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N. J. Aquarium
December 1906.

Geol. Soc. America, N. J.
1906.

Amer. Mus. Association
Carnegie Museum
Pittsburg, June 1907.

Washington, April 1908.

doc. 0092

Dec 26-1906
New York City Aquarium.

Shrimps are very active, swim about by the action of the abdominal appendages, using the anterior limbs for crawling but in the main for holding when alighting on rocks, sponges etc. The anterior antennae are held forward while the posterior larger ones are held out sideways.
When in danger they jerk backwards with lightning speed. The movement is so quick that one can not see how they do it. It must be done by jerking the fin-like tail under the body, which they otherwise hold stiff and extended in line with the body.

Salt water eels. The young are very active swimming over the ground. Without hesitation they shove under the rocks generally under the region of the mouth, evidently wanting to take food away from the crabs. They are evidently great fighters.
When at rest they lie under algae or rocks or sponges holding the head in a very alert way.
The eels young and old are graceful swimmers, move about with long serpentine movements.

Stone crabs. Crawl side-ways and at rest dig the posterior region into the sand by the aid of the posterior swimming limbs and by pushing with the anterior limbs using the chelae. The moment two come into contact it is the sign of battle although they do not always take hold. More often a one of them run away. The anterior region is held high up away from the ground and the gill lobes are constantly in vibration.

Lobster when at rest bend the posterior part of body tail under the body, lies somewhat on the ground but not prostrate with the chelae more or less open and beneath and in front of the mouth.
See more beyond.

Limulus young are very active crawling over the bottom evidently after food. When raised over the ground a little the feet are seen to be rapidly moving and used as swimming. The legs are rather active but not a rotatory movement, much slower.

Others dig under the sand showing the anterior enlarged rim of the head into the sand and then by aid of the limbs (anterior) push forward, and with the posterior dig away and push backward great quantities of sand. The head naturally dig under because of its construction and the angle of holding and therefore has a tendency to go deeper than may be desired. In a regular rhythmic manner the tail elevates the posterior half the abdomen: while the feet are constantly pushing backward the sand, in its movement the carapace: in this way a groove about twelve made that looked like Climatichnites, double rows of elevations with a furrow down the center and occasional marks of the dragging tail. The feet meanwhile regularly seen. When at rest they lie buried almost out of sight only one or both eyes protruding. In this position there is always left one or more narrow spaces between the head and abdomen through which the water evidently courses to the gills. The color of the test is almost that of the sand near by. The strength of the tail is due to use, in constantly

elevating the posterior up in when digging through the bottom. When turned over on back the tail is of great use to turn around over the head and abdomen act as two hinged pieces and the angle of the head in respect to the abdomen gives the required angle for easy entrance into the sand. Then it is pushed and digging away of the sand by the feet. Of course in water sand moves easily. When on the back it is wonderful to see how readily and how far the telson can be swung around and when in the sand the amount of power.

Fiddler Crabs.

Very shy ones, crawl side ways on tip toe. Some are without the enlarged chelae, the smaller animals. The remainder are usually right handed but there are many left handed.

In digging their holes the big chelae seems always to go down and may be for starting the hole, the other feet roll the sand in balls and push it to the surface. After a while the entrance sits at the top of the hole are cleared by taking the sand away from the feet.

They crawl over one another without in the least showing pugnacity.

Just now the body of the animals is a shiny black

(Thinking very conspicuous)
with the enlarged chelae a light yellow colour. Sizes,
The eyes are held high, erect and stiff. Antennae slightly recurved tips.

Are the smaller ones without the enlarged chelae the females? What is the cause for the enlarged chelae is it mainly due to right or left handed habit digging? Certainly it cannot be for food holding and putting into mouth.

Black snail or common on our coast is laying eggs on the glass side of the aquaria. These are about 1/16 inch long, elongate and are cases including a number (probably about 10) of black specks = each an egg. These adhere tight to the glass as other snails come and crawl over the cases without their pushing them away. Each animal lays a number of these cases, probably as many as 50 or more. They seem to emerge through the side near the foot, in a fold of the foot.

On the tubes mainly the larger ones are at work. In one case I saw a smaller one sit on the tube and try to take the stuff mostly sand tubes coming off from below and passing them on out. Is this really true and a case of male doing most of the work? What are these tubes for?

Hermit Crabs.

Elevate themselves high on their legs and use their enlarged chelae to shovel into a quick stroke sand to their mouths when it is assorted over by the smaller lateral palps. They do this rapidly several times and then crawl over the ground keeping on scrapping it. They evidently feed on small ground living animals and dead organic substances. As usual with crabs they can very alert both their eyes and antennae roll out in pot but not very protruding out of the shell.

The constant shoveling and crushing habits of the chelae evidently gives them their enlarged girth. In others the enlargement of all the limbs may be due to grasping about the large and heavy Natica shells.

Soft shelled turtle, very active, good swimmers with their extended feet and striking between toes. Can pull down considerably the posterior carapace edge in to close tail region. Head long and snout like like a gar-pike.

Hawksbill marine turtle

The youngest specimen probably less than 10 inches in length lay quiet on the ground [the land] and then rose rapidly by swimming to the surface for air. Took several gulps. Then went to the bottom again and lay there for 18 minutes rising again in the same way for air. They exhale just a little below the surface as one sees the bubbles issuing from the nostrils. Other specimens took longer and as a result did without a fresh supply of air much longer and it may be can go a day while without a fresh supply of air. They every now and then open their beaks [throat] in a gulping manner with the mouth closed which may have to do with air or the salivary glands. Others swimming about near the surface would poke it into the air displacing from ½ to several minutes of air.

In swimming their very long and narrow front flippers do nearly all the work. The arms strike high above the carapace with a more or less rapid stroke downward & backward and more or less on a flat surface. In drawing [making] forward these edges [the blades] of the flippers are [is] presented [makes] edgewise [a] far more clearly than when striking out. The hind legs

slow
in swimming do little work other than rudders
both being directed the same way in each rudder
movement, or to turn to one side the position again.

They swim slowly hovering over the bottom
looking at it intently. Evidently hunting for buried
food. Occasionally one would pick up a pebble
tasting it in the mouth and then again dropping
it. Do not discern food easily and may have mimic it in
trying the pebbles.
Restless animals when hungry, evidently quick swimmers.
See later for feeding.

Alligators when at rest with the nostrils above
the water opened then very irregularly, generally
less than one minute apart and then with
hardly an appreciable frequency.

American Crocodile asleep under water raised head
to the surface for air in 8 minutes apart.

Fishes swim by sinuous movements of their body and
particularly by the tail movements either alternate or pulsating. Both movements
produce darting motion. Fins as a rule for
guidance, and position in water.
When the tail is small as in the Swell Fish

(Ostracion maculatus) with the body box shaped the anterior fins are large, long and wide and very active. The tail is here drawn together and all the swimming is done by the fins except for quick movements when the tail is jerked with the rapid motion of the fins. The posterior ventral and the dorsal fins also are used for swimming and particularly the latter along with the anterior ventrals, which here are based of the gill arches.

Fishes of the Angel Fish type also have small tail but in them are very active. Further help is had by the dorsal and ventral body extensions which are thin and very movable. In fact the entire posterior region flops and assists in swimming.

The box fishes are slow swimmers, the clowns of the seas.

The most graceful swimmers are the eels, with their long serpentine movements flowing in succession waves from the anterior third to the tip of the tail.

Hawkestrill feeding at 2.15.

Small pieces of fish are fed. Not active as fishes in taking the food as it sinks. Take a piece of fish down and deliberately, try to bite it through with a fast fast, close their eyes and try to brake away the protruding piece with their first flippers. Very successful in treading up the mouth, then munch it several times to get it more into the mouth when they swallow. A slow process as slow as the fast tortoiss of the Galapagos. Saw one with a quick snap take a piece from another. Evidently can fight and pursue their prey.

Crab, ordinary blue edible crab.

As a rule walk sideways digs on tip toe with their chelae held out wide sideways, with the jaws constantly open. The posterior pair of swimming limbs are held above the ground, when walking and often swept over the back almost to the eyes evidently to keep are clean. When at rest the last pair of crawling legs often clean these limbs rubbing rest of on their carapace but also dig into the gravel.

The swimming legs are very active when swimming. The food is picked up by the chelae and passed to the mouth when the grinding is done. The jaws are decidedly unpoetic. During this process and at rest they stand high on tiptoe. They can also walk forward but then have to make awkward and some extra steps. Lateral gait is natural. The adaptation of the limbs for the different mechanical purposes is clear and distinct.

Lobsters rest in prominent places or hide under overhanging rocks always with the tail under protection or less or less under, at crayfish under but with the edge of the tail touching the ground. The posterior pair of limbs may often be seen projecting through the tail under support of the abdomen, evidently for cleaning purposes. When at rest the three pair of small limbs are constantly but slowly waving with many Connecticut and the gills Lobster in the object of these movements. Can it be in the mouth in front.

Crabs and Lobsters are constantly on the alert. Wonderfully present and ever ready for the attacks among themselves. Spider crabs are also top-toe walkers. All more or less guard their posterior region. They keep the enemy in front of them.

Giant Salamander. Japan, China, Tibet.
Attain 4½ feet. In streams up to 4000'. One specimen lived in captivity for 52 years. Eaten by Japanese.
Fishes have been kept in captivity up to 7 years.

Crawfish. Great climbers, one tank had a small shrub in the water, dead, and in the notches between the branches lay the crawfish, again with their tails beneath under.

Brown Sea Anemone. Eaten by some fish. Can crawl slowly. Some are dividing by fission, in fact several are doing this; more common than I had thought. Those in sun are nearly grey-white. The tentacles are all extended at length and hardly at all move. They seem to feed them on fish meat dipped anywhere. Very common in the tank.

Drills. One of the little aquaria had oysters with starfish and drills. Most of the oysters were dead but the drills seemed to be at work. The starfish had nothing to do with the oysters clinging to the sides of the tank. Two out of three had new arms growing on. Evidently they loose these

more than there is suffered by the closing of the oyster shell squeezing the life out.

One of the attendants told me that the stars breath[illegible] their arms are in that way muscle[illegible] a half truth.

Rices address.

American contributions
Permanence of continents and oceans. Dana 1846.
N.J. standard world wide.
American deposits shallow water deposits.
Pre-oceanic depths.
Dana the father of American Historical Geol.
Chronology unsatisfactory.

Structural Geology
Rogers the first great worker.
Wave like motion. Tangential movement also.

Glacial America 1826 Amer. Jour.
Deposits by ice under water.
Playfair known in 1802
Glacial climate with the acceptance of
C. D. theory, we now are more.

Tert Mam. & Evolution.
U.S. Geo. survey and other work
Some of latest as American mind in clearer
the theory of Evolution.
Non Pal. in Evolution is it strongest support.
Once the greatest objection.
Marsh Genealogy of Horses by Marsh.

Next series the Canal
Most ancient Mam. in Penn by Cope.
Le Conte's doctrine of Critical Periods.

Adding's memorial of Penfield a splendid one

Wolf's memorial of Haden a great subject handled very inadequately. A mean statement with some of the salient things of fiction out.

Sep. 1, 800'

Emmons

Quartz schist and [illegible]. Col, mostly
reddish Tint.
Central quartz vein. Fine fissure vein.
Lath Qtz., thin Lil. Chlorite and Calcite
Calcite and Lil. [illegible]
[illegible]
[illegible] are in
[illegible]
Central Qtz vein, [illegible], principally filled
by Chlorite and Calcite.
Talcose schists on flanks lie [illegible]
[illegible] dip.

Devonian
Old R.

Hudson River. Slate

Trenton Li

Camb.

Potsdam Sandstone

Laurentian

Granite Gneiss
Norian Li.

Pre Camb.

Archean Laurentian

Granville Series
Limestone
Fordham gneiss

Fordham gneiss

N.J. Acad Exhibit.

Eunoa acerba Clarke. N.J. State Mus.
Very curious, thin shelled, of Brachiopods.

Eurypterid. A segment from the Beetin at Litchfield indicates an animal of to 8-10 feet in length. = Eurypterus or Pterygotus.

Archimedes reversa and wortheni Barrow Ills American Mus.
Specimens of to. 1 foot in length to forty of both kinds.

Archaeocidaris wortheni Hall Amer. Mus.
At least nine specimens in all.

Red Canon, S. Dakota
A good locality for Jurassic Ammonites.

Five miles S.E. of Buffalo Gap S. Dakota.
Fine loc. for Heteroceras

Orthoceras regulare Ruedemann
An undistinguished form. Lyons material

Barrettia monilifera.
This undistinguished from Cuba. Near Whitfield as corals and Bradford England (Not as

radiatus. Attain a diameter of one foot and a length of stalk of 1½ to 2 feet.

The N. J. Devonic Lepidodendrum Clarke has photographed at site. Can one get N.
Archaeosigillaria vanuxemi
Upper Dev. (Hamilton Gr.) 2 m. E. of Nelles, N.J.

N. J. fine Devonic crinoid locality
Hamilton Gr. Vincent, N. J.
Odontocrinus, Gilbertocrinus, Rhodocrinus,
Eleutherocrinus.

Naoscaurus Stelliten mounted.
Fine. Above model by Dr. W.

Paleozoic fish models by Hussakof.
Pteraichthys, Coccosteus, Pleuracanthus,
Cacanthodes, Pteraspis, Cladoselache,

June trip to meetings of American Museums Association.

June 2 1907

Left New Haven at noon arrived at New York 2.15. Had lunch at Grand Union and then started for the American Museum of Natural History.

Later

" Dipnoans

" Lung fishes

"Fishes provided with a lung as well as with gills; they breath through nostrils, have three pairs of dentated plates, and paddle-like paired limbs. At present they are represented by but a few species. They are in many regards (movement, breathing, etc) like Salamanders.

"Lung fishes appeared early in the Devonian and attained their greatest development at the close of the Paleozoic."

"Crossopterygii" another good label.

"Sharks"
Many other good labels.
Arthrodira.
Dinichthys terrelli "about 20 feet in length.
Teleosts out of and replaced Sauria.
Appeared in late Mesozoic. "Teleosts" good label.

"Stegocephalians
"Ancestral types belonging to the Class of Amphibians; with thick skulls and scaly covering on body.
Sternberg collected most of these in "N. W. Texas in 1892."
Some in Wichita "Marl from Little Wichita Texas.
Eryops from Wichita Co. Texas. "Wichita Basin"

"Primitive Sabre toothed tiger"
Haplophoneus primaevus Leidy
If they library one go it will be the first mount. Mr Gso skeleton. Some of the fat made of 3 individuals. A fine skeleton otherwise. Known specimen somewhat more perfect. About 20 inches

tall by 30 inches long, base probably a little over 3 feet long.

From New Haven to New York had the Company of Mr. and Mrs Diller of Washington.

A new mount of Osborn's department is a low table case to show adaptive radiation. The time periods Eocene, Oligocene, Miocene, Pliocene Pleistocene and Recent are shown in circles. In the center is a picture of a Condylarth and from these radiate a series of teeth radially arranged of Titanotheres, Horse, Rhinoceros and Tapirs.

It did not impress me as teaching much because too much is intended to be shown by the teeth and the space is not large enough. It illustrates an idea that should not be attempted in a public exhibition. It is practically impossible to illustrate radiation and evolution in this way. A better way is to show a series of the animals mounted and table cases with facts to illustrate the facts under evolution.

The other day Hermann told me that

J. P. Morgan had paid $32000 for the Warren Mastodon and collection. As they had before a fair Mastodon one wonders why Osborn recommended to Morgan the purchase of this collection at such an extravagant price.

Blataris S. A. and W. Africa. Taxodont hinge ancestor gives rise to toothless hinge line on Anodonta. These fresh-water molluscs have had an independent origin.

These fresh water shells show undoubted connection between western Africa and Brazil.

Carnegie Institute.

Diplodocus carnegii. Sheep Creek Albany Co. Wyo.

The cast steel frame follows closely the bottom side of the vertebrae. These were laid in sand and a cast made in plaster and then was then sent to the moulder. Iron about 2½" wide, about ½" thick, rounded below and slightly hollow above. The vertebrae are laid on it and held in place by thin strips of iron held by screws to the cast steel frame. In the same way the chevrons are fastened to it below. Where the upright supporting rods come against the cast steel frame there is an offset thus

This cast steel frame [illegible] smaller and narrower under the tail and thicker under the sacrum and dorsals. Here it is nearly 4" wide and probably 2" thick.

There is little attaching iron under the sacrum.

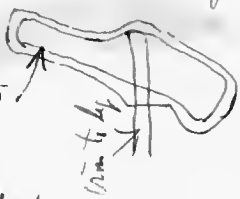
Leg irons half round, side strips welded on holding strips sheet iron. Pelvic iron also half round. Ribs held by half round iron. In front

all the iron is half round.

The steel frame is in pieces steel feet long and bolted together ~~4p~~. Fits the central body, modelled to their form.

Head ridiculously small, Held to vertebrae at right angles. Is this natural or misinterpreted.

Iron all around margin of minor side of scapula



One supporting rod under neck, one under abdomen from legs; one under pelvis (about 2½ inches in diameter), a smaller one ten feet back of pelvis, and to smaller ones under tail. All solid steel.

All other iron is half or oval round. Half round for the larger and heavier iron; oval for the straps. This is regular carriage makers iron. Steel is harder to work and breaks often in other bendings.

8 4 feet long.

They have a new skin restoration of Diplodocus this quite realistic knobby. Tail longer and exceedingly thinner and whip like at end. Legs mammalian like, and not reptilian. Made by Mills.

Steam Shovel.

A. D. Coggeshall mounted and made all the iron work in three months with 2 other men. The latter are paid $75 per month. Said the work cost less than $4000. This rapidity is due somewhat to the fact that they knew how to mount the skeleton from the plaster one sent to England. That one was mounted in 6 weeks Coggeshall assisted at times by one and sometimes 2 men.

Uses gas forges. Do much better and quicker.

All in all this is the finest big mount anywhere. The iron closely matches the bone.

One front limb and one hind limb entirely restored. Also three tail vertebrae. Skeleton a composite of three animals. Head plaster based largely on Brachiosaurus skull.

The iron holding together the ribs is fastened to upright under front legs, and another iron runs across to each leg, so that the legs also assist to support the animal's body. In reality the mount will stand without

the legs.

The two large supports between the legs are set leaning a little towards one another so that when the pelvis and the vertebrae are set on the cast steel uniting bed they make braces and strengthen and stiffen the entire frame work.

The masterpiece of Logger Hall.

Triceratops prorsus skull mounted on one post. Almost the iron strikes in the eye.

Pterodactyls in Beyer Coll.
Campylognathus jitulli, Holzmaden.
One Lithographic limestone.
Rhamphorhynchus. Not good skeleton.
" " " "
" " " "
" 2 "
Another small Lithographic specimen.

These skeletons show considerable detail but are not good skeletons when compared with one from Rhamphorhynchus.

Oidestes tortor. A good elat mount.

Fine skeleton of Mesohippus bairdi. Composite. Oreodontids. Oligocene, Bad Lands Creek, Scotts Co., Nebraska. Jn Peterson.

Fine group of Promerycochoerus carrikeri Three skeletons as found. Should have - skin of it to show sudden death or starvation. Also a fine mounted skeleton.

A perfect little skeleton of the rodent Glen fiber from the matrix of the Devils Creek Fauna.

A fine camel mount. No label.

Room 15 acres of floor space. Library has stacks for 1¼ million books, have ½ million now.

Buildings cost 6½ millions. Steel frame. Floors marble. Have wainscoating in marble, no plaster. Ceilings plain white. Walls a grey green. Not bad. Case backgrounds deeper green. Not a good color to set off exhibits. Small ceiling chandelier. All electric light. Some on pillars at 6' from floor.

Electric light plant enormous, seven great engines. No lights inside of cases.

Ceilings not over 14' high. Windows variable. Lights in rooms good as a rule.

I see nothing ideal to copy. Another new building along Park lines with little or no improvement.

On Founders Day Carnegie in his speech mentioned Holland as the "very irrepressible Holland" Audience silent. Carnegie must mentioned Brashear. Long and continued applause. After it subsided Carnegie said "the audience shows good judgment" followed by more applause.

The day before Founders Day Carnegie took a private examination. As soon as Holland heard of this he rapidly hunted up Carnegie, and began to say "I've tried Sam" "you are the recent man in getting ready." To this Carnegie replied "your tongue does not seem tired."

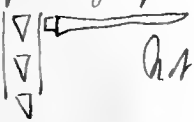
The show courts are faced with glazed tiles to give fine lights for the inside windows. The consequence is that the cases from 3 sides are mirrors and one is constantly at a loss to see the exhibits.

Not shy line to cases in centre of room. Of all heights, sizes and widths.

Cornice of some cases thus 

All cases with Tennessee marble bases.

Shelf holders like these not good. All front supported by upright studs. Very objectionable.



Not strong enough.

How would it do to have natural history exhibition rooms like art galleries with the lights all from the top. Here at the Carnegie Institute the art galleries have top lights. The glass is ribbed glass in squares of 30 inches in iron (thin) frames. The entire top of ceiling to make 3/4 of walls.

Hall and gallery of classic casts is in white marble with the wall panels in grey green. Sky light with thick and heavy wood frames (entirely too thick). One marvels at the cost of this hall. Could house a few thousand dollars worth of plaster cast. The house is too fine for the objects shown.

Fossil Vertebrate Hall.

A lower floor 140 x 66 feet. Ceiling about 15 high. A mezz with a gallery about 15' wide. Windows dog one side, the dog side of in mezzine. There are about 6 or 7 ft wide, rounded top are sky about 12 4' from floor, some from top. Piers about as wide as windows. In spite of the fact that the windows are all on one side the lighting is fair to good. Walls are walnut a grey green. Other part white with the upper ceiling a cream color.

Electric clocks in nearly all the halls but nowhere in evidence.

"Count Noble" (entire dog) and Virginia Dunn group around an old pine said my pipe the master piece of F. D. Webster. 12 x 6 feet. Cost

$4000. A very fine grand but cost entirely too high to illustrate the costs of the grand.

The grand Foyer is a hall 75 x 200' each. 24 large pillars in perspective. Floor inlaid in several woods. Gallery and dome in gold having taken $14000 gold leaf. Four golden Candelabra and diadems under gallery. Walls under gallery inlaid woods. Lobby a grand and costly reception hall. Very fine but useless.

Intercollegiate Geological
Excursion of 1907
To Providence, R. I.

October 25 - 1907
Left New Haven at 4.53 arriving at
Providence at 7.23 P. M.

Easter Vacation Trip.

To Washington.

April 1908.

Left New Haven on Colonial Express at 1 P.M. arrived at Washington 9.45
Round trip Ticket $ 14.00.
Stopping at Raleigh Hotel.

Wednesday April 15-1908.

Called at the U.S.N.M. about 9.30 and saw Ulrich and Bassler.

Ulrich states that the Clinton at Clinton N.Y. contains the Rochester fauna and as well its fauna. These Rochester fossils consist of about 5 species of Leiorhynchid Brachiopods and Bryozoa. Of these ten is one bifoliate form and several of the smaller ramose forms of the Trenton type. Nothing otherwise. The other questions resolves itself here, are these western species or are from the east (Atlantic) along with the other Cumberland Gulf fauna.

The term Rockwood is to be dropped because it is

now seem to be the Clinton of Clinton N.Y. The western Clinton is to have another name.

~~Ulrich collected in the Arajan Falls region Oethocyphaca triangi. Exact place & horizon Ed'd not known.~~ Ord Sil.

Walcott seems to be very shaky in regard to the position of the Belt. The evidence seems to be accumulating that the horizon is in the Cambrian.

Walcott in describing a new genus of Middle Cambrian trilobite belongs to Beecher's highest order. The head is somewhat like this true shield.

Redlichia of China has free cheeks. Not Olenellus but rather nearer Paradoxides. Cambrian Chinese trilobites strongly like our western Middle Cambrian genera.

A western U.S. Micromitra seems to me to have the beginnings of a stondylium. The area is like this Expressed in the dettyrium lies a flat plate with the markings (seemingly) of the central adductors and the lateral diductors. If this is true we have here the rudiments of a stondylium of the same general character as in Elkania. This view of these is of the greatest importance.

Ulrich and Bassler regard the southern Silurian after the Clinton as wholly detached from the northern Niagaran. The two series of rocks do not overlap one another. The species in common between them are nothing more than in usual between formations. I argued for some communication between them even in Louisville time but they did not seem acceptable to them. Ulrich holds to a barrier separating the two seas, the barrier being a north-west trend.

Bassler showed me a tray of Brassfield fossils. A number of the species reminded me of the Oklahoma so-called Hamilton fossils. I will look further into this. Ulrich claimed the Virgin to be in the Oklahoma section. Above it should come a break just as in Tennessee.

Had dinner at Miss Mosleys.

April 16th 1908.

Had a talk with Cross about the Colorado Triassic. Gave me his latest pamphlet to read.

Rico = Upper Penn - Lower Permian. Transition horizon.

Cutler = Permian transition (marine) to continental conditions. Both seen here at this horizon. Erosional unconformity here.

Dolores = Upper Trias. Horizon of fossil fossil wood. In this horizon are conglomerates the pebbles of which sometimes are of Permian woods. See David White about this. These pebbles noticed first by Dutton and Powell.

Conversation broken into and could not finish.

Keith told me something of the Ocoee. In the region of the Ocoee there was a central mountain core. To the west were laid down four formations into which can be traced some fossil horizons with Lower Cambrian species. The two lower horizons do not cross the Ocoee, the other two do. To the east of the axis are also four formations that can in a general way be correlated with the four to the west. The two lower ones do not cross the central axis. Considerable conglomerate here. No glacial evidence. No fossils.

Bassler will give me a general correlation table of the Tennessee Silurians.

Hartnack collection purchased at auction during the life of Mrs. or Mrs Hartnack at $1,000. One half by Smithsonian, the other by Springer.

Springer is soon to move to Washington with his family and collection. His office will be in the new National Museum. Clark is to be the third Echinoderm to curate. Springer is gathering crinoids from every quarter and is spending much money.

April 17 - Friday.

Called on Mr. F. C. Clark at the U.S.G.S. to study their methods of cutting rock.

They have three grinding machines, one polishing disk, one band saw, and one small diamond saw.

Grinding disks and machines are made by J. E. Hurley, 12 Ohio Ave, between 12-13 N.W. Price of a single machine about $ 80.00

Plates not to be smaller than 13" not over 18" The latter are very apt to shake the room. None should be over 16". A 13" plate should revolve 1000 times per minute, 18" plate not over 500 times per minute.

Prefers Carborundum to grinding. First grind uses grade 120. Second grind grade F a flour. Final use emery only grade 4F.

Think one grinder can be made with 2 or more disks detachable. Each disk should be in its box so that no two grades of abrasive will get mixed. Pulley can be made to lift off, held in place by its own weight & fastened by a set screw, a screwed on. First method of finish preferable.

The rough grinding is done on one disk and the finishing on the other disk with the emery. No sticks are polished. Coarse glass does all this.

Motor. There is 4-5 horse power. For one machine think 2 enough. Will run 2 or 3 machines at a time. Motor encased in box lined with asbestos. Connected motor to shaft connected with link chain. Other machine connections with belts and friction clutches.

Can get a second hand motor for 50-to $70.

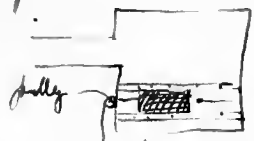
Polishing disk. Machine same as Grinding disk. To 18" depressed rounded To To felt the regulation yellow polishing felt. Oxide of tin dissolved in oxalic acid. Each half and half. This in bottle with hole in cork and dropped on felt.

This pad could be fitted on Grinding machine.

Band saw. Has a regulation wood working machine with 30 inch wheels. Advise larger wheels (40-50 inch) not only because of greater cuts but because the band saw will last longer.

The wheels should have a V cut into them in which the band saw lies. Tension is given in the regular way by a screw wheel under the upper wheel.

On the table are fastened two runners in which slides the table



Ohms machine cuts about 18 inches.

Machine costs about $100.

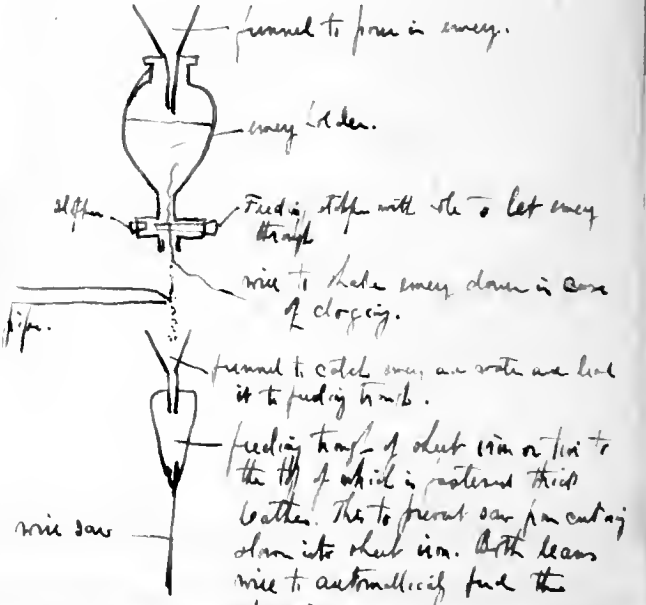
Saw tube cuts 1/32. Due to uneven cut eventually results in 1/8 inch cut. Saws made of annealed iron wire 1/16. The two ends are filed down to a long regular even bevel

These two ends are cleaned and coated somewhat with borax. Then are tied together by winding fine iron wire. Pinches still tighter with pinchers. Then fully wetted in with borax. Then a thin sheet of silver is taken about 1/2 inches wide and a strip cut 1/8 1/4 inch wide. This is again rolled out. Then all is melted over a blow pipe. While still hot it is held under a spirit of water to anneal the wire. Then filed in - nice along four sides, then rounded on a table with the file.

These saws should be made six at a time. New ones (the widest) used first on big cuts or in case of a break, one of the used saws (thinner) can follow in. This can not be done with a thicker one. The old and thinnest saws can be used when thin cuts or smaller abrasion is desired.

For abrasive use unused carborundum (may have said emery) fed to saw automatically with water stopped to machine above the blade of cutting. This abrasive is then used on the grinding machine.

The feeding of the abrasive is as follows:



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How to make diamond saws

The saw plates of 8-12 inches in diameter to be of soft Swedish iron. Saw must fit snugly on the shaft and not loosely or that it will wobble. Mention the diameter of the plate must be exact all around otherwise the plate will hammer and will not cut. Can be had of Max Holtz, Bonn, Germany.

Knick with a knife (not a razor) the edge of the plate. Knicks to be as close as possible and about 1 mm. deep, straight across the plate and not at an angle.

Pulverize bort finely in a mortar and mix with as little vaseline on a glass plate as possible. Put in the mixture with the finger and then with the trolley. (over)

clean it with the finger nail.

Bort costs about 50¢ per carat. A 10 inch saw costs about 50 cents to charge. As soon as saws are dull recharge.

Abandon all tickled and or rolling plates.

Bort can be bought of Theo. L. Lich-[illegible] at 2.25 per carat and black diamond at 6.00 per carat — [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible]

(over)

vice to automatically feed the abrasive.

Entire sides of wheels and band saw encased but free back and front so as to catch the wet abrasive. Thus 

Outline of catcher 

Diamond saws. Does not make them. Tried it but not successful. Buys them when needed. Stevens uses but few. Band saw does all the work.

Canada Balsam. Buys the best clear balsam in one oz. tubes. Cost about $1.50 per doz. of Arthur Thomas Co, 12th and Walnut, Phil. or Williams Earl and Brown, 1010 Chestnut st. Phil.

Takes a lot of it into a dish and heats it over a slow fire under heating Table. In an hour or more takes a little on a needle cools it by blowing and tests it on frozen nail. The amount of boiling depends on dryness of room. Harder (in mass) in winter in summer and less (a softer) in winter. It should be at such a point that one can just almost drop it with the frozen nail.

Takes a pencil like stick and finishes by warming a bit of thin hardened Canada balsam.

Having the specimen ground to plane ready for cementing he lays the glass slip on a warm (not hot) heating table and finally puts a fairly large quantity of Canada balsam on it. After the balsam has been well warmed and completly flowed out and creases the specimen is laid, and the slide turned over with the glass up, the specimen on the wood table. They are rubbed hard and forth, many are the Canada balsam pressed out and all the air bubbles.

The Canada Balsam is stiff or soft that if the slide is held in the fingers some minutes there is a slight sensation of the balsam adhering to the fingers.

The specimen is now ground on the Grinding machine with the Carborundum. This done in a few minutes. Then the elder Olsen then and finishes it in a few minutes more on the emery disk.

This now taken and laid again on the warming table and fresh Canada Balsam ran the slide laid on. Before this it is washed with a camels hair

brush with an abundance of turpentine to free all the old balsam of energy. The back side and the downward edge is drained of the turpentine but the specimen is not touched. This now laid on the warming table as stated. After heating a while or the hardy any fumes from off the cover glass is taken in a pincher, cleansed of dust with a brush and considerable of the balsam is scraped under it and forward and then dabbed. Slowly it starts spreading the balsam and air bubbles in front of it. Before the cover glass is laid on the green is tested and as before must not stick to the finger nail. The cover glass is worked back and forth to squeeze out all superflous green and air bubbles. Then - by Haddock Knife is heated over a flame, the edge of the Blade is ground on one edge only, and with this heated Blade all the balsam cut away. It is then washed in alcohol with a large jewellers brush, then in water and the slide is finished.

This is the process for all slides for soft natures that can not be remounted on a clean slide of glass. When the material is hard, the slide after being ground down to a finish are laid in

a shallow pan with turpentine. When all the outside balsam has been dissolved away, the thin section is pushed, after a little warming, onto the new and clean slip, and the ground glass thrown away.

Glass marking diamond. To be had of Geo. Wagner and Co., 12 Barclay st. N.Y. Costs about $ 1.25

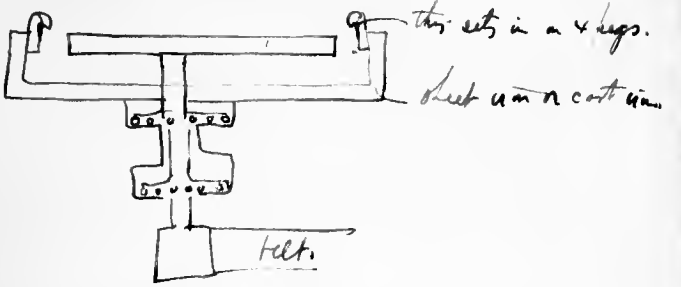
Agricultural Department.

Bureau of Road Making.

Mr. Paige in charge of machine department. Had Dr. Loring introduce me to Mr. Paige was not in was turned over to another man, and finally to a machinist who does outside work. Mr. T. H. McClure, Bowie Bowie Md.

The latter makes grinding machines or laps with 2 sets of ball-bearings. These are very light affairs and are to be set on tables. Will make such a machine with a 13" laps. including abrasive catcher for from 50 to 60 dollars. Each additional laps. dish

for about $80.00
The abrasive catcher is like this.



strong wooden table with a four inch hole cut through it to let belt leading shaft through. Beneath is the pulley for belt.
Could get out one in a months notice.

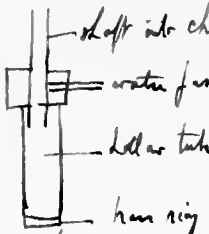
Drill Press. Good cheap machines made by Case Machine Co, Baltimore, Md. Mr. Fleming 436 Fourth St. N.E. Washington the local agent.
They make upright drill presses for from 40 to 150 dollars. Will take under the drill up to 3 feet tall. Into these drills presses are chucked the diamond edged core drills. Mr. Dahlgren will make these core drills as follows: A one inch drill for $10.00 A 2½ core for from 15 to 17 dollars. This price

includes the diamonds in the bare edge, about 7-8 stones.

Does not think a 2½ inch core can be drilled deeper than 4 inches.

These diamond drills at one inch diameter drill through 4 inches of granite in 10 to 15 minutes. The feeding on the press is by hand.

The chucks are as follows:-



Can make three chucks in 2 months notice.

These chucks must not work rigidly otherwise the diamonds will come out of their setting. The diamonds will determine the width of cutting and the chucks should be loose enough to follow the diamond bind.

Diamond drills will work very well in certain materials and hardly at all in others. Cuts a quartz crystal about as easy as marble but in a quartzite very difficult. A granular siliceous material it will drill through easily but in some of the siliceous stuffs will not work at all.

It may be that in these cases a gas fire chucked and fed with carborundum will do the work.

Coal sections. Very difficult to make and to retain all the chemical elements of the coal must be ground in oil. What kind of oil I did not find out. As the oil dissolves the Canada Balsam this is overcome by making about a half and half mixture of ordinary Kellers and Canada Balsam. This effectually holds the thin sections.

For grinding machines and band saws see Dillis Rule No 11.61. f. 26.

A good machine maker Merrill recommends is Mr. E. T. Jenks
Middleboro, Mass.
Could make a cue drill or a band saw.

Merrill buys diamond saws. Does not make them.

April 18- 1908. Saturday.

A day of great experiences.

A little after 9 A.M. called on Mr. Ridgeway to sign an authorization for him to examine why Yale is not paid the bill of $1030. This will go to the Government Printing Office and I am to see him on Wednesday. From a document I have seen I am led to think that the lithographer (Hoen or Storey) has been paid a year ago.

Then to see Babcock. Soon he explained his position in regard to changing the meeting place of the S. S. A. from New Haven to Baltimore. As indicated by his letter to me some months or more ago his present great fear is that the A. A. A. S. is to be abandoned. I then gave him my history and my information in regard to the S. S. A. accepting the Yale invitation. And finally that I thought there was too much hurry to Cantucia. Also that he had made a mistake and that he would learn it. He seemed to be deeply

affected but I could not see any new fact developed by him other than that there should be two meetings of geologists next winter. In this we are agreed but the mistake was made last winter by the Chicago men in not looking after Chamberlin's and Willis' interests. I will never believe other than that Chicago was strong in 1906 because the S. A. G. did not accept their invitation at New York in 1907 to go to Chicago, nor one then knowing that the A. I. M. E. was then to meet there. Therefore they cut the 1907 meeting at Albuquerque.

Also laid before Balcett my claim to close the catalog of A. G. Paleozoic fossils. Started Miss Moodey on two years, her services to be replaced by another person at $75 per month. He frankly could not see his way clear to do this. + called up Mr. Hays.

In the afternoon called on Hays and explained the situation to him. He can do this but it seems to force out a plan of Stanton, to whom he looks for advice. I or I will have to explain to Stanton, and if so, for then

in writing. I promised to complete the work cost what it will with Miss Mordays services for two years. Agreed to help Miss Morday with extra clerical to be paid for by me.

Mr Bailey Willis had asked me to meet at his house with "Hammers" the senior members of the local geological (known as "Picks and Hammers" (outgrowth of the "Association of Committee Assistants") first through Stanton and today through Ulrich from Nigel to call on him at the Survey. I had not intended to do this.

He immediately began on his Great Symposium for the A.A.A.S. next Winter. The first day of the A.A.A.S. meeting is to start the Symposium, then to be continued a day or two longer before the S.S.A. Dewey seems to favor this or Dana told.

Willis then began to say that he asked a committee to join him and that he had asked Grabau to take the Devonian because I was to remain at New Haven looking after the S.S.A. A gentlemanly way of taking away the geologists from the New Haven Meeting.

Now as Mr. Bretan for an unknown reason had failed to answer his letter he wanted to assign to me the Devonian in the Symposium.

I refused point blank because of my advanced position in Paleogeography and that I did not wish to be control in any way from doing anything that I choose to do in this matter. I told him that I had 50 paleogeographic maps but did not specify that 35 were strictly American, the other 15 worlds projection.

I told him that I had :- Devonian, Silurian and sketches some of the latter. Conway Thomas the Salina map and that this sea existed only in the east. This brought a rise out of him to the effect that the eastern sea extended all the way across the continent and that its absence in this area was due to erosion.

He soon saw that we were absolutely apart as I had assumed from Schuchert's remarks. This was my greatest objection for not joining his Symposium.

He then, after all the cold water I had poured on him, brought out his 15 N.A. paleogeographic maps for my inspection. I told him that he had

shown them in a lecture at Princeton ~~Chicago~~ Chicago University and at Urbana. Further that copies had been taken at Chicago by Savage at Urbana, and that Osborn had a set. I too could have a set without any other promise than that I would accredit them to Willis with the statement that they are very hypothetic. I refused to accept at present because it would in Lonn bind me to show him my maps. He repeated his offer that I could have them even without such a promise but that he would not urge me to accept his offer. I don't believe I will accept his offer even though so liberal and so kind.

His 15 maps are on the same base as mine only the net lines and drainage lines are all in black instead as mine are blue and black. The first one is Lower Cambrian. The known sediments are in green and assuming the Atlantic ocean to be permanent has connected the green of continental areas with the green Atlantic ocean. The Lower Cambrian is a narrow trough down the Appalachian area and out to Labrador, bounded on the west by

the great N. C land, and on the east by a narrow land, wider in N. and S. and thinnest in N.J. and Penn. The sea ends as a cule-de-sac somewhere in Ga. or Ala.

The Gulf area is also a permanent water basin.

To Appalachia is added as a probable extension a land as I have it extending from Ga. to include the Greater Antilles (Cuba, Jamaica, Porto Rico, and Haiti).

In a general way his lands are not dissimilar from mine in position, but his epicontinental seas are greatly different because of his theory of wide extent even though of no deposits.

2 maps. Mid. Camb. – Lower Ordovician.
3 " Upper Ordovician
? 4 " Middle Ordovician (Trenton).
5 " Silurian
6-7-8 " Devonian
9 Mississippian
10 Pennsylvanian.
11 Permian – Triassic. Probably also Jurassic
12 Cretaceous
13 Eocene. 14 Miocene & Pleistocene.

During the Tertiary Mexico in the greater western half is land. A long narrow land into Central America. In the Eocene there is gap between Venezuela and Central America of an 1/2 mile. In the Miocene widely connected.

The Devonian Adirondack axis is accepted.

Finally he told me that through a study of Shear Zones he has learned that the Pacific Southern Hemisphere is pressing the southern continents to the North. That the greater unaffected old lands and undisturbed Paleozoic strata are situated around the North Pole. India is shoved under the Himalayas, Africa has moved against Tethys folding those strata over to the north. For the other movements are each very latterally from the great oceans pressing up the continental edges. Few are in the equatorial region the east-west lines of structure are in the region of the Atlantic and Pacific coast and trended due to the two lines of movements — the movements of the Southern Continent north and the lands

bordering the great oceans have moved in the margins as eastward in Norway and N. N. along Appalachia.

Finally he thanked me for his services and deserve him a fine applause for his splendid Chinese work. He deserves all this and more. In Paleogeography he is off his ground and drill him to realize that such maps can not be made from his own point, i.e. that of the tectonic geologist.

April 19- 1908. Sunday.

Spent the morning at the U. S. N. M. with Bassler. Looked over the thin sections of Brach. shells and found that the Cambrian brachiopods had a non-fibrous, granular, recrystallized fine punctate structure. These punctae are arranged in lines, closely adjacent and seem to me not to be continuous pores, but interstitial pores passing from layer to layer. As one works the focusing screw of the microscope the upper ones disappear and lower ones come into view. Not a single Cambrian brachiopod has the fibrous, distinctly punctate shell structure seen in Middle Ordovician forms. Bassler thinks he sees a shell structure in the early Pentameracea that is identical with the true Pentameroids of the Silurian.

In this field there is a distinct study to be made that will yield good results. It should begin with recent shells and continue through all time into the basal Cambrian. It will not be of value in a general classification of rocks but will be of distinct value in genetic work and in the Cambrian even of far greater value.

In the afternoon called on Ulrich at 2421 First street. There met his sister and Miss Ulrichs Cincinnati family.

Later had considerable of Ulrich geologically.

Told him of my last summers Medina - Clinton discoveries. He was glad to get it but finally said it was what was to be expected. Thought that the Ohio Clinton was equivalent in time but not of the same sea connection as some part of the Rochester Upper Clinton. This maybe or but does inclined to look upon it as older than any New York Clinton.

I then asked Ulrich to give me a sketch of his present views of the Beekmantown-Chazy.

His "Ozarkian" embraces the Upper Canadian or Lowville and a part of Chazy time beneath the Beekmantown. This is a period of oscillation and will require 3 paleographic maps to make clear.

The Beekmantown is a long period of general inundation and one paleogeographic map will be enough.

Then follows what may be called Chazy time, another period of oscillations will require three maps to bring out. The lower and middle Chazy

he has near Stanistown, and as Chisholm has found Mackenzies south of Kentucky on the north side of the Ohio it must be in the Kaskaskia valley and so connected on up to the Champlain region. As the Chazy according to Ulrich is found east of the great fault it is the marble belt of Vt that in fact is the equivalent of the Chazy. According to Ulrich it is the Lower and Middle Chazy that extends out the St. Lawrence to Newfoundland. At times the waters may connect with Europe.

Willis admits to Ulrich that the great fault is an extensive over thrust and in the N.E. is shoved over as much as 50 miles. For this very reason we find the eastern moved mass Lower Cambrian western formations that have not been moved. Therefore Lower Cambrian may lay above the Beekmantown - Chazy fauna of Vermont.

The Upper Chazy did not go out the St. Lawrence valley and is not present at Newfoundland. Ulrich has a hazy idea it came in from the west across Canada to the Ottawa basin but he also seems to be looking for it from the Appalachian region.

Lashed him to make these maps for me

never fall or that I may use them.

In general he sees the origin of most of our Late Cambrian or Ordovician faunas from the Pacific. At times and irregularly there are faunas that come to us from the European Atlantic.

These Ozarkian and Chazy oscillations which I think may be as much 50 percent of other inundations are then reduced to 5% in east land.

Ozarkian time very long. Involves 3000' of limestone. All new to geological science. Thinks this time as long as all Ordovician time. I should not think more than Piedmontan Chazy to Quebec River.

Chazy probably at Inyo Mts California.

April 20 - 1908 Monday

Called on Miss Rathbun, Adler and Mr. Rathbun. Then Barbour and Ulrich.

After lunch with Stanton to explain my catalogue plans. Then showed him my Neozoic paleogeographic maps. Was struck with his little objections to my delimitations. Offered him a set of these maps. Asked him to make for me at least three of the Cretaceous, but he would not promise. I think will do it, or better if I make and send them to him for correction.

See my correction notes on my separate sheets.

In the evening up to Weigners'.

April 21- 1908 Tuesday.
Had breakfast with Prof Wells.
Then to Gilmores to see Camptosaurus.
Had lunch with Barbour and Moodys.
Met Kindle. The Quray limestone has two faunas the Upper Devonian one described by Girty and another one he calls Mississippian. Kindle was going to make out a large Lophophyllum with conjunctive lamellae. Beautiful specimens. Referred to me record to Spirifer Walcotti. This Mississippian fauna Kindle tells me has a strong Devonian impress (that of the Madison) but he would not commit himself. I would not be surprised if the Iowa Spirifer Grimesi is basal and the Quray fauna, at the top of the Upper Devonian. The Mississippian above in the normal Kinderhook.

Walcott called in Stanton and myself to help him on an International Committee. Osborn brought it in the morning before the National Academy a motion for a Committee on Time Correlation. Walcott to be chairman of the Inverterbrates. He will organize an American Committee. For the European Assistance I suggested Marr of Cam-

bridge, Beyer for Norway, Selenian a Hohn
for London, Tschernyschew, Nikitin a Pavlow
for Russia, for Germany Koken a Kayser.
for France Bassis a Schlert.

Attended the Geological Medical Academy
Meeting. Listened to Lectures taken "The Geol.
Age of the Santa Cruz beds of Patagonia."
He showed about sixty slides of Mammals in the
field by Smith. One a Tasmanian wolf like
animal, the rodd Lestoma defending its
young, horse (three toed) like but not an
Artiodactyl, another of its descendant with
but one toe, and 2 more.

Santa Cruz faunas strikingly different from
any of Northern Hemisphere. No Perissodactyls,
Artiodactyls, Carnivores. No Rodents
of strictly South American types no hairs, rabbits
mice or rats, beavers. No horses or elephants.

Man in Pampean associated with this fauna.

Marine Santa Cruz time (and to me seemingly
from earliest Eocene to latest Miocene) there was no
land connection between N. and S. America. First
connection during Lower Pliocene. Then came a
load of Mammals from South America and of

which only the Porcupine still lives. Of N. A. mammals many spread south and of those many still live. Those that died out were at the close are Post-Tert.

Patagonian formation is marine. Scott holds with Ortmann and Dall that this deposit is Miocene.

Below another continental deposit terminated above by the Notostylops beds. These formations are removed in time far further from the Santa Cruz than are the Pampean & The Pampean animals have descended into those of today

Pampean = Pleistocene.

There is no great break between the Pampean and Santa Cruz = Pliocene.

In other words the faunal types of the N. Hemisphere are spread on these evolutionary while the S. A. faunal types wish to make the beds considerably older.

The Santa Cruz rodents are much like those of N. Hemisphere but a close analysis shows all to belong to other genera are very peculiar.

Had dinner at Scott's at 6 P.M. 13 at table.

April 22 1908 Wednesday.

Called on Stose to explain my last summers Lower Devonian Oriskany observations. The Oriskany of Hancocks is from 170-180 feet thick. I showed him that there is no fault near it not an unusual unconformity.

The Lisle horizon above the Beecroft he had placed with the Marcellus.

Lee called on Kindle. Showed me a drawer of Lepidodendron, some 4 inches across. Lee are from S.E. Alaska. See his recent report. In a recent little siliceous limestone.

The Guelph Megalomus horizon has the Lyre Lepeditias. Probably a new genus of Megalomus.

Upper Devonian in S.E. Alaska.

Ordovician with Machurea (1¼ in. in dia) and a keeled cephalopod in appearance but fine striae. He called it Lyrolonia but it looks to me very different. Also called it Pronautilus but to me the same as the Lyrolonia. Horizon may be about Lake Champlain.

Lower Peninsula seems to have both Sil. and Dev. Faunas of Pal. greatness. May have one or two Pal. species.

Lower Devonian rocks on big fauna on the Salmon Trout River a tributary of the Porcupine River. Just above the Circle Arctic are 75 miles west of boundary between British America and Alaska. Can Eatonia recast to Held. form. Stylhead slits small and few in species. Corals 2 Favosites, 1 Cyrtovalaria? Platyceras common mostly Orthonychia. Middle member the Lower Middle Devonian because of this identification and of

the Leiorhynchus beds on the Upper Yukon is Upper Devonia. Has a Brachiopod.

My Permian likely refers to Upper Carb.

Beneath is a Mississippian Devel Spirif.

Saw Dall. Told him of my plan to give a course of Yale geographic lectures in the Dillman Course. Said he would gladly accept for two years hence. Thought he would like to come in other specialists as a Glacialist, meteorologist, Glaciologist, and geologist in connection before he finishes his lectures.

Aleutian Islands have Tertiary rocks around their margins. Here we can not go still

ing. Same in Greater Antilles.
Middle and Early Oligocene the wide broad
[illegible] deposits of the American tropical region.
Eocene Nummulitic [illegible] appear in the fauna
Otherwise the fauna is mainly American.
Suess has shown that Med. Echinoids and
Mollusca have slowly traveled from Europe by
a shallow sea route (: Sandwana) to America.
At this time North and South America
are widely separated. Elevation he thinks
set in mildly and that the ridge was estab-
lished during Miocene Time for in the Caribbean
Pliocene are found S. American Glyptodonts.

After the Miocene elevation he thinks there
was some sinking in Pliocene time for faunes
of this time are again found in the Tehuan-
tepec region. But this sinking was not all at
once to bring on complete breakage of the ridge.

The recent work of the Albatross in the
Pacific off the coast of S. and N. America
shows among the deep sea molluscs that they
are archaic in character but nothing so ancient
as was expected by the older Agassiz.
Further that there was a migration from the South

to the equatorial region and similarly from the north.

In the North Atlantic the molluscan often eliminating the circumpolar forms Dall finds five distinctly American on the American side and distinctly European on the European side. Less little evidence for a land connecting Europe with Iceland, Greenland and N. A.

In the North Pacific the American and Japanese molluscs have much in common.

Dall is now looking into the correlations of Cenozoic and non Cenozoic.

Listened to Willis when before the National Academy. Great tangential movements in N. Carolina both in the Piedmont Plateau and Appalachian region. Foreshortening of the Appalachian belt at least 35 miles and may be as much as 45 miles. The entire mass has moved to the west (N. W.).

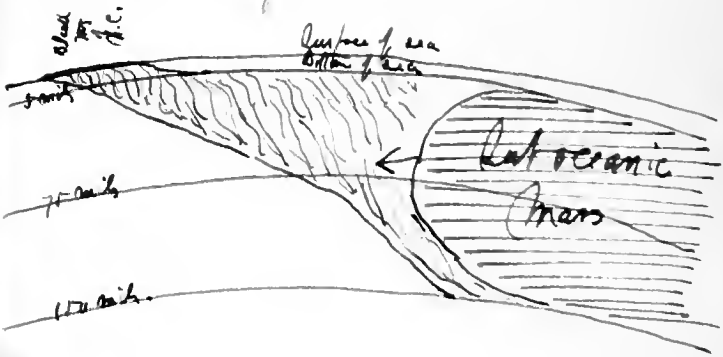
The great Eriboll overthrust he said was observed eastward in Norway and southward in Scotland. Overthrusting can take place in two ways overthrusting upwards in which case the ridge is

on top and underthrusting as in the case of India under the Himalayas and that of Scotland (Eire).

All the way through Euro-Asia in the main the trend lines are from the West to the East. In general the movements are from the southern hemisphere to the northern one but there are also movements from the north. This conclusion is that the water hemisphere a southern hemisphere has moved north as is shown in the equatorial trending lines especially of Europe to the west of America. Also that there has been spreading of the oceanic masses laterally pressing up the ends of the lands. It is this secondary movement that has set back the lines in the Lesser Antilles and in the eastern and southern ends of Tethys. To bring out these conclusions more strongly he took a North Pole projection and drew in Hoell the first land elements and the trend lines. From this it was shown that the old nuclei of the Northern hemisphere are the upthrust deep seated rocks and that these masses have long remained immovable. Against these have pressed the lands from the south.

Pendulum surveying has now clearly shown that the oceanic masses are from 3 to 5 percent heavier

in density than the land masses. In general the slight difference is too small to account for the great effects of spreading noted. Physicists Lawson Lane & Willis that even this slight difference of given time enough could effect produce the results seen. Willis holds that the suboceanic mass in which spreading takes place may be as low 100 miles deep. Beneath this there will be such great pressure that there can be no unequal movement. Hence his idea that these suboceanic masses are spreading laterally and northward and pushing of the continental margins. Thus :-



In the evening dined with Merrills and then to Hales lecture on Observations & the Sun from Mt Wilson near Los Angeles & Pasadena California. The apparatus of the Observatory is something enormous. From the many photos of the sun shown one gets the idea of a solar sphere without any very great protuberances. The sun spots under certain spectroscopic observations are seen to be low crater-like holes in a mass of calcium gas out of which one shoot or whirled by hydrogen gas. The latter can only be made out when seen on the edge of the sun. An analysis of these hydrogen clouds in their movements over the sun discloses the with the sun spots. In other words parts of the sun spots move regularly while other parts move irregularly these the hydrogen emanations.

All of this work is done by reflecting mirrors of large size.

We showed a photo of Andromeda by the same apparatus. A far finer photo than the one of Lick Observatory.

In talking on the matter with Abbot at the Board meeting Reception he said the sun was to him a gaseous mass with an internal temperature of

6000 degrees. The outer surface of the sun with its clouds of gases must be a sphere as the earth and without any marked eminences other than the great ejections of hydrogen. Some of these clouds are shot out to 300.000 miles.

April 23 Thursday.

Called on Arnold and had a talk in regard to California Tertiary. See my notes on separate sheets.

Then to Berkes. He and Kindle will soon publish a paper in B. of G. giving their latest results in Alaska. Should be out during the summer.

Had lunch in the U.S.G.S. with the paleobotanists, there met White, Knowlton, Stagg, Sidley, Stevenson, Thiessen, and Osborn. Talked on the formation of a paleontological society. Fossil was out at the lunch party but dropped in to say a word to White. Sidley also left early.

Then to Emerson and left Bowles.

In the evening to Kleinpell. Also Bowles.

April 24 Friday.

Called on Ridgeway and he found out from the Am. Printing Ink Co that the $1035 had been paid about one year ago to G. Gross & Co, Baltimore, Md. in Chestnut Biddel, and Chase streets. Ridgeway then gave me a letter of introduction to the firm and started after them on the 1.05 P.M. train. Ridgeway's letter reads as follows:

"Jersey City April 24-1908.

Messrs G. Gross & Co.

Chestnut, Chase and Biddle streets

Baltimore, Md.

Dear Sirs;

The will introduce to you Professor Frank Schumacher, the Curator of the Museum, who desires to examine into and close the matter with reference to the [illegible] stones and all more included in the contract for reproducing the illustrations for Monograph XLIX, U. S. G. S.

Professor Schumacher has been in correspondence with this office for over a year in

regard to this matter, and in every instance the Government Printing Office has been communicated with, but we were unable to ascertain the exact status of the account until today, when we were informed that payment should be made by your company.

According to specifications, and the contract on file, the payment of $1035.00 on the stores service to rests with your company.

I therefore turn the form back check over to your tender members, and have assured him personally that there will be no trouble in securing the amount which is due the University.

Yours Very Truly
Jno. L. Whitney

At 3.30 showed the latter in one of the store firm, a large, heavy, fierce-eyed man. It was very evident that he knew all about our bill. We started by handing up the letter under the heading Yale University Museum ordering a credit stock to the name for $1035.00. While the receipt was being written out he told me that the stores

were worth £--.2s. I then asked him if he thought he genuine the them when he answered that he did. I can not understand why the farm should be the owner of these stones. If they belong to any one they should go to the L.P.D. & D. not to Hale.

When the receipt was handed me to sign I refused to do so because of the wording in regard to them as the owners of the stones. I took this unsigned receipt with me saying I had no authority to give such a receipt. By this time the check was written out for £1252 and signed. Tom he then paid to Kidnapper Hale.

The farmer-lyed man admitted that they had one many loads from at least one field ago. His claim for some payment was that he was awaiting an order from the Public Bodies when the Public Bodies saw fit to have stone to do with Hale in the matter. To me it is a clear case of having it on the other fellow in the hope that somebody may forget all about it. Then a clear profit of not my £1252 but about £900