EVENING LECTURE SERIES OPENED BY DR. LILLIE

The regular series of Friday evening lectures at the Marine Biological Laboratory was opened on June 30 by Dr. Frank R. Lillie, president of the Corporation, with a message of welcome to investigators and students. A transcript of his remarks, based on shorthand notes, follows:

Ladies and Gentlemen: This is the first general meeting of the fifty-second session of the Marine Biological Laboratory. I wish to take advantage of this occasion, on behalf of the Corporation, to bid welcome to the investigators new and old, and to the students new and not very old—of course—and wish in your earnest work success and enjoyment. And I feel very sure that all will enjoy the opportunities for recreation that this place affords.

Since our last session the Laboratory has suffered serious losses of membership, unusually serious losses: Edmund Beecher Wilson, dean of American zoologists, trustee of this institution practically since its foundation, who died during the year; Charles R. Stockard, the noted anatomist and member of our Corporation and trustee for a great many years, who departed from this life too soon; and Charles R. Crane, for many years President of the Corporation and principal benefactor of the Laboratory for a great many years, whose portrait you see here on the wall, which was presented at a very timely occasion, as it turns out, last year in a celebration that we had for the fiftieth anniversary of the founding of the Laboratory. These were members of the trustees, and among the Corporation. We have two others: Calvin B. Bridges, noted geneticist, who has worked here for many years, and Edwin Linton, who was perhaps the Nestor of Woods Hole, who was here before the Laboratory was founded, and many years after with his wife established the Edwin S. Linton Scholarships at Woods Hole for the students of Washington and Jefferson College. These losses among the members of the Corporation should serve to remind us that our freedom and our liberty and our possessions are limited, and that the control of the affairs of the Laboratory is rapidly passing into the hands of younger members, that they will have to bear the responsibilities of the Laboratory in the future, that a change is coming very rapidly over the laboratory as the older members, who for many years gave their devotion to the institution, are very rapidly dying out.

Since we last met we have had the hurricane disaster, which occurred at a time when most of the members of the laboratory had left, and there were thus no casualties among laboratory members. Contributions came forward very generously from the Carnegie Corporation and were adequate to restore the losses suffered, so that today hardly anyone would notice the damages to the laboratory and you will find that it is just as well equipped to forward your research and studies as ever.

Now we are about to hear the first evening lecture of the season. These lectures are a very old institution, having been started by Professor Whitman, the founder of the laboratory, during his first year here, and maintained every year since. These are lectures in which some investigator presents chiefly the results of his own work in a way that is comprehensible to the general fraternity of biologists.

This evening we are to hear from Professor Plough of Amherst on the influence of temperature in evolutionary changes as noted in his studies on Drosophila. I take great pleasure in asking Professor Plough to take the platform. Professor Plough. (Applause).

EMBRYOLOGY CLASS NOTES

"I certainly never knew how many parts a microscope has until I greased mine! !" With this discovery by the budding scientists as they laboriously vaselined all metal portions of their 'scopes, the embryology class of 1939 got under way. Eager faces and poised notebooks greeted Dr. Goodrich as he opened the course with a lecture on fish. To those who had never worked with living material, there was much excitement as the fundulus eggs cleaved first in two, then in four, and so on in the orderly progression of multiples of two. Late in the evening one might hear, "Yes, I'll go down town for a cone, but I have to be back in time to see the sixteen-cell stage!" Some even refrained from joining the general late afternoon exodus to the beach just to watch the gastrula form. After struggling for some time with the circulatory system of the fundulus, the cunner and its polar body formation engrossed the class who craned their necks to look through horizontal 'scopes. Then there was the famous night when one of the few live cunner developed a pronephros under the curious scrutiny of several members of the class who insisted that it was dead just because they couldn't see the heart beating. "It's dead. Watch the tail curl up." "It isn't either, there goes its heart!" "Where?" "Well, I can't see it." However, the pronephros did form, even though the cunner was with the departed the next morning.

A more general observation of nature was made the day the whole class migrated to the fish traps by way of the *Sagitta* and the *Nereis*. A choppy sea and a generous sprinkling of sea water made it all the more fun for those who had never before been out on the ocean.

"I never thought I'd live to bounce a living nucleus!" Such a comment was brought forth after the demonstration by Dr. Duryee of his technique of removing nuclei from living cells and studying their contents by means of vital staining. A true test of steady nerves was made when the members of the class tried to imitate what seemed so easy when accomplished by his experienced fingers. His moving pictures of the effect of ordinary fixatives on tissue and its constitution made us groan to think of the cytology work that we had done previously.

With a timely warning not to let the "sideshows" occupy all of our time, Dr. Ballard introduced us to various beautiful and fascinating forms of coelenterates. Chopping off the heads of tubularia, seems a horrible destruction, but we all felt better when the next day we observed that each stalk was regenerating a head as beautiful as the old one had been.

"Mine looks like a surrealist drawing of humanity under a bowl of sky with a cloud floating around on top!" "Oh, no, it looks much more like a fat lady with a fur collar and one of these crazy things women put on their heads these days!" And all the time it was only the student's best attempt to draw a squid embryo! Dr. Hamburger directed our inquiry into the nature of this amazing little animal, but even his inspiration and the intricacies of the embryo couldn't compete with the interest of the budding embryologists in the great Louis-Galento fight, for every one crowded around the portable radio that had been brought to the lab for the occasion.

The sight of starfish actually curving their penta-symmetrical bodies about a pole was one of the most interesting to those students fresh from inland schools as Dr. Schotté introduced the portion of the course dealing with echinodermata. As this is being written, the intricacies of the transformation from bilateral to penta-radial symmetry are furrowing the brows of the investigators.

Short respite from such observations was given us by Dr. Packard as he gave a brief history of embryology and of the laboratory.

Although students may be found working in the laboratory at all hours of the day and evening except at meal times, there was considerable consternation at the suggestion that Dr. Goodrich might use a photometer to determine credit for the course in a ratio inversely proportional to the darkness of one's coat of tan!

—*Frances Pauls*

PROTOZOOLOGY CLASS NOTES

Mustered from Minnesota to the sunny shores of Georgia, 12 students are attending the class in Protozoology of the Marine Biological Laboratory. The course, conducted by Dr. Gary N. Calkins and Dr. George W. Kidder, consists of a series of lectures supplemented by laboratory work designed to give the student an adequate introduction to Protozoology and a substantial background for advanced work in this field.

After a timorous first week of arduous collecting and drawing, the "Protos" as they are loosely called, and they are loosely called, have excysted. Their lusty cries of "*Pork*" bellowed in a stage whisper a trifle louder than the fire horn readily betrays their presence. Working, eating, and dawdling together (Do Protozoologists *really* sleep?) has given the class an organized relationship. Extra-curricular lectures and shindigs are attended in a body.

Work in the laboratory has brought the students into contact with a great variety of interesting unicellular forms. In addition to collecting and culturing material gathered in the vicinity of Woods Hole, the Protos have trudged a beaten path to their wit's end attempting to draw specimens found. Slow moving forms have gained a great popularity with the students who so often seem to come out second best in the pursuit of the rapidly moving bugs. To some, even the slow moving forms present a problem, one student claiming a form under his 'scope had repeatedly tried to stare him down.

Hours have no fears for the bug hunters who haunt the lab with little respect for Morpheus. "Pork" is as likely to be heard after midnight in the vicinity of the lab as it is during the day. The Physiology class beneath have occasionally shown a disinterest in the meat cry, and have listened in amazement at the unbelievably loud stompings of Charlie, the Colpidium, whose wooden legged ghost often paces the floor.

Sunday the Protos took a holiday for the afternoon and journeyed to Nobska light on a picnic. A pleasant time and sunburn was had by all. With morale high, the followers of elusive, lowly life are plunging into another week of study with high hopes. —*Cecil Reid Reinstein*

EMBRYOLOGY CLASS NOTES

"And by their color shall ye know them" is only too true of the embryology class, their faculty, and friends who demonstrated that they can play as hard as they can work by going on an all-day picnic last Saturday. Although the sun was invisible through the fog, the damaging rays came through and did their insidious work. The high light of a day of ball-playing, swimming, burrowing in the fine sand, hiking through woods barefoot, and lazy lolling in the sun on the fine beach at Tarpaulin Cove was the dinner which included clams, lobster, and watermellon cleverly cut by Dr. Goodrich. The exponents of various schools of thought on the proper way to get at the lobster meat demonstrated their methods for the benefit of the novices. In the end the advocates of the hammer seemed to have a lead on those who slammed the tough carapace against trees. Only one seemed dexterous enough to draw the tender morsels from their shells by the aid of improvised chopsticks. The *Nereis* and the *Winifred* carried a completely happy, sand-covered crowd toward Woods Hole late in the afternoon. After supper, however, it began to be another tale as part of the class gathered in the court of the lab to discuss for an hour one topic of conversation, sunburn.

Earlier in the week, the class had been working long hours doing the experiments outlined by Dr. Schotté in the work on echinoderms. Many were the sea urchins thwarted by use of lithium, hypertonic sea water, and acid. The experiments on parthenogenesis aroused the greatest interest, and the loudest shouts of glee when the investigators discovered that they had actually raised fatherless sea urchins to the pluteus stage. As introduction to one of the best lectures of the series, Dr. Schotté confessed that he had left his notes in Amherst and that one of his colleagues at the breakfast table had suggested that he just let Providence put the words in his mouth. Dr. Schotté said, "I've always been interested to know how Providence feels about parthenogenesis!"

One of the high lights of the days that were spent on experimental work was the seminar held late Friday during which several of the students reported on the work they had done. Lively discussion followed some of the reports of experiments that had been made by most of the class. At the close it was rewarding to hear Dr. Schotté say that he had never had a class here that was as studious and interested as ours!

A somewhat different angle of embryology was presented by Dr. Frank Lillie in his lecture on "The Feather as a Developmental System." His explanation of experimental work carried on in his own laboratory was supplemented by his slides showing the growth of feathers. This was especially interesting since the feather is little known as a subject for experimentation.

Polar bodies, cleavages, and vitelline membranes are once again under the microscopes as the class tackles specifically the problem of fertilization under the guidance of Dr. Costello.

During the work of the first morning, Monday, the class departed en masse to the railroad station to bid farewell to Dr. Goodrich as he left for a few weeks of studying the tropical fish in Bermuda. His interest in the students, his good fellowship, and his capable organization of the course have meant so much to the budding embryologists that everyone was sincerely sorry to see him leave, and meant it when singing, "For he's a jolly good fellow - - -." —*Frances Pauls.*

PROTOZOOLOGY CLASS NOTES

Last week proved to be a busy one for the Protos. Dr. Calkins concluded his introductory series of lectures on a general survey of the Protozoa and their morphology and has begun his lectures on vitality for which he is justly famed. His work and its philosophical implications are being incorporated into the biological background of the embryonic Protos with much interest. Especially interesting also was Dr. Kidder's lecture on chromosomes and chromosomal activity of the Protozoa. We are being exposed to many new ideas on the cytology and physiology of the wee beasties.

The Protos have joined the collectors of rarities in attempting to get their drawing plates returned with Dr. Kidder's stamp of approval. The visual imagination of some students has resulted in drawings of seemingly theoretical organisms while other students should be momentarily worried as to the severity of penalties for the infringement of the copyright laws. Protoman Vince Groupé wonders if Dr. Kidder would approve of an unsigned drawing by Dr. Kidder. In addition to drawing, the Protos are spending a good deal of time making stained preparations. An unconfirmed rumor has it that some student found a Protozoan on a finished slide.

Hopes for a safe and sane Fourth were shattered when the class went down to the beach and blew up their savings in the form of 2-inchers and skyrockets; also blown was Brown's researchman Ormsby who lost several square inches of sunburn and epidermis fleeing from wildly thrown fireworks. The Protos' intentions were better than their aim. High spot in humor for the week occurred when a cilliate bit off more than it could chew under a 'scope; gurgled Wheaton's giggling Jeanne, "Look, it's *regurgarating*!" Also heard, "I'm not smoking, Miss Dewey, it's just the fog I'm in."

EMBRYOLOGY CLASS NOTES

"Motility" has taken on a new and sinister meaning for the embryologists whose patience and nerves have been strained far past the proverbial breaking point by the elusive annelid trochophores as they, the trochophores, swam around, over, under, and through the lens paper mesh intended to ensnare them. The pursuit of a sabellaria even led one eager scientist to lie in wait until 3:30 A. M. until the wary annelid finally was sighted, but sadly enough, the embryologist was so bleary-eyed by then that he couldn't see straight enough to draw it! Having put the ciliated and bewhiskered annelid trochophores into more or less accurate diagrams, the class is reported to be gaining in the race with the mollusc larvae under the capable guidance of Dr. Hamburger.

Earlier in the week Dr. Costello led the class through the maze of spiral cleavage as displayed by crepidula. The whirring of the centrifuge was later replaced by the odors of alcohols as the class turned from the effects of centrifugation on cell lineage to the preparing of slides of various cleavage stages of crepidula.

Because one year the float back of the supply department sank when the whole embryology class got out on it to study the breeding habits of nereis, the class was divided and assembled on two different evenings. Armed with electric lights, collecting nets, and finger bowls, the embryologists perched perilously on the edges of the wooden structure. There were some tense moments when two of the long-legged students hung suspended between a drifting boat and the float, but the marine forms were spared the shock of having such relatively huge forms plunge into the water.

Dr. Mary E. Rawles precipitated some lively discussion by her excellent lecture on her experimental work on pigmentation in feathers by grafting ectoderms from a bird of one pigmentation to the embryo of another. Her slides and discussion of her results were much appreciated by the class.

Another lecture attended with much interest was that given by Dr. Roberts Rugh. In addition to his slides and movies on the ovulation of frogs, he reported some of his recent work with X-rays on sperm with the resultant effects on the embryos.

In less serious moments the embryologists give vent to their feelings by breaking forth in song accompanied by a guitar and violin in the court of the old lab building. Occasionally arbacia appear in peculiar places such as in shoes and on chairs!

Although the picnic is stale news to the rest of the world, its effects are still with us in the form of peeling epidermis. One worthy sufferer reports the amazement of the dormitory maid at the amount of epidermis piled on the floor of his room. Other true scientists subjected layers of shoulder and back to scrutiny under a microscope. Vital stains were quite ineffective!

May we offer our services as tutors to the Botanists so that in the future they will be able to recognize the evident differences between a very superior type of the genus Homo and the lowly crustacean? —*Frances Pauls*

BOTANY CLASS NOTES

Two outstanding speakers were featured at last Thursday's seminar. Dr. Sinnott, professor of botany at Columbia University, started the program with an excellent summary of his work on the relation between cell size and ovary size in the growth of *Curcurbita pepo*. Dr. Bloch, also of Columbia, made a most interesting comparison between wound healing in plants and animals.

The last trip was an all-day excursion to Penikese Island and Gay Head. After landing at Penikese, the class walked across the island, taking care not to step on the bird's eggs which are laid in bare spots on the hillsides. Because of our caution, it is to be hoped that no mother bird returned to her nest to find her offspring scrambled. Collecting along the shore was excellent, despite the battering one received from the waves, and a goodly number of species was lugged home. This was our first experience with Fucus-covered rocks, and as a result, some of the budding phycologists found themselves unexpectedly in a sitting position.

The wind came up on the way to Penikese, and the good ship *Nereis* attempted to go three ways at once. The members of the class proved good sailors, however, and all lunches remained securely moored.

At Gay Head, there was a fine wash. Much *Rhodomenia* and *Polysiphonia* were dumped into the buckets, but, from an aesthetic standpoint at least, the delicate *Plumaria* was the prize catch of all.

As we approached Woods Hole, the sky grew blacker and blacker. Finally when we were within a few hundred yards of the dock, the storm broke, and the class cowered under the *Nereis'* semi-waterproof deck. Despite the storm, it was a very successful trip in every way.

The botany class reached its full quota with the arrival of Mrs. Thivy from Madras, India. Mrs. Thivy says that in her country algologists do not

They will be taken up in the following order:—Protozoa, Porifera, Coelenterata, Ctenophora, Platyhelminthes, Nemertea, Nematoda, Annelida, Bryozoa and Calyssozoa, Mollusca, Arthropoda (including Limulus), Echinodermata, and Protochordata.

Field trips for the study of marine invertebrates in their habitats and associations are planned to permit students to familiarize themselves with the appearances, names and relations of the shore inhabitants from the above phyla. The following places, where varied habitats are grouped close enough together to permit several to be studied in a short time while tides are low, will be visited in the order named (*D.V.* and weather permitting): Stony or Breakwater Beach, Lackey's Bay, Lagoon Pond Bridge, Cuttyhunk, Kettle Cove, Hadley Harbor, North Falmouth and Tarpaulin Cove. Half days will be spent in the study of animals dredged up from the sound at various places as they are brought on board in the dredges and on animals secured by sampling the sea surface layers with tow nets. Students see the methods used in such procedures. Keys for rapid identification of the more common animals of several of the phyla have been prepared by the members of the staff.

For field trips the class is divided into six teams of nine or ten members, and each member is shown how to use one or more implements on each trip to enable a team to find, identify and learn the habitat and associations of a relatively large number of species in the region visited. As nearly as possible a team is accompanied by a different instructor on each excursion. These instructors are interested in different aspects of biology and in different groups of animals. So the procedures in the field, as in the laboratory, differ with the various instructors and students profit by the influence and guidance of at least six different members of the staff on field trips and nine in the laboratory.

EMBRYOLOGY CLASS NOTES

The Martins and the Coys, those reckless mountain boys of the song, had nothing on the embryologists and the physiologists when it comes to feuds. It seems that the physiologists weren't happy about the sign that was placed behind them while they were having their picture taken. A limulus thrown into the embryology lab by some of their members boded no good, for a bucket of water "slipped" out the window with rather accurate aim. The subsequent calm was such as might come before a storm until a troup of masked and aproned human forms sneaked into the lab by the back door, lined up with backs to the aquarium, took aim, and began using their misappropriated syringes to spray perfume that possibly cost $.05 per gallon. Later, the fumes of butyric acid and pyridine seemed not to confine themselves to the waste jars of the physiologists! On the return from the towing trip Saturday morning, the embryologists found their lab suspiciously quiet and orderly, and so set to work inspecting and classifying the catch of the morning, listing members of each phylum on the black board. After nearly an hour, studious activity was broken when an observer directed his thoughtful gaze to the rafters and discovered there an additional specimen of the Phylum Chordata which was subsequently listed as a bracketed entry:

{ skunk
{ physiologist

Saturday afternoon found every able-bodied man warming up on the town baseball field in preparation for the much-heralded game. Despite the valient attempts of the team and its supporters who provided oranges and energy-producing sugar, the physiologists steadily succumbed to the assault of the embryologists who stacked up a score of 39-13. Typical of the afternoon's performance was the batter who trotted around the diamond, pushing three other men home (not physiologists), and then strolled over beyond first to retrieve a lost moccasin while watching the ball relayed in from the outfield! As a token of friendship and generosity, an embryologist appeared around the corner just as the game was over, bearing the skunk on a lengthy pole. "Sweets to the sweet!"

In order that life shall not be all play, annelida, mollusca, crustacea, coelenterata, and tunicata have been developing under our microscopes during the past week. The coelenterates are furnishing a great relief after the wearisome chasing of trochophores and the attempts to catch crustacea in moments of boldness when they put velumous schnozzles out from between their shells. In addition to the lectures and laboratory direction by Dr. Hamburger, Dr. Costello, and Dr. Ballard, we have been privileged to have several special lectures. Dr. Schotté reported his own experimental work on the potencies of regenerative material and showed some very interesting slides illustrating his transplants with tadpole blastema.

Dr. E. R. Clark illustrated his talk on microscopical observation of certain embryological aspects of mammals by motion pictures of the regeneration of tissue in rabbits' ears. He and his staff were generous with time and demonstrations of work in their laboratory. Strictly scientific atti-

tudes relaxed as some petted rabbits whose ears were fitted with skillfully made chambers that allowed observation of the growing tissue. It was fascinating to watch the formation of regenerating blood vessels and lymph system as the rabbits lay calmly on the beds provided beside the microscopes. Dr. Clark's indictment of the lymph system challenged our conceptions of that extensive system and aroused considerable controversy.

An unusual quantity of mail one morning included picture post cards that Dr. Goodrich sent from Bermuda to the students at each desk. Since each of them was different, the class almost felt that they were cycling Bermuda. Earlier in the week one of the girls received the following note from him as a result of having presented him with a pineapple just as the train pulled out when he left.

Dear Miss B.—

As you were, I judge, the willing or unwilling agent of the embryology class in a remarkable presentation you are now the recipient of this note of appreciation. As in my confused state I heard no audible presentation speech, I was for a time at a loss as to the inner significance of the vegetable. It seems clear, however, that because of its well developed apical tuft it resembles a trochophore larva. There being, however, no prototroch the symbolism must be that it indicates immaturity—of the recipient—which I, of course, welcome as being a delicate way of wishing many future years of existence before completion of the life cycle—and in this spirit I accept it with many thanks. From the more material point of view I may state that the apical tuft is now floating far out in the Atlantic with a few other axial parts—the remainder was so refreshing that I am certain it must have been a polyploid variety. (Cf. Reports of the Hawaiian Institute for Pineapple Research)

My best greetings to the Embryology Class of 1939.

Sincerely,
(Signed) HUBERT B. GOODRICH

The class is anticipating the remaining lectures of Dr. Sturtevant on "Genes and Cytoplasm," Dr. Ballard on "Tunicate Embryology," and Dr. Caswell Grave on "Ascidian Embryology." It will be with great reluctance that the budding embryologists pack up their microscopes and move out of the east wing of the old laboratory. Fascinating work tempered with lots of fun and good fellowship have made the course here an inspiring one. Any attempt to express appreciation for the fellowship, inspiration, and direction of the faculty and our worthy assistants, Gene and John, is inadequate, but sincere. Before liquidation into sentiment, adieu. —*Frances Pauls*

PROTOZOOLOGY CLASS NOTES

The Protozoologists are entering into their final week of the course with slide preparations as the chief activity. Last week, gastronomical difficulties with a lobster, the first and last the Net's reporter will ever, ever touch, led to the unfortunate omission of the Protos from the pages of the Net. On Sunday, July 15 the class attended a tea given by Dr. and Mrs. Calkins. In addition to the class, present were: Dr. and Mrs. Lillie, Dr. and Mrs. Woodruff, Dr. and Mrs. Sinnott, Dr. and Mrs. Kidder, Mr. and Mrs. Claff, Miss Dewey, Miss Zimmerman, and Caswell Grave II. A most delightful time was had by all. The brownies, tea and cake were excellent as was the Deck Tennis at which Dr. Calkins easily outshone the rest.

The long awaited Protos' picnic was held on Monday the 16th, when the class together with all the research workers in Protozoology and their families journeyed to Tarpaulin Cove on Naushon. Well armed with food, the group left on the *Nercis* at 9 A. M. Before lunch many went swimming and played water polo. A modified version of dodgeball was played at which Dr. Kidder excelled. Lunch was a treat indeed with lobsters and steak as the main course, watermellon and mints for dessert. The lobsters were a new experience for many, fortunately only one proving to be allergic to them. The unanimous verdict of the group was that it was the most enjoyable picnic they had ever been on. Mother Mamlet and her little chickadees suffered slightly with toasted epithelium for a few days afterward.

Class lectures have been mainly on vitality, and on protective adaptation, bacteria and their relation to Protozoan metabolism. Dr. Calkins' lectures on vitality have stimulated a great deal of thought on the philosophical consequences of research protozoology. Lectures by Dr. Kidder on bacteria-free cultures and their physiological significance have awakened an enthusiastic response among those who are doing research work on Protozoa at their universities. The limitation of uncontrollable factors is so greatly reduced by this technique that accurate physiological data now obtainable will cast a good deal of knowledge on many doubtful issues as work is being done. Mr. Claff's lecture and films given in the lab were greatly enjoyed.

The recent feud between Embryology and Physiology caused the innocent Protos much grief at the odoriferous butric acid joke. Not in a joking mood, the protos will undertake their special problems by the middle of this week and before this goes to press the official termination of the course will send a few wearier and we hope wiser Protos to a well deserved rest. It's a great life if you don't awaken! —*Cecil R. Reinstein*