, from *ran*, war, in Burmese, and *gung*, a hill ; the hill of war. It was anciently called *Ta-gung*, the *ta* being either the numeral one — when it would signify simply a hill; or the verb to grieve — the hill of grief. The original name still appears in that of the famous pagoda, which rises three hundred and sixty feet above the summit of the hill, and is called *Shweta-gung*. This the early travellers transformed into Golden Dagon, and then tried to connect it in some way, not clear to themselves, with the fish-god of the Philistines.

" After entering the Sitang River, which falls into the sea between the mouths of the Irrawady and the Salwen, not a vestige of a rock is seen for a hundred miles, till reaching the old city of Sitang ; which, like Rangoon, is at the first ledge of laterite, on coming up from the sea. The Sitang ridge rises from one to two hundred feet above the alluvial plain, which it crosses, like the walls of the Cyclops, as far as the eye can reach, and terminates in a perpendicular bluff on the margin of the river. Within a distance of thirty miles above, are three other ledges of laterite, parallel to this, and also terminating on the east bank of the river ; all of which are the sites of old cities — illustrating the influence that the geology of a country exerts on the distribution of its inhabitants. A careful study of the geological character of a new country would teach us, before a single hut had been erected, where the principal towns and cities would be built. Very sincerely, yours,

"FRANCIS MASON."

"Newton Centre, Aug. 7, 1855."

The following descriptions of shells, by Dr. A. A. Gould, should have accompanied those on p. 127, but the manuscript was accidentally overlooked: —

UNIO BRACTEATUS. T. transversa, oblongo-ovata, solidula, sub-ventricosa, tenuiter striata, flavo-viridis, viridi saturatiori radiata, anticè rotundata, posticè subacuta ; umbonibus ad trientem anteriorem sitis, elevatis, utroque angulatis ; marginibus dorsalibus et ventralibus lentè arcuatis ; dentibus cardinalibus perobliquis, compressis, duplicibus ; dentibus lateralibus arcuatis ; margaritâ argenteâ, aureo bracteatâ ; limbo iridescente. Long. $2\frac{1}{2}$; lat. 1 ; alt. $1\frac{2}{5}$ poll. From Llanos River, Upper Texas. Dr. T. H. Webb.

In size, shape, and color, like *U. Ogeecheensis*, but the nacre and position of the beaks are different. *U. Hydianus* is more inflated, more inequilateral, nacre pearly white. *U. Menkeanus* is more compressed, tip more acute, tooth in left valve deep cleft.

UNIO PETRINUS. T. solida, ovato-quadrata, subequilateralis, anticè acutè rotundata, posticè latè truncata, subtus vix arcuata, prope marginem dorsalem posticum plicis obliquis minimis ornata ; umbonibus modicis, subplanulatis ; epidermide dilutè flavo-viridi ; dentibus cardinalibus robustis, pyramidatis, lateralibus curtis ; margaritâ albâ. Long. $1\frac{1}{2}$; alt. $1\frac{1}{4}$; lat. $\frac{3}{4}$ poll. Llanos River, Texas. Dr. T. H. Webb.

May be compared to *U. Lamarckianus*, Lea, (= *U. Aberti*, Conr.) It is less compressed, apices less acute, and less angular ; the posterior altitude is greater, the posterior dorsal margin being less declivous, but as the posterior truncation is less decided, the length is greater compared with the height ; the surface is irregular, but destitute of granules or nodules.

Unio manubius. T. transversa, elongata, subarcuata, subventricosa, anticè angustata, posticè acuta, margine dorsali arcuato in marginem posticum desinente ; disco rudi, epidermide nitido-corneo induto ; dentibus cardinalibus compressis, triangularibus, ad marginem ferè parallelis, d. lateralibus remotis, arcuatis ; margaritâ argentatâ, talcosâ. Long. $3\frac{3}{4}$; alt. $1\frac{7}{8}$; lat. $1\frac{1}{4}$ poll. Chihuahua, sixty miles from Camp Ringgold. By Dr. T. H. Webb.

Allied to *U. declivis*, Say = *geometricus*, Lea, in which the posterior extremity is recurved and angular, rather than decurved with rounded angles ; and the surface is dead and dusky. In our shell, the anterior extremity is more prolonged, and much more slender. It is also intermediate between *U. obesus*, Lea, and *U. camptodon*, Say.

Anodon horda. T. tenuis, transversa, elongato-ovata, ventricosa, dilutè cornea, viridi nubeculata, anticè angustata, subacuta, posticè subtruncata, dorso excavato, declivitate umbonali obtusè angulato, submarginato, umbonibus obtusissimis, pallidis, tenuiter undulatis, ad trientem anteriorem sitis ; margaritâ argenteâ. Long. $3\frac{1}{2}$; lat. $1\frac{1}{2}$; alt. $1\frac{5}{8}$ poll. Comanche Creek, Texas. Dr. T. H. Webb.

Remarkable for the broad, inflated, pale beaks, presenting no distinct apex. In size and form, it might, at first sight, be taken for *U. anodontoides.* It approaches to *A. ferruginea* and *A. Dunlapiana*, but differs in its proportions.

Cyclas nobilis. T. magna, solida, ovato-rhomboidea, utrinque truncata sed posticè obliquius ; umbonibus anticis ; tumidis ; margine dorsali utrinque arcuatim declivibus ; margine ventrali arcuato ; valvis remotè et profundè sulcatis ; epidermide flavescente ; dentibus cardinalibus minimis ; intus pallida. Long. $\frac{1}{2}$; lat. $\frac{1}{4}$; alt. $\frac{3}{8}$ poll. Found near San Pedro, California. Dr. Webb.

Has a general resemblance to what is usually regarded as *C. similis*, but is more solid, more inequilateral, more obliquely truncated posteriorly, beaks more conspicuous, color paler, grooves coarser, cardinal teeth less developed. *C. solidula*, Prime, must also nearly correspond in its characters.

Dr. Jackson exhibited a glazed, earthen bowl, presenting, upon its internal surface, efflorescences from the cracks in the glaze, of irregular forms of Bichromate of Potash.

A saturated solution of the Bichromate of Potash had been standing for some time in the bowl, and it was afterwards washed out clean, with boiling water. A solution of Alum was then introduced, which, entering the pores of the Earthenware, already saturated with the Bichromate, forced out these peculiar efflorescent crystals.

This phenomenon is well known to chemists and mineralogists under the name of *Ludus Helmonti*. It is seen in concretions in cavities of rocks, and has often been supposed to be of organic nature, but is really owing to a shrinkage of the rock, and an oozing of crystals from the pores. The fibrous Selenite, or Flowers of Gypsum, of the Mammoth Cave; the filamentary or capillary Silver and Copper in crevices of the igneous rocks; the exudation from the shrinking slag in copper works, and the formation of fibrous ice in crevices in clay, so often seen by the road side, are familiar illustrations, originating from similar causes.

Dr. Jackson presented specimens of Argentiferous Galena; Crystallized Tremolite, containing Copper Pyrites, and Iron Pyrites mixed; Crystallized Tremolite, containing Galena; and Zinc Blende and Argentiferous Galena; from Warren, N. H. Dr. Jackson gave an account of this mine, and explained the processes of mining by shafts, levels, and right and inverted grades.

Dr. A. A. Hayes exhibited specimens of Native Iron from Liberia; and gave the historical and chemical evidence of its having been in use many years by the natives. By the simple process of hammering, this iron has been converted into rude instruments. It contains one and a half per cent. of crystals of Quartz and magnetic oxide of iron, and, consequently has never been heated or wrought. There is no trace of Carbon or Manganese, or Nickel, which, by their presence, would show it to be meteoric. Dr. Hayes's communication will be given hereafter, in full.

Mr. Sprague exhibited a very large Fungus, a foot and a half in diameter, the *Polyporus giganteus*, from Roxbury ; a species not common in this neighborhood.

Dr. Kneeland exhibited a curious parasitic growth from the gills of a codfish.

September 5, 1855.

Dr. C. T. Jackson, Vice-President, in the Chair.

A letter was read from Dr. H. K. Oliver, Jr., notifying the Society of his resignation of the Curatorship of the department of Entomology.

Mr. Stodder and Dr. Abbot were appointed a Committee to nominate a candidate to fill the vacancy thus created.

Mr. Stodder called attention to a fact of considerable interest. It is well known, that there has been a disease among the Sycamore trees, in this vicinity, for several years. The only Sycamore now remaining upon Boston Common, is at present in full foliage. This disease, he thought, commenced about the same time with the potato disease in this neighborhood, and is now ceasing at the same time with the disease of that vegetable. The question naturally arises, whether there can have been any direct or exciting causes common to both diseases.

Mr. Thomas A. Greene, of New Bedford, stated that he had observed the same fact in his vicinity ; the Sycamores were all recovering. He had never seen any satisfactory account for the disease.

Dr. Jackson gave an account of some researches into the composition and manner of formation of different kinds of steel.

As commonly known, steel is a combination of carbon and iron, made by heating flat bars of pure iron, in combination with charcoal. The carbon is first converted into oxide of carbon, and then unites with the iron as carburet. The result of this process is known as blistered steel, from the bubbles generated by gases upon its surface. Shear steel consists of parallel plates of pure iron and steel, welded by folding and uniting the bars of blistered steel. Cast steel is fused in pots of the most refractory material, and differs from cast iron, which likewise contains carbon, in this respect, that cast iron is a mixture of coarsely aggregated matters, graphite and iron, whilst cast steel is a chemical combination of carbon and iron.

From the researches of Berthier, it is known that manganese will form an alloy with iron. When iron is mingled with a considerable portion of manganese, a brittle compound results; but when combined with a very small proportion of manganese, a steel of very fine quality is obtained, which has this advantage over carbon steel: carbon steel becomes coarse when tempered in thick masses, from segregation of the particles of carbon; but no such trouble arises with manganesian steel. Parties in England have lately introduced excellent wire for piano-forte strings, made of this kind of steel, as well as for cutting instruments, and other purposes. In the wire, Dr. Jackson has found 1.12 per cent. of manganese, and has established the fact that it resists, to a very remarkable degree, the action of hydrochloric acid. Sixteen years since, Franklinite iron was manufactured by Mr. Osborn into very hard and fine steel. This steel required tempering at a lower heat than carbon steel. Many of our manganesian irons might be manufactured into steel, by the simple process of fusion, and a steel of uniform character might be made without previous cementation with carbon.

Dr. Jackson explained, with the aid of diagrams upon the blackboard, the reduction of iron in blast and reverberatory furnaces. Manganesian iron ore is reduced to pure iron, or "comes to nature," in the language of the workmen, with much greater rapidity than carbon iron; hence the two metals are often mixed, to "come to nature" at a good time, requiring less care and watchfulness on the part of the workman. Manganesian iron makes the best bar iron.

The Corresponding Secretary announced the reception of the following letters, viz: — From the Smithsonian Institution, March 26, and April 5, 1855, acknowledging the reception of numbers of the Proceedings; — from the Smithsonian Institution, accompanying a copy of Volume 7 of the Smithsonian Contributions to Knowledge; — from the New York State Library, August 24; — from the Western Academy of Natural Sciences, at Cincinnati, May 19, acknowledging the reception of Proceedings; — from the California Academy of Natural Sciences, May 30, accompanying copies of its Proceedings; — from the Geological Society at London, May 4, requesting copies of Volumes 1 and 2 of the Proceedings; — from the Royal Society of London, January 25; the Ethnological Society of London, January 1; the Linnean Society, November 10; the Imperial Mineralogical Society at St. Petersburg, March 25; the Royal Society of Sciences at Göttingen, May 16; and the Imperial Academy of Sciences at Vienna, December 27, 1854, returning thanks for copies of the Journal and Proceedings.

Dr. C. T. Jackson presented some Fossil Shells, from the tertiary strata of Wilmington, N. C. The clay and fine debris, contained within the shells, were referred to Drs. Durkee and Bacon, for microscopic examination.

Dr. Jackson remarked, that the whole southern coast of the United States is cretaceous and tertiary. South of Maryland, the coast is made up of clay and sand, and no rocks exist in place. Cetacean bones and Sharks' teeth are abundant.

Dr. Durkee observed, that he had examined sections of sharks' teeth, taken seventy feet beneath the surface of the earth, in Alabama. He had found their minute structure as perfect as in recent teeth. The dentine tubes were perfectly distinct. In one section, there were two principal medullary canals running longitudinally, and from these emanated several branches, furnishing nutriment to the dentine, analogous to the medullary canals of bones.

September 19, 1855.

Dr. Silas Durkee, in the Chair.

Dr. Kneeland read the following paper, on a so-called Opate Indian, exhibited in Boston, in September, 1855:—

This girl, who is 22 years of age, 4 feet 6 inches in height, and of the weight of 112 lbs., is probably a member of some Indian tribe, inhabiting the Sierra Madre Mountains. These mountains run, for the most part, parallel to the Gulf of California, through the Mexican States of Sonora and Cinaloa; their distance from the sea varies from 200 to 50 miles, and in the neighborhood of Mazatlan, they come still nearer to the coast. This girl has been called an *Opate* Indian; if she belongs to that tribe, she is from the central part of Sonora; the tribe is described by Mr. Bartlett, in his Personal Narrative, (Vol. I, p. 444,) as a quiet, agricultural people, living in thickly populated villages, noted for their bravery against the Apache tribe, and altogether superior to their neighbors, the Yaquis. The account does not agree with reports circulated about this individual; though it is probable that the members of the tribe inhabiting the mountain range are very degraded, when compared with those living in the fertile plains. The Opates, with the Tarahumaras, the Ceris, and the Mayos, occupy Sonora, from 28° to 30° N. latitude, and about the 33° of longitude West from Washington. On the other hand, the girl is said to have been obtained from the Sierra Madre Mountains in Cinaloa, in the neighborhood of Copala, which town is just on the edge of the mountains, about midway between Mazatlan and Durango, about 60 miles N. E. of the former, in latitude 24° N. and longitude 28° W. If she is from this neighborhood, she probably does not belong to the Opate tribe, as located and described by Mr. Bartlett. Such an incongruity is of little consequence to the naturalist, as the girl, without doubt, belongs to some one of the Indian tribes between the Sierra Madre Mountains and the Gulf of California, in the Mexican provinces of Sonora and Cinaloa ; and whatever may be the particular tribe of a scattered race which may claim her, she is just as much a curious, rare, and interesting specimen of *humanity.*

As to her tribe living in caves, in a naked state, on an equality with brutes, and partaking of their food, that would degrade her to a level with the Digger Indians of California, who, though very degraded, are yet far above the brutes. The locality of the Digger Indians is several degrees further North than the Sierra Madre range. This resemblance to the brute is mentioned, as the popular belief seems to be, in her case as in the Aztec children, that she is a specimen of a race, half human and half brute.

The girl is modest, playful in her disposition, pleased with playthings like a child, and, at times, rather hard to manage, from her obstinate and impulsive character. She is quite intelligent, understands perfectly every thing said to her, can converse in English, and also in Spanish ; she has a good ear for music, and can sing tolerably well ; she can also sew remarkably well, and is very fond of ornament and dress. Her appearance is far less disgusting than the representations of her, although the enormous growth of hair on the face, and the prominence of the lips, from diseased gums, give her a brutish appearance. Her hair is long, very thick, black, and straight, like that of the American Indian ; hair, of the same color and character as that on the top of her head, grows on the forehead, quite to the eyebrows, varying from one half to an inch in length, having been partially cut off in the middle of the forehead ; the eyebrows are very thick and shaggy, and the lashes remarkably long ; the hair also grows along the sides and alæ of the nose, upper lip, cheeks, and about the ears, which are large, and with very large lobes ; the chin is also well supplied with a black, fine beard, two or three inches long; the arms are hairy for a woman, though not for a man; on other parts of the body, there can be said to be no unusual growth of hair; there is great mammary development.

I have measured her head carefully, and it does not differ much from the average of these races, as given by Dr. S. G. Morton: —

	Long. diam.	Par. diam.	Front. diam.	Inter-Mastoid. Arch.	Occip. Front. Arch.	Horizontal Periphery.
Ordinary.	6.7 in.	6.	4.9	14.6	13.1	20.
Opate.	6.3	5.5	4.2	13.5	13.	20.

These measurements are somewhat approximative, as the integuments over the skull are preternaturally thick; she has, therefore, a well-proportioned, though small brain, and is capable of considerable cultivation. This head varies somewhat from that of an American Indian, — there is no characteristic prominence of the vertex, no flatness of the occiput or forehead, no want of symmetry in the two sides; the shape of the cheeks and the complexion are hardly Indian. The space between the orbits is large, and the eyes are very black and piercing; there is no obliquity to be noticed, as in the Mongol. The nose is flat, quite unlike the aquiline nose of the Indian, and yet not like that of the Negro. The mouth is very large, and the lips prominent, and rather thick; the gums are in a curious condition, being swelled all around, so as to rise above and conceal the teeth; they are not sensitive, and are so hard as to allow her to crack hard nuts with them; the growth in the upper jaw is chiefly a hypertrophy of the bone, and in the lower jaw, principally a disease of the gums resembling "vegetations." The molars, bicuspids, and canines are normal, though the latter are imbedded in the abnormal gum, while the back teeth are behind it. She is said never to have had incisors; but that must be an error, as she has the stump of one even now in the upper jaw, and there is no reason to believe that she had not the normal number; the condition of the gums might readily cause the loss of the exposed front teeth, while the back teeth might remain sound. She has a decided chin, which would indicate her humanity, if nothing else did. She has a well formed arm, and a small, symmetrical hand; she has also small feet. She is a perfect woman in every respect, performing all the functions of woman regularly and naturally.

She is evidently human, and nothing but human. She is quite unlike the mixed African — is she an American Indian? It may be here remarked, that her complexion, soft skin, hair, and shape of the head, face, and nose, remind one more of an Asiatic than an American type. Her disposition, too, is mild and playful, her manners gentle and communicative, differing from the sullen, taciturn, and forbidding ways of the Indian. It is well known, that some authorities maintain that the California Indians are of Asiatic origin, — Malays, who have been thrown in some way on the American shore, from the Pacific Islands. The notion also prevails among many of the tribes bordering on the Gulf of California, (among the Ceris, for instance,) that they are of Asiatic origin. This girl seems either of Asiatic origin, or of Asiatic and American Indian mixed. She is no specimen of a degenerate race, but an exceptional specimen, such as occurs, not unfrequently, in all races. Hairy women have lived before her, without any suspicion of brute paternity. The conformation of her mouth, in so far as it is abnormal, is more likely the result of disease, than a character of a tribe. The causes of these peculiarities must be sought for amongst those which modify the products of conception, and impress various fancied or real animal or vegetable resemblances upon the fœtus in utero; and which, in some inexplicable way, seem to arrest or modify animal development.

The girl was present at this meeting of the Society, and was freely and carefully examined. There was nothing remarkable about her, except the abnormal growth of hair, and the morbid condition of the gums and alveolar processes.

The thanks of the Society were voted to the girl, and to Mr. Beech, her agent, for the opportunity of examination, and to Mr. Napper, for photographic representations of her.

Prof. Jeffries Wyman exhibited some portions of Fossil Bones, from the Sandstone of the Connecticut Valley.

They had been examined twenty-five years ago, and were recognized as bone by Mr. Ellsworth. Fifteen or sixteen specimens had been recently sent him for examination, but they were mostly in very small fragments. Only one or two give any clue to the nature of the animals to which they belonged, but one, which he exhibited, he had found to be a vertebra, with portions of other vertebræ in front of and behind it. This vertebra presented two important features, viz: a transverse and an inferior spinous process. This proved the bone to have belonged to a higher class of animals than fishes. A concave extremity, and other markings, make it pretty evidently correspond to the vertebra of a reptile, possibly to an anterior caudal vertebra of a Saurian. In one or two specimens, a transverse section presented a large cavity surrounded by a thin wall, — a structure rather resembling that of the bone of a bird than of any other animal.

The greatest improbability connected with the subject is, that the remains of birds and reptiles should be found mingled together in the same formation. They are certainly not mammal, but Dr. Wyman has not much hesitation in pronouncing some of them reptilian.

The Cabinet Keeper reported, that Mr. E. Samuels, who had been sent by the Society for the purpose, had procured, from Truro, Cape Cod, two complete skeletons of the Black-fish (*Globicephalus melas*, De Kay,), two lower jaws of the same animal, two crania of the *Lophius Americanus*, and several specimens of reptiles, fishes, &c.; amongst them, some toads from the salt water marshes of Truro.

Mr. Samuels has also discovered, upon the inside of the Cape, at Truro, a fossiliferous bed of green sand, and has obtained a collection of shells from it. Amongst them, are *Venus mercenaria*, *Mya arenaria*, and *Ostrea Virginiana*. Mr. Bouvé refers this deposit to the Post-Pliocene formation.

Dr. Kneeland reported, that the Card Catalogue of the Library had been completed, and was now arranged alphabetically, and ready for use.

The Chairman gave notice, that copies of the Constitution and By-Laws of the Society, with a list of the members, had been printed, by an order of the Society, and were now ready for distribution.

The Curator of Geology announced the donation, from George B. Emerson, Esq., of some five hundred specimens, mostly fossils from the Paris Basin. The collection is very perfect and valuable, many of the specimens only wanting color, to have the appearance of recent specimens. It was voted, that the Curator of Geology be requested to express the thanks of the Society to Mr. Emerson for this donation, and for the many other favors which he has conferred upon the Society from time to time.

Mr. William D. Philbrick, of the Lawrence Scientific School, and Mr. Edwin Abbot, of Boston, were elected Resident Members.

DONATIONS TO THE MUSEUM.

July 25th. A specimen of Java Squirrel, *Sciurus bicolor*, and *Glareola pratincola*, Pratincole; by Mr. R. P. Napper, of Manilla. Specimens of Minerals and Fossils, among them a tooth of the Fossil American Horse ; by Mr. E. S. Holden, of Stockton, Cal. A box of Minerals, among them specimens of Garnets and Kyanite; by Mr. R. D. Mussey, Jr., of Rockport.

August 1st. A specimen of *Colymbus glacialis*, Great Northern Diver; by Mr. George B. Emerson.

August 15th. A specimen of Laterite, from the Valley of the Sitang, Burmah; by Rev. Francis Mason. The Body of a large Boa Constrictor, recently on exhibition in Boston; by Dr. J. V. C. Smith. A specimen of *Thalassidroma Wilsonii*, Wilson's Petrel, shot off Scituate, Mass.; by Mr. E. B. Welch. A specimen of Cinnabar Ore, said to contain 75 per cent. of Mercury; by Capt. Thomas Andrews. A portion of the trunk of a tree, having the extremity of a branch growing into it; by Mr. L. M. Sargent.

September 5th. Fossil Shells, from the Tertiary Strata of Wilmington, N. C.; by Dr. C. T. Jackson. A specimen of Ring-necked Snake; by Mr. C. P. Bronson.

September 19th. Five hundred specimens of Fossils, from the Paris Basin; by Mr. George B. Emerson. A large mass of Crystalline Sulphate of Lime; by Sprague, Soule, & Co.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPTEMBER 30, 1855.

Principes d'Osteologie Comparée. Par Richard Owen. 8vo. Paris, 1855. *From the Author.*

Geological Map of Russia. By C. Kutorga. 1852. *From the Author.*

Geological Map of Wisconsin. By I. A. Lapham. New York, 1855. *From the Author.*

Smithsonian Contributions to Knowledge. Vol. VII. 4to. Washington, 1855. *From the Smithsonian Institution.*

Patent Office Report. Mechanical. Congressional Document. 8vo. 2 vols. 1854. *From Hon. Charles Sumner.*

Description of a New Mollusk from the Red Sandstone, near Pottsville, Pa. By Isaac Lea. 8vo. Pamph. Philadelphia, 1855. *From the Author.*

Examination of Prof. Agassiz's Sketch of the Natural Provinces of the Animal World, and their relation to the different Types of Mankind. By J. Bachman, D. D. 8vo. Pamph. Charleston, 1855.

Examination of the Characteristics of Genera and Species, as applicable to the Doctrine of the Unity of the Human Race. By J. Bachman, D. D. 8vo. Pamph. Charleston, 1855. *From the Author.*

New York Journal of Medicine, for July and September, 1855. 8vo. New York.

New York Medical Times. Vol. IV. Nos. 10 and 11. New York, 1855.

Proceedings of the Academy of Natural Sciences. Vol. VII. No. 9. 8vo. Philadelphia, 1855.

Proceedings of the California Academy of Natural Sciences. Vol. I. pp. 11–46. 8vo. 1855.

Verhandlungen der Russisch-Kaiserlicher Mineralogischen Gesellschaft zu St. Petersburg. 8vo. St. Petersburg, 1854.

Nachrichten von der Georg-Augusts Universität und der Königl. Gesellschaft der Wissenschaften zu Göttingen. 12mo. 1854. Göttingen.

Bulletin de la Société de Geographie. 4rième série. Tome IX. 8vo. Paris, 1855.

Silliman's American Journal of Sciences and Art. No. 59, for September, 1855. 8vo. New Haven. *Received in Exchange.*

Annals and Magazine of Natural History. No. 91, for July, and No. 92, for August, 1855. London.

Cyclopædia of Anatomy and Physiology. Part 46. 8vo. London.

Ichthyology of South Carolina. By J. E. Holbrook, M. D. Nos. 1–10. 8vo. Charleston, S. C.

Comparative Anatomy. By C. Th. von Siebold and H. Stannius. From the German, with Notes and Additions, by W. I. Burnett, M. D. Vol. 1. 8vo. 1854. *Received from the Courtis Fund.*

Life of Sir William Pepperell. By Usher Parsons, M. D. 12mo. Boston, 1855.

Encyclopædia Brittanica. Vol. VIII. 4to. Boston, 1855.

History of Napoleon Bonaparte. By J. S. C. Abbot. 2 Vols. 8vo. New York, 1855.

History of Russia. Vol. II. By Walter K. Kelley. 12mo. London. Bohn's Standard Library. 1855.

Works of Edmund Burke. Vol. II. Bohn's British Classics. 12mo. London, 1855.

Pictorial Handbook of London. Bohn's Illustrated Library. 12mo. London, 1854.

Memoir of Rev. Sydney Smith. By Lady Holland. 2 Vols. 8vo. New York, 1855.

Story of the Campaign in Russia. By Major E. B. Hamley. 12mo. Boston, 1855. *Deposited by the Republican Institution.*

October 3, 1855.

The President in the Chair.

The Corresponding Secretary presented, in the name of the California Academy of Natural Science, the April and May numbers of the published Proceedings of that Society. Though the Academy is a newly organized Society, its contributions to the Natural History of California, as well as to other branches of natural science, are already very extensive. He referred particularly to the contributions of Dr. William O. Ayres, formerly Curator of Ichthyology in this Society, and called attention especially to the description, by that gentleman, of a very peculiar fish (*Cebidichthys crista-galli*) with a face resembling a monkey's, of which a single specimen has lately been found in the Bay of San Francisco.

The Corresponding Secretary also referred to a paper, read before the California Academy, by Dr. C. F. Winslow, on Earthquakes, etc., wherein Dr. W. dissents from certain views presented in a discussion upon this subject, at a meeting of this Society, some months since.

Dr. Charles T. Jackson presented to the Society a series of specimens of Iron Ores from Nova Scotia, some of which contain remains of Spiriferæ, Tentaculites, and Orthocera, and impressions of various other Silurian Mollusca. Also recent Fresh Water Shells, from a lake drained by railroad works, near St. John, on the Marsh road, and a series of Marine Tertiary Shells, from a clay-marl, in the same place. He also presented, in the name of Robert Fowlis, Esq., of St. John, two very perfect Fossil Star Fish, from the postpliocene marls, near the gas works in St. John. The thanks of the Society were voted to Mr. Fowlis for his donation.

GEOLOGY OF PARTS OF NEW BRUNSWICK AND NOVA SCOTIA.

Dr. Jackson gave a brief sketch of the Geology of New Brunswick and Nova Scotia, and described the Silurian, Carboniferous, and Triassic rocks of those provinces ; as also the metamorphic and trappean ranges of the Cobiquid and North Mountains. In these his recent explorations, he was associated with John L. Hayes, Esq., of Washington, D. C., and was employed by Charles D. Archibald, Esq., of London. In describing the Geology of New Brunswick, he began at St. John, and traced the rock formations from that place, following the line of travel up the Kenebekasis River, to the Peticodiac.

In the city of St. John, we find slates and metamorphic lime stones, which, from the occurrence in them of a bed of hard sandstone containing a fossil tree, are regarded as belonging to the Devonian group. No mollusca, or indeed any fossils, are found in the limestone, which is made up of a mixture of the blue and gray varieties, highly metamorphosed by heat, and much disturbed in their stratification. Masses of sienite, consisting of flesh-colored feldspar and hornblende, without much quartz, are observed at Indiantown, and are rocks of igneous origin.

All along the Kenebekasis River, are observed red sandstones of the old red or Devonian group, and at Sussex Vale we come to the celebrated Salt Springs, which rise from the Saliferous Sandstones, and produce, by evaporation, the finest and most agreeable table salt.

In Hillsboro, we find the lower members of the coal series, so remarkable for the abundance of fossil fishes, of the genus *Palæoniscus*, and for that highly bituminous variety of coal, which has been called Albertite. This group of strata, with its fauna and flora, were formerly described before this Society. Hills of snow-white gypsum, and some extensive beds of Anhydrite, occur in Hillsboro, and in other parts of Albert County. Naptha springs also exist near the shores of the Peticodiac River, and Petroleum floats on the surface of the waters that arise from them, and is deposited as a soft bitumen among the grass roots, and in the soil; it being left in its thickened and oxidized state by the water, as it periodically rises and falls with the seasons.

On reaching the mouth of Chepody Bay, we come to Mary's Point, and Grind Stone Island, where beautiful buff-colored, and light red Sandstones of the Carboniferous group, are quarried for building-stones, and a blue variety of the same formation, which is used for making grindstones, is found. At this time, the St. Mary's Point quarries present a scene of unwonted activity, owing to the enterprise of Mr. Archibald, who has employed upwards of seventy-five quarrymen, under the directions of Mr. George Lang, in quarrying out the freestone for architectural uses. These sandstones are found to be of excellent quality for building purposes, and are now largely imported into the United States, under the ægis of the reciprocity treaty between the United States and Great Britain. Mr. Alger has, on a former occasion, demonstrated the durable nature of this sandstone, before this Society, and our observations authorize us in confirming his opinion, that it withstands the action of frost even in the climate of St. John.

By far the largest portion of the stone is of a yellowish tint, or buff-colored, but there are also beds of a light red, and gray-colored varieties. They are, however, all of the same geological age, and belong to the true coal-bearing strata, as is proved by the fossil plants closely impacted between the beds of stone, and thin seams of bituminous coal, occasionally discovered in them.

An outlier of rock called, from its singular shape, the "Squaw's Cap," presents us with an abundance of fossil trees and roots, apparently of the Sigillaria, having none of the markings of Stigmaria, but smooth, with striated surfaces. Occasionally we find siliceous nodules in the blue sandstone, which are called by the grindstone cutters "bulls' eyes." They injure the grindstones when they occur, and stones containing them are avoided. Grindstone Island is one mile long, and half a mile wide, and is estimated to contain about 140 acres of quarry stone. The average height of the island above highest tides is sixty feet. The tide rises and falls between sixty and seventy feet. In obtaining slabs of the blue sandstone for making grindstones, these extraordinary tides perform valuable services, for the quarryman has only to split out his rock at low water, and fasten it by chains to his flat-boat, and allow the rising tide to float it, so that he can transport the stone to high-water mark, and leave it, where he can work upon it at his leisure. It is observed that the best grindstones are always obtained from the strata which are submerged at every tide. They are softer, and less liable to have cracks in them, as they are not exposed to extremes of heat and cold. The strata all dip down under the Bay of Fundy, at an angle of 38 degrees to the southward, and the trend of the strata is nearly east and west.

Above the tides, we have the extensive quarries now opened. They are supplied with heavy and massive cranes, and a tram-road or railway, for the removal of the stones and for transporting them to the wharf, where they are put on shipboard.

Owing to the favorable slope of the strata, beds of sandstone are here easily split up and removed, so that building stones are obtained at a very low cost.

On examining the "posts" of the quarry, we found that stones of from one foot to eight feet in thickness, and of any desired length and width could be obtained, and that the supply of uniform colored stones could be procured in abundance.

At present, most of the stones sent from Mary's Point are sold in New York, Philadelphia, and Baltimore, no agency having been yet established in Boston for the sale of them.

ACADIAN IRON MINES, IN LONDONDERRY, N. S.

Travelling around the head of Cumberland Bay, we pass over the rich dyked meadows originally reclaimed from the tidal overflowing by the first French settlers, and at length reach the Cobequid Mountains, which consist of sienite and greenstone rocks of igneous origin, and highly metamorphic olive-colored slates which immediately underlie the gray sandstones of the coal formation.

Mr. Dawson, in his Acadian Geology, describes these slates as Devonian, which their stratigraphic position seems to indicate, but we find no fossils in the metamorphic rocks, to aid us in determining their precise equivalency. The line of their uplift is nearly east and west, and does not run parallel with that of the south mountains of Nova Scotia, which will presently be described, as belonging to the N. E. – S. W. system, and which are Silurian, and of the same age as the Niagara and Clinton groups of the New York system. On the southern slope of the Cobequid range, in these olive-colored slates, exist innumerable and extensive deposits of ochreous oxide of iron, amorphous and botryoidal hæmatite, specular iron ore, and a mixture of spathose iron ore, and magnesian carbonate of lime, known under the name of *Ankerite*, which is also penetrated by abundant small veins, and investing masses of micaceous specular iron ore, which appears to have been introduced by plutonic sublimation. There is geological evidence of the igneous origin of the numerous veins of Ankerite, and it is highly probable, as has been suggested by Mr. Dawson, that the immense deposits of yellow oxide of iron have resulted from the decomposition of the carbonate of iron in the Ankerite. Volcanoes, we know, do give out abundant fumes of peroxide of iron, which crystallizes as specular iron ore in the volcanic cavern. May not a subaqueous eruption have produced the pulverulent peroxide abounding in these mines? Atmospheric causes do not appear to have been adequate to the decomposition of such enormous quantity of Ankerite, as would be required to yield so much of the peroxide. There are small veins, bunches, and films of black oxide of manganese in these ores of iron, and this renders them more particularly valuable in the production of steel, since it has been discovered that an alloy of metallic manganese with iron is highly useful in the production of the finest steel, such as the iron from this ore is known to produce.

Since my return home, I have made chemical analyses of the ores of these mines, and have obtained the following results. Specimens of the Ankerite yielded on analysis: —

	No. 1 Yellow Ore	No. 2 Brown Ore
Carbonate of Iron	23.45	20.30
Carbonate of Manganese	0.80	
Carbonate of Lime	44.80	49.20
Carbonate of Magnesia	30.80	30.20
Silex	0.10	
	99.95	99.70

This ore contains in No. 1 = $16\frac{42}{100}$, and in No. 2 = $16\frac{1}{10}$ per cent. of pure metallic iron. The limestone or carbonate of lime in it serves perfectly for a flux in smelting the ore in the blast furnace.

An average sample made up from all the ores of the mines mixed, yielded, in 100 grains: —

Per Oxide of Iron	74.80	
Oxide of Manganese	2.20	
Silica	2.20	
Titaniferous Iron	1.80	
Calcareous matters	19.00	Diff.
	100.00	

This ore contains $52\frac{38}{100}$ per cent. of pure metallic iron, and if the manganese is all reduced, and alloyed with the iron, it will amount to $1\frac{53}{100}$ of Manganesium, the proportion which will make the iron into the finest kind of steel.

There is one blast furnace now in operation at the Acadian Mines, smelting these ores, and six catelan forges are also employed. The iron produced is remarkable for toughness and strength, and is sold exclusively to steel makers in Sheffield, England. Since the immediate country around is hard wood forest land, an abundance of charcoal fuel can be obtained, and there will soon be other furnaces built near the mines.

EXCURSION TO HALIFAX AND TO NICTAU.

Having completed our surveys of the numerous mines near the Acadian furnaces, we left for Truro and Halifax, by stage-coach, and from thence went to Windsor, where we crossed over the gypseous formation, and observed some of those numerous inverted, funnel-shaped cavities in the gypsum, which now and then operate as trap-falls for men and animals.

Reaching the valley of Annapolis River, we travelled down it to Nictau, where we made a full examination of those inexhaustible beds of iron ores, which are worked by Mr. Archibald, and have been named by him the

VICTORIA MINES.

In 1827, Mr. Francis Alger and myself, made the first geological examinations of these curious and most interesting ore beds, which are contained in argillaceous slate rocks of Silurian age, having a line of elevation running Northeast and Southwest, and are distinguished by the great profusion of fossil shells which they contain; the ore being more fossiliferous by far than the slate rocks containing it, seeming to indicate that these ancient mollusca had a preference for an iron bed rather than one of clay. Formerly, the principal fossil shells of these ores were regarded as species of terebratulæ, and afterwards they were classed as Delthyris, but now they are arranged under the genus Spirifer, and they approach closely the *S. Niagarensis*, though none of them agree exactly with Mr. Hall's figures of that species. In 1827, I discovered a trilobite in one of these iron ore beds. It was called *Asaphus Crypturus*, by Prof. Green, of Philadelphia, who described it for me at the time. Tentaculites also occur in the red iron ore of Little River, one of the beds of this group. The species resembles, in form and size, the magnified drawings of *T. minutus*, of Hall's Clinton group of New York Fossils. There are Orthocera, and several other, as yet unknown or undescribed, molluscs in these ores, and it is difficult to determine their species, since we have only the interior moulds of the shells. They all appear to belong to the Niagara and Clinton groups, of the New York system.

One of the most curious phenomena presented at these mines, is the magnetic state of some of the ores, while others, not far removed from them, are wholly devoid of magnetism.

The ore, when deposited at the bottom of the sea, must have been a fine ferruginous mud of per oxide of iron. Since its formation, and probably at the time of its elevation, the most metamorphosed beds were rendered magnetic iron ore, a mixture of the protoxide and peroxide.

A great number of mines have been opened lately on these ores, and some new beds have been discovered since the original survey was made by Mr. Alger and myself. There are two principal and parallel beds, which vary in thickness from six to ten feet, and they have been traced, with certainty, five miles in length, and probably extend to Bear River, near Clements, a distance of thirty or more miles! Whether these two parallel beds, which are near each other, and dip 80°, constitute one bed, doubled up like the letter U, or are distinct deposits, we were, in the short time allowed us for our examinations, unable to decide. There are, however, several distinct and separate beds, besides the main ones; some of them are very compact and magnetic, and others are softer, and are not magnetic ore. The last named variety is seen in the red slates of Little River, and the others near Nictau River, and in very numerous pits and trenches, cut for the purpose of tracing the beds.

It was found impossible to rely upon the compass needle in surveying the magnetic ore beds, for the needle was astatic over them, and was attracted, even when quite remote from the ore, the North point invariably pointing toward the iron ore. It is quite evident that these mines may be considered, most truly, to be inexhaustible, and the wood of the country around, though it may supply fuel for many years, is not adequate to smelt more than a very small proportion of the ore actually in view. Hence it is advisable to export much of the ore to the United States, as well as to make charcoal iron for steel on the spot, for exportation to England.

This we have advised, and have no doubt of its being done, under the new laws of reciprocity in trade with the British Colonies, which will allow of the introduction of iron ore into this country, and of the exportation of anthracite to Nova Scotia, free of duty ; but the iron made in Nova Scotia cannot be brought to the United States without paying duties, and hence it will be sent to England. This will be mostly fine charcoal iron for making steel.

Anthracite will smelt the Nictau ores with great ease, and with but little additional flux, since there is silex in it, and nearly enough lime to make a fusible slag. The Anthracite iron made from this ore will be very strong and good, but not so valuable, of course, as charcoal iron. It will make good foundry pig, and good bar iron.

CHEMICAL ANALYSIS OF THE NICTAU IRON ORE.

This ore, dried at 212°, yielded, in 100 grains: —

Peroxide of Iron	70.20
Silica	14.40
Carbonate of Lime	5.60
Carbonate of Magnesia	2.80
Alumina	6.80
Oxide of Manganese	0.40
	100.20
Gain of Oxygen	.20
	100.00

It contains $50\frac{42}{100}$ per cent. of pure iron.

The results of smelting of the ores, and of refining the iron, prove that either white forge, or gray foundry pig iron can be made from them by management of the burden of the furnace, and that the refined or bar iron is nearly, if not quite, equal in toughness to that from Russia and Sweden. It also makes fine cast steel, as has been proved by trials made of it in Sheffield, England.

John L. Hayes, Esq., of Washington, Corresponding Member, confirmed Dr. Jackson's statements, with regard to the Nova Scotia Iron. He remarked also, that American Iron, manufactured by means of charcoal, was the only iron used in the chain cables of the U. S. Navy, which are all manufactured at the Navy Yard in Washington. He related instances, where cables of the best English iron had been broken in storms, when those of American charcoal iron had held. He thought that the value of charcoal iron over anthracite iron was underrated, especially in places where wood could be obtained, and readily transported, for making charcoal. English manufacturers are now turning their attention to this country, since the supply of Russian iron has failed, and as the supply from Sweden may be cut off by political causes ; and he believed that preference would be given, at some future time, to charcoal iron from the Acadian mines, from which steel of the highest quality can be made. It is well known, that some irons make better steel than others, and on this account have been said to have a *steely propensity*. The cause of this is not yet understood, but as manganese is found in all the steely irons, it is very probable that future investigations will establish the fact of manganese being the cause of the steely propensity.

Dr. A. A. Hayes read the following communication : —

ON THE EXISTENCE OF NATIVE IRON, IN A MALLEABLE STATE, IN LIBERIA, AFRICA.

In the African Repository, August, 1854, p. 240, there is a copy of a letter from Rev. Aaron P. Davis, of Bassa Cove, which accompanied a specimen of what Mr. Davis terms " pure ore, just as taken from its native bed." This specimen, bearing the marks of Mr. Davis's chisel, was placed in my hands by Rev. Joseph Tracy, of Boston, it having been forwarded to him by Rev. H. M. Blodgett, to whom it was given by William Coppinger, Esq., of Philadelphia, who was the recipient of it from Mr. Davis.

The larger mass, which I have the pleasure of exhibiting to the Society, presents a part of the specimen cleaned from oxide, while the small slabs show the texture of the iron in the central parts of the mass.

The specimen had been drilled and filed when I first saw it, and my attention was particularly arrested by the filed surface, as the arrangement of the particles, viewed under a lens, was not only unusual, but closely resembled that of the *unalloyed* part of meteoric iron. In all artificial irons, we find the particles disposed in such a way, that we may arrange the kinds under two heads. 1st, crude, or cast iron. In this the particles crystalline, and often distinctly *crystallized*, are separated, by the occurrence of two forms of carbon intermixed with them, as graphitic carbon and pure graphite. These foreign bodies prevent the cohesion of the particles, and rarely permit them to come in contact; hence this variety of iron is brittle; rarely bending or bearing the hammer without fracture. In that variety of *white* iron, containing the smallest proportion of graphitic carbon and *no graphite*, the size of the crystals is large, but they are not solid, as their internal structure is impaired by the presence of three or four per cent. of graphitic carbon. As a whole, this white iron often contains more *pure* iron than is found in some kinds of marketable malleable iron. The variety known as "Kishy" iron, is the exact representative of Meteoric iron; which consists of pure, unalloyed iron, in which alloys of iron and nickel, and nickel and iron are so distributed, as to prevent a regular crystallization.

2d. Malleable, or ductile iron. The removal of the two forms of carbon, by the process of refining crude iron, as usually practised, allows the crystalline particles to unite, so that a degree of perfect malleability is attained. In the iron reduced from the ore directly, by alternate exposure to contact with highly heated carbon and hammering, the oxide partly reduced, and partly forced out of the mass, allows the same kind of contact among the particles, as exists in the iron obtained in purifying crude iron.

Between these forms of iron and natural iron, there exists the same difference as we perceive between hammered copper and native copper. In the natural iron, as in the native copper, the crystals exist without extraneous matter interposed ; precisely as if deposited from solutions by electrolysis ; the masses they form are malleable, but always show flaws at points produced by the presence of earthy minerals, included in a more or less crystalline form.

In artificial ductile iron, the crystalline arrangement is broken down purposely, in order to unite the particles anew. Laminated iron, presents them flattened and shingled over each other, their serrated edges becoming *felted.* Drawn iron, exhibits an internal arrangement of longitudinal threads, formed from particles whose cohesion, laterally, has been diminished.

The native iron presents only minute crystalline grains, which have not been broken or blended. Their color is lighter gray than that of any hammered iron. They are without much lustre, resembling iron which has been aggregated by electrical deposition. The mass is tough ; and when a fragment is broken, repeated bending and doubling is required, and the fracture is hackly. The texture is not uniform. Some parts are less compact than other portions, rendering the specific gravity of the mass less than that of other iron. This inequality is due in part to the presence, in the mass, of crystalline quartz, magnetic oxide of iron, and a zeolite mineral, having a soda basis in part; conclusively proving that the iron has never been melted artificially.

Its chemical composition is,

Pure iron, ...	98.40
Quartz grains, magnetic oxide, iron crystals, and zeolite	1.60
	100.00

There are no other metals present ; a fact which prevents us from placing this iron in the class of meteorolites. And the *absence of carbon*, in any form, removes all doubt in regard to its being possibly of artificial formation.

Every form of iron which has been the subject of manufacture, contains carbon. And it is an interesting observation in this connection, that, in the large number of samples of ancient irons, and those produced by semi-civilized people, which I have analyzed, not only has carbon been present, but the proportion was always larger than exists in the iron of commercial people. It appears that the rude workmen, in producing this useful metal, stop at that point where the half-refined iron is sufficiently ductile to take, under the hammer, the required form ; while the purer irons are produced later in history, when the more highly prized qualities become known.

The discovery of native malleable iron in Liberia is interesting to science ; and if found in abundance, it will exert its usual civilizing influences, in a quarter to which the eyes and sympathies of philanthropists of the world are now directed. I may add, that two scimetars, made by the people of the interior, have been shown to me, and it was apparent, from the cross flaws and unequal texture, that they were not made from European iron.

The present specimen came from the tract of country on the St. John's River, recently purchased for the New Jersey Colony.

In the country back from Cape Palmas, and also further north, in the Sah-Po country, the natives have sufficient iron to supply their wants, and the evidence, so far as human testimony is concerned, is full and complete, that they obtain this iron by heating the rocks, " mixed with brushwood and charcoal, in piles," the iron remaining after the combustion of the fuel ; a mode which could not produce iron from any known ore, even in the state of cast iron.

Prof. Jeffries Wyman exhibited some of the results of experiments of the formation of rain impressions in clay.

From his investigations, it appears that ordinary rain marks are characterized by the existence of radiating lines around the circumference of the impressions ; which are caused by the fragments of the drops, as they are dispersed, often impinging upon the plastic surface.

If a mass of water is thrown into the air, and allowed to fall on soft clay, the form of the impression will depend upon the condition of the drops at the time of contact. In descending, the drops assume the following forms, viz: first, that of a flattened sphere; second, that of a cup with the concavity downwards; third, that of a ring; and fourth, those of two or more spheres formed by the rupture of the ring.

If the sphere be above a certain size, the impression presents a reticulated appearance in the centre, with radiating lines around the circumference. The impression formed by the cup is reticulated in the centre without radiating lines. The ring forms an impression corresponding with its shape, with radiating lines on its inner border, and sometimes on its outer border.

Prof. Wyman thought that rain marks could be distinguished from those of spray.

The rain mark is modified by the condition of the surface on which it strikes; if the latter is hard, or of a coarse material, the minuter details are not shown. On examining the fossil rain marks, he had not found that the radiating lines were preserved. They were doubtless destroyed by the drifting in of the new material by which they were covered up. In other respects, they resembled recent rain marks, and could be accounted for in no other way, than by the contact of drops of falling water.

Some discussion ensued upon the rain and spray impressions, in which the President, Dr. Jackson, Dr. Hayes, Dr. Abbot, and Mr. Bouvé took part. They all recognized the great value of Prof. Wyman's investigations, as valuable contributions to science, and hoped that he would continue these practical demonstrations in other and different materials.

The Librarian announced the following bequest to the Society, by the late James Brown, one of the Patrons of the Society: —

"I give and bequeath to the Boston Society of Natural History, Gould's Ornithology, in sixteen volumes, folio; Cuvier's

Histoire Naturelle, in three volumes, folio; Hardwicke's Indian Zoölogy, in two volumes, folio; Poiteau's Pomologie Française, in four volumes, folio; Lambert's Genus Pinus, in one volume folio, and one volume octavo; Gray's Genera of Birds, in three volumes, royal quarto."

Mr. Dillaway accompanied the announcement of this bequest with the following remarks: —

"The Society may well congratulate themselves on this timely donation. For many years we have been in want of these very works, but from their great cost, probably not less than $2,000, have been unable to obtain them. They constitute the most valuable donation ever made to the library, and give a completeness to the ornithological department, unsurpassed in any collection in this country, excepting perhaps that of the Academy of Natural Sciences in Philadelphia.

"This is not the first time we have been indebted to the liberality of Mr. Brown. On many occasions his purse and his influence have been freely offered in aid of our efforts for the promotion of Natural Science.

"In the list of our patrons, numbering eighty of the most liberal and public-spirited citizens of Boston, his name stands now among the first. Indeed, with the exception of the bequest of Ambrose S. Courtis, from whose estate we realized $10,000 — and the contribution of the late Amos Lawrence, who presented $5,000 towards the purchase of the building we occupy, the donation of Mr. Brown is one of the largest ever received.

"It is not for me to write his eulogy — it has already been written by other and abler hands — but as my acquaintance with him has been a long one, commencing at a time when his whole property could not have purchased one of the volumes he has bequeathed to us — when industry, integrity, and a generous heart were all his capital, and reaching to a period when he was able and willing to give his thousands to the promotion of literary, scientific, and charitable objects, I may be permitted to express a belief that Boston has lost by his death a citizen of whom she had good reason to be proud, and our Society a valued friend, whose memory we shall ever hold in honor."

The President bore testimony to the great value of the bequest of Mr. Brown.

A committee, consisting of Dr. C. T. Jackson, C. K. Dillaway, Esq., and Prof. J. Wyman, was appointed to report appropriate resolutions at the next meeting of the Society.

The Corresponding Secretary announced the reception of a letter from the Royal Academy of Sciences, at Berlin, August 27, 1855, returning thanks for numbers of the Journal and Proceedings, and for the Address by Dr. Warren.

The Corresponding Secretary also presented, at the request of Mrs. James Brown, of Watertown, a portrait of Mr. Thomas Nuttall, the Naturalist.

Dr. Kneeland presented eight rare birds, from the Philippine Islands, among them a Supercilious Ani, (*Dactylophus superciliosus.*)

The Secretary presented, in the name of Mr. G. S. Shaw, of Cambridge, a collection of birds, also from the Philippine Islands, and Australia; among them a specimen of Cuming's Ani, (*Dasylophus Cumingii*, Fras.)

The two Anis comprise all the described species of the genus *Dasylophus*, which is peculiar to the Philippine Islands. These birds, in addition to the beauty of their plumage, are interesting for the examples they furnish of remarkable changes in the epidermic covering of birds, the feathers in the first species being tipped with shining spangles, and in the latter with hair-like appendages. In *Dasylophus Cumingii*, the feathers of the crest, breast, and throat, are changed at their extremity into ovoid horny lamellæ of a shining black color — expansions of the true horny structure of the shaft. In *D. superciliosus*, the feathers forming a crest over each eye are changed, for three fourths of their extent, into red silky hairs or bristles, the base of the feather being of the usual appearance ; each shaft seems to divide into several of these hair-like appendages. Something of the kind is seen in the Bohemian Chatterer or Wax-Wing, in which some of the secondary and tertial quill feathers end in small, oblong, flat appendages, in color and substance resembling red sealing-wax ; these also are merely expanded, horny prolongations of the shafts of the ordinary feathers. The hairy crest of the Supercilious Ani bears some resemblance to the appendage on the breast of the Wild Turkey, only it is much more silky and finer, and is directly continuous with ordinary feather structure, while the appendage of the Turkey is bristly in its whole extent, showing a complete transition of feathers into hairs.

Dr. Durkee was appointed to take charge, temporarily, of the Entomological Cabinet.

Mr. Samuel W. Chamberlain was chosen a Resident Member.

October 17, 1855.

The President in the Chair.

An extract was read from a letter of Dr. A. S. Baldwin, of Jacksonville, Florida, addressed to the President, informing him that he was engaged in making a collection of the Fresh Water Shells of East Florida, for the Society.

A letter was read from Mr. Francis H. Storer, tendering his resignation of the office of Assistant Curator of Mineralogy.

The resignation of Mr. Storer was accepted, and Drs. Abbot and Kneeland were appointed a committee to nominate a candidate in his place.

A communication was read from Mr. John C. Jones, of West Newton, presenting a specimen of *Geococcyx* (*Mexicanus*?) — a bird from the coast of Alta California, known among the natives by the name of Correro Camino, or Road-Runner — and giving a description of some of the peculiar habits of this bird.

The President exhibited some fossil impressions of rain-drops, and a very distinct impression of a bird's foot, from the Connecticut River Sandstone, and made some remarks upon them, as illustrating the observations of Prof. Wyman, reported at the last meeting.

Mr. C. J. Sprague exhibited specimens and drawings of the *Cordyceps* (*Sphæria*) *militaris*, Fries.

This species of fungus is common in Europe, and not uncommon in this country; but it is interesting, from the fact of its being one of those which grow upon the larvæ and pupæ of insects. The specimens were both found at the roots of the Hamamelis Virginica in loose, black mould. There is another species *C. entomorrhiza*, which is found at the south. They both belong to the small tribe of the vast genus *Sphæria*, *Cordyceps*, elevated by Fries into a distinct genus. Mr. Sprague also exhibited, in elucidation of a few remarks upon the habits of these fungi, a specimen of *S. Lactifluorum*, from Maine, which entirely covered and transformed a species of *Agaricus*. The gills were not at all developed, and the whole plant was studded with the rose-red papillose perithecia of the *Sphæria*, shedding their copious white sporidia.

Prof. Jeffries Wyman read a part of a memoir on the Footprints discovered by Prof. Henry D. Rogers, in the Carboniferous Strata of Pennsylvania. (*Vide* Proceedings of meeting of April 4, 1855.) He gave an analysis of the anatomical characters by which Reptiles and Fishes are distinguished from each other, and attempted to demonstrate, that although there are but few osteological characters, which, taken by themselves, are of absolute value as distinctions between these two classes, yet when the combinations of characters, which exist in any given instance, are considered, there can be but little room for doubt as to the true zoölogical affinities.

There exist no known forms of recent or fossil reptiles or fishes, which, where all their osteological details are known, cannot be referred unequivocally to one or the other of these classes. A comparison of the Ichthyoid Reptiles and Sauroid Fishes shows, that although it is through them that the two classes approach nearest to each other, yet there are no forms so completely intermediate, as to bridge over the space which separates them.

He made comparisons between the form and structure of the feet of reptiles and the fins of fishes, showing, that although they resemble each other as regards their functions, yet morphologically they are always distinct. There is no known fish, recent or fossil, the pectoral or ventral fins of which could produce a series of tracks like those discovered in the coal strata of Pennsylvania, by Mr. Lea and Prof. Rogers. Although among Lophioid fishes, the pectoral fins are used for locomotion on the shores, yet they, in every instance, conform to the fish type — are fins and not feet. An analogous condition of things is found among Cetaceans and marine Saurians, where the limbs serve the purpose of paddles, and may be compared to fins, yet, morphologically, they can be referred only to the Mammalian or Reptilian types.

Prof. Wyman therefore thought, that, in the present state of knowledge, there was no ground for denying that the quadrupedal tracks found in the coal formations were made by Reptiles.

It was voted, that Prof. Wyman be requested to furnish a copy of his memoir for insertion in the Journal.

Dr. T. M. Brewer presented, in the name of J. W. Butler, Esq., Treasurer of the American Verd-Antique Marble Company, specimens of that marble, and of several minerals — Actinolite, Asbestos, Dolomite, Talc, Chromic Iron, and Magnetic Iron Ore — from the quarries at Roxbury, Vermont.

At the request of Dr. Brewer, Dr. A. A. Hayes gave the Society an account of the characters of the so-called Verd-Antique Marble, polished specimens of which were on the table.

He remarked, that considerable interest having of late been attached to this material, as an ornamental stone, a committee of the Franklin Monument Association, had requested him to examine it in relation to the action of atmospheric agents, purposing to adopt it as the base of the monument to be erected. It is well known, that the extremes of heat and cold, the alternate dryness and humidity of our climate soon deface and even disintegrate the less compact stones, leaving us but a limited number of materials, for ornamental workmanship exposed to the air. Ordinary marble suffers not only a superficial degradation of surface rapidly, but the new surface produced, becomes a hot-bed for cryptogamous plants, which in turn disfigure it, and greatly aid further corrosion. The classic and beautiful sepulchral monument, over the remains of Spurzheim, at Mt. Auburn, exhibits the defacement due to combined action of lichen growth and moisture, while near by is a monument to one whose memory is revered by us, of imperfect bronze, also attesting the activity of atmospheric agents, when this metal is freely exposed to them.

The samples subjected to trials were sawed, not polished surfaces; choice being made of the former, because the natural flaws existing in the material might become filled by the fine powders used in polishing.

The stone was first subjected to Braads's test, which, as is well known, quickly shows the unenduring character of sandstones, bricks, and some marbles. The activity of this test was increased, but under any mode of application it failed to show any disposition in the material to absorb moisture or disintegrate. Finally, hot diluted hydrochloric acid was applied, and the mineral was heated and immersed in it, without damage. The Quincy sienite and true granite will alone bear this test; the so-called granite, which is truly gneiss, fails under its application. The enduring qualities of this stone being thus demonstrated, it may safely be used in permanent works, where its variegated shades of white and green will long preserve their polish and beauty.

This mineral has been called Verd-Antique Marble, a name not only incorrect, but conveying a false conception of its value in a technical sense, as verd-antique marble does not resist exposure to our atmosphere. The experiments alluded to above, proved that the white portions were not marble, and as these portions resisted chemical agents, nearly as well as serpentine does, I was anxious to learn the composition of the whole. Dr. Brewer kindly furnished the specimens, which he took from the quarry during a recent visit, parts of the collection he has now presented.

The analytical experiments were first made on the white portion of different masses, and the results established the interesting fact, that this part is an anhydrous Carbonate of Magnesia, nearly pure.

The white part, often highly crystalline, can be separated from the masses only in small fragments. It then presents a milk-white color, is translucent, the cleavage planes having a high lustre. Generally, it contains scaly talc, of a clear green color, or it is blended with a dark green serpentine.

The selected portions of the white parts were used in the following determinations: —

100 parts of the powder lose humidity at 212° F. and at 450° F.; the whole loss is 0.08. 100 parts of the dried powder afford 47 parts of carbonic acid, as collected; the total loss of weight was 48.80 parts.

100 parts of the dried powder consist of: —

Carbonic acid	48.80
Magnesia	45.60
Talc and a little Silicic Acid . . .	3.60
Silicate protoxide of Iron	1.96
	99.96

A more compact variety of the white mineral afforded: —

Moisture	0.08
Water from hydrated rock	0.98
Carbonic Acid	47.16
Magnesia	44.24
Talc lamina and Silicic Acid	5.20
Silicate of Alumina	0.64
Protoxide of Iron from Silicate	1.53
	99.83

The analysis of an average specimen, which exhibited the greenish-black, light green, and white colors intermixed, gave as its component parts: —

Moisture	0.40
Carbonate of Magnesia	38.00
Talc and Serpentine	61.60
	100.00

61.60 consisted of: —

Combined Water	6.44
Silicic Acid	36.92
Magnesia	10.52
Protoxide Iron and Manganese	4.80
Alumina	2.06
Chrome Iron	0.63
	61.37

The basis rock is therefore an indefinite mixture of serpentine and greenish-white talc, with a silicate of alumina and protoxides of iron and manganese, which serves to render it compact, and probably imparts much of the green color.

Some specimens also contain actinolite with talc, firmly united, so as to present a close texture, and considerable resistance to fracture. The proportion of chrome iron ore, in crystalline grains, varies in different specimens ; but it is never large enough to seriously interfere with the operations of sawing and polishing.

As carbonic acid is often found in the analysis of serpentine, a fact to which Prof. William B. Rogers has recently called my attention, and which may be verified on some well-known varieties, it becomes apparent that this compound can hardly be classed as a simple mineral, and we approach nearer the truth when we consider it an aggregate of several distinct minerals constituting a rock.

The Committee appointed to prepare a series of resolutions, expressive of their appreciation of the valuable bequest to the library, by the late James Brown, reported the following preamble and resolutions, which were adopted: —

We are called upon to deplore the loss of one of our highly valued members, a Patron of this Society, the late James Brown, Esq., who died at his residence in West Cambridge, on Saturday, March 10, 1855, at the age of 55 years.

Mr. Brown was born in Acton, in this State, on the 19th of May, in the year 1800, and lived, while a young man, in Cambridge. He was then poor, but was always respected for the excellence of his character, and for his industry and fidelity to his employers. By his own industry, intelligent labor, and business habits, he gradually acquired so large an amount of property as to be able to make generous presents to the library of the College, and to aid in the advancement of many literary and humane undertakings.

He entered into the business of publishing books, first in Cambridge, and subsequently in Boston, where he became an active partner in the firm of Little & Brown, a publishing house well known, not only in this community, but all over the Union, for its sterling publications and great fidelity.

Mr. Brown soon took a lively interest in the Boston Society of Natural History, and freely contributed to its funds and to its library; and by his active endeavors induced others also to favor the Society with liberal donations.

The rank he took in becoming a Patron of the Society, he always ably sustained during his lifetime, and bore it in remembrance in his last hours, as is proved by the valuable bequest which he left to its library. Mr. Brown's taste for the beautiful, is admirably exemplified in his selection of the department of Ornithology as his favorite study, and the volumes he has left to the Society, in his last will, prove not only the excellence of his judgment in their selection, but also a most liberal spirit in the purchaser, of such valuable books in his favorite departments of science. Those who knew him well, say that he had a keen relish for the beautiful in nature, and that he enjoyed especially the observation of the habits of birds; and they attribute much of his cultivated taste to this devotion to one of the most lovely departments of Natural History. In his profession he was an astute critic in judging of the character and value of books, and those whose opinion is entitled to respect say, that there are few men in the country who could have been more safely trusted with *carte blanche* in the selection of a good library. The Committee beg leave to offer the following resolutions: —

Resolved, That the Boston Society of Natural History is deeply sensible of the great loss it has met with in the decease of its eminent Patron and benefactor, the late James Brown, Esq., for whose numerous donations made during his lifetime, the Society has been under obligations, as also for the kindly exertions often made by him to persuade others to aid in the increase of the Society's means for the promotion of science.

Resolved, That this Society, having received from the Executors of the will of their late Patron, a number of magnificent folios on Ornithology and other departments of Natural History, which he had bequeathed to their library, contemplate this, one of the last acts of his life, with sentiments of deep emotion and gratitude, as evincing the friendship and kind consideration of the testator toward this Society and his generous and kind appreciation of their wants.

Resolved, That a copy of the above preamble and resolutions be transmitted to the family of the deceased.

Resolved, That the thanks of the Boston Society of Natural History be presented to Mrs. James Brown for her generous donation of a portrait of the distinguished Naturalist, Thomas Nuttall.

Prof. W. B. Rogers exhibited a specimen of Aluminium.

The Corresponding Secretary announced the reception of the following letters, viz: —

From the Royal Geographical Society, June 1, 1855, accompanying the twenty-fourth volume of the Journal of that Society: — from the Société Linnéenne de Bordeaux, Dec. 20, 1854, the Académie Impériale de Bordeaux, Dec. 26, 1854, and the Académie Royale de Stockholm, May 31, 1855, returning thanks for copies of the Journal and Proceedings; — and from the Akademie der Wissenschaften at Vienna, May 1, 1855, presenting copies of its publications.

November 7, 1855.

The President in the Chair.

A letter, addressed to the President by Sir John Richardson, inclosing a copy of a communication from W. J. Christie to Sir George Simpson, dated Fort Polly, Swan River District, January 28, 1855, was read to the Society; the following is an extract: —

"With reference to the portion of Sir John Richardson's letter to you regarding a search to be made for the remains of the *Mastodon*, I have the honor of informing you, that agreeably to the above request, I procured in October last an Indian guide, and proceeded to Shell River, where the bones of that animal were found. The shoulder bones referred to by Sir John Richardson, together with other bones and the *teeth*, were found in the river by the Indians several years since, and were taken out and laid on the bank. Owing to some superstitious fear, the Indians, at the time of their discovery, would not bring them here; but two years afterwards they were sent for, and the shoulder bones, together with a tooth, were brought here; but whether or not the tooth was sent to Red River with the shoulder bones, I cannot ascertain. On reaching Shell River last fall, I carefully examined the spot where the Indians laid the bones, and found them; but having been buried, they had decayed so much that they fell to pieces on being touched. A portion of a large bone, and some fragments of what is supposed to have been a tooth, I brought here; these will be carried to Norway house next spring and disposed of as you may direct."

Prof. W. B. Rogers presented the results of calculations, which he had lately made, of the terminal velocity of rain drops of different diameters.

As the impinging force of the drop must in all cases depend on its weight and velocity jointly, the determination of the latter quantity, even approximately, would seem to be of considerable interest in connection with the subject of rain-drop impressions, which Prof. Wyman has begun to investigate with so much success.

Were the space around the earth a vacuum, a falling body would continue to be accelerated at a nearly equal rate to the end of its descent, and would not attain to its maximum velocity until the moment of its impact on the ground. Such, however, is not the condition of a body descending through the atmosphere. The particles of air lying in its way oppose a resistance to its motion, and this force increases in a very rapid ratio as the velocity augments. There will therefore in every case be a certain speed at which this resistance acting upward will precisely equal the weight of the falling mass, and when this is once attained all further acceleration must cease. In these conditions, supposing the air to be of uniform density down to the earth, the body will fall though the remaining distance at a uniform rate. This terminal velocity, therefore, is obviously the greatest speed which, under the conditions, the body can acquire by descending through the air, however great the altitude from which it may be supposed to fall.

Assuming, what is probably in most cases the fact, that the rain-drops fall from a sufficient height to attain a terminal velocity before the close of their descent, and taking as the basis of the calculation the formula of Hutton, which expresses numerically the law of resistance, as determined by experiment, in the case of spherical bodies, Prof. Rogers, in the first place, computed the terminal velocity of a spherical drop of water one tenth of an inch in diameter. Thence he deduced the velocities corresponding to other successively smaller diameters, by the simple rule that for unequal spheres of like material the terminal velocities are proportional to the square roots of the diameters. In this way was calculated the following table of the terminal or greatest attainable speed of spherical rain-drops, ranging in diameter from one tenth to one four thousandth of an inch.

Diameter.		Terminal Velocity in feet per second.
$\frac{1}{10}$	inch	71.50 ft.
$\frac{1}{20}$	"	50.50
$\frac{1}{30}$	"	41.40
$\frac{1}{40}$	"	35.60
$\frac{1}{50}$	"	32.03
$\frac{1}{100}$	"	22.70
$\frac{1}{1000}$	"	7.20
$\frac{1}{2000}$	"	5.06
$\frac{1}{4000}$	"	3.50

These numbers would of course require to be more or less modified, if account were taken of the altered form of the drops as they descend, but as we are ignorant of the nature and amount of this change, we cannot determine its effect on the terminal velocity.

If instead of assuming the descending globule to consist of water throughout its whole volume, we suppose it to be a hollow shell of water like a microscopic soap-bubble, it is obvious that for the same diameter the terminal velocity would be greatly less than in the above table. Admitting with Saussure and others that clouds are made up of such hollow vesicles of extreme minuteness, it can be shown that their descent to the earth would be so slow as to make their gravitating tendency inappreciable during the short time in which we watch them as they float by.

Dr. H. R. Storer presented, in the name of Dr. D. H. Storer, some specimens of very large Oyster Shells, probably *Ostrea Virginica,* taken from the milldam by Samuel Nicolson, Esq.

Mr. Nicolson, who was present, was introduced to the Society by Dr. Storer. He stated that, thirty-five years ago, having occasion to remove a portion of the flats beneath one of the large wheels in the mills on the milldam, he had found a bed of these shells two or three feet below the surface, forming a porous mass, through which the tide ebbed and flowed. The shells had also been found in the channel of Charles River, a quarter of a mile from the dam, and he supposed that there was an extensive bed of extinct oysters lying between these two points. The shells are long and slender, many of them attaining a length of 12 or 13 inches.

Mr. T. J. Whitemore remarked that this oyster has been well known in Charles River for many years, and that occasionally living specimens are yet found there.

Dr. C. T. Jackson remarked that there is an ancient oyster bed, near Boothbay, Maine, now sixty feet above the surface of the sea. No living oysters are found in the vicinity.

Prof. Wm. B. Rogers said an oyster of this character was found lying over the newest tertiary, near the mouth of the Rappahannock River, of post-pliocene age. He had noticed, that in shape, and in the peculiarity of the hinge, these specimens were identical with those from the Rappahannock River.

Dr. H. R. Storer reported the results of some recent experiments upon the cohesive properties of different sizes of Gutta Percha Pipe, made in connection with Mr. Charles Stodder.

The first trial was with one thousand feet of a pipe, of one inch internal diameter and one and three sixteenths external diameter, intended for an aqueduct at West Cambridge. Upon applying a pressure of 80 lbs. to the square inch, a fine hole was discovered; this hole being closed with a hot iron, a pressure of

100 lbs. was borne with ease. The remainder of the experiments were made with short pieces of pipe varying from one to three feet in length.

A piece of the same pipe was subjected to the full test; it bore 266 lbs., and burst at 272 lbs.

Another piece of the same diameter internally, with one and five sixteenths external diameter, from a different factory, bore 300 lbs., and burst at 320.

Pipe of seven eighths of an inch internal diameter, and one and one eighth external diameter, stood a pressure of 280 lbs., and burst at 304 lbs.

Pipe of five eighths internal, and one and one thirty-second of an inch external diameter, stood 320 lbs., and burst at 360 lbs. This is the size used in Boston for the Cochituate Water, and is there subjected to a pressure of not more than 60 lbs.

Pipe of one half an inch internal, and five eighths of an inch external diameter, bore 234 lbs., and burst at 240 lbs.

Pipe of the same diameter but of another manufacture, intended for an ordinary pressure of 35 lbs., stood 360 lbs., and then burst.

Pipe of quarter of an inch internal, and five eighths of an inch external diameter, stood 720 lbs., and burst at 760. This is a stout pipe, used in the shops for effervescing soda water, and generally subjected to a pressure of about 200 lbs.

Dr. A. A. Hayes asked at what temperature the experiments were made, as the power of cohesion would vary with the temperature.

Dr. Storer replied, at the common temperature of the Cochituate Water.

Prof. Wm. B. Rogers asked if these pipes were of recent manufacture. He had made experiments upon the cohesive properties of Gutta Percha and had found that a very remarkable molecular change takes place, after some length of time, in the material, so that it readily breaks up and becomes utterly worthless in that condition.

Mr. Charles Stodder stated that the material which had been in the market at different times was of very different qualities, and that the crude article itself, was extensively adulterated by the natives before exportation. When first introduced here and into England, much bad material was obtained. Some samples were found to be acid, and lime was recommended for its neutralization. This remedy however soon became an abuse, for lime and oxide of zinc were at one time extensively used for its adulteration, no less than fifty per cent. of lime being often introduced. Mr. Stodder has specimens of the pure gum, manufactured into different articles several years since, now in good condition.

Mr. C. C. Sheafe said he had a pipe, connected with bellows and freely suspended in the air, which had been in use about eight months, and which was now as fragile as glass.

Dr. N. C. Keep stated that he had used small quantities of Gutta Percha for several years. He had observed that when allowed to rest untouched for a considerable length of time, it uniformly lost its tenacity; but on being worked over again with the aid of heat, it appeared as tough and good as at first. The simple process of heating is not sufficient for this purpose, but the material should be re-wrought. The greatest nicety is required in determining the proper degree of heat, as brittleness may be occasioned by overheating. The use which he had made of it was in dental operations, principally as a temporary filling in sensitive cavities, etc.

Dr. S. L. Abbot stated that Gutta Percha had been used with success at the Massachusetts General Hospital, at the suggestion of Dr. H. J. Bigelow, to take impressions of strictures; but other instances have occurred where this material failed for this purpose and had even given rise to serious trouble from the breaking of the instrument.

Dr. C. D. Homans said that the same material was much used at the hospital for splints, it being simply remoulded in each case.

Dr. Calvin G. Page remarked that brittleness had been observed in thick sheets, which had lain unused for some time in the hospital, but these were afterwards re-worked and put into use.

Dr. Chas. T. Jackson stated that Gutta Percha varied very much in quality in different specimens. He had noticed this tendency to molecular change. Pelouze has examined the substance chemically, and found it to be identical in composition with caoutchouc.

Dr. A. A. Hayes said that Gutta Percha had been thoroughly analyzed in France and its component parts are well known. He had remarked that the molecular change is more readily effected in the light than in the dark. He thought pipes of this material would endure as long as any thing of a vegetable nature could in the soil.

The President exhibited casts of the Ichthyosaurus, which he had just received from Germany. To this species had been given the name of *Ichthyosaurus platyodon*, from its flattened teeth. The length of the head is about four feet, equalling that of the largest mastodon. It is supposed that the total length of the individual was about sixty feet. A cast of the head, and of the anterior extremity or paddle, were the parts exhibited and described by the President.

The Committee appointed by the Council to take into consideration the subject of an expedition to California, for the purpose of collecting objects in the various departments of Natural History, in behalf and at the expense of the Society, reported: — That they had made satisfactory arrangements to that effect with Mr. Emanuel Samuels, the Taxidermist and Janitor of the Society, and that he had already left for California in the prosecution of his object. Mr. Samuels was both willing and anxious to go upon the expedition, not only for the interests of the Society, but to extend his own acquaintance with Natural Science, and earn for himself a wider reputation as collector and taxidermist. Animated by this desire, pecuniary profit became an unimportant matter, and he expressed a willingness to go to California, remain there a year and employ all his time in the service of the Society, if it would assume the simple expense of the expedition. Were the Society to defray the expense of his passage to and from California, as well as purchase the necessary equipment for such an undertaking, a much larger sum would be necessary than the present funds in the treasurer's hands, or even the income of the current year, could meet. Under these circumstances, the committee would not have advised the undertaking. But an agreement has been entered into with the Smithsonian Institution, by which all the expenses of passage and outfit will be defrayed by that institution, which unites with this Society in the enterprise, on terms advantageous to both.

The Smithsonian Institution will reserve only such specimens as are necessary to complete its own collection. Dr. Leconte will name all the Insects, reserving only such as will fill vacancies in his already very extensive cabinet.

The Mammals will be given into Dr. Baird's hands, as he is now employed in their especial study. All remaining specimens will come to the Society, and all memoirs or descriptions of new species are to be first published either in the Society's Proceedings or Journal.

The Committee feel desirous of expressing gratification at the liberal and zealous spirit manifested by Mr. Samuels, who has constantly placed the interests of the Society before his personal emolument. He has been willing to undertake a difficult and laborious task, mainly for the reputation and honor which he may thereby acquire; and the Committee feel that so advantageous an arrangement could have been made with no other individual.

The Report was accepted.

Dr. Samuel Kneeland, Jr., presented a young male Golden or Ring-tailed Eagle, (*Aquila chrysaëtos,* Linn.) shot a few weeks since in Lexington, Mass. This bird is common in the northern and northwestern parts of this country, but is quite rare in the southern New England States, and this is the first specimen known to have been obtained in Massachusetts.

Dr. Freeman J. Bumstead, of New York, was elected a Corresponding Member.

November 21, 1855.

The President in the Chair.

Present by invitation, Prof. G. Gajani, of Rome.

The following letter was read to the Society.

Dijon, France, September 5, 1855.

To the President of the Boston Natural History Society:

I have learned by the Boston Daily Evening Traveller, sent me by a friend, that the Report of M. Elie de Beaumont, on my "Researches on Earthquakes," was the subject of discussion at one of the meetings of the Society over which you preside. That I have a great desire to see the report of this discussion, you can readily imagine. I therefore do not hesitate to request you to send me the numbers of your "Proceedings," containing these articles.

The Geological Societies of Paris and London, wishing to give me a proof of their willingness to aid me in forming a collection which I am endeavoring to make, have given me, from their memoirs, all the articles relating to Earthquakes and Volcanic Phenomena. May I hope that you will follow their example, and accede to my request? If your colleague, Mr. Stodder, would send me a copy of his memoir on the "Changes of the Surface of the Earth," I should be very grateful.

Accept, Sir, my thanks in advance, and the assurance of my most respectful consideration.

(Signed,) ALEXIS PERREY.

On motion of Dr. Chas. T. Jackson, it was voted that the current volume of "Proceedings," containing the articles in question, together with such other papers as it might be in the power of the Society to send, be transmitted to M. Perrey.

The President exhibited a specimen of small teeth, probably of a recent fish, found in a cavern in one of the towns on the south shore of Lake Erie, brought to the meeting by Mr. Allen.

Prof. Jeffries Wyman gave an account of the dissection of a Black Chimpanzee, (Troglodytes niger,) one of the collection presented by Dr. J. V. C. Smith. The dissection was made particularly with reference to a comparison of the muscular system of Troglodytes with that of man. The following were some of the deviations from the arrangement of the corresponding muscles in man.

The Deltoid arose from the whole base of the scapula below the spine, in addition to the origin which it has in man.

A Trachelo-clavicular muscle was present on each side ; this is never found in man.

The Pectoralis Minor was inserted by a slender tendon into the great tuberosity of the humerus, instead of into the coracoid process, as in man.

The Supinator longus was more powerful than in man, being fleshy to within an inch of its insertion.

The Flexors of the wrist were more powerful than in man.

The Long Extensor of the thumb was very slender.

The Short Extensor of the thumb was inserted into the base of the metacarpal bone.

The Extensor Ossis Metacarpi or Long Abductor was inserted into the Trapezium.

The Flexor longus Pollicis did not exist ; but in its place there was a small and delicate tendon from the flexor communis profundus.

The short muscles of the thumb were very small.

Muscles of the Lower Extremity. The Gluteus maximus covered only the lower part of the gluteal region, but had a portion of its origin from the tuber ischii. Its insertion reached as low down as the outer condyle of the femur.

The Gluteus medius was the largest of the glutei muscles.

The Flexors of the Leg did not allow the limb to be fully extended on the thigh from their shortness.

The short head of the Biceps passed beneath the tendon of the long head, became very imperfectly attached to it, and was inserted below it into the fibula.

No Peroneus tertius existed.

The Gastrocnemius was fleshy to the Os Calcis. The Tendo Achillis was very short.

The Flexor longus Pollicis Pedis was united by its tendon to that of the long flexor of the toes.

The Extensor brevis Digitorum Pedis supplied the tendons of the second, third, and fourth toes only. The great toe had an independent short extensor.

Intestinal Canal. The Cœcum was freely movable. The Sigmoid Flexure was very long, reaching the right hypochondriac region.

Papillæ Circumvallatæ of Tongue. Only three existed.

The Vertebræ were thirty-four, viz: Cervical, 7. Dorsal, 13. Lumbar, 4. Sacral, 5. Coccygeal, 5.

Prof. Wyman also exhibited two Monkeys' skulls as pathological specimens. One of them, that of a young Cynocephalus, presented a spongy disease of the bones of the head, which Prof. W. has frequently met with in monkeys. In each lung of this animal, was found a tubercle, of the size of a hazel nut, at the posterior and lower part of the lower lobe. The second monkey's skull presented a depressed parietal bone on one side, from some unknown cause; this was a Cebus from South America.

Prof. Wyman exhibited two plaster casts of the footprints of a South American Ostrich; and called attention to the fact, that although the papillæ of the skin and other points were represented in detail in the casts, yet the true number of phalanges could not be counted. The pressure upon the foot in taking the impression, as well as the natural weight of a bird's body upon its feet, which have been imprinted in the sands of the sea-shore, tend to straighten and extend the foot and thus obliterate, or render indistinct, the impressions of the phalanges.

Prof. Wm. B. Rogers made some remarks upon the Geology of the Southern and Middle States, confirmatory of the observations of Prof. Wyman upon the Footprints of the Carboniferous Strata of Pennsylvania.

Mr. Charles Stodder exhibited samples of Gutta Percha, of different qualities.

Dr. T. M. Brewer presented, in the name of Dr. T. H. Webb, a seed vessel and seeds of Nelumbium luteum, Yellow Nelumbo or Water Chinquepin, from Kansas. The seeds are used by the Indians as food.

December 5, 1855.

The President in the Chair.

The following extract from a letter of Isaac Lea, Esq., of Philadelphia, addressed to the President, was read to the Society.

"I am very glad to see, by late numbers of the Proceedings of the Boston Society of Natural History, that you have recently received from Mr. Field, of Greenfield, Mass., a slab of the Connecticut Valley Sandstone, displaying unusually interesting surfaces." (*Vide* Proceedings of meeting of June 6, 1855.) "The footprints of crustaceans are very rare. I hope you will describe and figure these. I do not understand, however, the impression which 'consists of an excavation of about fifteen inches long, and of an inch wide, dividing into two branches.' If there be two branches, they could not have been made by one unio. It is not at all unlikely that two individuals may have been travelling together.

"Many of these linear marks and grooves are very obscure, and I am much inclined to believe that many of them, which are regarded as sun-dried cracks, are really of vegetable origin. Some of the *Algæ anastomose*, and I do not see why some of these obscure impressions, may not be attributed to that form of imperfect vegetation. Other algæ have their branches inosculating, and of course, if impressed on a plastic surface, they would present the form of sun-dried cracks. We are daily getting more and more evidence of the cogeneric vegetation existing in the same horizon with the footmarks of the so-called New Red Sandstone of Connecticut, Pennsylvania, &c."

The President exhibited a cast of *Pterodactyl longirostris,* a fossil flying reptile, and pointed out its peculiarities.

The head was very large compared with the body, and the lower jaw very long, whence its specific name. The head and teeth preclude the idea of its belonging to the same class with the bat, an animal which it might somewhat have resembled when flying. Its sternum is oblong as in the Saurians, and does not resemble the sternum of birds. The principal peculiarity is the fold of the skin extending from the tip of the finger along the body, enabling the animal to fly, as has been supposed.

Prof. Jeffries Wyman remarked that there had always been some degree of doubt whether the pterodactyl had the power of flying, as until recently the sternum had always been found to be a flattened shield without a projecting keel. Herman Von Meyer has quite lately, however, detected a sternum with a broad keel, like that of birds, to which powerful muscles might have been attached, thus rendering flight easy.

Dr. Silas Durkee exhibited a portion of a Guinea Worm, (*Filaria Medinensis,*) and demonstrated, with the aid of the microscope, its minute structure.

The fragment was two inches in length, removed from the leg of a man who had recently returned from the Southern coast of Africa. Bundles of wavy fibres were visible upon compression, running longitudinally, and externally an epidermic coat, which could be completely separated from the subjacent muscular coat, presenting parallel rows of dotted markings, resembling those of striated muscle.

This portion of the worm was completely filled with young, varying in length from $\frac{1}{100}$ to $\frac{1}{1000}$ of an inch. They had a bilobed anterior extremity, with an intermediate fissure indicating an oral aperture, an appearance of an intestinal canal, and a very prolonged tail running to a very fine point. The dotted markings of the epidermis were also seen in the young.

Dr. S. L. Abbot read a translation from the Gazette Medicale of Paris, of July 28, 1855, of an article purporting to be an authentic history of the so-called Aztec Children. These children were exhibited to the Society several years ago, and were the subject of a memoir read by Dr. J. Mason Warren, a synopsis of which was published in the Proceedings. They are now exhibiting in Europe with the same narrative, as to their origin, which was circulated whilst they were in America.

By this account it appears, that the so-called *Aztec Children*, were born of mulatto parents in the neighborhood of Jacotal in the State of San Salvador, Central America. They were obtained from their parents for public exhibition on condition of receiving half of the profits. The man, however, to whom they were intrusted, sold them in New York, to an American, without the knowledge of the parents, for the sum of eighteen thousand dollars; and they were taken to Europe, and exhibited in England and France with the same fabulous story of their origin as accompanied their exhibition in America. The father of the children is a mulatto fisherman of San Miguel, who obtains a subsistence by taking fish in the lagoon of Ulupa. The mother is a young and vigorous mulatto woman, employed on a farm to grind corn for the laborers. Neither of the parents has a drop of Indian blood in their veins. As yet they have been unable to obtain possession of their children, or to get any redress for the grievous wrong done them.

Mr. J. A. Dupee, in behalf of O. A. Farwell, Esq., President of the Phœnix Copper Company, presented some specimens of Native Copper, from the company's location on Keweenaw Point, Lake Superior.

It is well known that the copper veins of that district are usually found in a direction nearly north and south. The specimens now exhibited, were taken from what is called in that neighborhood, the "scoriaceous or ash bed." This bed, of 150 to 250 feet in thickness, lies parallel with the geological formation, and has been traced from east to west about nine miles. It has long been known as containing copper. So early as 1844, considerable quantities were taken from it, but it was not ascertained to be worth working until 1854. Considerable attention to its value has been paid by the Copper Falls Company, and it is understood with prospect of pecuniary success.

Although frequently called an east and west *vein*, this deposit has not been considered by miners, technically, as such. Mr. Hill, in his annual report to the Phœnix Company, January, 1855, page 8, speaks of it as "holding copper intermixed with the rock *and not in a vein*." A true vein has at last been discovered in this bed. Mr. Butler, Superintendent, writes to the President of the Phœnix Company under date of the 16th of November, that he has opened a well walled vein, running east and west, in the ash bed, 30 to 40 feet in width, carrying rich stamp work. Aside from any interest this may excite as a mining adventure, the discovery is one of great scientific interest. Hitherto, the formation of Keweenaw Point has been regarded, so far as its cupriferous deposits were concerned, as very different from the district of Portage Lake and Ontanagon. In these places the metallic veins are found, with a single exception at the Quincy Mine, P. L., running *with* the formation, while at Keweenaw Point, until this year, the veins were supposed invariably to cross the formation at nearly right angles.

Mr. Dupee requested Dr. C. T. Jackson to express his views with regard to this mineral deposit on Eagle River.

Dr. Jackson then stated, that when he first called public attention to the native copper mines on Lake Superior, in 1844, he made a full survey of the whole mining districts on Eagle River, and at Copper Falls, and had published in his reports to the Lake Superior and Copper Falls Mining Companies, very full descriptions of their respective mining "countries," and of the copper and silver veins included in the rocks. On reference to his first Report, in 1844, it will be found that this scoriaceous or "ash bed," as seen on the margin of Eagle River, is described as exhibiting one wall, while for the distance of ninety feet, at right angles to it, the rock is impregnated with particles of native copper and silver, which are most abundant in the "ash bed," there called the "rotten rock." The other wall of this bed was not then found, and he was glad to learn that it had now been discovered by the miners. Regular veins had also been found in this same scoriaceous trap-rock; and at the time the Lake Superior Company stopped work, through bad counsels, there was a vein with well-defined walls, and rich in copper and silver, at the bottom of their tunnel under the river. Copper mining, at that day, was so little understood by the early adventurers, and so many difficulties stood in their way, in an unbroken wilderness, that the first mining company abandoned their mines before they had fairly commenced regular works. The Phœnix Company, having purchased the property, are now mining with greater advantages, and it is believed with fair prospects of ultimate success. The ash bed, mentioned by Mr. Dupee, is a comparatively soft scoria, or rotten amygdaloid, formed by the mixture of molten trap-rock and fine sandstone, which have been, as it were, melted together into a very spongy kind of scoria, the aqueous vapor having rendered it remarkably vesicular. The amygdaloidal and scoriaceous beds of trap-rock, occur in alternate layers with coarse conglomerate and fine red sandstone strata, appearing as if immense sheets of the molten trap had been poured out, at different times, through a fissure, and spread over the materials of the sandstone and conglomerate at the bottom of the sea, thus producing alternating beds of these rocks. In the bed of Eagle River, below the Phœnix Mines, Dr. Jackson's Assistant, Mr. George O. Barnes, had found no less than eleven distinct beds of sandstone and conglomerate alternating with the trap; and Dr. Jackson had previously described six of those alternations in his notes of the survey of the mining district of Copper Falls. It is true that there are cupriferous beds running with the "country," or parallel to the trend of the trappean range, and of the sandstone strata, which have a course E. N. E., and W. S. W., and that there are also crossing veins, which traverse these at right angles, and are generally rich in metallic lodes, and have well-defined walls and vein stones well characterized, Prehnite being the most common of the outcropping wall stone of the native copper veins, though Leonhardite, Laumonite, and Calcareous Spar, also occur in a similar manner in the mines; while Analcime, Apophyllite, Mesotype, and Chabasie, are common accompanying minerals. Toward the Ontanagon, and also in Isle Royale, Epidote is the most common vein stone, and even forms large beds filled with small irregular grains of copper, which often amount to eight per cent. of the mass. It is a curious and interesting fact that, although a vein fissure traverses both sandstone and trap-rocks, the only metalliferous portion of the vein is that which traverses the trap. This, Dr. Jackson explained as the result of the chemical action of protoxide of iron in the trap-rock, which decomposed the vapor of chloride of copper, as it rushed from the interior of the earth through the crevices; if, as is probable, these wonderful native copper lodes, are the products of sublimation and of galvanic segregation of the metal from vapor.

The Corresponding Secretary announced the reception of the following letters, viz: —

From the Royal Institution, Oct. 12, 1855, and the Royal Geographical Society, Nov. 14, 1855, returning thanks for copies of the Journal and Proceedings; from the Zoölogical Society of

London, Oct. 17, 1855, accompanying its Proceedings, Nos. 214 to 291; from the Societé d'Agriculture de Lyon, June 23, 1855, transmitting a copy of its Annals, Vol. 6; from the Bayerische Akademie der Wissenchaften, July 12, 1855, and the Naturhistorischer Verein at Bonn, August 15, 1855, accompanying donations of their publications.

Mr. Chas. J. Sprague presented a Lichen which he had found in Hingham and Newton, Mass., and which had been pronounced by Rev. Dr. M. A. Curtis, of South Carolina, to be *Myriangium Curtisii* of Berk. and Mont. It had not before been detected in Massachusetts.

R. D. Mussey, Jr., Esq., of Cincinnati, was elected a Corresponding Member.

December 19, 1855.

The President in the Chair.

A communication was received from the Kongelige Danske Videnskabernes Selskab, June 6, 1855, returning thanks for the Annual Address by the President.

Prof. W. B. Rogers presented the following table of the terminal velocities of rain-drops, as a substitute for that previously handed to the Secretary, (*Vide* page 267,) which by mistake had been copied from an unfinished calculation. The present table includes, in addition, the case of vesicular drops, such as have been supposed to form cloud or fog.

Diameter.	Terminal Velocity in feet per second.
$\frac{1}{10}$ inch	20.55 ft.
$\frac{1}{20}$ "	14.53

Diameter.		Terminal Velocity in feet per second.
$\frac{1}{30}$	"	11.86
$\frac{1}{40}$	"	10.27
$\frac{1}{50}$	"	9.182
$\frac{1}{100}$	"	6.498
$\frac{1}{1000}$	"	2.055
$\frac{1}{2000}$	"	1.453
$\frac{1}{4000}$	"	1.027
$\frac{1}{10000}$	"	0.647

Assuming the thickness of the vesicle to be a very small fraction of its diameter, the terminal velocity will be simply proportional to the square root of the thickness. Thus a vesicle say $\frac{1}{1000}$ of an inch in diameter, and $\frac{1}{100.000}$ of an inch thick will have a terminal velocity of 0.5034. If the thickness be $\frac{1}{1.000.000}$ inch, the terminal velocity will be 0.1591 feet per second, or about ten feet per minute.

Prof. Rogers also exhibited specimens of Iron ore and shale and shaly sandstone, more or less impregnated with Proto-Carbonate of Iron, from the Bituminous Coal region of the Trans-Alleghany basin, and called the attention of the Society to what he regarded as the most probable and simple *theory of the origin and accumulation of the Proto-Carbonate of Iron in coal measures generally.*

This compound of Iron, as we know, where mined in the coal measures, presents itself in courses of lenticular nodules and interrupted plates usually included in carbonaceous shales and in the fire-clays which underlie the seams of coal, and in such cases it often forms a heavy ore containing but little earthy or organic matter mixed with the Proto-Carbonate. But it is also frequently met with in a *diffused condition*, pervading thick strata of shale and shaly sandstone, and causing these rocks to present in their different layers all the gradations of composition, from a poor, argillaceous and sandy ore, to beds of sandstone and shale, with little more than a trace of the ferruginous compound.

On comparing the different subdivisions of a system of coal measures, we may remark certain general conditions connected with the abundance or with the comparative absence of the Proto-Carbonate in the strata.

One of these is seen in the fact that *the lenticular ores and strata impregnated with Proto-Carbonate of Iron are in a great degree restricted to such divisions of the carboniferous rocks as include beds of coal or are otherwise heavily charged with carbonaceous matter.* This is well shown on comparing together the four subdivisions of the carboniferous rocks of the great Trans-Alleghany coal region, as classified under the head of the Seral coal series of the Pennsylvania and Virginia geology. In the first of these, designated as the older coal measures, the Proto-Carbonate is found in large amount, both in the shape of layers of lenticular ore and diffused through the substance of the shaly strata. In the next division above, distinguished as the older barren shales, and which, as the name implies, is comparatively devoid of carbonaceous matter, much less of the Proto-Carbonate is met with. In the third group, that of the newer coal measures, the ore again abounds, and in the uppermost division, or newer barren shales, it has a second time almost disappeared.

The connection between the development of the Proto-Carbonate in the strata and the presence, either now or formerly, of a large amount of carbonaceous or vegetable matter becomes even more striking on a detailed examination of particular beds. Thus, in the coarse sandstones of the coal measures, which are comparatively destitute of vegetable remains, we find little admixture of the Proto-Carbonate. On the other hand, the fine-grained, flaggy, argillaceous sandstones, which are often crowded with the impressions and carbonized remains of plants, are at the same time more or less impregnated with this ferruginous compound. So, again, the soft argillaceous shales, in the midst of which the lenticular ore so frequently presents itself, show by their dark color and included impressions of plants, as well as by actual analysis, that they are richly imbued with vegetable matter. Nor do the nearly white fire-clays, which in many cases inclose thick courses of the lenticular ore, form any exception to this law. For although in their present state they contain little or no carbonaceous matter, the marks of innumerable roots of Stigmaria, and parts of other plants which every where penetrate the mass, show that at one time they must have been crowded with vegetable remains.

A further and yet more striking proof of the influence which the contiguous vegetable matter has had, in the formation of the Proto-Carbonate, is seen in the fact, that the most productive layers of the ore are commonly met with quite near to the beds of coal, and that frequently courses of the nodules are found in the carbonaceous shales or partings which lie in the midst of the seam itself.

While the strata including the Proto-Carbonate are thus distinguished by the admixture of more or less carbonaceous matter, they are *also remarkable for seldom exhibiting a distinctly red tint.* Presenting, where not weathered, various shades of greenish gray and olive and bluish black, they only become brown or red where, by exposure to the air, the Proto-Carbonate has been converted into the Sesquioxide of Iron. On the other hand, those divisions of the coal measures which have been but slightly charged with vegetable matter, as for example the barren shales of the Seral Coal rocks before alluded to, contain much red material, both in distinct strata and mottling the general mass, and are throughout more or less impregnated with the Sesquioxide.

A like general law as to color would seem to apply to the other great groups of sedimentary rocks, which include in particular beds accumulations of vegetable or other organic exuviæ. Thus, in the New and Old Red Sandstone formations, which generally include so large a proportion of sediment colored by the red Oxide of Iron, organic remains are of comparatively rare occurrence, and when present are met with almost exclusively in the gray and olive and dark-colored strata which are interpolated in certain parts of the great masses of red material. This relation is beautifully shown in the middle secondary rocks of the Atlantic slope, which extend in a prolonged belt from the Connecticut Valley into the State of South Carolina. In the strata of red sandstone and shale, which form the chief part of the mass, vegetable or animal exuviæ are almost entirely absent. But the remains of fish, and impressions of carbonized parts of plants, occurring in this group of deposits, are found embedded in layers of greenish and olive sandstones and dark bituminous shales. So, in the southern parts of the belt in Virginia and North Carolina, where these rocks include seams of coal and extensive beds of sandstone and shale containing the remains of plants, the usual red color is found to give place to the gray, olive, and dark tints of the old coal measures, and layers of Proto-Carbonate of Iron show themselves in the vicinity of the coal seams.

Taken in mass, the red and mottled strata of the unproductive coal measures, or of the other groups of red rocks above alluded to, would no doubt be found to contain, in an equal thickness, as large an amount of Iron as the Coal-bearing strata which include the layers of Carbonate; the difference being that, in the former case, the metal remains for the most part diffused through the rock as a Sesquioxide, while in the latter, having assumed the condition of Proto-Carbonate, it has to some extent been concentrated in particular layers or strata. According to a rough estimate of the amount of Carbonate ore included in the lower coal measures of the Laurel Hill region of Virginia and Pennsylvania, derived from a detailed examination of the ores and associated strata at several points, it may be safely assumed that the equivalent of Sesquioxide of Iron would not amount to one third of one per cent. of the whole mass of this portion of the coal measures, and a proportion not exceeding this is deducible from the measured sections of ore and accompanying rocks in the carboniferous strata of other tracts subjected to a similar calculation.

But even allowing a quantity three times as great as this, to cover the diffused carbonate and the oxide in some cases mingled with it, we should have only about one per cent. to represent the proportion of ferruginous matter in the entire mass; an amount undoubtedly much less than exists in many of the strata of red and purple shales and shaly sandstones of the carboniferous series or of the groups of red rocks geologically above or beneath it.

In attempting to explain the origin of the Proto-Carbonate, under the conditions above described, it is important to keep in view the fact of the diffusion of this compound through many of the strata as a general constituent, and the frequent preservation, even in layers of the ore, of the lamination of the contiguous rock. The supposition of its being a chemical deposit formed from springs charged with carbonic acid, and holding Proto-Carbonate in solution, is evidently inconsistent with these conditions, and not less so with the fact of the great horizontal extension of individual beds of ore and impregnated shaly rocks.

In view of these various considerations it may be concluded: —

First, That throughout the coal measures and other groups of rocks above mentioned, as well in the portions containing coal and diffused vegetable and animal matter as in the barren parts, the original sediment was more or less charged with Sesquioxide of Iron, and

Second, That this Sesquioxide, in the presence of the changing vegetable matter with which certain of the strata abounded, was converted into Proto-Carbonate, which remained in part diffused through these beds, or by processes of filtration and segregation was accumulated in particular layers.

It is well known that during the slow chemical changes by which vegetable matter inclosed in moist earth is converted into Lignite, or Coal, both Light Carburetted Hydrogen and Carbonic Acid are evolved, and that these gases are even eliminated from coal seams and their adjoining carbonaceous strata. The reducing agency of the Carbon and Hydrogen, as they separate in their nascent state from the organic matter, is capable, as we know, of converting certain sulphates into sulphurets, and even more readily of transforming the Sesquioxide of Iron into Protoxide. The latter change would doubtless be favored by the affinity of the Carbonic Acid present in the mass, for the Protoxide as formed, and in this way the sesquioxide would be entirely converted into the Proto-Carbonate of Iron.

Conceiving a like process to have operated on a large scale in the coal measures or other strata containing, when deposited, a mixture of Sesquioxide of Iron and organic matter, we have a simple explanation of the general conversion of this oxide into carbonate, and of the loss of the reddish coloring in which these materials more or less participated. As these actions must be supposed to have commenced in each stratum as soon as the organic matter contained in it began to suffer chemical change, we may conclude that the formation of the Proto-Carbonate was already far advanced in the earlier strata when only beginning in those deposited at a later period. Each layer of vegetable matter, as it was transformed into coal, would not fail to impregnate the adjoining beds of shale and sandstone with the Proto-Carbonate, and thus the development of this compound was as it were coeval with that of the coal.

The gathering of the diffused Proto-Carbonate into bands and courses of ore began no doubt as soon as the production of this compound had made some progress, but it probably continued until long after the completion of the chemical changes above described; and indeed, it is possible that in some strata it is not yet entirely finished. In this process, which finds a simple explanation in *the combined action of infiltration and the segregating force*, it can hardly be questioned that *the carbonic acid*, pervading the mass of sediment, acted *a very important part.* The large amount of this gas evolved from the beds of vegetable matter undergoing change, would impart to the water of the adjoining strata the power of dissolving the diffused Proto-Carbonate, which, being then carried by infiltration through the more porous beds, would accumulate above and within the close argillaceous or shaly layers, forming in some cases bands of rock ore, in others courses of nodular and plate ores. Of these, the former would seem to have resulted from the accumulation by *gravity* of the dissolved carbonate in the substance of sandy shales near the upper limit of the more impervious beds, while we may regard the latter as having been collected in all directions from the general charge of Proto-Carbonate accumulated in the argillaceous mass, its mobility in the dissolved condition greatly aiding the gathering process of the *segregating force.*

Dr. A. A. Hayes remarked that he had been much interested in the theoretical considerations presented by Prof. Rogers. He had long been aware that the conditions, belonging to deposits of proto-carbonate of iron in the coal measures, are such as to forbid the supposition that the compound had been deposited from waters holding the carbonate of iron in solution. The view presented, which refers the production of the carbonate from the peroxide, by the reducing action of organic matter undergoing changes in contact with it, harmonizes with a mass of chemical facts and observations already accumulated. The native hydrated peroxides of iron can be thus reduced to protoxides, and in part converted into proto-carbonate of iron, in the laboratory, by the aid of decomposing vegetable matter. In observing this change, it is always found that the reducing action on the peroxide commences at the time that the first steps in the decay of the organic matter are observed. Carbonic acid gas, with carburetted hydrogen gas, appears at a later stage; the protoxide of iron formed being insufficient in quantity to combine with all the carbonic acid which is produced. It is an essential condition in this change that water, or moisture, be present; as the organic decomposition — a kind of putrefaction — would not otherwise take place. It is proper in this connection to state the fact, that the ferruginous springs of this country rarely contain carbonate of iron dissolved. The iron salt which is present, is a *crenate*, originating from the decomposition of organic matter, in contact with ferruginous earth. The crenate of iron exists only as a proto-salt; it is soluble in water, and when brought in contact with air, hydrate of peroxide of iron falls, usually containing some humus, or coaly matter, resulting from the decomposition of the crenic acid. It is not probable that the crenate can produce the carbonate of iron, if oxygen is present; but when protected from oxidation, and especially in presence of an excess of carbonic acid, the crenate *may* form a proto-carbonate of iron, as the crenate of lime, even in the atmosphere, forms carbonate of lime.

In referring the production of carbonate of iron, deposited in strata, to the solvent action of carbonic acid dissolved in mineral waters, any theory should point out the source from whence the protoxide of iron is taken, to form the dissolved carbonate ; as protoxide of iron does not naturally exist. If a previous reduction of other oxides of iron, by organic matter, is necessary to insure this solution, it will probably be found that crenic acid, instead of carbonic acid, is the solvent.

The explanation, as given by Prof. Rogers, becomes, therefore, not only the simpler view, and strictly accordant with known facts, but it seems to be necessary, as a basis for the theory generally received.

There is a point of geological interest, in connection with the manner in which the proto-carbonate of iron is included in the coal series, and often in contact with beds of coal. This compound, as before stated, is a hydrate compound, and its varieties generally lose their carbonic acid and become peroxide by a moderate elevation of temperature ; its presence, therefore, in contact with alternating beds of coal, may be considered as indicating that such beds have not been subjected to heat above the temperature at which the carbonate is decomposed.

Prof. Jeffries Wyman stated that a year or two since, in the Ohio River, opposite Cannelton, there was noticed a sudden commotion and explosion, followed by a considerable ebullition of the water for some time, so that boats avoided the spot. Immediately afterwards, there was found a peculiar substance, light and porous, somewhat resembling pumice-stone, floating around in the neighborhood. Specimens of this substance were presented by Prof Wyman, and placed in the hands of Dr. Hayes, for examination.

Dr. C. T. Jackson observed, that the material bore resemblance to slag from iron furnaces. On trial, it was found still to float in water. [Dr. Hayes, having since examined the substance, reports that it contains particles of metallic iron, and is, in composition, the same as iron slag produced in the blast furnaces.—Secretary.]

Prof. Jeffries Wyman exhibited some impressions, in clay, of Hail, caught during a recent storm.

These impressions differed from those of rain, all of them being quite small, and considerably deeper than impressions of rain-drops of the same diameter. Around several of the marks was observed a radiated appearance, caused by a crystallization of the moisture of the clay by the contact of the hailstone, the clay itself being at about the temperature of freezing water.

DONATIONS TO THE MUSEUM.

October 3d. A specimen of *Aquila nævia*, European Eagle, and one of *Otis houbara* Gould, Bustard; by Dr. Freeman J. Bumstead, of New York. A specimen of American Swan, prepared as a skeleton by Mr. Samuels; by Mr. Nathan Robbins. A collection of Fresh Water Shells, Echini, &c.; by Mr. J. J. Dixwell. A specimen of Fossil Starfish; by Mr. Robert Fowlis, of St. John, N. B. A specimen of *Polyporus cinnabarinus*, a red fungus growing on wood; by Rev. Daniel H. Temple. A specimen of Hawk, species unknown, *Halcyon Lindsayi*, Lindsay's Kingfisher, old and young, two other undetermined species of Halcyon, *Merops Javanicus* and *erythrocephalus*, Javan and Rufous-headed Bee-eater, and *Dasylophus superciliosus*, Supercilious Ani; by Dr. Samuel Kneeland, Jr. A collection of birds from the Philippine Islands and Australia, among which were a specimen of *Dasylophus Cumingii* Fras., Cuming's Ani, a Cuckoo of undetermined species, Cinnamon-backed Egret, and Black and White Shrike; by Mr. G. S. Shaw, of Cambridge, Mass. A specimen of *Geococcyx Mexicanus*, Mexican Ground Cuckoo; by Mr. J. C. Jones, of West Newton.

October 17th. Specimens of Ankerite, Red Oxide of Iron, and Brown Hæmatite, from the Acadian Mines, and samples of Steel; by Dr. C. T. Jackson. Seventeen species of rare birds from the Philippine Islands, all new to the Collection; viz: five species of Parrots, two of Woodpeckers, two of Hornbills, two of Pitta, a Trogon, Rail, Tattler, Babbler, Coucal, and Megapodius — the last being the only specimen of the family in the Cabinet; by Dr. S. Kneeland, Jr. An African Parrot, a specimen of *Harelda glacialis*, Long-tailed Duck; by Mr. E. Samuels. A specimen of *Limosa Hudsonica*, Hudsonian Godwit; by Dr. S. Cabot, Jr. An Australian Sanderling; by Mr. G. S. Shaw. A Night Heron, Ruddy Duck, Crossbill, Indigo Bird, and Solitary Vireo; by Mr. A. L. Babcock.

November 7th. A Peregrine Falcon, *Falco Peregrinus;* by Dr. Samuel Cabot, Jr. The Skull of a Flamingo, and the Sternum of a Red-shouldered Hawk; by Mr. E. Samuels. The Sword of a Sword Fish; by Mr. Daniel Pratt, Jr., of Chelsea. Some Blind Fish, from the Mammoth Cave of Kentucky; by Mrs. David Loring. A conical earthen pot, containing a Mummied Ibis, with a duplicate mummied Ibis, a mummied Serpent, several young mummied Crocodiles, a Lizard, shot on the Nile, Petrifactions from the petrified forest, near Cairo, Egypt, a bottle of Water from the Dead Sea, &c.; by Mr. B. Homer Dixon.

November 21st. A specimen of *Nelumbium luteum*, Yellow Nelumbo, or Water Chinquepin, from Kansas; by Dr. T. H. Webb.

December 5th. Specimens of Dolomite, Talc, Serpentine, Lignified Abestos, and other minerals from Roxbury, Vermont; by Mr. J. W. Butler. A specimen of *Myriangium Curtisii*, obtained in Hingham, Mass.; by Mr. C. J. Sprague. Sixty specimens of Shells, of more than thirty-five species, two Echini, and a Cephalopod, from St. Helena,—all species new to the Cabinet—and a small specimen of Haliotis; by Dr. Samuel Kneeland, Jr. A specimen of *Vespertilio pruinosus*, Hoary Bat; by Mr. W. L. Clark.

December 19th. A specimen of Scutigera; by Mr. C. J. Sprague.

BOOKS RECEIVED DURING THE QUARTER ENDING DECEMBER 31, 1855.

Proceedings of the American Association for the Advancement of Science, Eighth meeting held at Washington, May, 1854. 8vo. Cambridge, 1855. *From the Association.*

Bulletin of the Pottsville Scientific Association, Schuylkill Co., Penn. For January and February, 1855. 8vo. Pamph. *From the Association.*

Report of the Superintendent of the Coast Survey. 4to. Washington, 1855. *From Prof. A. D. Bache.*

Description of the Lower Jaw and Tooth of Mastodon Andium; also of a Tooth and Fragment of the Femur of a Mastodon, from Chili. By Jeffries Wyman. 4to. Pamph. *From the Author.*

Address before the Lyceum of Natural History of Williams College. By Prof. William B. Rogers. 8vo. Pamph. Boston, 1855. *From the Author.*

Address before the American Association for the Advancement of Science. August, 1855. By Prof. J. D. Dana. 8vo. Pamph. 1855. *From the Author.*

Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean. 4to. Vol. I. Washington, D. C. *From Hon. Charles Sumner.*

Colored Figures of English Mushrooms. By James Somerby. 3 Vols. 4to. London, 1797. *From John C. B. Jones.*

Flora of North America. By J. Torrey and Asa Gray. Vol. II. Part 2. New York, 1843. *From C. J. Sprague.*

Reports on Phœnix Copper Company. 8vo. Pamph. Boston, 1855.

Memoir on the extinct Sloth Tribe of North America. By Joseph Leidy, M. D. 4to. Washington, 1855. *From the Author.*

Origin and Operations of the United States Astronomical Expedition. 4to. Pamph.

United States Naval Astronomical Expedition to the Southern Hemisphere, during 1849–52. Vols. I. II. Chili. By Lieut. J. M. Gilliss. *From Lieut. J. M. Gilliss.*

Book of Human Nature. By La Roy Sunderland. 12mo. New York.

Book of Physiology. By the Same. 12mo. New York.

Theory of Nutrition. By the Same. 12mo. Boston, 1855. *From the Author.*

Conspectus Generum Avium. Auctore C. L. Bonaparte. 8vo. Lugduni Batavorum, 1850.

Dissertations sur plusieurs Espèces de Fucus. Par Lamouroux. Agen, 1805. *From Alexandre Vattemare.*

Report of Commissioner of Patents in 1854. Mechanical. 2 Vols. 8vo. Washington, 1855.

Congressional Globe. Vol. 30. 2d Session, Thirty-third Congress. 4to. 1855. Appendix to ditto. 4to. Vol. 31. Washington, 1855.

Patent Office Report. 1855. Agriculture. 8vo. Washington. *From Hon. S. H. Walley.*

Report of the Superintendent of Education for Lower Canada, for 1853. 8vo. Pamph. Quebec, 1854.

Rapport du Surintendant de l'Education pour le Bas-Canada, pour 1854. 8vo. Pamph. Quebec, 1855.

Essai de Logique Judician. Par Bibaud. 12mo. Pamph. Montreal.

Les Servantes de Dieu en Canada. 8vo. Pamph. 1853. Par C. D. L. Heron.

Twenty-seventh Annual Report of the Natural History Society of Montreal. 8vo. Pamph. Montreal, 1855. *From L. A. H. Latour.*

Birds of Australia. By John Gould, F. R. S. 7 Vols. Folio. London, 1848.

A Century of Birds from the Himalaya Mountains. By the Same. Folio. London, 1832.

Birds of Europe. By the Same. 5 vols. Folio. London, 1837.

Histoire Naturelle des Mammifères. Par M. M. Geoffroy St. Hilaire and Frederick Cuvier. 3 Vols. Folio. Paris, 1824.

A Monograph of the Ramphastidæ or Family of Toucans. By John Gould. Folio. London, 1834.

A Monograph of the Trogonidæ. By the Same. Folio. London, 1850.

Illustrations of Indian Zoölogy. By John E. Gray, F. R. S. 2 vols. Folio. London, 1830–34.

Pomologie Française. Par A. Poiteau. 4 Vols. 4to. Paris, 1846.

Journal of a Tour through part of the Snowy Range of the Himalaya Mountains, &c. By J. B. Fraser. 4to. London, 1820.

A Description of the Genus Pinus and other species of the Family of Coniferæ. By A. B. Lambert, F. R. S. Text. 8vo. Plates. Folio. London, 1842.

A Monograph of the Odontophorinæ or Partridges of America. By John Gould, F. R. S. Folio. London, 1850.

Genera of Birds. By George R. Gray. 3 Vols. Folio. London. *Bequest of James Brown.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. VII. Nos. 10 and 11.

Journal of the Royal Geographical Society. Vol. XXIV. 8vo. London, 1854.

Denkschriften der Kaiserlichen Akademie der Wissenschaften. Achter Band. Wien, 1854. 4to.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Band XIV. Heft 1–3. Band XV, Heft 2. 8vo. Wien, 1854–5.

Almanach der Kaiserlichen Akademie der Wissenschaften. 12mo. 1855. Wien.

Receuil des Actes de l'Académie Imperiale des Sciences, Belles Lettres, et Arts de Bordeaux. Seizième Année. 1854. 2e et 4e Trimestres. 8vo. Bordeaux.

Kong. Vetenskaps Akademiens Handlingar för 1853–4.

New York Medical Times. Vol. V. Nos. 1, 2, and 3. October, November, and December, 1855.

New York Journal of Medicine. Vol. XV. No. 3. November, 1855. New York.

Silliman's American Journal of Science and Arts. No. 60, for November, 1855.

Almanach der Königlich Bayerischer Akademie der Wissenschäften für das Jahr, 1855.

Gelehrte Anzeigen. 4to. Band 3. München.

Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. 8vo. Zweites Heft. Bonn.

Sitzungsberichte der Niederrheinischer Gesellschaft für Natur-und-Heilkunde zu Bonn. 8vo.

Annales des Sciences Physiques et Naturelles publiées par un Société Imperiale d'Agriculture, &c., &c. Lyon. 2ième Serie. Tome VI. 8vo. Lyon, 1854.

Mémoires de l'Académie Imperiale des Sciences, &c., &c., Lyon. Classe des Sciences. Tomes III. and IV. Classe des Lettres. Tome VIII. Lyon. 8vo. 1853–4. *Received in Exchange.*

Bitumen; its Varieties, Properties, and Uses. By H. W. Halleck. 8vo. Washington, 1841.

Account of Knoëpfels Schoharie Cave. New York. 8vo. Pamph. 1853.

Neuvitas Mining Copper Company. 8vo. Pamph. New York, 1853.

Memoir on the Megatherium, &c. By W. B. Hodgson. 8vo. Pamph. New York, 1846.

Reports of Prof. H. D. Rogers on Wheatley, Brookdale, and Charlestown Mines. Phœnixville, Chester Co., Penn., 1853.

Statement of Wheatley Mining Co. 8vo. Pamph.

J. L. Smith on the Minerals of the Wheatley Mines in Pennsylvania. 8vo. Pamph. New Haven, 1855.

Report on Metropolitan Mine at Homowack, Ulster and Sullivan Counties, New York. 8vo. Pamph.

Reports of Prof. S. R. Leeds and A. D. Partz on the Karriker Gold and Copper Company. Jersey City. 8vo. Pamph. 1855.

Report on the Vanderburg Mine. By J. T. Hodge. 8vo. Pamph. New York, 1853.

Report on Cumberland Coal and Iron Company. 8vo. Pamph. 1855.

Report on Ulster Mine at Ellenville, Ulster County, New York. 8vo. Pamph.

Ancient Egypt. By G. R. Gliddon. 8vo. Pamph. New York, 1843.

Ancient Architecture of America. By R. C. Long. 8vo. Pamph. New York, 1849. *Exchange with W. H. B. Thomas.*

Cyclopædia of Anatomy and Physiology. By R. D. Todd. Part 47. 8vo. London, 1855.

Annals and Magazine of Natural History. No. 93 for September, No. 94 for October, No. 95 for November, No. 96 for December, 1855. *Received from the Courtis Fund.*

Life of J. P. Curran. By his Son, W. H. Curran. 8vo. Redfield, New York.

Pictures of Europe framed in Ideas. By C. A. Bartol. 12mo. Boston, 1855.

Travels in Europe and the East. By S. J. Prime. 2 Vols. 12mo. New York.

Japan as it was and is. By Richard Hildreth. 8vo. Boston, 1855.

A Visit to India, China, and Japan, in 1853. By Bayard Taylor. 8vo. New York, 1855.

History of the Reign of Philip the Second, King of Spain. By William H. Prescott. 2 Vols. 8vo. Boston, 1855.

Life and Works of Goethe. By G. H. Lewes. 2 Vols. 12mo. Boston, 1856.

Life of George Washington. By Washington Irving. Vols. I. II. 8vo. New York, 1855.

Prose Writers of Germany. By F. H. Hedge. 8vo. Philadelphia, 1848. *Deposited by the Republican Institution.*

January 2, 1856.

The President in the Chair.

The Secretary read a communication from Dr. James Lewis, of Mohawk, N. Y., Corresponding Member, as follows: —

Mohawk, N. Y., Dec. 17, 1855.

Dear Sir: Previous to commencing the task of packing and sending you some shells for the Boston Society of Natural History, permit me to present you a statement of what I have attempted and what I have accomplished, in tracing out the mollusca of this region during the past season.

The season having been an unfavorable one for any successful efforts in studying the Naiades of this region, my attention has been more closely fixed on shells of other families, and particularly, on the genus *Paludina*, in relation to which I have heretofore communicated.

After having collected large numbers of specimens from various localities, I am induced to modify a formerly expressed opinion, based somewhat hastily on conclusions drawn from having observed reversed specimens among the embryonic young of the shells of this region, namely,— that the reversion of the specimens is a specific feature. I find it extends to the following species:—

P. integra Say. most conspicuously.
P. decisa " next.
P. rufa Haldeman.
P. ponderosa Say.
P. ———? an abundant shell of Mohawk River, very nearly related to *decisa*, but differing in some constant particulars.*

Of the five species above named, I have reversed specimens. My efforts have been directed to procure, by exchange, large numbers of *Paludina* in alcohol, for the purpose of ascertaining what other species present this feature, and when I have further facts to communicate in reference to it, I will lay them before the Society.

I have ascertained that that singular little shell, known as *Limnæa gracilis* Jay, is to be found in the southern part of Herkimer County, N. Y., (Little Lakes,) and in the northern part of Otsego County, (Schuyler's Lake.) Thus far, I have found only a single fragment in the first-named locality, and a few eroded abandoned shells in the latter.

The extreme drought of previous seasons has had the effect, in some of the smaller bodies of water I have examined this season, to destroy great numbers of the bivalve molluscs that inhabit them; and, in some localities, the *Anodonta fluviatilis* Lea, is almost exterminated. Many other molluscs that I have pre-

* 1st. The plane of the aperture forms a larger angle with the axis of the shell, than in *decisa*.

2d. The labrum is usually formed by the margin of the shell continuing around the aperture in the same plane, while in *decisa* the margin is a little excavated just at or above the extreme periphery of the last whorl.

3d. The shells of the Mohawk River are less liable to erosions than *P. integra*, which is sparingly associated with them; while *decisa* is always more eroded than *integra*, when they are found together.

viously found abundant, are scarcely to be seen, even in the most favorable localities this season, owing no doubt to the same influences.

It may be a subject worthy of consideration, to inquire whether a similar mortality among the mollusca, in other regions, may not have some connection with the peculiar oils observed in bodies of water in various parts of the country during the last year; also, to ascertain whether an extensive mortality of this kind would not naturally favor a large development of the microscopic beings that have been studied with reference to this matter.

I hope soon to have the pleasure of laying before the Society specimens of an undescribed species of *Amnicola* that is found in the Mohawk River; also specimens of a minute species of *Limnæa*, which appears to have been erroneously referred to *L. caperata* Say by De Kay.

About four miles from Mohawk, N. Y., is a locality abounding in calcareous tufa, in which, in some places where the formation appears to have attained great age, shells of *Limnæa elodes* Say, are inclosed.

The tufa in question exists in various parts of the State, and in several localities in this county. F. E. Spinner, Esq., of this place, who is conversant with the geology of this county, is of the opinion, that the tufa is derived from water that has filtered through rocks known as the "Water Lime Rocks of the New York Geological Survey." This is inferred from the crumbly texture of the rocks in the vicinity of localities where the tufa occurs, and from the position of the tufa, — it being always just below where the Water Lime Rock crops out, or in a position corresponding thereto.

There is a small triangular Cyclas found in the waters of this latitude, extending from the Connecticut River, as far west as Kalamazoo River, Michigan. The species in question varies with the locality; in some instances so much as to have been described by different names. I am induced to regard it as *C. edentula* Say. It may be embraced under the following synonymy: —

Cyclas edentula Say.

" *rhomboidea* Say, of Adams and Linsley.

Cyclas Linsleyii Prime.
" *modesta* "
" *rugosa* (Whittemore ?)

The shell in question is analogous to *C. solidula* Prime, but smaller, and less inflated, with beaks less central.

In the northern part of Herkimer County, and in the counties adjoining, north and east, are numbers of small lakes which naturalists seem to be almost wholly unacquainted with. In the waters of those lakes are found numerous species of fish which, together with the deer and other game that abound in the surrounding wilderness, sometimes attract the sportsman from the usual haunts of men. From representations made by some observing men who have visited that region, I have formed the intention of visiting it, with the hope of being able to add some new items of interest to my future communications to the Society.

Very respectfully, Yours,

James Lewis.

It may not be unimportant to add, that among the items embraced in DeKay's descriptions of the mollusca of New York, is the description of *Physa glabra* (DeKay) which applies to the minute slender shell which, in a previous communication, I proposed to separate from *P. elongata* Say, and designate as *P. elongatina*. At the time my previous communication was made, I was unaware that Dr. DeKay had reference to the shell in question, in his description of *glabra*.

The following paper, on new remarkable gigantic Fossils and Footmarks, was read by the President, Dr. John C. Warren: —

Within the last half century many remarkable fossil animals and vegetables have been disclosed to us in rapid succession. That these forms should have remained undiscovered for so many centuries, is easily accounted for by the preference which the most polished nations of former ages have generally given to war and conquest, over the study of nature. It was not till the spirit of inquiry on these subjects had been diffused by Cuvier and others, that these forms of animal and vegetable life were revealed to us. Among these strange (because unknown) forms, the Sauroid animals are, perhaps, the most remarkable.

My principal object at present is to point out some of the peculiarities of an animal which seems to connect the Saurian with the Batrachian orders. About twenty years ago, some footsteps were noticed, having a strange resemblance to the human hand; these footsteps were variously considered by scientific men, and it required a series of years to determine their true character.

Having been observed at various places, and at different periods, as will presently be noticed, it was proposed by Prof. Owen to call this newly discovered mixture of Batrachian and Saurian by the name of *Labyrinthodon*, from the labyrinthic structure of the teeth; though the earlier appellation of *Cheirotherium*, derived from the appearance of the impressions, is favored by many naturalists. A few years after the discovery of the impressions, parts of the animal, supposed to have made them, became successively known; and, lately, the discovery of a large head has crowned the wishes of scientific inquirers. From the occurrence of the bones in the same beds with the footprints, and the consequent fact of the coexistence of the two animals, and the correspondence in size between the animal and the footprint, it is highly probable that the Cheirotherium and the Labyrinthodon are one and the same.

I have recently had an opportunity of obtaining a cast of the largest head of this extraordinary animal, which encourages me to present the effigies of a Saurian Frog of hitherto unknown proportions. The head of a common frog being between one and two inches in length and breadth, our wonder is naturally awakened on seeing a Batrachian animal with a head from two to three feet in length and breadth. If the head possess these dimensions, we may suppose the whole body of the animal to have been twelve or more feet in length; and I have thought it would give a more distinct impression of its character to represent it at full length, necessarily supplying from the imagination many parts of its extraordinary form. The figure I represent is different from that of Professor Owen's. [A painting of the animal, twelve feet long, was displayed.] In 1828, Rev. Dr. Duncan discovered in Dumfriesshire, Scotland, the first quadrupedal impressions in the red sandstone rocks; these were afterwards ascertained to be the tracks of a tortoise, named Testudo Duncani. In 1834, at Hildberghausen, in Saxony, footprints were discovered in this formation, which first led to the establishment of the genus Cheirotherium by Dr. Kaup, from their striking resemblance to the human hand. At this time Count de Münster and M. Link were of the opinion that they were made by a Batrachian animal. In 1838, at Stourton Hill, near Liverpool, England, similar impressions were found; a cast or two of these is in the Cabinet of the Society. In 1841, President Hitchcock discovered, in the Connecticut Sandstone, quadrupedal impressions, to which he gave the name of Sauroidichnites; he afterwards described these in Vol. III. of the "Memoirs of the American Academy of Arts and Sciences," under the genus Anisopus; the plates of which seem to show that they are allied to Cheirotherium. In 1844, Dr. Alfred T. King discovered in the coal formation at Greensburg, Westmoreland County, Pennsylvania, a series of fossil footprints of a reptile allied to Cheirotherium; his descriptions are in the Proceedings of the Academy of Natural Sciences, Philadelphia, for 1844, and in Silliman's Journal for 1845. In the same year, Dr. Deane, who long before had seen Ornithichnites, noticed quadrupedal impressions in the Connecticut sandstone; they are described in Silliman's Journal for 1845. In 1847, Prof. Von Dechen discovered in the coal formation of the Saarbruck district, remains which Dr. Goldfuss described as *Archegosaurus Decheni*, adding afterwards *A. medius* and *A. minor*, of which the first, the larger, was about three and a half feet long. This genus was a *Labyrinthodont*, rather than a *Crocodilian*. In 1849, Isaac Lea, Esq., discovered at Pottsville, Pennsylvania, where the Schuylkill breaks through the Sharp mountain, a double row of impressions, bearing some analogy to the European Cheirotherium; these were called by him *Sauropus primævus*, and were said by him and Mr. Lyell, to be from a formation equivalent to the old red sandstone of Europe, while Prof. Rogers has maintained that it belongs to the lower series of the coal formation. The Sauropus was a Saurian reptile, with a tail.

Saurian bones and teeth were found in the New Red Sandstone of Pennsylvania, in 1847, by Dr. Shelley, and described by Isaac Lea, Esq., in a valuable paper published in the Journal of the Academy of Natural Sciences, 1852, under the name of *Clepsysaurus Pennsylvanicus.*

Not only footprints, but bones of these animals have been found in the Triassic strata, in England and in Germany. The head and teeth, vertebræ, pelvis, and bones of the extremities have been examined by Prof. Owen, who has constructed an animal intermediate between the crocodile and the frog. From the labyrinthic structure of the teeth, resembling somewhat that of the teeth of Ichthyosaurus, he called the animal *Labyrinthodon ;* Cheirotherium and Labyrinthodon, therefore, are terms applied by him to the same animal.

The cast exhibited to the Society, is of a specimen from the Keuper coal-beds at Gailsdorf, in Wurtemberg ; the original is in the Museum at Stuttgart. This head is figured, and briefly described by Pictet, in Vol. I. of his "Traité de Palæontologie," the latest authority (1853) in my possession. Pictet calls it Mastodonsaurus instead of Labyrinthodon ; the synonyms are *Labyrinthodon Jaegeri* Owen, *Mastodonsaurus Jaegeri* Alberti, *Salamandroides giganteus* Jaeger, *Mastodonsaurus giganteus* Quenstedt. Besides the *M. giganteus*, Pictet alludes to *M. Vaslenensis* de Meyer, undescribed, and *M. Meyeri* Münster, and *M. Andriani* Münster both of which are doubtful species. Pictet is of opinion that the five species of Labyrinthodon, described by Owen, may not belong to the species called above Mastodonsaurus Jaegeri.

The length of the head, which comprises only the cranium and the upper jaw, is two feet four inches, and its greatest width, posteriorly, two feet. The general shape of the head is like that of the frog ; but the broad, much depressed, and flattened maxillary and facial surfaces of the skull, and the coarse sculpturings of the outer surface, resemble those of the crocodile. It resembles the frog in the double occipital condyles — in the narrowness of the palatal processes of the superior maxillary, which do not reach to the middle line, — and in the formation of the osseous roof of the mouth, principally by a pair of broad flat bones, analogous to a divided vomer of great extent.

It resembles the crocodile in the extension inwards of the superior maxillary bones over the top of the skull to the nasal bone, constituting with it a continuous roof to the nasal cavities, — while in the frog there is a wide interval between these bones. The broad and almost continuous flooring, formed by the palate in the roof of the mouth, indicates a nasal cavity having sub-terminal nostrils, separated from the cavity of the mouth, and with their posterior openings far behind the nasal apertures, as in the crocodile, — while, in the air-breathing Batrachians, the nasal passage is very short, the internal apertures piercing the anterior part of the palate.

It resembles Batrachians in having a row of small teeth extending transversely across the anterior extremity of the palate bones, consisting (in the English fossils) of three median small teeth, and two outer large ones on each side ; and in having a longitudinal row of small, equal-sized teeth, continued backward along the exterior margin of the palatine bone, concentric with the maxillary teeth, as in the Amphiuma — teeth of both of which series are recognized in the cast. In the maxillary teeth, it resembles the crocodile, having a large tusk on each side in each jaw, from which the teeth grow smaller as they go backward ; there are teeth anterior to these tusks, which are implanted on the outer edge of the alveolus, every alternate socket being empty to receive those of the opposite jaw. Pictet mentions the original of this cast as having more than one hundred teeth in all, seven of which are in the intermaxillary bone. Owen mentions, as characteristic of the Labyrinthodon, a row of small teeth, as in fishes, anterior and external to the larger teeth.

Other parts of the skeleton, as described by Owen, show mingled Batrachian and Crocodilian characters. The symphysial extremity of the lower jaw is abruptly bent inwards, and the angular piece is broad, extending forwards to near the symphysis, as in Batrachians ; the long and slender ramus resembles most nearly that of Amphiuma. The bodies of the vertebræ present biconcave articular surfaces ; the superior arch is anchylosed to the centrum ; the articular surfaces slope in a parallel direction, obliquely to the axis, indicating an habitual inflexion of the spine, as in the frog. The strength and direction of the transverse processes indicate the attachment of ribs, which were rendered probable by the apparatus for breathing by inspiration, (in this respect differing from the frog, and approaching the crocodile ;) the presence of ribs, too, says Prof. Owen, implies that their generative economy was similar to that of existing crocodiles. A bone resembling the episternum of the Ichthyosaurus, with deep and wide grooves, indicates the existence of clavicles; in this, differing from the crocodile and resembling the frog. The humerus, radius, ulna, tibia, and bones of the toes, are eminently Batrachian in their characters. The pelvis resembles that of the crocodile in the articulation of the ilium with the ends of *two* thickened and expanded transverse processes, instead of *one*, as in the frog; and in most other respects it is Batrachian in its character. The great size of the acetabular cavity shows the same relative superiority in the size of the hinder extremities as in many Batrachians; this greater size of the hind feet compared with the fore feet is seen in all the footprints of Cheirotherium.

Osseous dermal scuta or plates have been found in connection with these bones, showing crocodilian affinities; but their presence, as Owen says, would not absolutely exclude the Labyrinthodon from Batrachians, as the skin is the seat of the variable characters in all animals; the Labyrinthodon would not, in this respect, be much further removed from Batrachians, than is Trionyx from ordinary Chelonia.

The Labyrinthodon resembles fishes in the absence of any trace of alveoli of reserve for the successional teeth,— in the anchylosis of the base of the teeth to distinct and shallow sockets,— and in having a row of small teeth anterior and external to the larger.

For other and further details of the resemblances, both Batrachian and Crocodilian, in the genus Labyrinthodon, we must refer to Mr. Owen's paper, of which there is an Analysis in the "Annals and Magazine of Natural History," Vol. VIII. (London, 1852: pp. 305–13.)

This Sauroid Batrachian, then, as far as the head is concerned, had the facial and nasal parts of the skull formed after the *Crocodilian* type, with *Batrachian* characters, well marked in the intermaxillary, superior maxillary, and inferior maxillary bones, and in the occipital condyles.

M. Pictet has come to different conclusions from Jaeger and Owen. He is of the opinion that the Labyrinthodon is a *Saurian* rather than a *Batrachian;* and he grounds his opinion more particularly on the scuta or scales, which exist in the former and not in the latter; furthermore, the teeth of the Labyrinthodon more resemble those of the Saurians, in their form, than they do those of the Batrachians.

The size of the tracks varies from four to twelve inches in length; the head, of which the cast is exhibited, is much larger than any of those described by Owen, and must have belonged to an animal at least twelve feet long. The European Cheirotherium had five toes on each foot, one of which was turned in like the human thumb; the hind foot was three or four times larger than the fore foot. There is no evidence of the animal having had a tail. The impressions are in a single series, each fore and hind foot being near together and alternately of the right and left side. The animal appears to have been made in a clumsy manner, swinging the legs outward in a circular direction, like the course of a scythe. At Hildberghausen, the larger impressions of the hind foot were about eight inches long and five wide. One was twelve inches long. Near each large step, and at a regular distance of one and a half inches before it, is a smaller print of a fore foot, four inches long and three inches wide; from pair to pair the distance is about fourteen inches; though differing in size, the fore and hind feet are nearly similar in form. These footmarks are partly concave, and partly in relief.

In the American Cheirotherium of Dr. King, there is a double row of tracks, and in each row they occur in pairs; each pair consists of a hind and fore foot, each being at nearly equal distances from the next pair; in each parallel row the toes turn the one set to the right, the other to the left. In the American fossil, the posterior footprint is not even twice as large as the anterior, and the fore foot has only four toes; one toe stands out in each foot like a thumb, turned alternately to the right and left. The American Cheirotherium was evidently, as Mr. Lyell says, a broader animal, and belonged to a distinct genus from that of the triassic age of Europe.

In this neighborhood, in Gill, on the borders of Greenfield, two slabs of considerable interest, containing quadrupedal impressions have lately been discovered by Mr. Field. One of them, found in the autumn of 1854, was of an irregularly quadrangular form, and about five feet square ; it was taken from a sandstone rock, near the surface of the earth, inclined at an angle of thirty degrees. The rock is a beautiful red shale, about an inch thick, and is covered with impressions ; there are four lines of tracks of small quadrupeds comprehending in number about two hundred impressions. They are from one to two inches in length, and less than an inch in breadth. Some of the impressions are followed by a linear mark, like that of a tail; and two or three of them exhibit a distinct brush, behind the footsteps. The tracks sometimes cross each other, but are generally distinct. The toes are usually four in number on the fore feet, and five on the hind, as in frogs. The slab presents in its middle portion three large impressions, a foot and a half distant from each other ; in some respects they represent ornithichnites, but the form is for the most part different from that of any known impression of a bird. A third set of eminences is produced by striæ, which have much the appearance of fuci, or seaweed, dragged across the surface of the slab. A fourth set of impressions is of small globular bodies about an inch in diameter, probably fruits, or seeds, or ova. Finally, there is an impression of a regular corkscrew form, about two feet long, interrupted in its middle by one of the quadruped tracks.

A second slab, discovered the last autumn, is larger than that just described. It is about five feet by six, and is covered with impressions of three kinds. 1st, small quadrupedal impressions; 2d, ornithic impressions, graduated from the smaller to a very large size; 3d, three extraordinary impressions, the distance between which is twenty-two inches. These last tracks are considered by President Hitchcock (who has a slab containing very perfect impressions of a form similar to these) to be those of a "tailed giant-biped," to which he has given the name of *Gigandibus caudatus.* These last impressions are very remarkable. On our slab they are three in number, each of them measuring a foot in length, and seven inches in breadth. The first of them is very distinct, and is directed to the lower part of the slab; the 2d and 3d are nearly on the same line. They possess three toes and a thumb-like appendage, which is set on the inner edge of the impression. This thumb is more distinct in the first-mentioned impression than in the two others, but undoubtedly existed in all three. [The same thumb-like appendage is seen in two consecutive impressions of the Otozoum Moodii of President Hitchcock, now in my possession.] At the first view, these tracks have the appearance of a human foot; but, on closer examination, they are found to vary from this apparent form, and to approach to that of some quadruped, and even, in some respects, to the ornithichnite form. There is a groove in the direction of the footsteps one sixth of an inch wide, extending from the upper edge of the slab to the posterior part of the upper impression; from the anterior part of the upper impression to the posterior part of the second; from the anterior part of the second to the posterior part of the lowest impression, there is some interruption; from the anterior part of the lowest impression the groove runs to the edge of the slab, showing a continuity of the line in the direction of a fourth impression. On the whole, the groove runs in the direction of the three impressions, and is seven and a half feet in length.

Besides these, there is an impression of a large size, very distinct and very beautiful. It has three toes, all the articulations of which are better defined than in any other slab of the same kind. This impression is thirteen inches long by eight inches wide, and appears to be ornithic.

The stone on which these marks are engraved is a beautiful, shiny, brown shale, very thin, and in some places cracked, so that it is necessary to inclose it carefully in a frame.

These two remarkable slabs are in my possession, and will probably be described more fully hereafter.

Dr. Hayes announced the discovery of a second or alternating bed of coal, at the Albert Mine in New Brunswick, and exhibited specimens of the coal. A careful examination of the special geology of this mine, at the time of the celebrated trial, had led Dr. Hayes to the conclusion that one or more additional beds would be discovered, and this conclusion was publicly expressed in the course of the trial.

It was found that the working bed of coal had on both sides a layer, of varying thickness, of a mineral, which analysis showed to be the equivalent of fire-clay of the coal measures. This layer rested in contact with the coal, being really distinct from the laminated shales, which were the next members of the series. With this fire-clay the proto-carbonate of iron occurred, intermixed in a laminated, though more frequently, a nodular form. The occurrence of the fire-clay on both sides of the bed connected the characters of this deposit of coal with those of the well-known cannel beds in Scotland and elsewhere, and made probable a repetition of the bed within a moderate distance. The recent discovery of another bed, represented as being eleven feet in thickness, is important in an economical view, as this coal has already found its applications in the great arts of gas manufacturing, and as a basis material in producing oil.

Dr. Calvin Ellis exhibited a cyst of the human liver, containing Echinococci. These entozoa were examined under the microscope, and viewed in different positions; the circular arrangement of their characteristic hooklets was visible in most of the individuals.

Rev. Elias Nason, of Natick, was elected a Resident Member.

January 16, 1856.

The President in the Chair.

Dr. C. T. Jackson exhibited a vial of blood, taken from the heart of a woman who died from the effects of Chloroform, inhaled at a dentist's office in this city.

Dr. Jackson stated that the blood of this woman had lost the property of coagulation, was of a peculiar, dark cranberry-red color, and quite uniformly liquid. The red blood-globules, in a microscopic examination made by Dr. Bacon, were found to be a little shrunken and distorted; the white globules were also deformed.

At the autopsy, no morbid appearances, of any kind, were discovered in the brain or spinal chord, the latter of which was particularly examined in the portions which give off the respiratory nerves. The lungs were of a peculiar dark-red color, and much congested with blood ; but still crepitating on pressure, or when cut into. No organic disease was found in any of the viscera, and it was the opinion of all the physicians present, that the deceased came to her death from the effects of chloroform.

Dr. Jackson's particular duty in this examination, was to investigate the chemical condition of the blood. He had ascertained that it contained *formic acid*, which was readily separable by distillation of the blood, by the heat of a chloride of calcium bath.

The formic acid, separated, had its peculiar odor, and instantly decomposed nitrate of silver, reducing the silver to its metallic state, so that large flakes of the metal were obtained. The observation that chloroform was decomposed by the blood, with the production of formic acid, he believed to be new ; and it must be regarded as an important physiological fact of no small practical moment. Three atoms of chlorine leave the formyl to combine with the blood, while three atoms of oxygen are abstracted from the blood to unite with the formyl in the production of formic acid. Thus, the blood is not only deprived of its oxygen, but it is so altered as to be incapable of absorbing vital air, and the patient dies from asphyxia.

Such appears to be the probable theory of the cause of death in this case. It becomes us to inquire, whether there is not always a partial decomposition of the blood, effected by the inhalation of chloroform, from which, in cases where it is not carried too far, the system recovers ; while a more complete change results in death. There is still much to be done in the chemical and physiological investigation of this subject. Dr.

Jackson was of the opinion, that when chloroform must be administered, it should be largely diluted with ether ; but the latter agent alone is a much safer anæsthetic, and should always be preferred when it can be obtained ; for no death is as yet known to have been produced by its proper administration, mingled with air ; while chloroform, in spite of all proper precautions in its administration, has destroyed life.

The chloroform inhaled in this case was found to be perfectly pure.

Dr. C. T. Jackson remarked, that in the last number of Silliman's Journal, (January, 1856,) in a description of a new species of Fossil Footmarks, found in the sandstone of the Connecticut Valley, Prof. Hitchcock states that he has found *unmistakable evidence of a tail.* Elie de Beaumont expressed the opinion, some time since, that many of these tracks might have been made by bimanous Saurians, but no traces of a tail had been at that time discovered. Prof. Hitchcock, having looked carefully for traces of quadrupedal character in this animal, and having found impressions of two feet only, has given it the name of *Gigandibus caudatus*, or tailed giant-biped.

The President observed that he had some beautiful slabs bearing these impressions, which he would exhibit to the Society at an early opportunity.

Dr. J. N. Borland exhibited the Genito-Urinary Organs of the Boa Constrictor, and explained their remarkable peculiarities.

The specimen was dissected from a fine male serpent, about twelve feet long.

The testes, kidneys, and their tubes, lay one on each side of the abdominal cavity, being loosely, yet strongly, confined within the peritoneal folds, by very tough cellular tissue. The arrangement of these parts was similar on each side ; those on the right being larger throughout. The testes lay nearest the centre of the animal, and were long, almond-shaped bodies, the right three inches in length, the left $2\frac{1}{2}$ inches. The vasa deferentia connected them with the kidneys; that of the right side being four inches long, and that of the left $2\frac{1}{2}$ inches. The kidneys were long, lead-colored bodies, divided into numerous lobules. They have been aptly compared to a quantity of flat buttons, strung together. The right kidney was seven inches long; the left six inches. The vas deferens passing over, and the ureter issuing from the kidney, joined together, and, forming a strong cord, opened together in a papilla on the inner surface of a blind sac, about an inch below its upper extremity. The papillæ, in which the end of each side terminated, were side by side, about half an inch apart. Below them, dissimilarity ceased. The ureter of the right side was $21\frac{1}{2}$ inches long; that of the left eighteen inches.

The sac itself alluded to, is the nearest approach to the urinary bladder possessed by serpents; it was $2\frac{1}{2}$ inches long, and of the capacity of a pullet's egg; on its right side, near its lower part, was the opening of the rectum; and at its extremity, in the centre, was the external anal opening, on each side of which was seen the double penis with bifurcated extremities. The penis forms, as it were, continuations of the sac, lying usually in the tail of the animal. During sexual excitement it is reversed, like the fingers of a glove turned inside out, into the sac, and extended through its anal opening. The specimen showed it in this condition, having been distended with gelatine, to show an approximation to its size, and the arrangement of the inner (now outer) mucous membrane. The smooth membrane of the sac extended down about half the length of the penis, which was $4\frac{1}{2}$ inches, where a fold commenced, which wound in spirals to the extremities of the bifurcations. Each penis, or each side of this double organ was bifurcated to the depth of $1\frac{3}{4}$ inches. The urethra was not like the closed canal of the higher animals, but a simple, straight, open groove running from the sac to the spiral fold, where it was lost.

The penis is retracted by long muscles, arising from the tail, and inserted into the extremities of the bifurcations.

Between the penis and the anus, on each side of the latter, were two long, oat-shaped bodies; these were the anal sebaceous glands, which emit a strong, musky odor during the rutting season.

Mr. Sprague called the attention of the Society to the great and valuable work of Levaillant, on the Birds of Africa, which had been received by the Society from the widow of the late James Brown, in exchange for other works bequeathed by him, of which duplicates were already in the Library.

The thanks of the Society were voted to Mrs. Brown and her family, for their kindness in making this exchange.

Mr. Sprague read a letter from Mr. E. Samuels, who is now in California, making collections for the Society, containing a list of specimens, principally of birds, reptiles, and insects, which he had obtained in the short space of time since his arrival. The prospect seems to be good for his making a large and valuable addition to the Cabinet of the Society.

Mr. Whittemore stated that Mr. T. A. Conrad, of Philadelphia, was desirous of visiting the western parts of the United States, for the study and collection of Shells. Mr. Conrad would like aid or commissions from the North, from gentlemen or societies.

It was voted, that the Curator of Conchology, Mr. Whittemore, be a committee to correspond with Mr. Conrad, on the part of the Society, upon the subject of his collections.

February 6, 1856.

The President in the Chair.

The Secretary read a letter from Isaac Lea, Esq., of Philadelphia, to the President.

Dr. Brewer informed the Society that a second list of specimens collected in California, had been received from Mr. E. Samuels; and that those catalogued in the first list sent by Mr. Samuels, are now in Washington, on their way to this city.

The President remarked, that the Society had recently lost by death two of its oldest and most valued members, and Natural Science two of its most industrious and eminent cultivators, in Dr. Thaddeus Wm. Harris, of Cambridge, and Rev. Zadock Thompson, of Burlington, Vt.

Prof. William B. Rogers said, that Dr. Harris was well known throughout the United States and abroad, as a naturalist, particularly in the branch of study which he especially cultivated. He was not personally acquainted with him. With Mr. Thompson, however, he had enjoyed frequent interviews, and he could not allow the present opportunity to escape, without expressing the high respect in which he had held him as a thorough and persevering worker in Geology. He possessed a larger amount of accurate, practical knowledge than would have been supposed from his modest and retiring manners, and exhibited a great natural sagacity in those departments of science which he loved. Science had lost in Zadock Thompson a devoted student.

Dr. Samuel Kneeland, Jr., read the following sketch of the life of Mr. Thompson: —

He was born in Bridgewater, Vt., in 1796; he was the second son of Mr. Barnabas Thompson, whose father was one of the early settlers in that part of the country. Early in life, Mr. Thompson showed that strong propensity for observing facts in Natural Science, and for mathematical applications, which made the results of his studies so reliable. Obliged to struggle against pecuniary difficulties, he made steady progress in science, and when he graduated at the University of Vermont, in 1823, he had already acquired a high reputation, which went on increasing as long as he lived. Occasionally occupied as a teacher of youth, his chief labors were those of independent investigations into the natural resources of his native State. As the Historian of Vermont, he was extensively and honorably known; his work will always be one of authority on the natural, civil, and political history of the State. In 1853, he was appointed State Naturalist of Vermont, making it his duty to study its Physical Geography, Geology, Mineralogy, Botany, and Zoölogy. On this work, Mr. Thompson entered with zeal, and he had far advanced towards its completion, when his labors were closed by his death, which took place, from an organic disease of the heart, on the 19th of January, 1856, at Burlington, Vermont.

Mr. Thompson delivered the Annual Address before the Boston Society of Natural History, in June, 1850, on the subject of the "Geology of Vermont." He made several valuable communications to the Society, which are published in its Proceedings; many specimens have also been added to the Cabinet through his instrumentality.

In view of these facts, it seemed proper that the Society should take special notice of his death. Dr. Kneeland, therefore, moved the following resolutions, which were unanimously adopted: —

Resolved, That in the death of the Rev. Zadock Thompson, the Boston Society of Natural History has lost a valued friend, a distinguished member, and a sincere and truthful coworker in the various departments of Natural Science.

Resolved, That this Society deeply sympathize with his bereaved family; and that the Secretary be directed to communicate to them a copy of these Resolutions.

On motion of Dr. Charles T. Jackson, a Committee, consisting of Dr. A. A. Gould, Dr. C. T. Jackson, and Dr. Jeffries Wyman, was appointed to prepare a series of Resolutions expressive of the loss the Society has sustained, and of its deep grief, in the death of Dr. Harris.

February 20, 1856.

Dr. Charles T. Jackson, Vice-President, in the Chair.

Dr. C. T. Jackson read the following paper on the Chemical Analysis and comparison of Serpentine Marbles known under the name of Verd Antique: —

Having made the original geological surveys of the great masses of Serpentine Marbles, which occur in the northern part of the State of Vermont, and described such as would furnish a marble identical with the celebrated Verd Antique of Europe, I have since been requested to institute a mineralogical and chemical comparison of the European and Vermont varieties.

The results to which I have arrived possess some scientific as well as practical interest, for they not only show a curious replacement of carbonate of magnesia for carbonate of lime, the magnesite being most abundant in the Vermont marble, while calcite is the predominant spar in the European variety. It has also been ascertained, by experiments made by me some years since, that the Vermont Serpentine marble, and that mixture called Verd Antique, are uncommonly durable, resisting not only atmospheric agencies, but also the action of acids, and, to a remarkable extent, that of fire.

Dr. Hayes, in an interesting report on this marble, has confirmed these results, and I am happy in being able also to verify his analysis of some of the magnesite veins, while I also add now some new analyses of other veins in the Vermont marble, and of the calcite of the European Verd Antique. I offer like analyses of the serpentine of the Verd Antique, both of Europe and Vermont, showing their identity of composition, and also an analysis I made many years since of the softer serpentine of Lynnfield in this State.

Serpentine consists essentially of hydrous silicate of magnesia and silicate of the protoxide of iron, with occasionally a little oxide of chromium — these oxides giving the green color to the serpentine. The presence of water of composition in serpentine materially affects its hardness, the softer varieties containing the largest proportion of water. In some varieties I found as much as 15 per cent., while the lowest was 7 per cent. Both the Verd Antique Serpentine of Europe and of Roxbury, Vermont, contain between 12 and 13 per cent. of water. That from Proctorsville, Vt., contains but 7 per cent., and that of Roxbury 13, while that from Europe contains 12.5 per cent., and that of Lynnfield 15 per cent.

Verd Antique Marble may be defined to be Serpentine mixed with or containing numerous veins of magnesian carbonate of lime. The relative proportions of these ingredients may vary considerably on account of the isomorphic or rather plesiomorphic characters of the two minerals. Carbonate of the protoxide of iron, in like manner being plesiomorphic with both carbonates of lime and of magnesia, replaces either of those minerals in all proportions, without changing the angles of the crystals more than one degree.

It will be observed on examination of the analyses I have made, that in the Vermont Serpentine the white spar veins are chiefly composed of magnesite, while there are also veins consisting of magnesian carbonate of lime and of carbonate of iron. The relative proportions of these magnesian and ferrous carbonates in the Vermont marble are nearly the reverse of those in the European variety, thus beautifully illustrating the law of isomorphous substitution of mineral ingredients.

Owing to the refractory nature of Serpentine, and the difficult erosion of the magnesite, the Vermont Verd Antique is less liable to decomposition from atmospheric agencies, and also has the property of resisting a high temperature, and even the action of mineral and other acids far beyond the celebrated Verd Antique of Italy. When highly polished it is a rich and beautiful green marble, veined with white, and sometimes is richly mottled with magnesite and dolomite spar. Its polished surface is not liable to erosion from atmospheric causes, and will offer no hold for lichens, mosses, or other parasitic vegetation, which so frequently mar the beauty of our more open-grained white monumental marbles.

1st. Chemical analysis of the white veins of European Verd Antique.

These veins, picked out with great care to avoid any mixture of particles of serpentine, yielded per cent. —

Carbonate of Lime	81.00
Carbonate of Magnesia	11.70
Carbonate of Iron	7.30
	100.00

2d. Chemical analysis of the white veins of Roxbury, Vermont, Verd Antique marble. These veins were quite common in the slabs examined by me. They were picked out with care to avoid any admixture of Serpentine. On analysis, they yielded —

Carbonate of Magnesia	80.00
Carbonate of Lime	15.00
Carbonate of Iron	3.50
Silica and loss	1.50
	100.00

It will be observed that the carbonate of lime in the European marble is represented by carbonate of magnesia in the Vermont variety, and the carbonate of magnesia by the carbonate of lime, a reversal of these ingredients.

3d. Chemical analysis of the magnesite veins in Roxbury, Vt., Verd Antique. These veins are probably like those analyzed by Dr. Hayes. They yielded per cent. —

Magnesia	38.88
Carbonic acid	37.12
Protoxide of Iron	9.00
Undecomposed Serpentine	15.00
	100.00

The protoxide of iron was originally in combination with carbonic acid in the stone, forming carbonate of iron, an isomorph with carbonate of magnesia.

4th. Chemical analysis of the dolomite spar veins in Roxbury, Vt., Serpentine.— A cleavage crystal, with angles of 106.15°, was analyzed, and yielded —

Carbonic acid	46.50
Lime	30.52
Magnesia	18.47
Protoxide of Iron	4.25
Silica	0.05
	99.79

In this mineral the carbonic acid is combined with the lime, magnesia, and protoxide of iron.

5th. Chemical analysis of the Serpentine of the Verd Antique of Europe.— It was picked out clean as possible, reduced to small grains, and washed with very dilute muriatic acid, to cleanse it from adhering carbonate of lime. The attack was made by means of carbonate of soda, in the usual manner of rendering insoluble silicates soluble in acids.

The results obtained were —

Silica	42.40
Magnesia	31.20
Protoxide of Iron	13.90
Water	12.50
	100.00

The Roxbury, Vermont, Serpentine, analyzed in the same manner, yielded —

Silica	42.60
Magnesia	35.50
Protoxide of Iron and ox-Chromium . .	8.30
Carbonate of Lime	0.60
Water	13.00
	100.00

Chemical analysis of Serpentine from Lynnfield, Mass.,—a light green and rather soft variety.

Silica	37.5
Magnesia	41.0
Protoxide of Iron	2.5
Carbonate of Lime	4.0
Water	15.0
	100.0

This variety of Serpentine is capable of being decomposed by boiling sulphuric acid, and was at one time used in the manufacture of sulphate of magnesia.

It is too soft to be used for ornamental marble, but it withstands heat perfectly after it has been gradually baked, so as to expel its water of composition.

It comes nearer to the precious or noble Serpentine in composition than to that of the Serpentines of Verd Antique Marble, which are much harder than noble Serpentine.

Dr. Hayes remarked that he was pleased to have his analytical results confirmed, and he considered that no doubt, in relation to the ornamental stone from Roxbury being a mixture of anhydrous carbonate of magnesia, and a magnesian rock, could longer exist.

In regard to the presence of any lime in the mixture, the numerous analyses made by himself had not shown a particle, strictly speaking, as belonging to the composition of the rock. Any little cavity showing dolomite crystals or granules is to be considered foreign, as is the case when aggregates of talc crystals, or compact asbestos occur.

The dark portion of the rock, as has before been stated, cannot be considered as a true Serpentine, but as an assemblage of silicates of alumina and iron, with silicate of magnesia. Such a composition as would be given by a mixture of ordinary slate and serpentine. This mixed rock is cemented, as it were, by the anhydrous carbonate of magnesia, which generally exceeds thirty per cent. of the weight of the average of the rock as worked.

That the name "Verd Antique Marble," as applied to this ornamental stone, is a misnomer, must be apparent to every one;

and any resemblance as indicated by the eye, between selected pieces of this and true Verd Antique marble, affords no ground for argument in relation to the name, while the general physical characters and chemical composition show it to be entirely different from any marble, scientifically considered. But this beautiful mineral has been introduced as an ornamental stone, capable of resisting the destructive effects of our climate, and it is therefore in its economical and technical relations that its highest value consists. "Verd Antique Marble," as is well known, becomes changed after an exposure of twelve months to the air and storms; and to class an enduring Serpentine with so perishable a rock, would be doing injustice to the enterprise to which we are indebted for its ornamental uses.

In regard to chemical analyses of such compound rocks, no trustworthy results can be obtained by decomposing them and separating the earths singly, and then, by a reconstruction of compounds, *assuming* a composition. It is only by a kind of proximate analysis, in which each carbonate, hydrate and silicate is separated from the others present, that we get a truthful and clear view of the composition. By this mode of analysis, the Serpentine of Reading, or Proctorsville, Vermont, proves to be Serpentine, consolidated and variegated by *anhydrous carbonate of magnesia;* while the Lynnfield mineral, is a *magnesian rock and slate* containing carbonate of magnesia also.

Prof. William B. Rogers referred briefly to observations recently made by him, and still in progress, on the variations of Ozone in the atmosphere.

In making these observations, he uses the prepared paper and scale of colors of Schönbein's Ozonometer, which, although imperfect as a means of comparison, is the best for practical use yet devised. The slip of paper is suspended out of doors in a box open only at the bottom, so as to be shielded from the rain and snow, and from strong light, at the same time that it is freely exposed to the air. Usually, it is allowed to remain in this position for twelve hours, when it is removed for observation, and a fresh slip substituted; but when there are indications of a great prevalence of Ozone, the test is examined, and renewed at shorter intervals.

On comparing the recorded observations for the past six weeks, Prof. Rogers had been struck with what seems to be a fixed relation between the direction of the aerial current and the amount of Ozone prevalent at the time. As long as the wind has continued to come from Eastern or Southern points, he has found the Ozone to be nearly or quite absent, but whenever the current has changed to West or Northwest, the test-paper has unfailingly indicated its presence in considerable force. The rapidity and amount of this effect has always been greatest when the wind has hauled suddenly to West and North, and has blown violently, but it has continued to manifest itself, although with slow abatement, as long as the current held from this quarter.

To illustrate this effect, Prof. Rogers referred to examples within the present month, (February.) Thus, on the 11th, the wind being light from W. by S. and S. W., there was no indication of Ozone, and during the morning of the 12th, the wind continuing from the same general quarter, furnished a like negative result. About 1 P. M., however, the current changed suddenly to N. W. with a snow squall, after which it continued to blow in gusts in the same direction until late at night. Two hours after this change, viz: at 3 P. M., the test-paper was found to be charged with Ozone to the amount of $\frac{7}{10}$ of the maximum of Schönbein's scale, and at 10 P. M., a second paper which had been freshly substituted for the former, gave $\frac{8}{10}$. Again, on the 15th and 16th, the wind blowing from S. and S. by W. showed no Ozone; retaining the same general direction through the night of the 16th, and part of the following morning, it gave a like negative result. About 11 A. M. of the 17th, the wind hauled towards West, and about 1 P. M., it began to blow strong from W. by N., after which it continued gusty from this quarter and N. W. until late next day. The test-paper hung out at 9 A. M. of the 17th, was found at 1 P. M., or two hours after the change, to present Ozone amounting to $\frac{3}{10}$; and another substituted at that time, showed at 6 P. M., or five hours after, a change measuring more than $\frac{8}{10}$.

Although the observations thus far made have indicated the prevalence of Ozone in connection with winds from W. and

N. W. and its absence in the case of those moving from the opposite quarters, they have been continued far too short a time, and have been too local to warrant any positive reference of a general kind. The development of Ozone in the air being probably dependent on temperature, relative dryness, solarization, electricity and other physical conditions which are perpetually changing, we cannot hope to read precise laws in regard to its production and disappearance without long-continued and varied observations. Yet, from the marked contrast in respect to moisture, and other properties between our great continental and our oceanic winds, it seems not improbable that some such opposite relations to Ozone as above indicated may be found actually to obtain.

Dr. A. A. Hayes observed that an extraordinary accumulation of atmospheric electricity had been frequently noticed when the wind was north.

Dr. Thomas M. Brewer read a paper on the short-eared owl of North America, in which he noticed certain differences between that species and the short-eared owl of Europe, *Brachyotus palustris*, Gould, and the South American variety, *B. Galapagoensis*, Gould.

Dr. Brewer proposed for the North American bird the name of *Brachyotus Cassinii*, in honor of the author of " Illustrations of the Birds of California, Texas, Oregon, British and Russian America." The *B. Cassinii* differs chiefly from the *B. palustris* in its larger size, darker color, and constant variations in the habits of the living birds ; from the *B. Galapagoensis* in the deeper shade of fulvous in the latter species. The supposition of specific differences between the Southern and the Northern short-eared owls of America, is strengthened by the fact that they are found in entirely different localities, and that there is a long interval between them.

Mr. Charles L. Andrews read a paper entitled " Contributions to the Mycology of Massachusetts."

Mr. Andrews remarked that Mycology, although beset with serious difficulties, and requiring patient and persevering labor, offers an immense and exceedingly interesting field of study. A series of years would be requisite to complete a catalogue of those found within the borders of the United States. Fries, the well-known author of a work on Fungi, mentions having found two thousand species comprised within the limits of a square furlong. Their universality is very remarkable, and we find but few substances in nature exempted from their inroads. Every tribe of plants possesses peculiar and characteristic species on the stem or leaf. They are found upon bottles, cloth, thread, opium, roasted meats, dead flies, pigs bristles, old stockings, and in other equally curious situations. Our furniture, clothing, fuel, books, food, in short almost every object forms a congenial habitat for some species or other of these vegetable growths. He had recently been examining some cryptogamous plants detected upon the title-page of a book which had been immersed in sea water, and had recognized *Aspergillus candidus*, *A. roseus*, and *Eurotium herbariorum.* Massachusetts is remarkably fruitful in Fungi, and to these Mr. Andrews had particularly paid attention.

Appended to Mr. Andrews's remarks were descriptions of thirty-six species common to England and America. Mr. Andrews's descriptions of the latter being placed in juxtaposition to those of the former by the Rev. M. J. Berkeley, the differences between them were seen to be very slight. The following is a list of the species described : —

Genus Agaricus.

Agaricus muscarius, excelsus, procerus, hypothejus, emeticus, ruber, piperatus, giganteus, conicus, oreades, corticola, campestris, semiglobatus, semiovatus, fimiputris, comatus, micaceus.

Genus Cantharellus.

Cantharellus cibarius, cinereus, cornucopioides.

Genus Polyporus.

Polyporus versicolor, betulinus, ulmarius.

Genus Boletus.

Boletus granulatus, subtomentosus, calopus, luridus, edulis.

Genus Bulgaria.

Bulgaria inquinans.

Genus Nidularia.

Nidularia campanulata.

Genus Racodium.

Racodium cellare.

Genus Eurotium.

Eurotium herbariorum.

Genus Aspergillus.

Aspergillus candidus, roseus, glaucus.

Genus Fusarium.

Fusarium tremelloides.

Mr. C. J. Sprague exhibited a specimen of the fruit of the Buttonwood, *Platanus occidentalis,* from a tree in this vicinity. The Buttonwood is now in process of fructification, and there are signs of regeneration in this tree, which has been for some years in an unhealthy condition.

The Corresponding Secretary announced the reception of the following letters, viz: from the Geological Society, Dublin, November 14, 1855; Die Königliche Akademie der Wissenschaften zu Berlin, October 1, 1855; the Smithsonian Institution, October 12, 1855; the American Philosophical Society, January 15, 1856; the Boston Athenæum, November 14, 1855; the Linnæan Society, London, December 12, 1855, acknowledging the receipt of the Society's publications. Die K. Preussische Akademie der Wissenschaften zu Berlin, October 1, 1855; Commissioner of Indian Affairs, January 14, 1856; Die K. Akademie der Wissenschaften zu Wien, August 1, 1855, presenting various publications. R. D. Mussey, Jr., of Cincinnati, January 23, 1856, accepting membership of the Society. George C. Brown, Mount Holly, N. J., February 5, 1856, offering to present objects of natural history.

March 5, 1856.

The President in the Chair.

Prof. Jeffries Wyman, in behalf of the Committee appointed to prepare resolutions expressive of the loss which the Society had sustained in the death of their late member, Dr. Thaddeus William Harris, of Cambridge, offered the following, which were unanimously adopted :—

Resolved, That the members of the Boston Society of Natural History have learned, with deep regret, the death of their late associate, Dr. Thaddeus William Harris;

That, in his death, the Society has lost one of its earliest and most respected members, science a faithful and zealous student, as well as a conscientious and truthful observer, the results of whose labors have eminently contributed to the extension of the knowledge of natural history, and have reflected dignity and honor upon American science ;

That the members of this Society sympathize with his family in the loss they have sustained in his death.

Prof. Wyman, in presenting the resolutions, referred to Dr. Harris's wide reputation as a naturalist at home and abroad, and to his scientific labors. His researches were confined chiefly to Entomology, though he had an extensive knowledge of other departments of natural history, especially Botany. As an entomologist, he ranked among those, comparatively few in number, who, with a thorough knowledge of classification, combine the faculty of correctly observing, and accurately recording the habits of insects. His observations, though less numerous, will bear comparison with those of Réaumur and De Geer. His very valuable Report to the Legislature of Massachusetts, on *Insects Injurious to Vegetation*, is an admirable testimonial of his industry and patience, his powers of observation, and his happy manner of portraying the subject of his thoughts. At the time of his death, he was engaged in an investigation of the origin of some of the cultivated plants, and their subsequent distribution by human agency over the world. These researches, which, in the opinion of those competent to decide, are of high value, it is hoped, may yet be given to the public.

Mr. C. J. Sprague read a paper entitled "Contributions to New England Mycology," as follows : —

CONTRIBUTIONS TO NEW ENGLAND MYCOLOGY.

By C. J. Sprague.

I was requested, last year, by the Rev. Dr. M. A. Curtis, of South Carolina, to pay some attention to the Fungi of this locality, as few collections had been made in our Northeastern States, which offer to the Mycologist a comparatively unexplored field. I began to collect specimens, as my leisure would allow, and I have gathered, during the year, over four hundred species. Some of these are very common ; some, already known in Europe and at the South, have been detected here now for the first time ; others are new to science. I have been cordially assisted in my researches by Mr. Dennis Murray, to whom the study of Mycology has been long familiar, and who has discovered many rare species. Our united collections have all passed under the examination of Dr. Curtis, and have been named by him. Whatever scientific exactness the subjoined list may display is entirely due to him.

The list contains the names of such species only as have been determined beyond doubt. Many others yet remain for verification and description. I have included also a few species communicated to me by Dr. Curtis and the Rev. Mr. J. L. Russell, of Salem. The list comprises but a fraction of New England Fungi; but it is laid before you to supply, though partially, a void in this branch of knowledge. If circumstances shall allow, I hope to make extensive additions through future researches.

When not otherwise stated the species were all collected near Boston.

ORDER I. HYMENOMYCETES.

SUB-ORDER I. *Agaricini*, Fr.

Agaricus, L.

A. laccatus, Scop.
A. conigenus, Pers.
A. galericulatus, Scop. So. Paris, Me.
A. epipterygius, Scop.
A. campanella, Batsch.
A. salignus, P.
A. applicatus, Batsch.
A. geophyllus, Bull.
A. semiorbicularis, Bull.
A. tener, Schaeff. Portland, Me.
A. variabilis, P.
A. semiglobatus, Batsch.
A. campestris, L.
A. sublateritius, Schaeff.
A. campanulatus, L. Portland, Me.

Coprinus, Pers.

C. comatus, Batt.
C. micaceus, Bull. D. Murray.

Cortinarius, Fr.

C. cinnamomeus, L.

Paxillus, Fr.

P. porosus, Berk. D. Murray.

Hygrophorus, Fr.

H. cinnabarinus, Fr. So. Paris, Me.

Lactarius, P.

L. piperatus, L.
L. vellereus, Fr.

Russula, Fr.

R. alutacea, Fr.

Cantharellus, Adans.

C. cibarius, Fr.
C. aurantiacus, Wulf.
C. tubæformis, Fr. Portland, Me.
C. infundibuliformis, Scop. So. Paris, Me.
C. crispus, P.

Nyctalis, Fr.

N. asterophora, Fr. D. Murray.

Marasmius, Fr.

M. rotula, Scop.
M. opacus, B. & C.
M. archyropus, Fr.

Panus, Fr.

P. dorsalis, Fr. Portland, Me. E. S. Morse.
P. stipticus, Bull.

Schizophyllum, Fr.

S. commune, Fr.

Lenzites, Fr.

L. betulina, Fr.
L. striata, Fr. D. Murray.
L. corrugata.
L. Klotschii, Berk.
L. abietina, Bull. D. Murray.

SUB-ORDER II. *Polyporei*, Fr.

Boletus, Dill.

B. granulatus, L. D. Murray.
B. strobilaceus, Scop.

Polyporus, Mich.

P. brumalis, Fr.
P. perennis, Fr.
P. squamosus, Huds. Portland, Me.
P. elegans, Fr. do.
P. lucidus, Fr. do.
P. Curtisii, Berk. D. Murray.
P. giganteus, P.
P. sulphureus, Bull.
P. cupulæformis, B. & C. D. Murray.
P. adustus, Fr. Portland, Me. E. S. Morse.
P. hispidus, Bolt. D. Murray.
P. conchifer, Schw. D. Murray.
P. betulinus, Bull.
P. scutellatus, Schw.
P. applanatus, Pers. Portland, Me.
P. fomentarius, L. do.
P. ribis, Fr. D. Murray.
P. ulmarius, Fr.
P. cinnabarinus, Fr. Bethel, Me.
P. hirsutus, Wulf. D. Murray.
P. versicolor, L.
P. abietinus, Fr.

P. pergamenus, Fr.
P. ferruginosus, Schrad.
P. incarnatus, P. D. Murray.
P. sinuosus, Fr.
P. Sartwellii, B. & C. ined. D. Murray.

Trametes, Fr.

T. sepium, Berk. D. Murray.

Dœdalea, Pers.

D. unicolor, Fr.

Favolus, Fr.

F. Europæus, Fr.

Merulius, Hall.

M. tremellosus, Schrad. D. Murray.
M. lacrymans, Wulf. Portland. E. S. Morse.

Sub-order III. *Hydnei*, Fr.

Fistulina, Bull.

F. hepatica, Schaeff. D. Murray.

Hydnum, L.

H. imbricatum, L. D. Murray.
H. subsquamosum, Batsch.
H. zonatum, Bats. R. I. A. Metcalf.
H. repandum, L. So. Paris, Me.
H. compactum, Fr. D. Murray.
H. aurantiacum, Alb. & Schw.
H. adustum, Schw.
H. coralloides, Scop. White Mountains. Oakes.
H. ochraceum, Pers.
H. mucidum, Pers.
H. farinaceum, Pers.

Irpex, Fr.

I. sinuosus, Fr.
I. cinnamomeus, Fr.

Phlebia, Fr.

P. radiata, Fr. Portland. E. S. Morse.
P. rubiginosa, Berk. & Rav.

Kneiffia, Fr.

K. setigera, Fr.

Sub-order IV. *Auricularini*, Fr.

Craterellus, Fr.

C. cornucopioides, L.

Thelephora, Ehr.

T. caryophyllæa, Fr.
T. multipartita, Schw. D. Murray.
T. palmata, Fr. D. Murray.
T. pallida, Schw.
T. pteruloides, B. & C. D. Murray.

Stereum, Lk.

S. fasciatum, Schw.
S. complicatum, Fr.
S. Curtisii, Berk.
S. purpureum, Pers.
S. ochraceo-flavum, Schw.
S. hirsutum, Wild.
S. rubiginosum, Schrad.
S. frustulosum, Fr.
S. rugosum, Fr. So. Paris, Me.

Corticium, Fr.

C. læve, Pers.
C. cinereum, Fr. D. Murray.
C. incarnatum, Fr. Rev. J. L. Russell.
C. polygonium, Fr.
C. corrugatum, Fr.
C. Oakesii, B. & C. D. Murray.

Guepinia, Fr.

G. spathularia, Fr.

Cyphella, Fr.

C. fasciculata, B. & C.

Sub-order V. *Clavati*.

Clavaria, L.

C. cristata, Holmsk.
C. inæqualis, Fr. White Mountains. Oakes.
C. contorta, Holms.
C. fusiformis, Sow. D. Murray.
C. mucida, Pers. D. Murray.

Calocera, Fr.

C. cornea, Batsch.

SUB-ORDER VI. *Tremellini.*

Tremella, Dill.

T. mesenterica, Retz.
T. albida, Huds. D. Murray.

Exidia, Fr.

E. glandulosa, Fr.

Dacrymyces, Fr.

D. tortus, Fr.

ORDER II. GASTEROMYCETES.

SUB-ORDER IV. *Trichogastres.*

Tulostoma, P.

T. mammosum, Fr. D. Murray.

Lycoperdon, Tourn.

L. gemmatum, Fr.
L. pyriforme, Schaeff.

Geaster, P.

G. hygrometricus, P. D. Murray.
G. minimus, Schw. D. Murray.

Bovista, Dill.

B. nigrescens, P.

Scleroderma, P.

S. vulgare, Fr.

Mitremyces, Nees.

M. cinnabarinus, Schw.

SUB-ORDER V. *Myxogastres.*

Lycogala, Mich.

L. epidendron, L.
L. parietinum, Fr.

Æthalium, Lk.

Æ. septicum, L.

Leocarpus, Lk.

L. vernicosus, Lk.

Didymium, P.

D. cinereum, Batsch.

Physarum, P.

P. aureum, P.

Stemonitis, Gled.

S. ferruginea, Ehr.

Arcyria, Hill.

A. incarnata, P.
A. cinerea, Fr.

Trichia, Hall.

T. pyriformis, Hoffm.
T. serotina, Schrad.
T. turbinata, With.

Licea, Schrad.

L. fragiformis, Bull.

SUB-ORDER VI. *Nidulariacei.*

Cyathus, Hall.

C. striatus, Hoffm. D. Murray.
C. campanulatus, Sibt. D. Murray.

Crucibulum, Tul.

C. vulgare, Tul.

ORDER III. CONIOMYCETES, *Fr.*

SUB-ORDER I. *Sphæronemei*, Corda.

Leptothyrium, Kze.

L. punctiforme, B. & C. ined. Stockbridge. M. A. Curtis.

Depazea, Fr.

D. kalmicola, Schw. Stockbridge. M. A. Curtis.
D. cruenta, Kze. R. I. S. P. Olney.

Sphæronema, Fr.

S. seriatum, B. & C. ined. D. Murray.

Sphæropsis, Lev.

S. mamillaris, B. & C. ined. Cambridge. M. A. Curtis.

Vermicularia, Tode.

V. dematium, P.
V. oblonga, Desm. D. Murray.

Asteroma, Dec.

A. pomigena, Schw.

Sub-order II. *Melanconiei*, Corda.

Melanconium, Lk.

M. ovatum, Lk. Stockbridge. M. A. Curtis.

Micropera, Lév.

M. drupacearum, Lév. D. Murray.

Melasmia, Lév.

M. ulmicola, B. & C. ined. Stockbridge, M. A. Curtis.

Cytispora, Fr.

C. carbonacea, Fr. J. L. Russell.

Myxosporium, Lk.

M. nitidum, B. & C.

Nœmaspora, P.

N. aurea, Fr. Portland. E. S. Morse.
N. crocea, P. J. L. Russell.

Discella, B. & Broome.

D. obscura, B. & C. ined. Stockbridge, M. A. Curtis.

Coryneum, Kze.

C. pulvinatum, Kze. So. Paris, Me.

Sub-order IV. *Torulacei*, Corda.

Sporidesmium, Lk.

S. lepraria, B. & Broome. Stockbridge. M. A. Curtis.

Spilocœa, Fr.

S. fructigena, Schw.

Sub-order V. *Pucciniœi.*

Aregma, Fr.

A. mucronatum, Fr. Stockbridge. M. A. Curtis.

Puccinia, P.

P. graminis, D. C.
P. junci, Schw.

Podisoma, Lk.

P. juniperi, Lk.
P. macropus, Schw.

Sub-order VI. *Cœomacei*, Corda.

Uromyces, Lev.

U. Lespedezæ violaceæ, Schw. J. L. Russell.

Uredo, P.

U. Ari Virginici, Schw. Stockbridge. M. A. Curtis.
U. nitens, Schw.
U. pyrolæ, Lk. Rhode Island. Mr. Olney.

Epitea, Fr.

E. miniata, P.

Ustilago, Lk.

U. segetum, P.

Peridermium, Lk.

P. pini, P. White Mountains. P. P. James.

Rœstelia, Reben.

R. lacerata, Sow.

Æcidium, P.

Æ. compositarum, Schlecht.
Æ. aroidatum, Schw. Stockbridge. M. A. Curtis.
Æ. berberidis, P.

ORDER IV. Hyphomycetes.

Sub-order I. *Isariacei*, Corda.

Capnodium, Mont.

C. elongatum, Berk. & Desm.

Ceratium, A. & S.

C. hydnoides, Fr.

Sub-order II. *Stilbacei.*

Stilbum, Tode.

S. lateritium, Berk. D. Murray.

Tubercularia, Tode.

T. vulgaris, Tode.

T. granulata, Pers.

Fusarium, Lk.

F. lateritium, Nees. Mr. J. L. Russell.

Sub-order III. *Dematiei*, Fr.

Helminthosporium, Lk.

H. macrocarpon, Grev.

Macrosporium, Fr.

M. cheiranthi, Fr. Mr. J. L. Russell.

Cladosporium, Lk.

C. herbarum, Lk.

Sub-order IV. *Mucedines*, Fr.

Streptothrix, Corda.

S. atra, B. & C. ined.

Trichothecium, Lk.

T. roseum, Lk.

Sub-order V. *Sepedoniei*, Fr.

Sepedonium, Lk.

S. chrysospermum, Fr. D. Murray.

Artotrogus, Mont.

A. asterophorus, Fr. Mr. Murray.

Glenospora, B. & Desm.

G. Curtisii, B. & Desm.

ORDER V. Ascomycetes, *Berk.*

Sub-order I. *Evellacei*, Fr.

Helvella, L.

H. lacunosa, Apz. So. Paris, Me.

Geoglossum, P.

G. glabrum, P. D. Murray.
G. hirsutum, P.

Mitrula, Fr.

M. paludosa, Fr.

Spathulea, Fr.

S. flavida, Fr. So. Paris, Me.

Leotia, Hill.

L. lubrica, Scop.

Rhizina, Fr.

R. undulata, Fr. D. Murray.

Peziza, Dill.

P. macropus, P.
P. furfuracea, Fr.
P. abietina, P. D. Murray.
P. hemisphærica, Weber. So. Paris, Me.
P. Agassizii, B. & C. ined. do.
P. coprophila. do.
P. scutellata, L. do.
P. stercorea, P. do.
P. calycina, Fr.
P. vulgaris, Fr.

Ascobolus, Pers.

A. conglomeratus, Schw. M. A. Curtis.

Helotium, Fr.

H. citrinum, Hedw.

Chlorosplenium, Fr.

C. Schweinitzii, Fr. D. Murray.
C. chlora, Schw.

Propolis, Fr.

P. versicolor, Fr. D. Murray.
P. hysterina, Fr. J. L. Russell.

Bulgaria, Fr.

B. inquinans, Fr.
B. rufa, Schw.

Sub-order II. *Tuberacei*, Fr.

Elaphomyces, Nees.

D. muricatus, Fr. D. Murray.

Sub-order III. *Phacidiacei*, Fr.

Patellaria, Fr.

P. discolor, Mont. D. Murray.

Urnula, Fr.

U. craterium, Fr. D. Murray.

Dichæna, Fr.

D. faginea, Fr.

Rhytisma, Fr.

R. salicinum, P.
R. acerinum, P.
R. prini, Schw.
R. asteris, Schw. J. L. Russell.

Phacidium, Fr.

P. pini, A. & S.

Hysterium, Fr.

H. pulicare, Pers.
H. flexuosum, Schw.
H. rufilabrum, B. & C. ined. Stockbridge, M. A. Curtis.
H. smilacis, Schw.
H. rufescens, Schw. Stockbridge. M. A. Curtis.

SUB-ORDER IV. *Sphæriacei*, Fr.

Hypocrea, Fr.

H. Oakesii, B. & C. Ipswich. Mr. Oakes.
H. gelatinosa, Tod.
H. lactifluorum, Schw. So. Paris, Me.

Cordyceps, Fr.

C. militaris, L.
C. capitata, Holm.
C. ophioglossoides, Ehr. D. Murray.

Xylaria, Schrank.

X. polymorpha, P.
X. digitata, L. D. Murray.
X. hypoxylon, L.

Nectria, Fr.

N. peziza, Tod. D. Murray.
N. muscivora, Berk.
N. episphæria, Tod.
N. cinnabarrina, Tod.

Sphæria, L.

S. concentrica, Bolt. Portland. E. S. Morse.
S. enteromela, Schw. do. do.
S. cohærens, P. White Mountains. Mr. Oakes.
S. ustulata, Bull.
S. multiformis, Fr.
S. vernicosa, Dec. D. Murray.
S. fusca, P.
S. fragiformis, P.
S. contorta, Schw. D. Murray.
S. stigma, Hoffm.
S. verrucæformis, Ehr.
S. aculeans, Schw. Stockbridge. M. A. Curtis.
S. spiculosa, P. D. Murray.
S. errabunda, Desm. Portland. E. S. Morse.
S. maculæformis, P.
S. myriadea, Dec.
S. fimbriata, Pers. Rhode Island. A. Metcalf.
S. colliculus, Wormsk. D. Murray.
S. conospora, B. & C. ined. Stockbridge. M. A. Curtis.
S. subaquila, B. & C. ined. do. do.
S. orbicularis, B. & C. ined. do. do.
S. Spraguei, B. & C. ined.
S. morbosa, Schw.
S. vomitoria, B. & C. ined. D. Murray.

Microthyrium, Desm.

M. smilacis, Not.

Dothidea, Fr.

D. ulmea, Fr.
D. ribesia, Fr.
D. Robertiani, Fr. C. Wright.
D. pteridis, Fr. Rhode Island. Mr. Olney.

SUB-ORDER V. *Perisporiacei*, Fr.

Erysiphe, Hed. Fil.

E. phlogis, Schw. Stockbridge. M. A. Curtis.

SUB-ORDER VI. *Onygenei*, Berk.

Onygena, P.

O. equina, P. D. Murray.

Eurotium, Lk.

E. herbariorum, Web. D. Murray.

Trichoderma, P.

T. viride, P.

Mr. Sprague read a third letter from Mr. E. Samuels, giving a list of specimens of animals and plants which he had collected for the Society, in California.

Prof. Wm. B. Rogers offered a preamble to the resolutions adopted at the last meeting, relative to the Naval Board, which was read and adopted.

On motion of Dr. C. T. Jackson, it was voted that the preamble and resolutions, as a memorial to Congress, be placed in the hands of one of the Senators from Massachusetts.

The Preamble and Resolutions are as follows: —

The Boston Society of Natural History, feeling a deep concern in all measures of the General Government which have a bearing upon the interests of science, and the reputation of its cultivators,— anxious to testify to the public authorities their high estimation of the services of those officers of the navy who of late years have been charged with important scientific duties,— and desirous of seeing established, in connection with the naval marine, some permanent organization by which the scientific labors of its officers may be duly recognized and rewarded, have adopted the following resolutions, which they beg most respectfully to submit.

Resolved,—That the researches of Lieut. M. F. Maury, on the subject of atmospheric and oceanic currents, and other kindred phenomena, being of great value to the mercantile as well as the naval marine of the world, entitle him to the respect and gratitude of all who honor science or appreciate its application to practical results.

Resolved,— That Lieut. J. M. Gilliss, by his successful discharge of various public duties of a scientific nature, and especially by his valuable astronomical observations in the late expedition to Chili, is entitled to the high consideration usually accorded to those who successfully devote themselves to such pursuits.

Resolved,— That we regard the encouragement of a taste for science in our naval service as an important means, not only of elevating its intellectual character, but of increasing its usefulness in time of peace, and its efficiency in war; and that any policy which represses the love of scientific research and distinction in our naval officers must prove a serious injury to the service.

Resolved,—That while we would not call in question the just and patriotic intentions of the navy board in its recent action, we cannot forbear expressing our regret that by placing Lieutenants Maury and Gilliss on the "retired list," it has given rise to the impression that the scientific labors to which the officers of the navy may be deputed, are to be regarded as of inferior dignity to the other kinds of active service; and that, instead of being considered meritorious, they are to constitute an obstacle to professional advancement.

Resolved, Therefore, That we respectfully suggest to the proper authorities a reconsideration of the subject, and such action as will secure to those of our naval officers who may be placed on scientific duty, encouragement to persevere in this arduous branch of the service.

Resolved,—That, in the opinion of this Society, the interests of science and of the navy would be promoted by the establishment of a scientific board, composed of naval officers distinguished for their cultivation of science, and that it is recommended to the Society to memorialize Congress to this effect.

Dr. C. T. Jackson exhibited a new Water Filter, in which the cleansing medium was formed of four layers of wire gauze closely compressed and bound together.

Dr. Jackson stated that the Cochituate water now contains a large quantity of Cyclopean animalcules, and that oil is to be found in them also. The water is now generally considered pure and tasteless. A quantity of Cyclopeans, collected by means of this filter, was shown.

Dr. Durkee, by aid of the microscope, exhibited the presence of oil globules in the water, and a few were seen in the bodies of the crustaceans.

Dr. S. L. Abbot suggested that one of the causes of the contamination of Cochituate water the past year might be the extinction, by drought, in vast numbers, of some species of mollusks, as mentioned by Dr. James Lewis, of Mohawk, N. Y., in a recent communication to the Society.

Dr. Hayes observed that he was in possession of facts relative to the contamination of the Albany and Haverhill waters, etc. He would like to have them, together with any observations of Dr. Jackson and others, referred to the Cochituate water committee.

The President stated that it had been proposed to add a botanist and an ichthyologist to this committee. This might be a matter for consideration at another meeting.

Dr. A. A. Hayes exhibited specimens of Saltpetre Earth from Tennessee, the precise locality from which they came being unknown. The samples were richer in the materials for the production of saltpetre than any he had ever seen. They yielded from eighty to one hundred pounds to the ton. The nitric acid was united to lime and magnesia, and to a trace of potash. An important feature in the specimens was the existence of crenates.

Dr. Hayes promised to give a more full account at a future meeting.

Prof. William B. Rogers remarked, that, from his observations in the caves of the Middle and Southern States, he was satisfied that the earthy deposit containing the nitrates, known in some places as *Petre dirt*, was chiefly derived from the overhanging and adjacent rocks, and not from sediment brought into the cave by existing or former streams. The limestone, in which the nitriferous caverns are found, often contains a large amount of siliceous and argillaceous matter, and, in some instances, a marked proportion of organic substances. The more pervious layers, gradually deprived of their carbonate of lime by the leaching action of the water infiltering from above, are reduced to an earthy mass, the mere *caput mortuum*, as it were, of the original rock. In some cases this decomposition pervades the stratum for a great distance ; the residuary, fine-grained, ashy clay retaining the lamination and bedding which it had before the change. In course of time, the earthy mass falls to the floor by its own weight, aided, perhaps by occasional tremors of the ground, or is detached by the load of stalactites suspended from it below, and thus comes within the levelling and transporting action of the streams flowing through the cave.

As to the production of the nitrates with which the Petre dirt is more or less impregnated, Prof. R. thought that it could not, in any large degree, be referred to the excretions and other remains of animals occasionally found in these caves; since the quantity of nitrogen required for this purpose would far exceed such a means of supply. Besides this, the nitrates are found in the earthy mass while it is still adhering to the roof or walls, and far removed from the organic matter supposed to be buried in the floor. Nor can we regard the nitrogen as chiefly derived from organic substances in the decomposing rocks. For, in the case of some caves producing Petre dirt, the surrounding limestone contains only a trace of such ingredients. We must, therefore, refer the formation of the nitric acid, and ultimately the nitrates, to mutual chemical reactions between the porous calcareous earth and the contiguous atmosphere.

Dr. C. T. Jackson thought that, in connection with this subject, an explanation of the manner of formation of stalactites might be interesting to those not particularly conversant with their growth.

In the grotto at Corneal, near Trieste, where he had observed their formation, the first thing to be noticed was a minute pore or perforation in the rock wall, in which a drop of water, saturated with bi-carbonate of lime, had collected. Upon the evaporation of the water, the carbonic acid escapes, and the solid material is deposited in the form of a thin ring or hollow crust. Subsequent depositions convert the ring into a tube with very thin walls, and this tube gradually becomes elongated by additional depositions of bi-carbonate of lime. The stalactite then increases externally, commencing at its upper extremity, and acquires a conical form; and it may continue to advance until it meets the stalagmite beneath it, which, as is well known, is formed by drippings from the surface of the stalactite.

Prof. Rogers added a brief sketch of facts which he had observed in the growth of stalactites.

A drop of water, charged with carbonate of lime, is seen to form at a particular point of the roof, and after its descent, another drop, by the same mechanical causes, takes its place. It is not necessary to suppose a hole around which the concretion may collect. Usually there is none. At the margin of the drop where it thins away to a film, evaporation and the loss of carbonic acid combine to cause a precipitation of part of the dissolved carbonate, which, on separating, attaches itself to the rock in the form of a very delicate white *ring*, corresponding to the margin of the liquid. Each succeeding drop deposits a similar ring in contact with and beneath that already formed, until the whole is prolonged downwards in the shape of *a quill-like tube.* This, from its vertical position, invites the water of the adjoining part of the roof to descend along its outer surface, and now an exterior and more rapid growth begins. Usually, the former process continues to operate for a long time after the external growth has commenced; so that the stalactite, in some cases, retains its open central canal until it has reached a length of a foot or more, and a diameter at its base of two or three inches. As the water, which flows along the outside of the tube, parts at each step with a portion of its calcareous charge, and thus grows continually less capable of forming the deposit, the rate of deposition must diminish somewhat regularly from the upper to the lower end of the mass. Hence it is that stalactites, formed in positions where their growth on all sides is freely permitted, have always a *sharply conical or tapering form.*

The drops which fall from these pendants to the floor, still retain a portion of carbonate of lime in solution; but as the shock of the impact and the spreading of the liquid greatly favor the escape of its carbonic acid, a further deposit must be formed in this position, and thus the stalagmite grows upwards to meet the stalactite growing downwards, until in many cases they unite to form a column reaching from the floor to the ceiling of the cave.

As in general the infiltering water follows the joints and planes of stratification of the limestone rock, the *fashion or pattern of the stalactitic drapery will be more or less determined by the position and arrangement of these divisional surfaces.* Where, as in parts of Weyer's Cave, in Virginia, these planes of bedding are steeply inclined, and meet the roof in a series of parallel lines, the concretionary action seems to have commenced by forming parallel rows of stalactites along these lines. This process, in certain places, has gone on until by lateral union of the adjoining pendants of each row, they have been transformed into *parallel sheets of stone,* which, in some instances, extend from the roof to the floor. From their great extent, and a degree of thinness which, in part, renders them translucent, these sheets are capable of being thrown into sonorous vibration by a blow from the heel near the ground, and under these circumstances they emit a musical sound of great depth and force.

March 19, 1856.

Dr. Chas. T. Jackson, Vice-President, in the Chair.

Prof. Jeffries Wyman exhibited an interesting factitious specimen, alleged to have been taken from the jaw of the Musk Ox, and presenting, externally, the odor of musk. The specimen was placed in his hands by Dr. A. A. Hayes, for physiological examination. Upon looking at the specimen superficially, it had the appearance of integument, covered with hair, and inclosing some solid substance, and it was evidently prepared to resemble a glandular body secreting the odoriferous substance, and removed with the adjacent integument. It, however, was very clearly not a natural production ; and upon making a section of the specimen, it was found to be composed of a solid, brownish-black mass, mingled with a certain amount of hairs, but not resembling a glandular secretion. It was apparently a ball of some material, scented, and covered with hairy skin.

Dr. Hayes remarked that the material contained in the so-called excrescence of the Musk Ox, alluded to by Dr. Wyman, is evidently an artificial mixture, principally of vegetable origin. The specimen was given to him by Samuel T. Dana, Esq., and was supposed to have come from Chinese Tartary. It may be considered a fine specimen of factitious drug manufacture, in which art the Chinese excel other nations.

The characters of the contained substance are the following: color, brownish-black; fracture, even; full of bubble-cavities, in some of which white rounded granules were contained. These granules were palm-starch, apparently.

The brown-black mass dissolved in water almost wholly, and had the odor of cloves. It contained gum and some tannic acid, being an extract from the acacia bark, or a similar production. The musklike odor of the envelop is not present in the interior.

Dr. A. A. Hayes exhibited two war weapons, from the west coast of Africa, made by the natives. He called attention to the peculiar texture of the iron, forming the blades of these weapons. It was traversed by flaws, which extended deeply into the iron, presenting the same appearance as that produced when the native iron of Africa is heated and subsequently hammered. The iron contained no steel, but had been hardened by condensation under the hammer.

Mr. C. J. Sprague exhibited specimens of *Spilocœa fructigena*, Schw., and *Asteroma pomigena*, Schw., and remarked upon them as follows: —

These two funguses are very common upon apples in the winter season, appearing to select no particular variety. The *Spilocœa fructigena* appears at first in small black patches underneath the skin. As it increases in size, it ruptures the skin and invades the surrounding parts, leaving a mottled black and brown scar, which sometimes extends over half the fruit, checking its growth, and rendering the side it affects partially abortive. The circumference of the scar is marked by a deeper and fresher color where the parasite is still strong, feeding upon the untouched portions, and extending in every direction. Under a microscope, the plant is found to consist of interwoven filaments, septate towards the apex, the last articulation swelling into an oblong vesicle containing two or more nuclei.

The *Asteroma pomigena*, Schw., appears first as a dark, clouded stain, generally round, from a half to a quarter of an inch in diameter. A microscopic examination of this exhibits a radiating network of branched filaments, which look like a miniature Hypnum. Seated upon this mycelium are minute black perithecia, of a depressed, semi-globular form. As these increase in size, the mycelium disappears, leaving them strongly defined in small black dots upon the apple skin. They get finally rubbed off, and leave a minute black ring to mark the place where they were. He had never been able to find any fructification. A single spot, with its radiating mycelium, is a beautiful object under the microscope.

These two funguses grow very frequently upon the same fruit, and are so very common that it would require a careful selection to obtain any number of individuals entirely free from their attacks.

Dr. A. A. Hayes informed the Society that he had obtained some further analytical results on Serpentines, which, in connection with those previously published, might possess some interest.

He alluded to the fact that multiplied trials on the serpentine rock, called Verd Antique Marble, had proved that the composite character was maintained throughout the whole mass which had been quarried; it being truly an assemblage of magnesian minerals, cemented by anhydrous carbonate of magnesia. The formation of which this quarry is a part, is extensive, passing through the State from its southerly border to its most northerly township; including a large collection of magnesian minerals. It was therefore deemed important to inquire, if analytical experiments would give analogous results on samples of the serpentine taken from different parts of the range. Some early analyses that he had made, confirmed his conclusions in relation to the rock occurring at Troy, Kellyvale, and different points in Roxbury, Vermont; he therefore chose specimens from Proctorsville, a village in the township of Cavendish.

Dr. Hayes stated that in the year 1827, in company with Rev. John Wheeler, and the resident physician of the place, he took the first specimen from this deposit, which subsequently became well known to mineralogists. The specimen was exhibited, and consisted of compact asbestos, forming veins in a talcose rock. Other polished specimens presented the usual, nearly uniform, deep green color, which renders this material a fine ornamental stone. Its translucency, hardness, and other physical characters, place it among the finer serpentines; its chemical composition becomes therefore a point of interest. In the analyses, a large number of specimens was used, and as in the case of all compound bodies, the proximate mode of analysis was adopted.

I. 100 parts of the Proctorsville Serpentine are composed of

Moisture	0.40
Carbonic Acid	17.05
Magnesia	16.00
Forming the cement	33.45
And 66.55 of Magnesian minerals as basis-rock, consisting of combined water	6.21
Silicic Acid	36.10
Magnesia	18.70
Proto-peroxides Iron and Mang.	3.40
Alumina	1.13
Chrome Iron	.92
	99.91

II. The analysis of the darkest-colored specimen afforded—

Anhydrous Carbonate of Magnesia	26.40
Compound rock base	73.60

73.60 parts were composed of asbestos, talc, talcose slate, and silicate of iron; containing 36 silicic acid, and 5.60 of combined water.

This serpentine has therefore the chemical composition of the so-called Verd Antique Marble, as quarried at Roxbury.

The research was afterwards extended so as to embrace specimens from a large number of localities, including Hoboken, N. J., Chester, Lynnfield, and Newbury, in Massachusetts, and some European samples of wrought serpentine from ancient cities. These have all afforded anhydrous carbonate of magnesia as a constituent part of the composition both chemically and mechanically considered. They also confirm, in a general manner, the evidence that earlier analyses afforded of the complex characters of serpentine rock.

As an illustration of the chemical and mechanical composition of a Verd Antique Marble from Europe, Dr. Hayes exhibited a polished specimen, which having a mottled surface of green and white, agreeably blended, was a beautiful marble. With the specimen, were the two minerals which formed its basic or green component part, as removed by chemical means, and these were scales of talc, and prismatic fragments of clear green asbestos. The composition of this Verd Antique is, in 100 parts,

Granular Carbonate of Lime	42.60
Compact Asbestos and Talc	55.00
Carbonate of Magnesia	1.92
Moisture	.12
	99.64

The asbestos and talc containing 5.20 combined water, after drying at 212° F.

Dr. Jackson, in reply to Dr. Hayes, said that his own analyses of the Serpentines of Vermont and of Massachusetts, agree perfectly with those of European Serpentine, made by himself, and by many of the most celebrated analytical chemists of Europe; that he could not conceive how the presence of carbonate of magnesia could possibly have been overlooked by so many chemists, or how their analyses could balance so well as they do, if carbonic acid were present in any considerable quantity, as would be the case if the magnesia were in the state of a carbonate and not a hydrous silicate in Serpentine; for anhydrous carbonate of magnesia contains 51.69 per cent. of carbonic acid.

Pure crystallized Serpentine contains —

Silica	42.97
Magnesia	41.96
Protoxide of Iron	2.48
Oxide of Chromium	0.87
Water	12.02
	100.30

and the composition of massive Serpentine is nearly the same.

He admitted that there are numerous veins of magnesite, as well as of dolomite spar, or magnesian carbonate of lime, in the Roxbury, Vermont, Serpentine Marble, but did not consider the Serpentine itself as composed of carbonate of magnesia in the place of hydrous silicate of magnesia.

He had, as the original surveyor of the quarries, and the first who published on the subject of that marble, named it *Vermont Verd Antique*, on account of its close resemblance to the celebrated Verd Antique existing among the ancient monuments of Rome. He believed this name to be quite appropriate, and it has been adopted by the Company.

The analyses which he read at the last meeting of the Society, justified, he believed, this conclusion, and the name will therefore be retained.

His analysis of the Lynnfield Serpentine was made on the 27th of May, 1837; the specimens having been taken from the quarry by himself, while employed by the owners of it.

He found it readily soluble in sulphuric acid, and he made from 100 grains of it, 127 grains of anhydrous sulphate of magnesia, or 178 grains of crystallized Epsom salts, and then recommended the manufacture of that salt from it, as was subsequently done in Roxbury.

On the 6th of August, 1839, Dr. Jackson completed his analyses of the Serpentine Marbles of Proctorsville, Vermont, and subsequently, in the spring of 1840, surveyed the quarries from which the marble was obtained.

In 1853, he made the first examinations of the Serpentine ledges of Roxbury, Vermont, and directed the owners of them as to the most suitable localities for quarrying the marble, and he had since revisited them and given further directions. In December, 1854, at the request of the company, he made his analysis of this marble, and passed specimens through the severest ordeals, to ascertain the durability of the stone, which proved to be capable of withstanding heat, cold, and all the usual acids and salts.

All these facts concerning the various Serpentines and Verd Antique Marbles were published soon after the work was executed, and these publications Dr. Jackson believes to have been the first in which these localities of workable Serpentine and Verd Antique Marbles, above named, were described.

Prof. William B. Rogers remarked that he had been much interested in the facts which had been disclosed in regard to the composition of this material, especially in the statement of Dr. Hayes, that the substance of the white veins was nearly pure anhydrous carbonate of magnesia, and that neither it nor the green matter contained any carbonate of lime. He had recently made a qualitative analysis of the white substance, and also of the clear rhombic crystals occurring in little groups in the midst of it, and had found both to consist of carbonate of magnesia, with some proto-carbonate of iron, but without any distinct trace of lime. In these experiments, he was struck with the resistance presented by the white matter of the veins to the solvent action of hydrochloric acid, a fact auguring well for the durability of even this part of the rock in many of its applications.

Dr. H. R. Storer asked if any change had been noticed in the Cochituate Water recently. He had observed that the water in his father's house, in Winter Street, was impure.

Dr. Bacon had noticed a slight impurity in the water, for a few successive days, a short time since.

Prof. Rogers had collected upon a cotton filter, a considerable quantity of foreign matter, but no odor was detected in it. On standing, however, for some time, at a temperature of 65 degrees, a peculiar odor became quite apparent.

Dr. Jackson suggested that, in some instances, the impurity of the water might be occasioned by impurity of the filter. To cleanse the common sand filter, he recommended that the filter box be filled with a solution of soda or potash, corked, and allowed to stand a few hours; the operation to be repeated two or three times if necessary.

Dr. Hayes recommended the employment of the large stone filters, in which the sponge is cleansed every day.

DONATIONS TO THE MUSEUM.

January 2d. A specimen of Flying Fish, and some marine animals and plants; by Gen. Samuel Andrews.

February 20th. A specimen of Mistletoe growing upon the oak; by Dr. Henry Bryant. Fossil Shells; by Master Edward Renouf.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1856.

Proceedings of the Yorkshire Philosophical Society. 8vo. Vol. I. London, 1855. *From the Yorkshire Philosophical Society.*

History of the Condition and Prospects of the Indian Tribes in the United States. 4to. Vol. 5. Philadelphia, 1855. *From the Commissioner of Indian Affairs.*

Proceedings of the American Antiquarian Society. 8vo. Pamph. Boston, 1855. *From the Association.*

Salmonidæ. No. 1. By A. C. Hamlin, M. D. Bangor, Me. 8vo. Pamph. 1855. *From S. Kneeland, Jr.*

Description of some new Fossil Shells from the Tertiary of Petersburg, Virginia. By Henry C. Lea. 4to. Pamph. Philadelphia, 1856. *From the Author.*

Observations on Binocular Vision. By Prof. Wm. B. Rogers. 8vo. Pamph. New Haven, 1856. *From the Author.*

The Physical Atlas of Natural Phenomena. Plate 12. The Arctic Basin, its limits, &c. By Prof. H. D. Rogers. *From the Author.*

Memoir of Thomas Handasyd Perkins. By Thomas G. Cary. 8vo. Boston, 1856. *From the Author.*

Histoire Naturelle des Oiseaux d'Afrique. By François Levaillant. 6 Vols. Folio. Paris, 1799. *Received from the Executors of the Estate of James Brown, in exchange for other works bequeathed by Mr. Brown.*

New York Medical Times. Vol. V. Nos. 4, 5, and 6.

New York Journal of Medicine and the Collateral Sciences. Vol. XVI. Nos. 1 and 2.

Silliman's American Journal of Science and Arts. No. 61, for January, and No. 62, for March, 1856.

Physikalische Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin. For 1854. 4to. Berlin, 1855.

Monatsbericht der Königlichen Preuss. Akademie der Wissenschaften zu Berlin. January to June, 1855. 8vo. Berlin.

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. VII. No. 12, Vol. VIII. No. 1. 8vo. Pamph. Philadelphia, 1856. Also Title Page and Index to Vol. VII.

Proceedings of the American Philosophical Society. Vol. VI. No. 54. 1855.

Proceedings of the Zoölogical Society. Nos. 214–291. 8vo. London, 1850–5.

Proceedings of the Zoölogical Society; with illustrations. 8vo. London, 1851–2.

Transactions of the Linnean Society of London. Vol. XXI. Part 4. 4to. London, 1855.

Proceedings of the Linnean Society of London. Nos. 59–66. 1854–5.

Notices of the Meetings of the Royal Institution of Great Britain. Part 5. 8vo. London, 1855.

Denkschriften der Kaiserlichen Akademie der Wissenschaften. Neunter Band. 4to. Wien, 1855.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Band XV.–XVI. 8vo. Wien, 1855.

Jahrbücher der K. K. Central-Anstalt für Metereologie und Erdmagnetismus; von Karl Kreil. Band III. 1851. Herausgegeben durch die Kaiserliche Akademie der Wissenschaften. 4to. Wien, 1855.

Memorie della Accademia delle Scienze dell' Istituto di Bologna. Tome V. 4to. Bologna, 1854.

Opere Edite ed Inedite del Professore Luigi Galvani. 4to. Bologna, 1841.

Francesco del Giudice. Della Instituzione de' Pompieri Libri Tre. 4to. Bologna, 1852.

Francesco del Giudice. Universalità dei Mezzi di Previdenza, Difesa, e Salvezza per la Calamità degl' Incendi. 4to. Bologna, 1848.

Aggiunta alla Collezione delle Opere del celebre Prof. L. Galvani. 4to. Pamph. Bologna, 1842.

Rendiconto dei Sessioni dell' Accademia delle Scienze dell' Istituto di Bologna. 12mo. Pamph. Bologna, 1853–4.

Journal of the Academy of Natural Sciences of Philadelphia. New Series. Vol. III. Part 2. 4to. Philadelphia, 1855.

Proceedings of the California Academy of Natural Sciences. Vol. I. pp. 67–77. 8vo. 1855.

Genera of Recent Mollusca, arranged according to their organization. By H. and A. Adams. Parts 21–24. 8vo. London.

Malakozoölogische Blätter. Von Dr. K. T. Menk und Dr. L. Pfeiffer. Erster Band. 8vo. Cassel, 1854.

Thesaurus Conchyliorum. By G. B. Sowerby. Part XVI. 8vo. London, 1856.

Constitution, By-Laws, &c., of the Essex Institute. 8vo. Pamph. Salem, 1855. *Received in Exchange.*

American Almanac for 1856. 12mo. Boston.

Annals and Magazine of Natural History. Nos. 97 and 98. London.

Andrews's Latin-English Lexicon. 8vo. New York, 1855.

The Viviparous Quadrupeds of North America. By J. J. Audubon and J. Bachman. Vols. II. and III. 8vo. New York, 1851. *Received from the Courtis Fund.*

Encyclopædia Britannica. Vol. IX. 4to. Boston, 1855.

Dealings with the Dead. By a Sexton of the Old School. 2 Vols. 8vo. Boston, 1856.

Life of Nathan Hale. By J. M. Stuart. 12mo. Hartford, 1856.

Biographical and Critical Miscellanies. By Wm. H. Prescott. 8vo. New York, 1845.

History of England. By T. B. Macaulay. Vols. III. and IV. 12mo. Boston, 1856.

History of Massachusetts. By J. S. Barry. 8vo. Boston, 1855. *Deposited by the Republican Institution.*

April 2, 1856.

The President in the Chair.

The following communication from Prof. Edward Daniels, of Illinois, Corresponding Member, addressed to Dr. C. T. Jackson, was, at the request of Prof. Daniels, read to the Society: —

Some three years since, in the town of Spring Prairie, about thirty miles west of Racine, Wisconsin, a woman of low standing was delivered of a dead child. It was in midwinter, when the ground was frozen and covered with deep snow. There being no spade, shovel, or other digging implement on the premises, the husband of the woman threw the corpse of the dead child into the vault, and covered it with snow. Accumulations of fecal matter soon buried the whole to some depth. This burial was known only to the family, and to one or two others in the vicinity.

During the past winter, the premises having changed hands, the old privy was removed, and the vault cleared out. While removing the lower portion of its contents, which were frozen solid, one of the workmen, who was digging with a pick, felt something burning on his hands, which were sprinkled with the dirt of the soil, and he observed that his hands were smoking. He, in some alarm, went and put his hands into water, but on withdrawing them he again perceived the smoking to recommence. The attention of a physician was called, but he was much puzzled at the appearance. A friend of his, Prof. McGoffin, of Carroll College, coming in at the time, recognized the smoking substance as phosphorus, and on examining the vault, discovered numerous small fragments of that substance scattered among the gravel, smoking and burning with great activity. On further examination, he discovered two large pieces, one of which was the precise cast of an infant's femur, and all the pieces of phosphorus found were in the shape of bones.

The phosphorus is quite pure, and cannot be distinguished from that sold at the apothecaries shops. The surfaces are rough, uneven, and covered with a white crust, which may be rubbed off.

Prof. Daniels supposes that the phosphorus in the phosphoric acid of the bone phosphate had been in some way reduced to elementary phosphorus. He says the facts here stated may be implicitly relied upon as true, and he wished them to be communicated to this Society, and to ask the opinion of members upon the subject.

Dr. C. T. Jackson observed, that this case was so extraordinary, and so out of the course of nature's chemistry, as to require a very careful investigation. We are not aware of any instance of the reduction of phosphorus from the phosphate of lime ever having taken place without the liberation of the phosphoric acid, or at least its conversion into super-phosphate of lime, and its decomposition and distillation with carbon at a high temperature. How such a decomposition could take place at the freezing point, he could not conceive. Had phosphorus been thrown into the vault, how could it have formed casts of the bones at a temperature at which it is quite solid? Could it come from Phosphuretted Hydrogen, derived from decomposition? It is to be hoped that some of the bone-shaped fragments have been preserved in water, and that we may have an opportunity of inspecting them.

Prof. Daniels is now absent on a Geological tour in Kansas, and Dr. Jackson hopes, on his return to Illinois, to hear from him again, and to learn more particulars about this anomalous case.

Prof. William B. Rogers remarked that the case was very interesting, but that the strictest inquiry should be made as to the facts in a detailed form, before any explanation could be offered.

Mr. T. T. Bouvé inquired, if what had the appearance of phosphorus could have been merely a layer of this substance upon the bones.

Dr. A. A. Hayes suggested that it would be advisable to request of Prof. Daniels a more particular history and description of the matter. There would be a question as to the disposition of the lime basis of the bones in contact with phosphorus, and as to the presence of phosphuretted hydrogen gas.

The Secretary was instructed to request of Prof. Daniels a more minute relation of facts in the case, and at the same time to express to him the thanks of the Society for the communication.

Mr. Bouvé exhibited some excellent colored lithographs of some of the Fossil Impressions in the Sandstone of the Connecticut Valley, drawn by Dr. James Deane, of Greenfield, Mass. Dr. Deane proposes to prepare a memoir upon the Connecticut Fossils, to be accompanied by drawings of the impressions in the same style as those exhibited, if sufficient encouragement is received from the lovers of science.

The President hoped the Society would consider the subject worthy of their attention. For a long time he had seen the necessity of just such a work as Dr. Deane designs to undertake. He has all the materials for his labor, resides upon the spot of their discovery, has great ingenuity, keen powers of observation, and high enthusiasm; and, above all, having been instrumental in drawing the attention of scientific men to a new class of fossils, has the very best opportunity for a description of them.

Prof. Rogers expressed himself much pleased with the exquisite delicacy of the drawings, which, together with the resemblance in color to the original stone, makes them very valuable. Dr. Deane was the first to recognize these impressions as of animal origin, and there could be no question but that he was well fitted to undertake a memoir upon the subject. He thought Dr. Deane should receive a verbal encouragement, at least, from the Society, and accordingly the Secretary was requested to transmit to him an expression of the great interest which the Society feels in the prosecution of his labors, and the assurance that he may expect every encouragement which the Society has in its power to extend.

Dr. Hayes submitted the following remarks, on some specimens of guano, which he exhibited, from the islands of the Atlantic Ocean.

About two years since, an enterprising commercial firm in this city, discovered on Monks Island,—a small island off the coast of Guyana,—a remarkable rock, covering a deposit of the kind of guano now so well known, as coming from the Atlantic side of South America.

The rock and guano were sent to me for chemical analysis, and finding both to possess a high economical value, I recommended the introduction of them as sources of phosphate of lime, for agricultural purposes. A large quantity of these products has been imported, and numerous analyses by myself and others, have shown a considerable uniformity in the composition of thousands of tons.

The specimens now before you, exhibit averages of the two varieties.

In the specimen which I have called Guano Rock, we have irregular incrustations of from one inch to two feet in thickness, pale yellowish brown, or nearly white, while its fracture is of some shade of dark brown, and shows bands of very dark, alternating with those of a lighter color. Like compact calcareous concretions, the upper surface presents rounded elevations and nodules, while below the mass is full of cavities and irregularities. Its fracture is generally splintery, and its average hardness, greater than that of Fluor spar, is next to that of Feldspar.

Sp. Gr. 2.440, (average.)

The arenaceous guano may be considered as comminuted fish bones, mixed with minute shells, still retaining organic matter; and one of the specimens shows the first step in aggregation, by which solid masses form. These eventually by chemical operations, become consolidated, so that the resulting body has all the characters of a firm rock.

It will be observed that the rounded grains of the arenaceous guano, are generally of the size of mustard seed, and in forming the sandstone aggregate, they show individually as the grains of sand in that rock. In the guano-rock, this individuality is entirely lost, and the eye detects nothing in the close-grained and compact banded mass, which indicates its origin. Indeed, it would be difficult to find two bodies mineralogically more diverse than the two specimens before you. It is to this loss of the granular form, and the production of a compact, remarkably close-textured rock, that I wish to call your attention, as it has an important connection with a subject which has long engaged my leisure time, and which has been approached in some papers I have before read here.

This guano-rock has a composition not very different from that of the arenaceous guano; both, however, present a very novel result, by analysis. In stating the composition, I purposely omit several constituents which occur in minute quantity only, and keep in view the bone phosphate of lime and organic matter, as the prominent constituents of both.

100 parts of the Guano Rock consist of—

Moisture	0.80
Dry Organic Acids, &c.	11.00
Sulphate of Lime	7.90
Bone Phosphate Lime and Magnesia . .	110.20
Sand	0.80
	130.70.

100 parts of the Arenaceous Guano, from below the guano rock, contain —

Combined water	6.84
Dry Organic matter	1.80
Sulphate of Lime	7.00
Bone Phosphate Lime and Magnesia	114.40
Sand	0.60
	130.64

Considering the mineral matter of each, that in 100 of guano rock weighs $88\frac{2}{10}$, in 100 of arenaceous guano $91\frac{3}{10}$; the proportion of bone phosphate of lime and magnesia becomes 110 nearly in each, when an equal weight is taken. The question, from whence does phosphate of lime, of this composition, come ?— at once arises in the mind of any one who has a recollection of the composition of fish bones, and especially the composition of the ordinary Atlantic guano of the Aves, and other Islands. In 100 parts of calcined ox bone, there are 86 parts of bone phosphate of lime and magnesia and 14 parts of carbonate and silicate of lime; rarely 88.5 parts as given by Heintz. Fremy has recently classed the bones of man, elephant, lion, calf, kid, ostrich, serpents, codfish, and other fish as identical in composition. I have found the bone phosphates of lime and magnesia, in the burnt bones of the halibut, to equal 86.80 per cent., while the bone and organic matter of the vertebra of this fish, as extracted by acids, afforded 92 per cent. of the mixed phosphates. Taking, therefore, the highest result on any fish bones, we have in the dry matter only 92 per cent. of bone phosphate of lime and magnesia, while 100 parts of the dry mineral part of the guano rock, afford the phosphoric acid sufficient, when combined with lime, to produce 125 parts of the same salt.

As we can look to no natural source for bones having the composition of guano-rock, we inquire into the chemical influences exerted while the excrement of birds, mixed with more or less of other animal remains, undergoes decomposition at a temperature never lower than 85° F., moisture and water being present.

Experiment shows that under these conditions, the putrefaction proceeds with the production of acids. The bones of the halibut give to sea-water lime salts, at the expense of a portion of the bone. Abstracting lime from the bone, leaves in excess the phosphoric acid, and the washing away of the soluble salts of lime formed, by rains, adds them to the constituents of sea-water.

Recurring to the composition of guano-rock, we see that the proportion of organic salts and other organic matter, is much larger than exists in the guano from which it was derived. The physical characters of the rock are modified by the presence of these compounds, but the most remarkable change is that from a granular to a compact solid. This change could be effected by infiltration, as takes place from calcareous waters; but as the rock guano is above the mass producing the soluble organic salts, it is necessary to consider another condition.

When water holding saline matter in solution evaporates from the surface of the earth, pure water alone escapes, while the saline and colored organic compounds remain at or near the surface. In accordance with this law, the saline matters which can be dissolved, and the colored matters which can be suspended, in water, rise to the surface, and so long as capillarity can act, they are deposited in the porous parts, gradually filling the pores and consolidating the surface. Doubtless, while this process is proceeding, rains carry back a part, which is to be raised anew, until finally the surface-rock, no longer pervious, becomes cemented into the compact state it now presents, by this action of capillarity.

As the material of the guano-rock has been organized at one time, and may now be considered as mineralized, the specimens present a fine illustration of the action of the minor natural forces in changing the physical conditions of matter, as well as its chemical composition. On the other hand, the putrefaction of fish remains, being often accompanied by the formation of acids, we are able to trace to their sources the organic salts of lime, as well as the phosphate of lime, which analyses show to exist in sea-water.

The Committee to whom the subject of "Encouraging and extending the various New England Fisheries," was some time since referred, reported: —

That various kinds of marketable fish now extinct, or nearly so, in this Commonwealth, have been propagated and raised, artificially, and at small expense, by various experimenters in Europe.

That there seems no reason why similar experiments should not succeed equally well in this country.

That they are of opinion that the subject, if properly developed, might prove of great benefit to the community, and is not unworthy the consideration of this Society.

That the late action of Mr. George Baty Blake, of this city, a life-member of this Society, in petitioning the Legislature for the accomplishment of this object, taken as it was entirely independently of the Committee, without their knowledge, and without knowledge of them, meets their warm commendation, and is highly creditable to that gentleman, both as a business man and as a patron of science.

That a petition from this Society, in aid of that already submitted to the Legislature, might be of service, as expressing the opinion of the Naturalists of the State. The Committee would therefore recommend such petition, —

And that the thanks of the Society be given Mr. Blake for the interest he has shown in this subject, and the efforts he has made.

In accordance with the recommendation of the Committee, a form of petition, submitted by them, was adopted, and ordered to be presented to the Legislature.

It was also voted — that the thanks of the Society be presented to George B. Blake, Esq., for the interest which he has shown in the subject of the artificial propagation of fish, and for his efforts to have proper measures established for an experimental investigation into the question in this State.

Dr. H. R. Storer, at the request of the President, briefly stated some of the well known facts relative to the artificial propagation of fish.

The operation of obtaining the ova and milt is very simple, consisting merely in pressing the body of the fish, from the head towards the tail, and collecting the spawn in water in a common vessel. The contents of the vessel should be put in motion occasionally, to prevent the collection of parasitical growths upon the eggs. Freezing, or even complete desiccation of the eggs, does not always necessarily destroy them, so that some kinds may be transmitted from one place to another in the dry state, and ready to be matured. Dr. Algernon Coolidge of Boston has estimated the cost of raising one million of trout to be less than two hundred dollars.

Dr. Storer referred to the disappearance from this Commonwealth entirely of salmon, and almost entirely of trout, and to the constant demand for these fish in the market at exorbitant rates ; to the comparatively small supply of salt-water fish, wholly insufficient, if proper efforts were made to extend the country and western trade ; and to the excellence of many species of fish, now unsalable because not generally known, as the whiting, turbot, &c.

The feasibility of artificially propagating salmon and trout has been proved in France and Scotland, and that of shad and alewives has been proved in Connecticut, on a small scale, by Dr. Wm. O. Ayres, a member of this Society.

The capacity, in many species of fish, of adapting themselves to new localities is well known ; from fresh water to fresh water,— as is shown in the instance of the common pickerel placed in the ponds of Berkshire County, where there were none before, and in the instance of the great northern pike of the lakes transplanted to the Connecticut River ; from salt water to fresh water,— as is illustrated by the presence of smelts in Jamaica Pond ; and from salt water to salt water,— as is proved by the tautog planted in Massachusetts Bay, north of Cape Cod, and consequently in water of much colder temperature.

Dr. Storer alluded likewise to the comparatively small expense, both of the preliminary experiments and of the business when established upon a permanent basis ; to the adaptation of many of the waters of this State to the purpose ; and to the advantages of a greater supply of fish to the general health, and in reducing the prices of meat.

Mr. Sprague read a fourth letter from Mr. Samuels, giving a list of specimens, principally of birds, collected in California for the Society.

Dr. J. N. Borland gave a description of a dog brought from Japan by Commodore Perry, and belonging to the breed from which the King Charles Spaniel derives its origin. It was a male of black and white color, of rather large size, and weighing about ten pounds; the forehead was very full and round; the nose short; the eyes large and far apart; the ears short; the hair straight and fine; the tail curled upon its back, as in the Esquimaux dog. It is kept as an imperial pet in Japan. The pair which Commodore Perry obtained cost $180. The female died on the voyage.

April 16, 1856.

The President in the Chair.

Dr. C. T. Jackson, by request of one of the members, gave an account of the method now employed by the Narraganset Fish Guano Company, in the extraction of oil from Menhaden, and of converting the residual matter into a substitute for Guano.

He said that the manufacture of oil, and of artificial guano from fishes, had long been practised in France, where the fish called Merlan was employed for this purpose, and yielded but one and a half or two per cent. of oil, while the Menhaden is a much fatter fish, and produces oil more abundantly. In France, the fish-cake remaining after the extraction of oil, is dried at a steam heat, and is then ground fine, and packed in air-tight casks for sale as a manure.

The Narraganset Company are engaged in similar processes, in the conversion of their fish-cake into manure. They first steam the fish, then press out the oil, and afterwards dry and grind the remainder, mixing some gypsum, limestone, or earthy material, in order to render the grinding more perfect. Sometimes they add sulphuric acid to the fish-cake, and convert the bones of the fish into superphosphate of lime, and the flesh into sulphate of ammonia and humus, according to the method first indicated by Dr. Hare of Philadelphia. In case this method is employed, the acid fish-cake should be ground with limestone, when the excess of sulphuric acid will form sulphate of lime, and render the addition of gypsum unnecessary.

It has been proposed to add a certain proportion of peat to the fish-cake, during the operation of grinding it; the peat acting as an excellent absorbent of ammonia, and as an antiseptic. This is applicable to the fish-cake that has not been treated with sulphuric acid.

Properly prepared fish-cake is fully equal to guano as a fertilizer, and it can be prepared at a much lower cost than guano can be brought from the coast of Peru. There are doubtless many places on our coast where fish can be obtained in adequate quantities for the manufacture of this manure.

Dr. Charles Pickering gave an account of the late volcanic eruptions upon the island of Hawaii, explaining, by means of diagrams, the positions of Mauna Loa and Mauna Kea, and the course of the lava stream towards the coast.

Dr. Jackson observed that the Hawaiian lava was one of the most fusible of known lavas, and he instanced the so-called Pele's hair, which is very fusible in the flame of a common candle.

Dr. Pickering stated that Pele's hair was a kind of glass, the product of the volcanic eruption under peculiar circumstances. The true lava was no more fusible than that from other localities.

A letter was read from Oliver H. Holden, Esq., of Melbourne, Australia, accompanying a valuable donation from the Government Museum of Natural History, at

Melbourne. The collection numbered about one hundred and fifty specimens of Australian Birds; several specimens of mammalia, amongst them the Kangaroo, Opossum, White Native Cat, Kangaroo Rat, Common Bat, Wallabee, Bandicoot, &c.; specimens of Fossils; and some Photographs and Engravings, selections from an illustrated work on Victoria, by Wm. Von Blandowski, Curator of the Museum. This donation was made through Mr. Blandowski, at the instance of Mr. Holden, who was formerly a resident of Boston, in accordance with a suggestion from Dr. Silas Durkee.

Dr. C. T. Jackson presented a copy of the Transactions of the Philosophical Society of Victoria, Vol. I., published in Melbourne.

Dr. Jackson remarked that the progress of this Society had been truly extraordinary. Scarcely three years had elapsed since its organization, and yet it had accomplished a great deal. Representing, as it does, a whole continent, abounding in peculiar forms of animal and vegetable life, it is destined to become a very important Society.

It was voted to present to the Philosophical Society of Victoria, and the Government Museum of Natural History, (which are understood to be connected with each other,) a complete copy of the Journal and Proceedings of this Society. The Curators of the different departments were also requested to prepare a collection of specimens to be presented to the Victoria Museum.

The thanks of the Society were voted to the Victoria Museum for their valuable donation, and to Mr. Oliver H. Holden for his kind agency in obtaining and forwarding them.

Dr. Jackson exhibited a specimen of Aluminium, manufactured into a thimble. This new metal is still exceedingly rare.

Mr. Sprague informed the Society of another arrival, at Washington, of Bird Skins from California, forwarded by Mr. Samuels.

It was voted, that after the Annual Meeting, the hour for opening the meetings, during the summer months, shall be 8 instead of $7\frac{1}{2}$ o'clock.

Franklin Darracott, of Boston, was elected Resident Member.

May 5, 1856.

Dr. Chas. T. Jackson, Vice-President, in the Chair.

A special meeting was called this evening, to take appropriate measures relative to the decease of the President of the Society, Dr. John C. Warren.

Dr. Charles T. Jackson, Vice-President, upon taking the Chair, announced, with a few remarks, the decease of the venerable and much respected President.

Remarks were also made by Dr. D. H. Storer, and Prof. Wm. B. Rogers.

A Committee, consisting of Dr. D. H. Storer, Dr. Samuel Cabot, Jr., Dr. Samuel Kneeland, Jr., Prof. Wm. B. Rogers, and Dr. C. T. Jackson, was appointed to prepare a series of resolutions, expressive of the deep sense of regret which the Society experiences in its recent bereavement.

It was voted to attend the funeral of the late President on Wednesday, May 7, and to meet at the rooms of the Society for this object at $10\frac{1}{2}$ o'clock, A. M.

May 7, 1856.

ANNUAL MEETING.

Dr. Chas. T. Jackson, Vice-President, in the Chair.

Dr. D. H. Storer, in behalf of the Committee appointed to prepare a series of resolutions expressive of the deep sense of regret which the Society experiences in its recent bereavement, read the following report, which, together with the resolutions, was adopted: —

Mr. President and Gentlemen: We are again called upon to mourn; we meet here to sympathize in our common sorrow. Science has lost a true friend; her votaries, we would reverently bow to the stroke, while we deeply feel and gratefully acknowledge the goodness, which so long averted the blow. He, who for the nine past years has presided over this institution with paternal solicitude — who has performed every duty devolving upon him with the greatest cheerfulness, with unsurpassed fidelity — who, with the enthusiasm of youth, would not allow the most inclement nights of the last most inclement season to prevent his attendance at your meetings — but who was ever here to encourage you by his presence to increased exertion — has accomplished his work. He has left us forever.

He needs no fulsome eulogy. His claims upon the respectful and lasting remembrance of his professional brethren have already, elsewhere, been most eloquently portrayed. The debt we owe his memory can never be repaid; but, as naturalists, that debt we should recognize.

Upon the death of Dr. Amos Binney, our much-loved President, Dr. Warren was selected to succeed him. From the day of his appointment, his interest has never flagged; but has increased with his advancing years.

His first great desire was to see our valuable collection displayed in a more safe and commodious building — to accomplish which, his efforts were indefatigable. A large portion of the means required to purchase our present accommodations, was procured directly by him — and but for the influence he was enabled to exert in his social relations, we could hardly have succeeded in our attempt.

Dr. Warren's labors were principally directed to the great object of exciting and keeping alive a taste for Natural History, by constantly presenting its wonders to such minds as he thought susceptible of being thus influenced.

He delighted to gather around him those whose tastes were congenial — to enjoy with such the beauties of his country-seat — to extend its hospitalities. How many of us have been made the happier by his yearly festival !

He has, however, done more than this. Three years since he prepared an address, which was published, presenting a history of the Society from its foundation. He became exceedingly interested in Paleontology — he exerted himself to assist in procuring the magnificent slabs, containing the ornithichnites from the Connecticut River, which ornament our Hall. He also made a most valuable private collection of these footprints, and two years ago described some of the most striking of them in a small volume, with the title " Remarks on some Fossil Impressions in the Sandstone Rocks of Connecticut River." At a great expense he purchased the most perfect skeleton of the Mastodon giganteus now known to exist ; and his elaborate work upon that subject will ever remain a monument to his zeal, his industry, his munificence.

Just previous to his decease, he had prepared a paper on the animal of the Argonauta, all the available species of which genus he had collected, described, and figured. This memoir he had completed, the last page of manuscript having been corrected by him within a week of his death.

This was his last labor — his dying legacy to science. Let us cherish his memory ; and upon this occasion, upon this altar, renew our devotion.

In compliance with the duty devolving upon us, we would present the following resolutions : —

Resolved, That in the sudden bereavement which has befallen our Society, we would not suppress the grief so deeply felt. For the long-continued, unwearied interest, manifested by our late President, in our prosperity ; for the readiness, the liberality with which he seconded every effort for our advancement; for the uniform courtesy with which he presided over our assemblages, and the kind-heartedness so often evinced there; for his anxious desire to see around him a band of brothers engaged in the same ennobling pursuits,— actuated by the same spirit, aiming at the same end, we shall ever with gratitude remember him.

Resolved, That some member of the Society be appointed to prepare a biographical sketch of our late President, to be presented to the Society at a future meeting.

Resolved, That our deep-felt sympathy be extended to his afflicted family.

Prof. Jeffries Wyman was chosen, in conformity with the recommendation of the Committee, to prepare a biographical memoir of the late President.

The Society then adjourned, out of respect to the memory of the deceased.

May 21, 1856.

ADJOURNED ANNUAL MEETING.

Dr. Silas Durkee in the Chair.

A letter was read from Francis Alger, Esq., notifying the Society of his resignation of the office of Curator of Mineralogy.

The Annual Reports of the Curators were read and accepted.

The Curator of Ornithology called particular notice to the magnificent donation of birds from the Government Museum of Natural History of Victoria, as one of the most valuable donations ever made to this department of the cabinet; the collection contained at least one hundred species of birds not before in the museum. Valuable donations have also been received from Dr. Samuel Kneeland, Jr., Mr. George S. Shaw, of Cambridge, and Mr. E. Samuels, principally of birds from the Philippine Islands and Australia. The Botanical department has been enriched during the past year by several hundred South European plants, presented by Prof. Asa Gray, of Cambridge. To the Geological cabinet has been added a fine series of Fossils from the Paris basin, the gift of George B. Emerson, Esq. The Curator of Comparative Anatomy acknowledged valuable donations from Dr. J. V. C. Smith, George B. Emerson, Esq., and Dr. S. Kneeland, Jr., and called attention to the fact that some of the specimens under his charge are materially injured from year to year, in consequence of the increased dampness and other unsuitable conditions of the building.

The Librarian reported the addition to the Library, during the year of 360 volumes and 36 pamphlets. The most valuable donation ever made to the Society's Library was received by bequest of the late James Brown, a full account of which will be found in the printed Proceedings, Vol. V. pp. 254–6. A portrait, in oil, of the eminent naturalist Thomas Nuttall was presented by the widow of Mr. Brown.

A Card Catalogue of the library has been prepared, in accordance with a vote of the Society at the last Annual Meeting.

A portion of the report of the Librarian, relative to the reprinting of certain numbers of the Journal and Proceedings, was referred to the Publishing Committee.

The Treasurer read his Annual Report, which was referred to Messrs. Amos Binney and James M. Barnard as Auditing Committee.

The Committee appointed to nominate a list of officers for the ensuing year reported, and the report was accepted. The Committee not being prepared to nominate a candidate for the office of President, the election of a President was postponed one fortnight, to the first Wednesday of June.

The Society then proceeded to ballot for officers for the ensuing year; and the following officers were declared elected: —

Vice-Presidents,

Charles T. Jackson, M. D., and D. Humphreys Storer, M. D.

Corresponding Secretary,

Samuel L. Abbot, M. D.

Recording Secretary,

Benjamin S. Shaw, M. D.

Treasurer,

Nathaniel B. Shurtleff, M. D.

Librarian,

Charles K. Dillaway.

Curators,

Thomas T. Bouvé,	*Of Geology.*
Jeffries Wyman, M. D.	*Comp. Anatomy.*
Thomas M. Brewer, M. D.	*Oölogy.*
John Bacon, M. D.	*Mineralogy.*
Thomas J. Whittemore,	*Conchology.*
Samuel Kneeland, Jr., M. D.	*Ichthyology.*
Henry Bryant, M. D.	*Ornithology.*
Silas Durkee, M. D.	*Entomology,*
Charles J. Sprague,	*Botany.*
J. Nelson Borland, M. D.	*Herpetology.*
John P. Reynolds, M. D.	*Crustacea and Radiata.*

Cabinet Keeper,

Charles Stodder.

The following gentlemen were appointed a Committee to nominate a candidate for the office of President, to report at an adjourned meeting to be held upon the first Wednesday of June, viz: Dr. A. A. Gould, Prof. Jeffries

Wyman, Dr. Samuel Cabot, Jr., Dr. N. B. Shurtleff, and Mr. C. J. Sprague.

Prof. Wm. B. Rogers read, by its title, the following paper "On the origin of Greensand, and its formation in the oceans of the present epoch," by Prof. J. W. Bailey, of West Point, N. Y.

ON THE ORIGIN OF GREENSAND, AND ITS FORMATION IN THE OCEANS OF THE PRESENT EPOCH, BY PROF. J. W. BAILEY.

As an introduction to the subject of this paper, it is proper to refer to various observations which have been made of facts intimately related to those which I wish to present. That the calcareous shells of the Polythalamia are sometimes replaced by silica, appears to have been first noticed by Ehrenberg, who, in a note translated by Mr. Weaver, and published in the L. E. & D. Philosophical Journal for 1841, (Vol. 18, p. 397,) says: —

"I may here remark that my continued researches on the Polythalamia of the Chalk, have convinced me that very frequently in the earthy coating of flints, which is partly calcareous and partly siliceous, the original calcareous shelled animal forms have exchanged their lime for silex without undergoing any alteration in figure, so that while some are readily dissolved by an acid, others remain insoluble; but in chalk itself, all similar forms are immediately dissolved."

The first notice of *casts* of the cells and soft parts of the Polythalamia was published by myself in the American Journal of Science for 1845, Vol. XLVIII., where I stated as follows: —

"The specimens from Fort Washington presented me with what I believe have never been before noticed, viz: distinct *casts* of Polythalamia. That these minute and perishable shells should, when destroyed by chemical changes, ever leave behind them indestructible memorials of their existence was scarcely to be expected, yet these casts of Polythalamia are abundant and easily to be recognized in some of the Eocene Marls from Fort Washington." This notice was accompanied by figures of well-defined casts of Polythalamia (l. c. pl. iv., fig. 30, 31).

Dr. Mantell also noticed the occurrence of casts of Polythalamia and their soft parts, preserved in flint and chalk, and communicated an account of them to the Royal Society of London, in May, 1846. In this paper he speaks of the chambers of Polythalamia as being frequently filled with chalk, flint, and *silicate of iron.* (Phil. Trans., 1846, p. 466.) To Ehrenberg, however, appears to be due the credit of first distinctly announcing the connection between the Polythalamia and the formation of Greensand, thus throwing the first light upon the origin of a substance which has long been a puzzle to geologists. In a notice given by this distinguished observer upon the nature of the matrix of the bones of the Zeuglodon from Alabama, (see Monats-Bericht, Berlin, February, 1855,) he says: —

"That Greensand, in all the numerous relations in which I have as yet examined it, has been recognized as due to the filling up of organic cells, as a formation of stony casts (Steinkernbildung,) mostly of Polythalamia, was stated in July of the preceding year." He then refers to the Nummulite Limestone of Traunstein, in Bavaria, as rich in green opal-like casts (Opalsteinkernen) of well-preserved Polythalamian forms, and mentions them as also occurring, but more rarely, in the Glauconite Lime-stones of France. He then proceeds to give an account of his detection of similar casts in the limestone adhering to the bones of the Zeuglodon from Alabama, and states that this limestone abounds in well-preserved brown, green, and whitish stony casts of recognizable Polythalamia. This limestone is yellowish, and under a lens appears spotted with green. These green spots are the Greensand casts of the Polythalamia, and they often form as much as one third of the mass. By solution in dilute chlorohydric acid, the greensand grains are left, mixed with quartzose sand, and with a light yellowish mud. The latter is easily removed by washing and decantation. The casts thus obtained are so perfect that not only the genus, but often the species of the Polythalamia, can be recognized. Mingled with these are frequently found spiral, or corkscrew-like bodies, which Ehrenberg considers as casts of the shells of young mollusks.

With reference to the perfection of these casts of the Polythalamia, and the light they throw upon the structure of these minute animals, Ehrenberg remarks: —

"The formation of the Greensand consists in a gradual filling up of the interior space of the minute bodies with a green-colored, opal-like mass, which forms therein as a cast. It is a peculiar species of natural injection, and is often so perfect, that not only the large and coarse cells, but also the very finest canals of the cell walls, and all their connecting tubes are thus petrified, and separately exhibited. By no artificial method can such fine and perfect injections be obtained."

Having repeated the experiments of Ehrenberg upon the Zeuglodon Limestone, I can confirm his statements in every particular, and would only add, that besides the casts of Polythalamia and small spiral mollusks, there is also a considerable number of green, red, and whitish casts of minute anastomosing tubuli, resembling casts of the holes made by burrowing sponges (Cliona) and worms.

In the Berlin Monats-Bericht, for July, 1855, Ehrenberg gives an account of very perfect casts of Nummulites, from Bavaria and from France, showing not only chambers connected by a spiral siphuncle, but also a complicated system of branching vessels. He also gave at the same time an account of a method he had applied for the purpose of coloring certain glasslike casts of Polythalamia, which he had found in white tertiary limestone from Java. This method consists in heating them in a solution of nitrate of iron, by means of which they can be made to assume different shades of yellow and brownish red, still retaining sufficient transparency when mounted in balsam to show the connection of the different parts.

The interesting observations of Ehrenberg which are alluded to above, have led me to examine a number of the cretaceous and tertiary rocks of North America in search of Greensand and other casts of Polythalamia, &c. The following results were obtained: —

1st. The yellowish limestone of the cretaceous deposits of New Jersey occurring with Teredo tibialis, &c., at Mullica Hill, and near Mount Holly, is very rich in Greensand casts of Polythalamia and of the tubuliform bodies above alluded to.

2d. Cretaceous rocks from Western Texas, for which I am indebted to Major W. H. Emory, of the Mexican Boundary Commission, yielded a considerable number of fine Greensand and other casts of Polythalamia and Tubuli.

3d. Limestone from Selma, Alabama, gave similar results.

4th. Eocene limestone from Drayton Hall, near Charleston, South Carolina, gave abundance of similar casts.

5th. A few good Greensand casts of Polythalamia were found in the residue left on dissolving a specimen of marl from the Artesian Well at Charleston, S. C.; depth 140 feet.

6th. Abundance of organic casts, in Greensand, &c., of Polythalamia, Tubuli, and of the *cavities of Corals*, were found in the specimen of yellowish limestone, adhering to a specimen of Scutella Lyellii from the Eocene of North Carolina.

7th. Similar casts of Polythalamia, Tubuli, and of the *cavities of Corals*, and species of Encrinites, were found abundantly in a whitish limestone adhering to a specimen of Ostrea sellæformis from the Eocene of South Carolina.

The last two specimens scarcely gave any indications of the presence of Greensand before they were treated with dilute acid, but left an abundant deposit of it when the calcareous portions were dissolved out. All the above-mentioned specimens contained well-preserved and perfect shells of Polythalamia. It appears from the above, that the occurrence of well-defined organic casts, composed of Greensand, is by no means rare in the fossil state.

I come now to the main object of this paper, which is to announce that the formation of precisely similar Greensand and other casts of Polythalamia, Mollusks, and Tubuli, is now going on in the deposits of the present ocean. In an interesting report by Count F. Pourtales, upon some specimens of soundings obtained by the U. S. Coast Survey in the exploration of the Gulf Stream, (See Report of U. S. Coast Survey, for 1853, Appendix, p. 83,) the sounding, from Lat. 31° 32′, Long. 79° 35′, depth 150 fathoms, is mentioned as "a mixture in about equal proportions of Globigerina and black sand, probably greensand, as it makes a green mark when crushed on paper." Having examined the specimen alluded to by Mr. Pourtales, besides many others from the Gulf Stream and Gulf of Mexico, for which I am indebted to Prof. A. D. Bache, the Superintendent of the Coast Survey, I have found that not only is Greensand present at the above locality, but at many others, both in the Gulf Stream and Gulf of Mexico, and that this Greensand is often in the form of well-defined casts of Polythalamia, minute Mollusks, and branching Tubuli, and that the same variety of the petrifying material is found as in the fossil casts, some being well-defined Greensand, others reddish, brownish, or almost white. In some cases I have noticed a single cell, of a spiral Polythalamian cast, to be composed of Greensand, while all the others were red or white, or *vice versa*.

The species of Polythalamia whose casts are thus preserved, are easily recognizable as identical with those whose perfectly preserved shells form the chief part of the soundings. That these are of recent species is proved by the facts that some of them still retain their brilliant red coloring, and that they leave distinct remains of their soft parts when treated with dilute acids. It is not to be supposed, therefore, that these casts are of extinct species washed out of ancient submarine deposits. They are now forming in the muds as they are deposited, and we have thus now going on in the present seas, a formation of Greensand by processes precisely analogous to those which produced deposits of the same material as long ago as the Silurian epoch. In this connection, it is important to observe that Ehrenberg's observations and my own, establish the fact that *other* organic bodies than Polythalamia produce casts of Greensand, and it should also be stated that many of the grains of Greensand accompanying the well-defined casts are of wholly unrecognizable forms, having merely a rounded, cracked, lobed, or even coprolitic appearance. Certainly many of these masses, which often compose whole strata, were not formed either in the cavities of Polythalamia or Mollusks. The fact, however, being established beyond a doubt, that Greensand does form casts in the cavities of various organic bodies, there is a great probability that all the masses of this substance, however irregular, were formed in connection with organic bodies, and that the chemical changes accompanying the decay of the organic matter have been essentially connected with the deposits in the cavities, of green and red silicates of iron, and of nearly pure silica. It is a curious fact in this connection, that the *siliceous* organisms, such as the Diatomaceæ, Polycistineæ, and Spongiolites which accompany the Polythalamia in the Gulf Stream, do not appear to have any influence in the formation of casts.

The discovery by Prof. Ehrenberg, of the connection between organic bodies and the formation of Greensand, is one of very great interest, and is one of the many instances which he has given to prove the extensive agency of the minutest beings in producing geological changes.

Dr. Samuel Kneeland, Jr., read the following paper: —

ON THE ANIMAL OF THE ARGONAUT SHELL, BY DR. JOHN C. WARREN.

Dr. John C. Warren having obtained, just before his death, a fine specimen of this rare animal, occupying, with its eggs, its shell, intended to take advantage of an early opportunity to exhibit it; he had illustrated the description of the principal organs by enlarged plates, and had combined in this paper many points of great scientific interest collected from various English and foreign works and journals. He thought that it would be interesting and useful to future observers to have what is known upon this rare animal placed before them at once, as a starting-point for future investigations.

He had intended to read this to the Society on the evening before his death, which fact will give a melancholy interest to these, his last words to the scientific world.

The term *Argonauta*, as applied to a Mollusk, is of modern origin, but the *animal* to which it is now applied was well known to the ancients; they, however, in describing what we now call the Argonaut, made use of the word *Nautilus*. About the time of Linnæus, the ancient term Nautilus was taken from the Argonaut, and given to another molluscous animal, not known to antiquity.

Aristotle, and the naturalists who preceded him, called the Cephalopod Mollusks *Polypi;* an application of the term which at first sight appears strange, but which is, in fact, perfectly correct, as these animals have a great number of feet, — hence the name. This term is now confined to the lowest class of Radiata.

The Argonaut belongs to the Cephalopod Mollusks, which have been divided, from the number of their branchiæ, into the *Dibranchiata* and the *Tetrabranchiata;* to the former the Argonaut belongs, to the latter the Nautilus. The Dibranchiate Cephalopods have their arms provided with suckers, hence they have been called *Acetabulifera* by D'Orbigny; the Tetrabranchiata have none of these suctorial disks, and are inferior in organization to the former. The Dibranchiata are divided according to the number of their arms, into *Octopods* and *Deca-*

pods; to the former the Argonaut belongs. The Octopods are all naked, without external shells, except the Argonaut. This animal is the *Nautilus* of the ancients; its shell, however, is not chambered like that of the Nautilus. The Argonaut is found in the Mediterranean and Indian Seas, and in the Atlantic and Pacific Oceans, where the shell is often cast ashore by the waves; it is usually obtained without the animal, which, sinking with its shell below the surface at the approach of danger, is rarely captured by the general naturalist; it is also said to be nocturnal and crepuscular. The specimen exhibited was the first ever seen here.

The best known species of Argonaut are *Argonauta argo*, Linn., *A. nodosa*, Solander, and *A. hians*, Solander. One species is found fossil in the pleiocene of Piedmont, very like *A. argo*, but considered identical with *A. hians*, now living in the ocean.

Specimens of five species of shells were exhibited from the Society's and Dr. Warren's collections. The beautiful specimen of the *A. compressa*, Blain., presented to the Society by Col. Thomas H. Perkins, was also exhibited; this shell, which cost him $500, is, according to Dr. Cabot, who has made the comparison, the largest Argonaut shell in any cabinet in Europe or America. D'Orbigny, in his great work quoted below, gives as the measurements of the largest he had examined: greatest length of the shell, 9½ inches, while in our specimen it is 10 inches; greatest diameter of the opening 6⅙ inches, in our specimen it is 6½ inches; greatest width of the opening, including the auricular appendages, 3 inches, while in ours it is 4 inches.

The animals of these three species of shells have been called respectively *Ocythoë antiquorum*, *tuberculata*, and *Cranchii*. Dr. Gould* describes a species as *A. geniculata*, taken near Rio Janeiro. Mr. Conrad,† in a recent monograph, besides these four species, mentions the *A. compressa*, Blainv., from the Indian Ocean; *A. papyria*, Conrad; *A. gondola*, Dillwyn, from the South Atlantic; *A. Oweni*, Adams, from the South Atlantic; *A. cornuta*, Conrad; *A. dispar*, Conrad; *A. polita*, Conrad; *A. Nouryi*, Lorois, from the tropical Pacific; *A. crassicosta*,

* Mollusca of the U. S. Exploring Expedition, p. 470.

† Journal Acad. Nat. Sciences, Vol. 2, 1850–54, Philadelphia, p. 331.

Blainville, from Australian Seas; and *A. naviformis*, Conrad. A specimen of *A. Nouryi*, obtained from Dr. J. C. Parkinson, of New Jersey, was exhibited from Dr. Warren's collection, an extremely delicate and beautiful shell.

The principal internal organs were described, illustrated by colored, enlarged, and beautiful drawings.

The mantle is thick and fleshy, and adheres to the head posteriorly, having a single anterior opening. The arms are eight in number, attached to the cephalic cartilage, the first pair being dilated and membranous at the extremity; all are provided with two rows of sessile unarmed *acetabula*, or suctorial disks, for purposes of prehension. In an animal from the Gulf of Guinea, described by Dr. W. E. Leach * under the name of *Ocythoe Cranchii*, (the animal of *Argonauta hians*,) it is stated that these membranes are generally attached to the sides of the arms, but in one specimen the membranes adhered only by their base below the apex of the arm; the membrane is subject to great variation in size and form, and is often different on the arms of the same individual. The suckers on the palmated arms extend round the whole circumference of the part, visible to the naked eye; hence Owen says † it appears as if this characteristic structure arose from the extremities being bent back on themselves and united to the stem by means of a thin membrane.

Having no fins to the mantle, like the Decapods, it must chiefly progress, while swimming, in a retrograde manner by ejecting water from its funnel. The expanded extremities of the dorsal arms, which poets have celebrated as being kept erect to catch the breeze, ‡ cannot be regarded as such by the naturalist; for in some Octopi, according to Owen,§ similar membranes are found,

* Phil. Trans. Vol. 107, 1817, pp. 295–6, London.

† Trans. of Zoölogical Society, London, Vol. 2, pp. 113–119, 1837.

‡ Aristotle, Ælian, Oppian, Athenæus, Pliny, and other Greek and Latin authors, have written both in prose and poetry of this little navigator, which they considered as a special favorite of the Gods, and as the instructor of man in the art of navigation. Modern poets have also sung its praises — among others, Pope and Byron; the former writes:—

> "Learn of the little Nautilus to sail,
> Spread the thin oar, and catch the driving gale."

§ Cyclopædia of Anat. and Phys. Art. Cephalopoda, London, 1836.

and, as these do not inhabit shells, the membranes, even if they could be kept erect, could not be used for wafting the animal along the water. It seems to be beyond question that these expanded arms are not locomotive organs. Madame Power,* who examined a great number of these animals at Messina, from the position of the animal in the shell, with these arms to the right and left, and from repeatedly watching its movements, has ascertained that it can drag itself along the bottom, or climb madrepores in search of food, or anchor itself, by the suckers of the other arms, hanging from its shell, which is carried above it supported by the membranous arms. According to Von Siebold,† these dorsal arms, with their terminal cutaneous lobes, are used for keeping the shell in place by their application to its external surface, their movements, as in other Cephalopods, being chiefly due to the contractions of the mantle and the funnel; — it is certain that they can move forwards and laterally, to a certain extent, by the action of their arms; else they would seem poorly provided with means for obtaining their prey. As will be seen hereafter, the shell is principally secreted by these arms, whose two surfaces have a different structure; the external surface is quite smooth with many chromatic or coloring cells; while the internal has hardly any, but is covered with numerous reticulated projecting lines, becoming more prominent as the lobes are contracted, and between which are cell-like depressions.

The Argonaut has no internal shell like the Cuttle-fish, but an external, monothalamous, symmetrical shell, containing but not attached to its body, either by a siphon or by muscles, as in the Nautilus. The eggs are deposited in the cavity of the shell, as in the specimen exhibited.

The arms are not fully united by membranes at their base, as in the Poulp, so that the Argonaut is without the powerful locomotive organ furnished by the contraction of these webs. Zoölogists were for a long time divided in opinion as to whether the Argonaut shell is formed by the animal found in it; the arguments on both sides will be given hereafter. In the Nautilus, powerful muscles take their origin from the central cartilage, and form

* Report of Brit. Association, 1844, pp. 74–7, London.

† Burnett's Translation, p. 276, Boston, 1854.

a firm bond of union to the horny girdle of the mantle, and by means of this to the sides of the last chamber of the shell — in the higher Cephalopods these muscles are always in relation to the development of the internal shell or framework ; in Octopus, Loligo, and Sepia, these muscles arise from the base of the arms and the cephalic cartilage, and are attached to the sides of the mantle and to the capsule of the calcareous plate — in Argonaut, which has no internal shell, these muscles are smaller even than in the naked Octopus, and reduced to a few fibres lost in the mantle ; there is no muscular connection between the body and the external shell. This has been alluded to by Owen,* as affording a strong analogical argument in favor of the opinion that the Argonaut shell does not form an integrant part of the animal which inhabits and deposits its eggs in it ; as it seems hardly probable, says he, considering the intimate relation between the shell and the means of attachment in other Cephalopods, that this animal, with a highly developed external shell, should have its attachment reduced to a lower degree than in the naked Octopus.† The Serpula, however, an Annelid, can secrete as true a shell as the Argonaut, and has as little muscular connection with it ; it can also take different positions in its shell, quit it and return to it, as is doubtless true of the Argonaut — so that these facts do not prove any thing in favor of the parasitism of the Argonaut.

The funnel is entire, and without a valve, articulated to the inner sides of the mantle by a cartilaginous ball-and-socket joint. The eyes are large and sessile ; the organ of hearing is well developed in the substance of the cephalic cartilage.

The jaws consist of two horny mandibles, moving vertically, like a parrot's beak. The oral cavity has a well developed tongue, partly papillose, and partly spiny, the points directed

* Memoir on the Pearly Nautilus, p. 19, London, 1832.

† [In a recent letter to the author, Isaac Lea, Esq., of Philadelphia, says, in relation to the *A. argo* : " There is a muscular attachment, and, small as it may be, it is not at all anomalous. In all the spiral shells, the attachment is small, and it is transferred in its position as the individual increases in size, enlarging its ' house.' M. Blanchard procured and examined six living specimens, and ascertained that the hard and soft parts were attached by a ligament." (Ann. Lin. Soc. de Bordeaux, Vol. 3.)] This is opposed to the opinions of the best writers on the subject, both English and continental.

backwards; and also salivary glands. The æsophagus is provided with a lateral dilatation or crop, but continues of almost uniform width to the stomach, which is an elongated muscular sac, like the gizzard of a bird, with its cardiac and pyloric orifices close together at its upper portion. At a short distance from the pylorus there is a triangular glandular body, which Owen considers a rudimentary *pancreas*, communicating with the intestine; the intestine, nearly straight, terminates in the funnel, within the influence of the respiratory currents, which also expel the excrements.

The ink-bag is present in the Argonaut, and is situated near the termination of the intestine, into which it opens, — not enclosed within the capsule of the liver. The liver is of large size, extending from the crop to the stomach; it consists of two lobes, united for a considerable extent along the median line, gradually extending laterally and forwards so as partially to inclose the alimentary canal; it is simple and undivided, not numerously lobulated as in the Nautilus.

The branchiæ are two in number, each composed of fifteen pairs of lamellæ; they are concealed and protected by the mantle which forms for them a chamber anterior to the other viscera, into which the rectum and generative organs open. Respiration is affected by the alternate dilatation and contraction of this chamber; the water rushing in by the anterior opening of the mantle during its dilatation, and being expelled through the funnel during its contraction. The aquiferous system opens by two apertures, one on each side, at the posterior and upper angle of the eye, at the bottom of a slight depression; and communicates with a cavity situated at the upper part of the head, and also with the peritoneal and other cavities.

There is a single ventricle or aortic heart, surrounded by a pericardium in the centre of the cavity of the body. At the base of the branchiæ are two sinuses, which have been called by some authors *branchial hearts* and *pulmonary sinuses;* according to Von Siebold (*op. cit.* pp. 289, 292,) these have no muscular fibres, but have a glandular aspect, and are in close relation with the urinary organs — they, however, require further investigation.

The divisions of the vena cava, and other veins entering the pericardiac cavity, are furnished with clusters of spongy cellular or glandular bodies, which open into the veins by conspicuous foramina; these have been found in all Cephalopods. Owen (*op. cit.*) thinks that these *follicles* relieve the vascular system by affording a temporary receptacle for the blood when it accumulates in the vessels from expansion or from impediment to the circulation from the varying pressure to which the animal may be subjected at different depths in the ocean, analogous to the *rete murabile* of Cetacea, or the venous sinuses of fishes; and that they may also purify or modify the blood, somewhat like the spleen of higher animals. These bodies have been regarded as absorbents, a rudimentary portal system, a spleen, accessory branchiæ, blood-reservoirs, &c.; according to Von Siebold, (*op. cit.* p. 292,) they can now be positively regarded as kidneys, for by chemical analysis it has been found that they secrete uric acid. They consist of a tissue of contractile fibres, among which are branches of the venæ cavæ — the urine is secreted from the external surface, escaping into the peritoneal cavities. According to Harless, these appendages of the veins must be regarded as *everted* glandular follicles, the urine-secreting cells being situated externally and the bloodvessels within — a curious histological fact.

The skin is soft and tender. In the layer analogous to the rete mucosum are immense numbers of chromatic contractile cells, containing a coloring matter; in the Argonaut, these cells possess the greatest variety of color; by their contraction and dilatation, and by the action of the surface tissue producing the rapidly changing tints in the skin when exposed to the light.

The sexes are distinct, though the specimens usually found are all females, the males having been described as parasites until recently. The ovary is single, situated at the bottom of the visceral sac, consisting of a spherical capsule, and ovisacs attached to its internal surface, connected in bunches. The ova escape by a single opening into a short single passage, which divides to form the two oviducts, ascending with several convolutions to their widely separated orifices at the base of the branchiæ; there are no laminated glands, as in many genera, serving for the production of an external covering to the ova and for connecting them together; their ova are, therefore, connected by the secretion of the lining membrane of the long tortuous oviducts. The ova (of which the specimen showed great numbers, occupying a considerable portion of the shell,) are of an oval form, of the size of mustard-seed, connected in clusters by long filaments entangled together. According to Von Siebold (*op. cit.*) the shell is formed while the embryo, after its escape from the egg, is still persistent in the spawn inside the shell of its parent. Eggs have been found in very small shells, so that the power of reproduction must be very early developed. As to the position of the animal in the shell, which the advocates of parasitism maintain is not constant, Madame Power (*op. cit.*), from the examination of great numbers, says that the "relative position of the animal to its shell is always the same; when retracted, the visceral sac is lodged in the spine, the membranous arms to the right and left, the other six arms placed beneath the body in the middle; the mouth in the centre of the large aperture, the eyes being visible on the right and left through the sub-transparent shell; the siphon (funnel) resting on the open part of the keel, about two lines from its extremity;" this was the position of the specimen exhibited. According to Mr. Rang, when the Argonaut rises to the surface, it does so with the keel of the shell upwards, turning it downwards when it floats on the water; the shell being very light, it probably rises to the surface by means of its funnel and arms, in the manner of the other Octopods; when frightened, by retracting its six arms within the shell, and with the palmated ones embracing it outside, it can readily sink to the bottom, without any air-chamber such as is found in the Nautilus.

Lamark, Leach, Rafinesque, De Blainville, Broderip, Sowerby, Gray, and others, think the animal of the Argonaut is a parasite, the shell being formed by an inferior Heteropodous Mollusk, allied to *Atlanta* and *Carinaria* — and for the following reasons: there is no attachment by muscular or any other texture of the animal to its shell; it may voluntarily quit it, and in this condition was described by Rafinesque as the genus *Ocythoë;* it is not found in any regular position in the shell. These objections are answered by the facts in the case of Serpula, above mentioned; and, from Madame Power's numerous observations, it is evident that the position of the animal in the vast majority of cases is the same. Contrary to the analogy of other testacea, there is little or no correspondence in the disposition of the color of the Ocythoë and its shell; the external surface of the skin has the same epidermic covering as in the naked Poulp, and yet the shell has also its delicate epidermis in its natural state; the shell serves very little for the protection of the body, as its cavity is usually found more or less filled with eggs. Poulps were known to occupy shells parasitically for the deposition of their eggs, even by Aristotle. A naked Octopus has been found imbedded in a wooden pot which had been thrown overboard. Desjardins found a Poulp in the shell of a *Dolium;* so that this parasitic propensity is not peculiar to Ocythoë.

The advocates of non-parasitism — Cuvier, Duvernoy, Ferussac,* and D'Orbigny, and others — say that, from the time of Aristotle to the present day, the Argonaut shell has never been found with any other inhabitant than the Ocythoë; and, what is of greater weight, the Ocythoë has never been found in any other shell than that of the Argonaut — whereas the parasitic Hermit-Crab takes different shells as they fall in his way. The *A. argo, nodosa,* and *hians,* have each a different species of Ocythoë. The shell does not always contain eggs; Owen alludes to three instances in which it was exclusively and exactly occupied by the Cephalopod.

In addition to the structure and uses of the palmated arms, as already given, it may be mentioned that the nucleus of the shell has not been observed in the egg, it being formed posteriorly, as quoted from Von Siebold; the structure of the shell indicates secreting organs different from those of other Mollusks, which organs are the palmated arms, as will presently be seen. Young animals have been taken 300 leagues at sea, their shells still cartilaginous, with others adult; it is hard to believe that they have come this distance in search of a shell, and that they have not formed it themselves.

Van Beneden † observed two shells, broken in different places, which had been entirely repaired by a matter like the rest of

* Hist. Nat. des Céphalapodes Acetabulifères, Paris, 1835–48. The most complete account yet published on the Argonaut, and its allied genera — with plates.

† Nouv. Mémoires de l'Acad. Royale de Belgique, Tome XI. 1838.

the shell. De Blainville believes the Poulp of the Argonaut shell is a parasite; the exceptional expansion of one pair of the arms, he thinks, is for maintaining the animal in the shell by embracing its exterior, as the hooks of the Paguri, among Crustaceans, serve to fix the latter animals in their borrowed shells; while M. Rang sees in this arrangement a new argument in favor of non-parasitism. The parts found repaired were the middle of the sides, the lower free border, and near the back. In the first, the reproduced part had not the transverse ribs nor the striæ of increase; it was more convex than the shell, with a corresponding internal depression; it was produced beyond the broken surface, especially on the inside; laminated like plates of mica. By chemical reaction, the new was shown to be like the old shell; there being, however, less carbonate of lime according to the superficiality of the layer, the external having very little, and apparently serving for an epidermis — the part broken being thus reproduced like the formation of the entire shell, which at first is membranous.* In the reparation of the free edge there is the same polish as on the rest of this edge, as if it were covered with a layer of enamel. If the palmated arms can thus produce a polished surface on the border, as the Cypræa does over its whole shell by means of its mantle, it is a strong argument in favor of non-parasitism; for the supposed constructor of the shell allied to Carinaria, could in no way polish this surface. Is it probable, then, that an animal having no shell, should have an apparatus capable of secreting, in case of need, matter proper for repairing with similar tissue a shell not its own, and also of depositing a layer of enamel on the free border at the place where its palmated arms come out in order to embrace the shell? It can hardly be doubted that this Poulp is not only the *inhabitant*, but the *maker* of its shell.

It is very curious that among the great number of Argonauts examined by different naturalists, not a single male has been

* Dr. Warren has also a fine specimen of *A. nodosa*, in which a fracture of one side of the shell had been completely and beautifully repaired; and a specimen was exhibited showing the partial closing of a fracture by a thin membrane. This reparation, according to Madame Power, takes place with great rapidity; she has seen a large opening covered over by membrane in less than six hours.

found ; and yet the males must be very numerous, as almost all the Argonauts carry impregnated ova. In 1825, Delle Chiaje, at Naples, described and figured, under the name of *Tricocephalus acetabularis*, a small animal, supposed a parasite, on the Argonaut ; he placed it among the Helminthes or Trematode Worms, although it had a double row of suckers, by which it fixed itself to the skin of the Argonaut; similar animals were afterwards described by Cuvier under the name of *Hectocotylus*. Dujardin seems to have been the first to perceive the true position of these animals, thinking them parts detached from a Cephalopod for purposes of fecundation. In 1842, Koëlliker advanced the opinion that these animals were the *males* of the Cephalopods on which they were found. He maintained * that they have arteries and veins, a heart and branchiæ ; that they have the same spermatozoa, contractile pigment-cells, suckers, and remarkable arrangement of the muscular fibres, as exist in the Cephalopods on which they are found ; that they are all males, and live in the neighborhood of the female organs ; and (what is probably not true) that the embryos found in the eggs of some Octopods exactly resemble them.

Von Siebold (*op. cit.* Book 11), following Koëlliker, considers the Hectocotylus as the male of an Octopod, though he differs from him in regard to certain points of their structure. Both of these authors have fallen into errors which have been corrected by M. M. Verany and C. Vogt,† the latest writers on the subject, to whom we must refer for details and figures ; the latter consider the Hectocotyli, not as *stunted males*, but as *detached arms* of Cephalopods organized in a special manner, having neither the intestine nor the heart indicated by Koëlliker. M. Verany found in the Mediterranean an Octopus which had, in the place of the right arm of the third pair, a vesicle implanted on a small pedicle furnished with suckers ; on other specimens, this arm was abnormal, instead of a vesicle, the pedicle supporting a very large arm terminated by a globular body resembling the Hectocotylus of Cuvier ; this abnormal arm was easily detached, and

* Trans. of the Linnean Society, Vol. 20, London, 1846, pp. 9–21.

† Annales des Sciences Naturelles, Tome 17, 1852, Paris, pp. 147–188.

its terminal sac contained the white thread (*fouet*), a part of the male generative organs.

There are, then, *male* Argonauts, but so very small that they have been mistaken for embryos still carrying the umbilical vesicle; this supposed vesicle of the embryo was one of the transformed arms of the adult animal, containing the so-called Hectocotylus. (Figures of the adult male Argonaut were exhibited, of the natural size, not quite an inch in length, while the adult female is from six to eight inches long.) H. Müller, who first discovered the male Argonaut, says that it has no shell; neither has the female, according to him, when of the same small size; the arms are all pointed, not having the palmated appendages of the female.*

Below the venous appendages are the male organs of generation, consisting of a testicle, vas deferens, a receptacle in the shape of a bottle, and an ejaculatory duct by which the spermatophore is expelled during copulation. The greatly developed arm, above alluded to, has for its axis a cylindrical muscular tube, continued beyond the suckers into a long thread-like body (*fouet*), usually concealed in the terminal sac; in the middle is a bloodvessel and a series of nervous ganglia, mistaken by Koëlliker for the intestine and its contents; at the base of the arm is a sac in which the seminal apparatus is contained.

A figure of a Hectocotylus, or one of these detached arms of the male Cephalopod, was exhibited, in which was seen the pedicle on which it is implanted and from which it is very readily detached; oval below, more pointed and truncated above, terminating in a sac containing the *fouet*, or in this organ unrolled and as long as the arm; it has two rows of suckers. The separation of these arms takes place without laceration, naturally, and the pedicle which remains undoubtedly reproduces the arm, as in the case of the deciduous horns of Ruminants. The sac

* [In the *A. geniculata*, Gould, the shell is unknown; it is stated (*op. cit.*) "that there was no impression on its surface answering to the folds of a shell, so that it had not very recently, if ever, occupied one." M. Rang is of opinion (see Ferussac and D'Orbigny) that the shell is formed by the *female* Argonaut for the protection of her eggs; and that, perhaps, the male has no shell — this point requires further investigation.]

at the base of the detached arm does not contain the testicle, with its excretory and ejaculatory ducts and penis, as supposed by Koëlliker and Von Siebold; these organs are situated in the usual position of other male Cephalopods; the seminal apparatus, or spermatophore, formed in the internal organs, is transplanted from the respiratory cavity into the sac at the base of the Hectocotyliform arm; which, being thus charged, is detached periodically from its pedicle, and attaches itself to the female, probably during the act of copulation, which is known to take place between other Cephalopods; by means of its suckers it creeps to the female genital openings, where the spermatophore fulfils its mission.

H. Müller,* in a paper on this subject, observes: "It is then proved that the Hectocotylus is formed on a male *Argonauta*, and is nothing but an arm metamorphosed in a very irregular manner." This is certainly a very curious fact, occurring in a class of animals whose reproduction takes place in the usual way in most of its genera, but in these few in strange contradiction with the supposed established laws of Zoölogy.

The fossil *Aptychus*, which is now admitted to be the internal shell of a Cephalopod, receives some illustration from the developments in regard to *Hectocotylus*. Von Siebold (*op. cit.* p. 274) says that, if the relations of the latter to certain Octopods be borne in mind, the idea of Alexander Braun, that the *Aptychus* may have been the male of certain *Ammonites*, merits consideration. If they be considered abortive males, sheltering themselves in the mantle of the females, this would explain why they are so often found at the base of the first chamber of Ammonites. It is also possible that the fragment of a Mollusk, found by Quoy and Gaimard at the Celebes Islands,† may be the Hectocotylus of the long-sought male of *Nautilus pompilius*.

Dr. J. N. Borland presented a specimen of *Scaphiopus solitarius*, Holbrook, a reptile common to Alabama and Tennessee, but, until recently, almost unknown here. The specimen was taken by Prof. Jeffries Wyman, from

* Annales des Sciences Naturelles, Tome 16, 1852, p. 132, Paris.
† Annales des Sciences Naturelles, Tome 20, 1830, p. 470, Paris.

a pond which in summer is dry, near his residence in Cambridge.

According to Dr. Holbrook, the animal is solitary in its habits throughout the year, except during the copulating season, which is in the early spring, when it takes to the water. It commonly lives in moist places, in holes, a few inches or more beneath the surface of the ground, which it excavates by means of the little digging plates attached to the hind feet. In this habitation it quietly waits for its insect-prey.

Prof. Wyman gave some account of observations on Scaphiopus which he had recently made. As already stated by Dr. Borland, it is very rarely found in this section of the country, having been previously noticed in only one locality, viz: in Danvers, by Dr. Andrew Nichols, whose very interesting account of it was published in the Proceedings of the Essex Institute of Salem.

The first specimen observed by Prof. Wyman was dug up in his garden in Cambridge about a year since. In the latter part of April of the present year, he obtained about thirty specimens from a small pond in his neighborhood, where they were congregated for the purpose of depositing their eggs. Those noticed by Dr. Nichols were not found in the water till July, and then in a small pond which was formed after a long rain, and which had only a temporary existence. This shows, in the two cases, a wide difference in the season in which the eggs are deposited.

While copulating, the Scaphiopus grasps the female round the pelvis and not under the axilla as do the frogs and toads. The sexual impulse in the males is very powerful, and under its influence they attach themselves to toads and frogs, if they happen to come in their way; or if one of them is removed from the female, and the finger is placed beneath the male, it is at once so firmly grasped that he may be lifted out of the water before relaxing his hold. In almost every instance observed by Dr. Wyman, the under surface of the abdomen of the female was more or less ulcerated or abraded, in consequence of long-continued pressure from the grasp of the male. In one instance, where a male Scaphiopus was united to a female toad, the latter deposited her eggs; these very soon began to shrivel and very rapidly underwent decomposition.

In swimming, the Scaphiopus does not strike the water with the right and left legs simultaneously, but, like the turtles, by alternate strokes.

The Scaphiopus is nocturnal in its habits, passing the day deeply buried in the earth; which is doubtless the explanation of its not having been more frequently observed. The process of burrowing resembles that of the toad, the earth being scraped away by thrusting out the feet laterally; these being provided with a broad and horny ridge, which serves as an excavator. As fast as the earth is removed, the body is thrust backwards into the hole. The pelvis of this animal is very loosely articulated with the sacrum, so as to move very freely backward and forwards upon it, as was observed while the animal was making its excavation, as well as on dissection.

Dr. Wyman also stated that nearly all the eggs of Scaphiopus, frogs, and toads, deposited in the latter part of April, in the pond above referred to, were destroyed by a parasitic fungus. Only a small number of these and those which were deposited a few weeks later, came to maturity, the larger part perishing before the embryo was able to leave the egg; and some of them were attacked after the tadpole was sufficiently developed to swim around. The development of the fungus preceded the death of the embryo.

Dr. A. A. Hayes asked if any cases of poisoning of animals had been met with from parasitic growths upon their food. He had recently seen several cases of sudden death in horses, where no traces of poison could be detected in the stomach. The food, however, in these instances, which consisted of grain which had been damaged by water, was covered with a parasitic vegetable growth.

Mr. C. J. Sprague stated that a specimen of *Equisetum arvense*, (Horsetail,) was handed him a few weeks since by Dr. C. T. Jackson, and it was asserted that this plant had been the cause of the death of a number of horses recently in Vermont.

Prof: Wyman read an extract from a letter of Mr.

Robert Howell, proposing an exchange of fossils for a copy of the Society's Journal. The subject was referred to the Curator of Geology.

Dr. Kneeland announced a bequest, by the late president, of a skeleton of a Chimpanzee, an incomplete set of the bones of a Dromedary, and a number of casts of remains of the Iguanodon, Dinornis, Hylæosaurus, Gavial, and Zeuglodon, and the lower jaw of a Mastodon.

A collection of Birds and Reptiles, sent by Mr. Samuels from California, was exhibited, and a sixth letter from Mr. S. read to the Society. A letter from Prof. Baird, of Washington, and a list of the specimens, also accompanied the collection.

Mr. Sprague exhibited a brush, made of the fibres of the Mexican Aloe, a material apparently capable of replacing the bristles commonly used in the manufacture of brushes.

Mr. N. H. Bishop presented several crystals taken from the surface of the earth in South America.

The Secretary stated that he had made a hasty qualitative chemical examination of them, and had found them to be composed of Sulphate of Soda and Sulphate of Magnesia, with a trace of Chlorine.

The specimens were referred to Dr. A. A. Hayes for a thorough analysis.

The Corresponding Secretary announced the reception of the following letters, viz: —

From the Smithsonian Institution, February 16 and March 11; — Western Academy of Natural Sciences, February 12; — Geological Society, London, November 22, 1855; — Entomological Society, London, December 5, 1855, acknowledging the receipt of the Proceedings of the Society; — Der Verein für vaterländische Naturkunde in Würtemberg, December 29, 1855, acknowledging receipt of Proceedings and presenting its own publications; — Academia di Bologna, May 26, 1855, presenting its publications and other valuable books; — George B. Blake, Esq., in reply to the vote of thanks passed at the meeting of the Society April 2.

June 4, 1856.

ADJOURNED ANNUAL MEETING.

Dr. Chas. T. Jackson, Vice-President, in the Chair.

The Committee appointed to audit the accounts of the Treasurer, reported that they had made their examination, and found the accounts correctly cast and properly vouched. The report was accepted.

The Committee appointed at the last meeting to nominate a candidate for the office of President, were further instructed to report the names of two or more persons as candidates for this office, at an adjourned meeting; and it was also voted that the meeting, when adjourned, should be adjourned to the time of the next regular meeting, to hear and act upon the report of said Committee.

A seventh letter was read from Mr. E. Samuels, giving a list of objects collected in California since his last account.

Dr. Brewer called the Society's attention to the fact that Mr. Samuels's letter mentions that he had obtained two specimens of California Red-tailed Hawks, shot on their nests, with their eggs.

This is an interesting and important acquisition, and may at last enable us to determine with certainty a disputed point in our ornithology, and to remove whatever confusion still remains. There are three varieties of North American hawks, each of which is probably a distinct species, in regard to which some confusion has prevailed. These are the common Red-tailed Hawk of the Atlantic States, (*Buteo borealis*,) *B. Swainsoni*, and the California Red-tail, described by Nuttall as *B. montanus*. The last has only recently been admitted to be a good species. In regard to all three there has been some difficulty in determining their specific distinctions, and they have been more or less confounded by writers. Mr. Audubon gives for the *B. Swainsoni* a figure of the Red-tail, and Mr. Cassin, in his Synopsis of the Birds of Prey accompanying his illustrated work, confounds the Western Red-tail with Swainson's Buzzard. Soon after its publication, having an opportunity to examine three genuine specimens of the latter, he is convinced of their distinctness, and that he had till then never seen a genuine *B. Swainsoni*. In the same paper, however, Mr. Cassin expresses the belief that there is no specific difference between the eastern and western Red-tailed Hawks. This opinion, however, he has since recalled. His attention having been called to differences in their eggs, in the cries of the bird, and finding also constant differences in their plumage, he has since admitted the Western bird to be a distinct species, to which Mr. Nuttall's name of *Buteo montanus* belongs. Mr. Samuels's specimens of the birds and eggs will, without doubt, afford satisfactory evidence of the correctness of these conclusions, and determine this interesting question beyond further doubt.

Dr. Kneeland presented, in the name of Dr. James C. Parkinson, of Bridgeboro', New Jersey, descriptions of two new Argonauts, *A. Conradi*, and *A. fragilis*.

A. Conradi. — Oblong ovate, surface minutely granulated, the granulations being chiefly in the grooves between the ribs, and on the tubercles : very few on the ribs. Sides convex toward the carinæ, plane toward the lip. Ribs rather distant, except on the umbo : broad, elevated, except anteriorly, where they become nearly obsolete ; straight, entire, not furcate ; long and short ribs alternating. Back broad, anterior and posterior third convex ; middle third concave, anterior third, studded with small tubercles. Tubercles on anterior and posterior thirds of carinæ small, nearly obsolete: on the *middle third of each carina, seven very large tubercles*, broad at the base ; compressed laterally near the apex ; terminating in an acute edge, curving outwardly. Sinus furnished with a thick callus continued to the margin of the lip. Lips convex. Aperture subquadrate oblong ; narrowing somewhat anteriorly. Angles acute ; spineless ; everted. Anterior half of the shell milk white, except near the sinus, where it is pale purple ; posterior half pale fuscous. Subsinus, carinæ, and large tubercles, dark fuscous ; a white, longitudinal, central line running through it, between carinæ. Anterior half of shell polished, remainder dull.

Length, $2\frac{3}{8}$ inches. Breadth, $1\frac{1}{4}$ inches. Aperture : length, $1\frac{1}{4}$ inches ; width, 1 inch. Obtained at New Nantucket, Pacific Ocean.

I have named this shell after the distinguished T. A. Conrad, whose labors in the Testaceological field are well known and universally appreciated.

No. 2. *A. Fragilis.* — Oblong ovate, very thin, frail, sides smooth, without granulations, having numerous opaque, minute milk-white spots distributed over them ; ribs numerous, interrupted, a few entire ; subfurcate, somewhat waved. Back narrow, flat. Tubercles many ; rather small ; generally of a size. Sinus large, furnished with a callus, which is attenuated towards the edge of the lip, *and is carried across the base of the aperture, from one sinus to the opposite, in a flattened arch ; upon this arch rests one side of the nucleus of the shell ; which is* NOT INVOLUTED *like other species, but rises in a cylindrical form, a half inch above the arch from which the inner side springs ;* it has much the appearance, in shape, of the end of the finger of a glove. Around this cylinder are a number of lines of growth ; otherwise it is smooth, somewhat waved, and destitute of tubercles for the distance of $\frac{3}{4}$ inch from the apex ; lips convex. Aperture, ovate oblong.

Color white, except the apex and posterior half of nucleus which is fuscous, posterior half of carinæ are also of the same color, with a white, central, longitudinal line running along the centre. Angles, which are rounded in the adult, acute in the young shell, somewhat everted, pale, purplish brown. Shell translucent.

Length, $2\frac{1}{4}$ inches. Breadth, $1\frac{3}{4}$ inches. Aperture: length, 2 inches; width, $1\frac{1}{2}$ inches.

Dr. Kneeland also presented, in the name of Dr. Parkinson, an uncommonly large and perfect shell of *Nautilus pompilius*, very much larger than any in the Society's cabinet.

Also, a very curious insect from the Sechelles Islands, called the "leaf-fly," or the "fly-leaf," "*la mouche feuille*." He read the following description of the insect from the "Mauritius Watchman," of the 8th of January, 1845: —

"Among the insects of this Archipelago, none is more remarkable than the *mouche-feuille*, as it is very appropriately named. The male and female insects differ considerably in appearance; and it is the latter only which deserves the foregoing title. The male is about an inch and a half long, and possesses some slight resemblance to a grasshopper in the form of the head and horns, nor is the body unlike that of that insect. The wings are of an exceedingly weak gauze-like texture, of a very pale green color, and are rather shorter than the body. Their powers of motion are extremely limited, being confined, as far as our observation has extended, to a slow and feeble walk. We have never seen them attempt to fly, nor do they appear to possess any instinct of danger.

"They delight principally in the Badamier, a tree which flourishes remarkably well at Sechelles. To the leaf of this, the female insect bears a most astonishing resemblance. The entire length is from an inch and a quarter to two inches, and the breadth in the widest part about an inch and a quarter. The head might easily be mistaken for the broken stalk of the leaf, to which the neck bears a perfect resemblance. The wings present the exact form and color of the young leaf, and the veins which traverse them have precisely the appearance of the ribs of the leaf. A kind of suture which seems to unite the wings in the centre, though they are really detached, presents a ridge perfectly analogous to that of the leaf stalk. The legs are flat, and of such a form as closely to resemble those little abortions of leaves which are frequently found on the Badamier. Another remarkable circumstance is the change of color which these insects undergo. As the leaves on which they feed wither, they lose their bright green color, and become yellow; whether they resume their green color with the leaves or not, is not known. No insect is more harmless and defenceless than this; their sole safety consists in their escaping observation by the close resemblance to the plant on which they feed. Their greatest enemies are ants, which prey upon them with great avidity, cutting out pieces of their wings and carrying them off, until the poor insect is completely dismembered. They seem sensible of no pain during this attack, for we have repeatedly seen ants eating the wings, while the fly continued its own repast on the badamier leaf without interruption; nevertheless, death ensues. They eat in the same way as caterpillars, cutting in a circular direction, but they are far from being so voracious as these insects. They drink frequently, plunging their mouths into the dew-drops, and drinking by suction.

"The *mouche-feuille* attains its full growth in about four months, and then begins to lay, and deposits an egg daily for about three months, when it dies. The eggs are of a dark brown color, and much resemble in shape the *Carambole*, but with a little knob at each end. They are about three lines in length, and one and a half in diameter at the largest part. In from eighty to ninety days the young are hatched, and are then of a reddish brown color, nearly an inch long, and perfectly flat, without any appearance of wings. It seems incredible that an insect of such a size could have been contained in such an egg. As they grow, the color gradually changes, and the wings appear, but we are unable to detail minutely the stages of their growth; but we believe it to differ from that of almost every other insect in that they do not change their skin. They were formerly found in all parts of the islands, but are now rarely met with except in Silhouette."

This genus has been called *Phyllium* by Illiger and Westwood; and *Mantis* by Fabricius and Donovan.

Dr. Durkee exhibited three living specimens of *Elater noctilucus*, or Lightning Spring-beetle, brought from the Island of Cuba, eight weeks since.

Dr. Zabdiel B. Adams was elected a Resident Member.

June 18, 1856.

ADJOURNED ANNUAL MEETING.

Prof. Jeffries Wyman in the Chair.

The Committee on nomination of a candidate for the office of President, presented a report, in accordance with their instructions at the last meeting. The report was read and accepted.

It was voted to defer the balloting for a President until the hour of 9 o'clock.

Mr. T. T. Bouvé read a letter from Dr. James Deane, of Greenfield, requesting the loan of specimens of fossils, to aid him in the preparation of his work on the fossils of the Connecticut Sandstone.

It was voted that the Curator of Geology be empowered to loan Dr. Deane such specimens as he might desire.

An eighth letter was read from Mr. E. Samuels, accompanied by a list of specimens sent from California.

Dr. Brewer read a letter from Mr. Robert Kennicott, of West Northfield, Cook Co., Illinois. Mr. K. proposes to exchange fossils, reptiles, birds, and fishes for a copy of the Journal of the Society.

It was voted that a copy of the Proceedings, and of such numbers of the Journal as are not scarce, be forwarded to Mr. Kennicott in consideration of his proposed exchange.

Dr. Brewer called attention to an interesting fact noticed by Mr. Kennicott, viz: that *Plotus anhinga* (Snake Bird) is found in Illinois; also that the Wood Ibis (*Tantalus loculator*) is common in Southern Illinois, where it probably lays its eggs. Mr. Kennicott saw the latter bird frequently near Cairo, in August and September of last year.

At the meeting of May 21, Mr. N. H. Bishop presented samples of a peculiar crystalline salt which he had brought with him from South America. Mr. Bishop's account of this peculiar mineral is as follows: —

It is found mixed with the soil in greater or less abundance, from San Luis de la punta, (a town on the western side of the pampas of the Argentine Republic, where the grass plains properly end, and the *travesia* or desert commences,) to the foot of the Andes.

San Luis lies in Lat. 33° 16′ S., Long. 66° 27′ W., and is the capital of the province of the same name. From this town, westward, the soil is almost worthless, until the River Mendoza is reached, where irrigation commences.

The soil is very light and dry, not compact in the least. This is probably caused by the dryness of the atmosphere and absence of water; for when Mr. Bishop crossed that part of the country, they were obliged to purchase water that had been caught in holes for the use of cattle. Stones are rarely met with; where they do exist, at the base of the Andes, he did not observe the existence of this salt. There are several spots on the *travesia*, between San Luis and Mendoza, furnishing a poor quality of grass, which is fed upon by the cattle which are driven across the continent to the coast. With the exception of these spots, the country between the above-named towns, and extending many leagues to the north and south, is a dreary desert, covered with a low growth of thorn bushes and a few species of gnarled trees, some of which bear pods.

This substance penetrates the earth from a few inches to a couple of feet. It is particularly abundant at certain places east of the town of San Juan, where the ground is covered with a thin incrustation. It is here exceedingly painful to the eyes from the reflection of the sun's rays, and the inhabitants are constantly affected with inflammation of the eyes.

The method of treating the soil by the natives is very simple. The water is conducted from the rivers Mendoza and San Juan (which take their rise in the Cordillera) through a sequia or canal, around squares of level land, at irregular intervals of time, and, to use their own expression, they *wash off the salitre.* Then a plough, constructed of two pieces of wood, is brought into service, and turns up from six to eight inches of the soil, which goes through the same washing process as the first. After two or three repetitions of this operation, a shallow soil is obtained, partially free from *salitre*, in which wheat, clover, pumpkins, melons, etc., are raised. The remaining *salitre*, according to the belief of the natives, is exhausted by successive crops, and after several years of tillage, the soil is suitable for the vine. Oranges, peaches, quinces, olives, figs, etc., flourish. Within a few years, large tracts of land have been made exceedingly fertile by the process above described, and could the New England plough be introduced there, the process would be far more valuable.

Dr. A. A. Hayes, communicated the following as the results of his analysis of the saline mineral, presented by Mr. Bishop : —

The specimen was a white, crystalline solid, formed by the union of two layers of salt, as often results from the evaporation of a saline solution, when the pellicle formed on the surface falls to the bottom. Along the line of junction, crystal facets are seen, but the forms are indistinct. These crystals readily scratch calc spar, and dissolve without residue in water, affording a solution, which, by evaporation at 150° F., leaves the salt with some of the original physical characters. It readily parts with a portion of water by heat, and when the temperature is raised to redness, it fuses quietly into a transparent, colorless, anhydrous fluid ; on cooling, an opaque, white, crystalline solid remains. In this climate the specimen attracts moisture, and therefore has not a fixed amount of water constituent.

It consists of water, sulphuric acid, soda, magnesia, chlorine. Mixed with it are traces of crenate of iron and lime, with sandy grains of earth.

One sample afforded —

Water	16.420
Sulphuric acid	49.658
Soda	23.758
Magnesia	9.904
Chlorine	.260
	100.000

Three fragments from different masses were taken, and the following substances found : —

Water	16.42	18.84	19.60
Sulphate of Soda	48.00	45.82	45.74
" Magnesia	34.20	33.19	33.31
Chloride Sodium	1.21	1.79	1.16
Crenates Lime and Iron with Silicic Acid	0.17	0.30	0.13
Sand	——	0.06	0.06
	100.00	100.00	100.00

The varying amounts of water given, are illustrative of the absorptive power of the salts in the atmosphere of this place. Dried at 90° F., the amount of water was 15.20 in 100 parts, which exceeds by four parts, the proportion necessary to form proto-hydrates of the two salts present.

Analysis does not show the two sulphates to be in definite proportions in the masses, but the crystals may be a double salt, composed of one equivalent of sulphate of soda, and one equivalent of sulphate of magnesia; each retaining an equivalent of water. In the masses, the closest approximation is 42 parts of sulphate of magnesia found, instead of 46 parts required.

The communication of Mr. Bishop embraces interesting facts. These saline deserts cover extended areas, in different parts of South America, and, so far as he has been able to learn, the saline matter differs in kind at the different points. The tendency of saline matter contained in any soil is to rise through the aid of moisture to the surface, where, the water escaping, the salt is deposited. This effect, contrary to the gravitating influence, is the most common cause of deserts, and may be exerted everywhere, when the evaporation of water from a given surface becomes much greater in amount than that surface receives in the form of rain and dew. The cultivation of saline deserts by washing down the saline matter, exhibits the opposite action of water in restoring fertility, and it is by no means essential that the water should contain organic matter to insure the full effect, as the soil of deserts generally contains all the organic matter of many years' accumulation.

Dr. Wyman made a few remarks on some of the habits of the painted tortoise (*Emys picta*) during the breeding season, which he had recently observed.

Dr. Wyman also gave some account of the development of the dorsal cord in the Alewive, (*Alosa vernalis.*)

The dorsal cord has been generally described as terminating anteriorly between the auditory capsules, and, in consequence, it has been inferred that the true vertebral column does not extend beyond the basilar portion of the occiput; and that the occiput is the only part of the cranium which has a vertebral structure. In the Alewive, he had seen the dorsal cord, in the earlier specimens, uniformly extending as far forwards as the space between the eyes, and consequently into the region of the anterior sphenoid; subsequently, as the face is enlarged, the anterior part of the cranium seems to be carried forwards, and then the dorsal cord is seen between the auditory capsules only. If the dorsal cord is to be regarded as an index of the extent of the parts considered serially homologous with vertebræ, then it may be inferred that the vertebral column extends originally through the base of the cranium, and consequently that the cranium conforms to the vertebral type.

Dr. Wyman also gave some account of the habits of the Alewive in depositing its eggs, as observed in Fresh Pond, in Cambridge.

The eggs are about $\frac{1}{30}$ of an inch in diameter, and are laid in April and June in the greatest abundance; the localities selected being usually gravel or sandy bottoms, but sometimes they are laid among small stones, and in five or six inches of water. The alewives move ordinarily in small shoals along the borders of the pond, but varying from two or three to very numerous pairs. The males follow the females very closely, and when entering a small shallow cove, often some of the number are pressed entirely out of the water on the shore.

The Corresponding Secretary announced the receipt of the following letters, viz: —

From the Royal Society of London, March 8, 1856, acknowledging the receipt of the Society's publications; das Bibliothekariat der K. Bayerischen Akademie der Wissenschaften, January 12, 1856, acknowledging the same, and presenting various works; from the same, January 20, 1856, asking for duplicate copies of all works presented by the Society, and offering to reciprocate with its own publications; die K. Akademie der Wissenschaften, Wien, November 1, and December 30, 1855, presenting its publications; der Zoölogisch-botanischer Verein, Wien, December 12, 1855, presenting Vols. 3 and 4, and parts 1, 2, and 3 of Vol. 5 of its Transactions, and inquiring as to the reception of Vols. 1 and 2; George Frauenfeld, Wien, December 12, 1855, presenting publications of his own and asking an exchange on the part of the Society.

Dr. Brewer announced the second arrival of specimens, principally of Birds, Plants, and Eggs, from California, collected by Mr. Samuels, and forwarded by the Smithsonian Institution, accompanied by a catalogue by Prof. Baird.

After some remarks by the chairman upon the advantages and feasibility of summer excursions into the country and to the seashore, for the study and collection of objects of natural history, it was voted that a committee be appointed to take into consideration the subject of such excursions ; and Messrs. Bouvé, Binney, and Brewer were chosen this committee.

The hour appointed for the choice of a President having arrived, Messrs. Ellis and Binney were appointed a committee to collect and count the votes, and after the first ballot, Professor Jeffries Wyman was declared unanimously elected.

Prof. Wyman hesitated in accepting the office thus tendered to him, expressing great diffidence in his ability to serve the Society acceptably in the capacity of President, at the same time signifying his willingness to promote its welfare in any way that lay in his power. He thought he could do this better in his private capacity than as its presiding officer.

Several gentlemen having urged in the most emphatic manner the acceptance of the office so cordially offered him, Prof. Wyman begged the Society would allow him time for consideration on the subject.

Mr. Benjamin J. Jeffries was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 16, 1856. A very valuable donation of Australian Birds, Mammals, and Fossils, made by the Government Museum of Natural History, at Melbourne, upon the suggestion of Oliver H. Holden, Esq., of that city, formerly a resident of Boston, as follows : *Cincloramphus rufescens*, Rufous-tinted Cincloramphus, male and female; *Larus Pacificus*, Great Pacific Gull; *Trichoglossus Swainsonii*, Blue Mountain Parrot, male and female; *Porphyrio melanotus*, Black-backed Porphyrio, male and female; *Casarka tadornöides*, Chestnut Shieldrake, or Mountain-duck, male ; *Spheniscus minor*, Little Penguin; *Lestris catarractes*, Skua Gull; *Ardea Novæ Hollandiæ*, White-fronted Heron; *Recurvirostris rubricollis*, Avocet, male and female ; *Eöpsaltria Australis*, Yellow-breasted Robin, male and female; *Xema Jamesonii*, Jameson's Gull; *Lobivanellus lobatus*, Spur-winged Plover, or Alarm-bird; *Hæmatopus longirostris*, White-breasted Oyster-catcher; *Spatula rhynchotis*, Australian Shoveller, male; ——— ——— Little Teal; *Malacorhynchus membranaceus*, Pink-eyed Shoveller; *Spatula rhynchotis*, Shoveller, female; *Schœniclus magnus*, Great Sandpiper; *Anas punctata*, Chestnut-breasted Duck; *Petroica multicolor*, Scarlet-breasted Robin, male and female ; *Himantopus leucocephalus*, White-headed Stilt ; *Jeracidea berigora*, Brown or Eastern Coast Hawk; *Bernicla jubata*, Wood Duck, male and female; *Nycticorax Caledonicus*, Nankeen Bird; *Biziura lobata*, Musk Duck, male and female; *Anas superciliosa*, Australian Wild Duck; *Athene (?) connivens*, Winking Owl; *Cuculus inornatus*, Unadorned Cuckoo ; *Rallus pectoralis*, Cuv., Pectoral Land Rail; ——— ———, Little Scrub Pigeon; *Peristera chalcoptera*, Bronze-winged Pigeon ; *Cacatua galerita*, White Cockatoo ; *Dacelo gigantea*, Laughing Jackass; *Gymnorhina leuconota*, White-backed Magpie; *Strix delicatulus*, Delicate Owl; *Hemipodius varius*, Painted Quail, male and female; *Cygnus atratus*, Black Swan, 2; *Schœniclus Australis*, Australian Tringa; *Entomyza cyanotis*; Blue-faced Entomyza; *Colluricincla harmonica*, Harmonious Colluricincla, female; *Phalacrocorax carboïdes*, Common Cormorant; *Cthonicola minima*, Little Cthonicola; *Myzantha garrula*, Miner; *Euphema aurantia*, Orange-bellied Grass-Parrakeet; *Acanthogenys rufogularis*, Spiny-cheeked Honey-Eater; *Tropidorhynchus corniculatus*, Friar Bird; *Rallus Lewinii*, Lewin's Water-Rail; *Platycercus Pennantii*, Lory ; *Anthochæra carunculata*, Common Wattle-bird; *Amadina Lathamii*, Spotted-sided Finch; *Cthonicola minima*, Little Cthonicola, 2; *Trichoglossus concinnus*, Red-eared Lorikeet (?) ; *Ptilonorhynchus holosericus*, Satin Bower-Bird, female; *Platycercus eximius*, Rosella Parrot ; *Pachycephala pectoralis*, Banded Thickhead, female; *Graucalus mentalis*, Summer Bird, male; *Alcyone azurea*, Azure Kingfisher; *Euphema pulchella*, Chestnut-shouldered Grass-Parrakeet, female; *Pomatorhinus temporalis*, Temporal Pomatorhinus; *Pachycephala glaucura*, Grey-tailed Pachycephala; *Petroica phœnicea*, Flame-breasted Robin, female; *Gymnorhina organica*, Grey-backed Magpie; *Seisura inquieta*, Razor-Grinder; *Cysticola isura*, Square-tailed Warbler; *Cinclosoma punctatum*, Spotted Ground-Thrush, female ; *Artamus sordidus*, Common Wood-Swallow; *Cinclosoma punctatum*, Spotted Ground-Thrush; *Sericornis citreogularis*, Yellow-throated Sericornis; *Pachycephala glaucura*, Grey-tailed Pachycephala, male; *Ptilotis fuscus*, Fuscous Honey-Eater; *Cuculus insperatus*, Brush Cuckoo; *Cracticus destructor*, Butcher Bird; *Colluricincla harmonica*, Harmonious Colluricincla; *Collocalia arborea*, Tree Martin ; *Petroica phœnicea*, Flame-breasted Robin ;

Stipiturus malachurus, Emu Wren; *Glyciphila fulvifrons*, Fulvous-fronted Honey-Eater; *Aprosmictus scapulatus*, King Lory, young male; *Halcyon sanctus*, Sacred Halcyon; *Rhipidura mosacillöides*, Black Fantailed Flycatcher; *Sericornis osculans*, Allied Sericornis; *Trichoglossus pusillus*, Little Stringy Bark Parrakeet; *Anthus Australis*, Australian Pipit; *Anthochæra lunulata*, Little Wattle-Bird; *Micrœca macroptera*, Great-winged Micrœca; *Chrysococcyx lucidus*, Bronze-winged Cuckoo; *Pachycephala pectoralis*, Banded Thickhead, male; *Rhipidura mosacillöides*, Black Fantailed Flycatcher; *Lathamus discolor*, Swift Lorikeet, male; ditto, female; *Ptilotis leucotis*, White-eared Honey-Eater; *Anthochæra lunulata*, Little Wattle-Bird; *Ptilotis leucotis*, White-eared Honey-Eater; *Oriolus viridis*, New South Wales Oriole, male; ditto, female; *Micrœca macroptera*, Great-winged Micrœca; *Chrysococcyx lucidus*, Bronze-winged Cuckoo; *Anthus Australis*, Australian Pipit; *Ptilotis auricomis*, Yellow-tufted Honey-Eater; ditto; *Melithreptus* ——— ——— Honey-Eater; *Pardalotus punctatus*, Spotted Pardalote, male and female; *Estrelda temporalis*, Red eyebrowed Finch, male and female; *Pardalotus striatus*, Striated Pardalote; *Rhipidura albiscapa*, White-shafted Fantail, male and female; *Sitella chrysoptera*, Orange-winged Sitella; *Malurus cyaneus*, Blue Wren; *Acanthiza uropygialis*, Chestnut-rumped Acanthiza; *Zosterops dorsalis*, Grey-backed Zosterops; *Falcucunlus frontatus*, Fronted Shrike Tit, male and female; *Acanthiza nana*, Chestnut-throated Acanthiza; *Climacteris erythrops*, Red-eyebrowed Tree-Creeper; *Acanthorhynchus tenuirostris*, Slender billed Spine-Bill; *Melithreptus lunulatus*, Lunulated Honey-Eater; *Dicæum hirundinaceum*, Swallow Dicæum; *Ptilotis penicillatus*, White-plumed Honey-Eater; *Acanthiza chrysorrhœa*, Yellow-tailed Acanthiza; *Ptilotis chrysops*, Yellow-faced Honey-Eater; *Meliphaga Australasiana*, Tasmanian Honey-Eater; *M. Novæ Hollandiæ*, New Holland Honey-Eater; *Acanthiza lineata*, Striated Acanthiza; *Pelecanus conspiccillatus*, Australian Pelican.—*Mammals:* Brush-tailed Opossum, White Native Cat, Kangaroo Rat, Wallabee, Kangaroo, Common Bat, and Young Bandicoot, and a parcel of Fossils from Flemington.

A collection of fifty-four species of Land Shells; by Dr. John Gundlach, of Havana. A Crustacean from St. Simon's Island, Georgia; by Dr. James C. Parkinson, of Bridgeboro', New Jersey.

May 21st. A specimen of *Scaphiopus solitarius*, from Cambridge; by Dr. J. N. Borland. Two specimens of Emydes and two young Alabama Turtles; by G. W. Binney. A specimen of Sulphuret of Iron; Crystals of a compound salt of sulphate of soda and magnesia taken from the surface of the soil; and two eggs of *Athene cunicularia*, Burrowing Owl, all from South America; by Nathaniel H. Bishop. The body of a young Lion a few days old, and a Human Embryo; by Dr. S. Durkee. An Embryonic Buffalo; by Dr. S. Kneeland, Jr. Bequest of the late President, Dr. John C. Warren, as follows: A skeleton of a Chimpanzee, together with a set more or less complete of unarticulated bones of the Dromedary, and the casts respectively marked as follows: Femur and Metatarsus of the Dinornis gigas, New Zealand; Humerus of the Hylæosaurus; Toe bone (phalangeal) of the Hylæosaurus Mantelli; Toe bone (proximal phalangeal) of an Iguanodon; Toe bone of the hind foot of the Iguanodon; Coracoid bone of the Iguanodon; Horn of the Iguanodon; Four casts marked "Tooth of the Iguanodon;" Unguical or nail bone (distal phalangeal) of a foreclaw of the Iguanodon; Unguical or nail bone (distal phalangeal) of hind claw of the Maidstone Iguanodon; small bone of the toe of the hind foot of the Iguanodon; Cast of a claw bone (ungueal bone) of a Gavial; Lower Jaw of a Mastodon, and Casts of parts of a Zeuglodon.

June 4th. An uncommonly large and perfect shell of *Nautilus pompilius*, and a specimen of the Leaf-fly or Fly-leaf, from the Sechelles Islands; by Dr. James C. Parkinson, of New Jersey. A specimen of Agalmatolite; by Dr. C. T. Jackson. Two shells of *Bulimus undatus*, variety B. zebra; two eggs of *Sturnella militaris*, South American Meadow Lark, both from South America; by N. H. Bishop. The skull of an English Terrier Dog; by E. A. Samuels.

June 18th. Four specimens of *Salmo erythrogaster*, Lake Trout, from Moosehead Lake; by Dr. Augustus C. Hamlin, of Bangor. The skin of an animal, probably of the Jerboa kind, from Africa; by Rev. Louis B. Schwarz.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 31, 1856.

Memoir of Hon. Abbott Lawrence. By Hon. Nathan Appleton. 8vo. Pamph. Boston, 1856. *From the Author.*

Quæstionum Ionicarum Liber. Auctore J. F. Lobeck, Fasc. I. 8vo. 1850. Regimontii Pruss. *From the Author.*

Contributions to the Anatomy of the Invertebrata. No. 3. Terebratula flavescens. By Prof. Owen. 4to. Pamph. London, 1853. *From the Author.*

Army Meteorological Register for 12 years, from 1843 to 1854. 4to. Washington, 1855. *From T. Lawson.*

Description of a Skeleton of the Mastodon giganteus of North America. By John C. Warren. 4to. Boston, 1855. *From the Author.*

Jahresbericht der Naturforschenden Gesellschaft in Emden, fur 1854. 8vo. Pamph. Emden, 1855. *From the Smithsonian Institution.*

On the Sandstone Fossils of the Connecticut River. By James Deane, M. D. 4to. Pamph. 1856. Philadelphia. *From the Author.*

Personal Observations in Victoria. By W. Von Blandowski. 8vo. Pamph. Melbourne, 1855. *From the Author.*

Acadian Geology. By H. W. Dawson. 8vo. Edinburgh, 1855. *From the Author.*

Transactions of the Illinois State Agricultural Society. 8vo. Vol. I. 1853-4. Springfield, Illinois. *From R. Kennicott.*

Description du Terrain Houiller de la France. Par MM. Dufrénoy et E. de Beaumont. 4to. Paris, 1842. *From A. Vattemare.*

Proceedings of the American Association for the Advancement of Science. 7th meeting at Cleveland, and 9th meeting at Providence. 2 Vols. 8vo. Cambridge, 1856. *From the Association.*

Sur l'Arragonite. Par M. Hauy. 4to. Pamph.

Sur la Réunion de la Pycnite avec la Topaze. Par M. Hauy. 4to. Pamph.

Précis des Expériences Galvaniques. Par J. Aldini. 8vo. Pamph. Paris, 1803. *From A. A. Hayes.*

Histoire des Progres de la Géologie de 1834 à 1845. Par le Vicomte d'Archiac. 5 Vols. 8vo. Paris, 1847.

Transactions of the Philosophical Society of Victoria. Vol. I. 8vo. Melbourne, 1855. *From Dr. Charles T. Jackson.*

Resumé Explicatif d'une Carte Géologique des États Unis et des Provinces Anglaises de l'Amerique du Nord. Par Jules Marcou. 8vo. Pamph. Paris, 1855.

Esquisse d'une Classification des Chaines de Montagnes d'une partie de l'Amerique du Nord. Par J. Marcou. 8vo. Pamph. Paris, 1855.

Institut Impérial de France. Rapport sur un Memoire de M. J. Marcou, relatif à la Classification des Chaines de Montagnes d'une partie de l'Amerique du Nord. Par MM. Elie de Beaumont, Dufrénoy, et E. de Verneuil, Rapporteur. 4to. Pamph. Paris, 1855. *From J. Marcou.*

Duplicate copies of the above works of M. Jules Marcou. *From Charles T. Jackson.*

New York Medical Times. Vol. V. Nos. 7, 8, 9. 1856.

New York Journal of Medicine. Vol. XVI. No. 3.

Silliman's American Journal of Science and Arts. No. 63, for May, 1856.

Proceedings of the California Academy of Natural Sciences. Vol. I. Part 2d, pp. 79–86. San Francisco. 8vo. 1856.

Proceedings of the Elliott Society of Natural History of Charleston, S. C. No. 1. 8vo. pp. 1–24.

Verhandlungen des Zoölogisch-Botanischen Vereins in Wien. Band III., IV. und Band V. 1, 2, 3. 8to. Wien, 1853–5.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Band XVII. Heft 1, 2, 3. October, 1855. 8vo. Wien. Band XVI. Heft 2.

Wurttembergische Naturwissenschaftliche Jahreshefte. *Received in Exchange.*

Annals and Magazine of Natural History. No. 99 for March, 1856, No. 100 for April, No. 101 for May.

Genera of Recent Mollusca. By H. and A. Adams. Part 2d. 8vo. London, March, 1856.

Proceedings of the Zoölogical Society of London, with Illustrations. Parts 248–59. 8vo. London, 1853. *From the Courtis Fund.*

Lives of American Merchants. By Freeman Hunt. Vol. I. 8vo. New York, 1856.

Works of Edmund Burke. Vol. III. Bohn's Edition. 12mo. London, 1855.

Life of Schamyl, and Narrative of the Circassian War of Independence against Russia. By J. M. Mackie. 12mo. Boston, 1856.

Encyclopædia Britannica. Vol. X. 4to. Boston, 1856.

The Roman Exile. By G. Gajani. 12mo. Boston, 1856.

The Attaché in Madrid, or Sketches of the Court of Isabella II. 12mo. New York, 1856.

Rise of the Dutch Republic. By J. L. Motley. 3 Vols. 8vo. New York, 1856.

History of the Plymouth Plantation. By Wm. Bradford. 8vo. Boston, 1856.

Recollections of the Table-Talk of Samuel Rogers. 12mo. New York, 1856.

Life in Brazil. By Thomas Ewbank. 8vo. New York, 1856. *Deposited by the Republican Institution.*

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N. B. New genera and species are in *italics*.