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INDIVIDUALISM IN MEDICAL EDUCATION[1]

IN human progress there are two fundamental processes which sometimes proceed equally, but usually one or the other is dominant,—these two processes are extension and consolidation. In the birth and growth of nations, there is first settlement in colonies due to community of thought and action; this expansion is followed by a union; national expansion leads to international alliances; the expansion of alliances leads to consolidation into world leagues. In the growth of religions many beliefs are unified by the Christian religion; then extension of doctrines leads to innumerable sects, followed by attempts at consolidation. In the more specialized fields of activity the same processes are observed. In celestial physics the theory of gravitation coördinated the scattered and divergent views; then a period of differentiation, followed by attempts at coordination in the theory of relativity. In the field of medical science there are many illustrations of the same procedure. Scattered observations on variations in the blood, phlegm, and bile, during illness were brought together in the humoral theory of disease; in like manner studies on bacteria were unified in the germ theory. Studies on heredity and environment found common expression in the theory of evolution. In the past, medicine was largely restricted to the diseases of mankind. At present she recognizes the intimate relationships of the diseases of plants and animals to those of mankind. In the near future she must take into consideration the diseases of metals; ultimately her domain will extend widely over both the organic and inorganic world. In the growth of knowledge in all of

[1] An address delivered before the Association of American Medical Colleges March 7, 1922.

its special fields and great provinces, and as a whole, two processes stand forth, namely, extension and consolidation, specialization and generalization. The vitalizing factors in these are: individual thought, and collective thought.

Whether one follows the theory of evolution or accepts the teaching of the book of Genesis, he must contemplate the beginnings of intellectual growth in the individual. Individual thought precedes collective thought. Individualism, in the abstract, postulates that each human being may live to the fullest extent his own life as he wills. According to Biblical history it attained its greatest development with the first inhabitant of the earth but did not reach its ideal. The family embodies the first step in the growth of collective thought; and as the family grows individuality becomes restricted. Here and there it breaks away from the common modes of thought and action and asserts itself in differences so pronounced that one member becomes a genius while another becomes a black sheep—a Rocail and a Cain. Rocail erects a sepulchre adorned with statues of various metals, made by talismanic art, which move and speak and act like living men. Cain becomes jealous and envious of Abel and murders him.

Community life further accentuates common thought and is necessary for the preservation of mankind; but with its growth, individuality is again repressed. Through the ever increasing restrictions brought about by unity of purpose and organization, individuality is forced toward the average. Ideas either destructive or constructive must go up or down to the level of common thought. Great leaders,—philosophers, statesmen, and scientists,—have been those who have resisted these equalizing forces. Now and then a voice cries out: "Here am I lone wanderer in endless search of myself. For æons I have been searching from star to star down the ages until I chanced this way. . . I love the idea of equality, fraternity, democracy, but I must soon leave this crowd and wander on until I come to the kingdom of my solitary soul." He who explores ways of thought or action far ahead of his contemporaries must have an inner world in which he passes long and solitary hours. If he be engaged in scientific experimentation, in an unknown land with neither map nor sign post, he may lose his sight as did Bunsen, or his life as did Lazear.

If the development of individuality be ignored one of the greatest forces in the progress of mankind is lost to the world. On the other hand, the principle of collectivism underlies our entire social organization. It develops a general bond of likeness between the one and the many; it makes the individual a part of the whole; it leads to similarity, equality, fraternity, democracy. It enables us to move in companies, regiments, battalions, divisions, and armies. Without it, a nation sinks into oblivion and a world may be lost. Without individualism the same is true. A commander-in-chief, a great field marshal, is as necessary as the army. A million souls submerge their individuality for a common purpose, but each cries out, Where am I going? What am I doing? What I have in myself is moribund. I am physically an automaton, and intellectually boots, boots, boots.

The child accepts life as it is; it sails in a ship over seas that are calm; it knows naught of the larder, ballast or sails; the length of the voyage; the course or the destiny. Its life is in another's keeping; its own life is unknown; nothing stirs from within. The youth thinks of the ship; the voyage; the strange lands which bid him come. Self is beginning to assert itself; something stirs from within. Maturity builds a ship, carefully equips it, and sets forth on an uncharted ocean in quest of a new world. Something within takes possession of the heart and soul and guides every act.

Education is the bringing out of something from within; not the forcing of something in from without. Its emblem was written by an unknown hand on the walls of Delphi—"Know thyself." It is this something within; the personality, the essential self, the individual which must receive greater consideration in our schools. What I have in common with others is best developed by the school. What is mine and mine alone can not go to school with any one but it can be stimulated, intoxicated, liberated.

Let us proceed with the central thought; greater men in medicine through greater liberty in medical education. A medical school is built upon the same general foundation as any other institution. Purpose, products, materials, and methods form the corner stones.

The purpose of the medical school is to train men in the application of scientific methods to the prevention, alleviation, and cure of disease, and to advance medical knowledge in its broadest sense.

The products of medical schools may be considered as belonging to three principal groups: the practitioners, the investigators, and the teachers. A survey of the medical profession at large shows that its eminent men usually may be placed in one or the other of these groups; sometimes in two, but rarely in three. The group of practitioners comprises those whose primary interests are in the alleviation and cure of disease. The group of investigators includes those whose deepest interests are in the causation and prevention of disease. The group of teachers contains those whose principal aims are the dissemination of the methods adopted and the results achieved by the practitioners and the investigators. Lister, Pasteur, and Osler typify the groups.

A few decades ago, the country demanded and the schools furnished, for the most part, but one type of practitioner, and that type was the all-round practitioner. He was obliged to know something of medicine, surgery, and obstetrics, together with dentistry and pharmacy. In addition to these, he was expected to show proficiency as a veterinarian. The conditions of to-day are so different, that the all-round practitioner of to-day would have been a specialist fifty years ago. The cries from the country for general practitioners are heard far and wide but are less and less heeded by the young graduate. A doctor who has had modern training in laboratories and clinics with apparatus and libraries and contact with progressive men, is quite unwilling to leave all these. Moreover he can not come up to dear old Dr. Brown to whom physiognomy revealed more than modern laboratory methods; who did many a successful major operation on the kitchen table, and who thought nursing and a controlled environment entirely superfluous. The ambitious young doctor of yesterday, following the advice and example of his successful seniors, went forth to do an all-round practice for a number of years before entering upon the study of a specialty. Away from libraries, laboratories, clinics and stimulating colleagues, he found little growth or expansion, beyond that indicated by adipose tissue. The ambitious young doctor of to-day who contemplates a career as a specialist dispenses with this hibernating period of two or three years and seeks instead the live atmosphere of the hospital, an assistantship to the master, or a fellowship in some one of our great foundations. The rural districts and small towns will be obliged to adopt something of the same methods that they long ago adopted in securing churches, schools, and factories—they will be obliged to build and equip hospitals if they hope to obtain modern medical service. With the hospital comes the staff which, in turn, forms the basis of the group clinic. Instead of the general practitioner making a complete diagnosis, there is a group of collaborating clinicians, each of whom is an expert in his particular field. The rapid development of the group clinic is creating a situation which must be recognized both by the profession and the schools.

The practitioner of the future, either general or special, not only must measure up in self-reliance, responsibility, and judgment to the practitioner of the past, but also must be better trained and more thoroughly imbued with the investigative spirit.

Each patient presents a problem, the solution of which is more difficult than that in almost any other field of science. While every medical problem must be approached through the avenues of physics, chemistry, or biology, the physician is often baffled at the very beginning of his work by the fact that he is unable to determine which will aid him most. Often he finds that no one of these sciences will solve the problem but that all are involved. Physics may explain the mechanism of joints and muscles; it may aid us in the interpretation of the effects of light, heat, electricity, osmosis, pressure, on living tissues, but it does

not explain, nerve impulses, sensations, memory, or thought. Chemistry may teach us the rates of protein, carbohydrate, and fat metabolism in health and disease; it may help us to know more of the precious vitamines and hormones but it does not tell us why one child resembles the father or mother physically and mentally, while another child does not. Biology may aid us in solving this problem but she, too, is extremely jealous of her secrets. She readily acknowledges that the process of fertilization is essentially the same throughout the animal kingdom, but she teaches us that the processes of regeneration are entirely different in different forms, and cautions us not to infer that a new leg will grow out from the stump of an old one in man as it does in some of the lower animals. She teaches that the organs of seeing, of hearing, of smelling, of tasting, of feeling, are the organs through which these sensations habitually are received. But she warns us not to infer that the loss of one of these special sense organs means an entire loss of that special sense. Our senses overlap to a degree which we little realize; light perception through the skin; sound perception through all parts of the body; color perception through both sound and smell; are a few of the many possibilities as revealed in the lives of Laura Bridgeman, Helen Kellar, Willetta Huggins and others. Deductions from the phenomena presented in these various fields are extremely hazardous and emphasize the necessity of working through the avenues of multiple hypotheses in the interpretation of disease. When this has been said, let us also recall that the names of diseases, of their courses, and of their processes are broad, generic terms, which signify physical, chemical, and biological complexes. Acuteness in observation; precision in experimentation and caution and judgment in deduction are the essentials for the interpretation of disease. They are the A.B.C. of the practitioner of the future.

One of the greatest needs in our medical schools of to-day is the encouragement of students to devote their lives to the study of the causation and prevention of disease. It becomes more and more apparent, as set forth last year by the committee on graduate work, that the medical schools must give opportunity and encouragement for men to develop as research workers. We need no longer argue that reproductive scholarship must be supplemented by productive scholarship. We accept the established fact that the investigative spirit must pervade the atmosphere of the medical school. Frequently a student stands where the roads fork and, as William James puts it, "one branch leads to material comfort, the flesh pots, but it seems a kind of selling of one's soul; the other to mental dignity and independence, combined, however, with physical penury. On one side is business, on the other science." It is not enough for the student to stand in deep perplexity outside the private door of his teacher and whisper that research work is going on inside. He must be invited in, and given time to accept the invitation. It is therefore necessary that some provision be made whereby any student may come more intimately in contact with research methods and ideals than is possible in our medical course of to-day. How far we can organize research is a question. There is no doubt but what to some extent we can create the investigative spirit. At any rate, we can help the young man who evinces this spirit; we can give him time; furnish him with apparatus and books; point the way to fields of investigation; discuss his problems and help him in his experiments. We can not dominate him nor restrain him. We can not force him to work independently or in cooperation; this must depend upon his bent, his personality, his individuality,—genius can not be organized nor can it go to school.

In every medical school there are those who are deeply interested in presenting summaries of the progress made in certain fields of medicine, or in the entire province of medicine. Their object is to sift out and correlate well established procedures. They may be neither practitioners nor investigators in the sense previously mentioned. They are so to speak the editors of medical facts and theories; the compilers; the writers of textbooks; the historians. This group we may designate as teachers or medical journalists. I am fully aware that this group is one created by American institutions

and will doubtless become extinct in time for the simple reason that teaching must be accompanied by thinking; teaching and research are inseparable. The great teacher has always possessed the investigative spirit but may not have been a great investigator. We must, at present make provision for those who wish to prepare for teaching in its broadest sense.

These three types have been designated as they exist to-day. They are generic rather than specific. They possess many attributes in common and may sometimes form a trinity.

The materials to be converted by one method or another into the products set forth are students who enter the medical school with a high school and at least two years of college training. There are no two who have followed the same course of study with the same degree of interest or who have reached the same results. In the high school the student feels his way through a large range of group electives, and often before entering college he has decided that he will major in agriculture, engineering, law, theology, or medicine. In his college work, electives have enabled him to accentuate his choice or perchance to find that his decision was wrong. In both high school and college the student may have inclined toward subjects involving manual training and thereby have acquired keenness of touch and dexterity, or toward music, cultivating the sense of hearing. He may have elected biologic sciences, accentuating observation. He may have turned toward mathematics, physics and chemistry, emphasizing precision in deduction and experimentation. He may have laid special stress on history or languages thus acquiring an excellent memory and facility of expression; or perchance on philosophy thus developing the power of abstract thought. Those of us who come in contact with these men as they enter upon the study of medicine are impressed by their differences in concept, habit and training. He who comes from the land of mighty oceans, forests, and mountains, thinks in larger terms than he who comes from the truck farm. The boy brought up in the country better understands the thought and action of the country folk than the boy brought up in the city. The boy who is reared in the highly commercialized districts of a great city regards an education in quite a different light from the one who is reared in a college or university town. One student is always on time, another is always behind time; one works quickly, another slowly; one is deft, another clumsy; one student retains best what he sees—his memory is visual; another retains best what he hears—his memory is auditory; still another remembers best what he reads—his memory depends on word association. One mind stores up isolated impressions and facts—it is analytic; another arranges impressions and facts in groups—it is synthetic. Will the student who is slow and clumsy ever make as efficient a surgeon as the one who is quick and deft? Will the one whose memory is auditory, or depends on word association, ever succeed in surgery as well as another who is able to visualize the positions and relations of organs in the body? Will the student who has an untrained ear ever make as efficient an internist as the one whose keenness in sound perception and discrimination enables him to differentiate between normal and abnormal sounds in the lung or heart? Is the one which an analytic mind as capable of interpreting a syndrome as another whose mind is synthetic? It is beyond question that the men who enter the medical school at the age of 22 or 23 years are quite unlike in their mental equipment and this fact must be taken into account in the medical curriculum.

The method of the medical school is the curriculum; around it centers, to a large extent, the resources of the school, and through it are expressed the principles and concept of medical education. The curriculum of half a century ago was probably the best that could be devised to meet the needs of the profession and schools of that day. From an economic point of view, it was highly advantageous; one teacher could lecture to a large number of students and was entirely relieved of the time consuming instruction to small groups and individuals. It was an excellent mechanism for turning out one type of general practitioner. While it served in part as an intellectual pathway, it also functioned as a "straight jacket." It kept the students so busy that they could not destroy

much property nor throw out many professors. To-day the conditions are entirely different. The financial situation has changed so that the school is no longer a recipient but a donor. The students are better trained both in behavior and intellect and are more eager for instruction. Many teachers are on a vocational basis and are able to give more time to instruction. Moreover, the medical school no longer looks to a single product, but to many products. The fixed curriculum of half a century ago will not meet the conditions of to-day, yet, in principle, it has remained unchanged. Our national organizations dealing with medical education have recognized and emphasized the need of a more liberal curriculum but have not adopted measures that materially assist the medical school in the development of such a curriculum. The fixed curriculum is so deeply rooted, so widely spread and so thoroughly fostered by standardizing bodies and educational institutions that state examining boards are rapidly adopting or creating such curriculums as the basis for medical licensure. "Eight months in each of four separate calendar years," devised for the improvement of medical education became a serious obstacle to patriotic service during the late war, and is no less an obstacle to education at the present time. A curriculum covering 4,000 prescribed hours is another mechanism to protect and advance medical education but it has defeated thinking. Medicine and medical specialties, 900 hours; surgery and surgical specialties, 648 hours; obstetrics and gynecology, 216 hours; are artificial divisions proposed by the medical educational bodies as a means of insuring better trained physicians and of eliminating bad medical schools, but these regulations have resulted in the state boards going one step further with the same good intent. But what a handicap has followed as a result of these measures. One state requires 170 hours of general pathology, another 240, another 250, and still another 270. Like variability is found in practically all the subjects in the state board curriculums. Certain peculiar requirements are exacted by some of the state boards. For example, one says in substance, either teach 60 hours of electro-therapeutics or your graduates can not practice in our state.

The day is not far distant when the schools must either incorporate in their curriculums the particular requirements of each state board curriculum or find that their graduates are not qualified to practice in these states. To incorporate these requirements means an enormous time expansion and this is impossible. The schools are thus approaching an impasse of their own creation and some remedy must be found. The one obvious solution is the creation of an elastic curriculum. The students in entering the medical school with a fixed curriculum are beginning a four-year program that requires all to do essentially the same kind and the same amount of work at the same time and in the same way. They are leashed together, made uniform in action and thought like the rowers in a great galley; shackled hand and foot, heart and soul, with chains of our own forging. It follows that the more uniform the special senses and intellectual processes, the more efficient becomes such a curriculum. To reach its maximal efficiency, we must revamp and equalize the special senses and intellectual processes,—but is this education?

The fixed and congested curriculum of to-day must give way to an elastic curriculum which is adjustable not only to these perplexities but also to instructional resources, clinical resources, and to the growth of medical science. It must provide for collective teaching; cooperative study and individual study.

Alexander Bain tells us that in the Scottish universities prior to the eighteenth century the quadrennial arts course was conducted by so-called regents, each of whom carried the same student through all the four years. In a rectorial address to the students of Aberdeen University, in 1882, he said: "You the students of arts, at the present day who encounter in your four years, seven faces, seven voices, seven repositories of knowledge, need an effort to understand how your predecessors could be cheerful and happy confined all through to one personality; sometimes juvenile, sometimes senile, often feeble at his best." Contrast this with the condition to-day, when seventy faces, seventy voices, and seventy personalities are encountered by the medical students in the four years of their course. To the

single instructor the student could carry his entire intellectual possessions; to each of the seven, one seventh; to each of the seventy, he can carry but one seventieth. But what instructor realizes this and is willing to accept his proportion? Each demands more than the student can give, and the student under this tremendous pressure loosens his hold on the get-something idea, adopts the get-by methods, and revises his ethical principles accordingly.

Probably no field of science is undergoing a more active fermentation than medical science, with the splitting off of new segments; the discarding of certain subjects; and the addition of new subjects. Just as physiology and pathology split off from anatomy, so biochemistry is outgrowing physiology; bacteriology is asserting its independence of pathology; pediatrics and neurology, otolaryngology and ophthalmology are attaining independence from general medicine and surgery. Owing to the increase in entrance requirements, certain subjects like chemistry, embryology, histology and comparative anatomy are being shifted from the medical course to the premedical course, while other subjects like osteology, bone modeling, etc., have fallen by the wayside. Again, there is going on a continual importation of subjects from the outlying fields of investigation. Immunology, Roentgenology and parasitology have been brought into the curriculum from these outlying fields. The schools that are most actively engaged in the exploration and investigation of borderland subjects find greatest difficulty in holding to a fixed curriculum.

The clinical resources of one school may be quite unlike those of another. One is favorably situated for the study of tropical diseases, another is able to utilize a great tuberculosis sanatorium, another a great psychopathic institute. The school should be able to adjust its curriculum to these resources. If in South Africa, study sleeping sickness in the clinic, in the class room, and in the laboratory. If in Panama or Louisiana, emphasize, if you wish, malaria; if where cretanism abounds, study it, teach it and think it. While one school may thus emphasize this or that particular line of study, all are studying disease, and the underlying principles of disease prevention and control are not distributed geographically. Upon the proper certification that a student has had four or five years training in a good medical school should rest his qualification to practice. If it be expedient to protect the public by some form of state or national examination such examination should be directed solely toward determining the student's ability to work and think in terms of disease prevention and control.

The principle of collective teaching in all education is based upon the assumption that all human beings possess certain resemblances both physical and mental; otherwise we could not speak of them as a group. Each person possesses more or less of every ordinary human power. Our senses of feeling, tasting, smelling, hearing and seeing are similar; their actions and interactions upon an inherited substratum are reflected in thinking, and modes of thought run along fairly parallel lines. Collectivism stimulates a spirit of emulation; of comparative evaluation of mental assets both quantitative and qualitative. It arouses a sense of power which enables a member of a group to overcome obstacles which would defeat him if he were alone. This is forcibly illustrated by the heroic deeds of the soldier when inspired by the common purpose of the group. The status of the medical profession demands many elements of collectivism. There must be developed in the medical students a fraternal sympathy; a spirit of mutual consideration, and a basis for disciplined, or expert, cooperation. There is a fairly common substratum in each subject, in each great division, and in the curriculum as a whole, which can be presented collectively, and whether or not this be the method of the future, it must be the method of the present because it is an economic necessity. These are some of the considerations which justify class lectures, class demonstrations, class experiments and class examinations. It must not be inferred, however, that it likewise justifies the existence of the present division of students into freshman, sophomore, junior and senior classes. This grouping is a menace to education and should disappear as soon as possible, especially in the medical school.

The spirit of cooperation between faculty and students in medical training is one of greatest value to the student, not only for the school period, but throughout his entire life. In order to develop this spirit, we should determine as far as possible the special assets of each student at the time he enters the medical school, and ever keep in mind his adaptability for certain kinds of work. Much can be learned through contact afforded by laboratory work and through the seminar. This should be supplemented by a knowledge of his home life, his living conditions and his social habits. Through careful observation and inquiry, we must obtain as clear a picture of the student's individuality as is possible. With this as a guide we should help him to place his assets where they will yield the greatest returns. Experience teaches that most students, at the end of the second or third year of the medical course, have decided whether they wish to lay equal emphasis on medicine, surgery and obstetrics, fitting themselves for general practice, or to give some emphasis to one, fitting themselves for a special field. If, in the judgment of the faculty, the student's selection is wise, he should be permitted to accentuate his choice. In the fourth year the student should be allowed a further latitude which will permit him again to accentuate the all-round training in medicine, surgery and obstetrics, or to lay further emphasis on one of these. In the fifth year, he should be given the liberty to round himself out for general practice as an interne, or to add to his special training, or to do independent work in research. Collective teaching and cooperative study are both necessary but they both are drawn into a common vortex unless supplemented and invigorated by individual study.

Individual study alone starts the waves which roll on and on toward the unseen and unknown shore. Working in harness is most excellent for the development of the team, but the freedom of the fields is necessary for the growth of the individual. What an inspiration comes through the exploration of the limitless fields! What a thrill comes when the individual receives a new interpretation or new revelation of nature's laws! How hopeless to read a description of the country one is about to explore. It is known only by exploring it. Individuality derives strength from the history of science, its workers and their work; but no record or experience coincides with it. They are as guide posts which disappear at the frontiers of science and individuality must wander on alone. The light from the north star may direct its footsteps but the light which comes from the soul spurs it on. The traditional home of individuality is in the university, and here is the one place where it should be fostered and encouraged. It is fair to presume that in each of our medical schools there are to-day students of great potentiality who need but the stimulus and opportunity to become leaders in science. How shall they be given the opportunity. One of the simplest of the initial steps to be taken would be to grant them the privilege of electing a certain portion of their work both quantitatively and qualitatively. The privilege of adjusting study to capacity should be restored. It was distinctive of the earlier ages and each successive generation has lessened the privilege. The students of our day are expected to know more and must consequently attempt to learn more than the most brilliant intellectual leaders of the past, who would be content to-day with the schooling of Horace, of Shakespeare or Darwin. Where they learned one thing we are attempting to learn a half dozen. They acquired knowledge; we attempt to. We can not keep the medical students marching in the trodden paths of their predecessors until weary and heartsick they complete the march, only to find that they have also acquired mental debility on the way. We must encourage them to forsake the trodden paths, to break tradition when tradition is outgrown, and to explore the unknown fields. Individuality can never be limited to the mechanism of public order, either within or without the school. Life is bigger, it asks for more. There is only one way to develop strong men, and that is by helping them to become independent thinkers. Electives are the stepping stones to independent thought, and independent thought is the threshold of knowledge.

Throughout nature there are many beautiful pictures of collective and individual effort.

Who can but envy the ideal presented in the life of the wild honey bee that belongs to the swarm and works with her companions for a common purpose. Her coming and going are regulated by no schedule or master. She goes through the forests, along the streams, over the meadows, from flower to flower, gathering nectar from wherever it can be found. Ever going, ever returning, she not only increases her particular store, but enlarges that of the swarm. Beyond and above all these, and all unknown to her, she gives to mankind greater blessings in flowers and fruits.

Let us give to the student opportunity and encouragement to seek truth wherever it can be found. In bringing truths together he builds not only for himself but also increases the common fund of useful knowledge. Beyond and above these, he helps to build a great fund of knowledge which will illuminate life in the years to come.

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HYDRA IN LAKE ERIE

WE seldom think of Hydra as of outstanding economic importance. However in this connection some interesting data were obtained by the writer during the summer of 1920 while staying at a pound-net fishery on the north shore of Lake Erie near Merlin, Ontario. The fishery is located about midway between Rondeau and Point Pelee, and from it are operated 20 pound-nets in four strings, 5 pound-nets in a string. The strings are approximately three miles apart and this would mean about nine miles from the most easterly string to the most westerly. In midsummer all the nets were taken out of the lake, some replaced from a reserve stock, the others simply reset after being washed, dried, mended and tarred. This midsummer cleaning is necessary because of the algal and other growths which accumulate on the nets making them heavy as well as putting considerable strain on the nets, especially in stormy weather, through the obstruction of the free flow of water through the meshes.

All of the nets when lifted in late July and early August were loaded with a very conspicuous brownish-orange growth in addition to the bright green algal growths. At first sight diatomaceous ooze or a bacterial production was suggested but microscopic examination showed it to be composed of innumerable living Hydras. The nets were lifted into the characteristic flat-bottomed pound-net boats and brought to the dock. The boats were anchored 100 to 150 yards from the dock and the nets dragged through the water to cars on the dock in order to wash off some of the loose material, especially mud. In addition to the mud many Hydras were washed off and these gave to the water a brownish-orange color quite distinct from the lighter color of the mud. The bottoms, seats, etc., of the boats were covered with Hydras to the depth of from ⅛ to ¼ inches and a quart jar was quickly filled by simply running a hand along the seats. A fisherman eight miles to the west and another seven miles to the east reported Hydra in apparently equal abundance. This means a distribution of at least fifteen miles along this part of the shore. The beach is sandy to gravelly with some large stones. Very little life was found on the bottom out as far as one could wade. However out beyond the region of strong wave action there must be places of attachment for the Hydras other than the nets in order to account for the existence of the species from one fishing season to another, since in 1920 they had not reached sexual maturity by the first week in December when the nets were removed for the season.

Specimens of this Hydra were submitted to Professor Frank Smith of the University of Illinois who kindly stated that they without doubt were *Hydra oligactis* Pallas although absolute determination could not be made in the absence of gonads. He stated that the large size and numerous buds indicated optimum conditions of food and temperature.

Fishermen had frequently spoken about a poisoning which often affected them while handling the nets during the process of cleaning and mending. They said this occurred chiefly after the nets had dried and were covered with a fine dust which they called tar dust. No poisoning was observed during this