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## ZOOLOGY AND ITS MAKERS AT INDIANA UNIVERSITY: SEQUEL

On July 1, 1948, the writer assumed the chairmanship of the Department of Zoology at Indiana University, succeeding Dr. Fernandus Payne who had held the position since 1925. One of my first commissions was to compose the history of the Department ("Zoology and its Makers at Indiana University", Bios, vol. 20, no. 2, May, 1949). Eighteen years later, June 30, 1966, I relinquished the chairmanship and was succeeded by Dr. William R. Breneman, Waterman Professor of Zoology. Just as I recorded the Department's history on the occasion of assuming its leadership, it has seemed appropriate, on this new occasion of change of stewards, to write a sequel. This task has been the pleasant one of odd hours during the past two years.

Let me make it clear that this is a history of the Department, not a set of personal memoirs. Although I was in the center of most of the events described and in some measure influenced many of them, the ultimate events themselves rather than the actions and reactions of myself and others are the important things. A grist of journal notes, letters, memoranda, and personal recollections could be used to mill a quite different kind of story, for decisions and actions are born out of discussion and debate, concession and compromise, persuasion and pacification; but I see little to gain and much to lose from writing in this vein.

One possible approach to the framing of this sequel is a methodical listing of occurrences in the chronological order in which they took place. Although this would serve well as a detailed record of dates and happenings, it would, I fear, provide little impression of the pattern and flow of events. It might be good anatomy, but it would be very poor embryology. I choose, then, to report in terms of pervasive developments. Hopefully, the reader will see the degree to which events and circumstances are interlocked and at the same time will gain an impression of the evolutionary progress of the total departmental organism of which these events and circumstances are only components.

### Physical Plant

Near the close of the earlier account one may read this sentence: "Not too far over the horizon is a new building for the life sciences". As it turned out, the horizon was more distant than we anticipated. A conservative state legislature from whom the necessary construction funds had to originate, considered that a delay would see a decline in prices for material and labor. This, of course, did not occur. Then, when funds were finally authorized (March, 1951), the Korean war engendered shortages of certain materials, notably copper and steel. So it was not until early spring of 1952 that construction of what came to be dubbed Jordan Hall of Biology actually began, and a full three years were to elapse before the project was completed.

To those of us constituting the "building committee" of the departments (Bacteriology, Botany, and Zoology) destined to occupy the building, those three years were ones of seemingly endless conferences with architects, contractors, and suppliers. But it is not with such matters that we are concerned; it is with the history of the building itself. Although many finishing touches remained to be completed, the move to Jordan Hall began during the early summer of 1955. In fact, Developmental Anatomy (Z215) was conducted in the new laboratories that summer. However, other courses did not follow until fall and the transfer of offices and research facilities was not completed until the approach of Christmas.

It was no mean task to make the shift, for the activities of the Department

had become widely scattered. The capacity of old Biology Hall (presently known as Swain-East) had long since been exhausted and important functions were centered elsewhere. An instructional laboratory and the Muller laboratories for *Drosophila* genetics were located in Lindley (Science) Hall; the Institute for Sex Research and the Sonneborn laboratories for protozoan genetics had been in Wylie Hall since 1950 (the Sonneborn laboratories having been removed earlier to the Chemistry building); and animal quarters were operated in assorted quonset huts. The Department of Botany, too, had some facilities outside Biology Hall and the Department of Bacteriology occupied the upper reaches of Kirkwood Hall. It goes without saying that the transfer of all the resources of the departments for which Jordan Hall was designed posed a real problem in logistics.

The fall and winter of 1955-56 provided for a "shakedown cruise" and by spring we felt ready to put the building on display. An open house under the auspices of the Society of the Sigma Xi served to present the building to our university colleagues. But the formal dedication of the building was deferred until the Commencement period in June, 1956. In a departure from the usual oratory and pageantry, the Department chose to subsidize a "homecoming" for former graduate students and faculty associates. A modest program of invited papers and a dedication lecture by Professor Muller constituted the formal part of the program. Not only was it good to renew old friendships, but our guests shared our pleasure and satisfaction over the realization of the long planned for building, while we in turn felt pride in the professional achievements of our former students. Jordan Hall was also the headquarters and center of activities when in August, 1958 Indiana was host for the annual meeting of the American Institute of Biological Sciences.

Thirteen years have now elapsed since Jordan Hall was put in service. Thanks to splendid housekeeping, the building still presents a visage of freshness and newness, and it continues to provide efficient facilities for instruction and research. But once again needs outstrip resources and the initial planning for the construction of a major addition is now being undertaken. Meanwhile, nearby Morrison Hall (formerly a women's dormitory) has been completely remodeled for use by the departments in the biological sciences. Most of our graduate students and the Institute for Sex Research were transferred to this building by September, 1967, thus releasing space in Jordan for other uses, and during 1967-68 additional lecture rooms and instructional laboratories were progressively put in service. Concomitantly, as they have been released, rooms in Jordan Hall have been (and still are) undergoing renovation. The present thinking is that with the completion of the new wing to Jordan, Morrison Hall will be released for other university functions. It is not unlikely, however, that by the time the Jordan expansion is realized, growth and change in the biological sciences will necessitate the retention of Morrison in our physical plant.

Lifted eyebrows commonly greet the news that Morrison has been added to our resources and that plans for a new wing to Jordan are afoot. Does today's over-crowding mean that we designed and constructed Jordan unwisely? There are several answers to this question. We actually did look ahead twenty years and to the best of our ability planned accordingly. Unfortunately, a limitation of funds necessitated some cutback of the original plans, so not all of what we envisioned would be required twenty years later was built in the first place. It should be realized, too, that the design for the building was virtually "frozen" two years before construction began. Add three years for the construction itself, and for all practical purposes the building was five years old the day we moved in. So Jordan Hall is eighteen rather than thirteen years old. But the principal answer lies in circumstances that no one could have foreseen fifteen or twenty years ago. I refer to the tremendous impact on teaching and research

engendered by the financial resources from such agencies as the National Science Foundation and the National Institutes of Health, and the concomitant change in the image of biology. The molecular and biochemical visage of modern biological science is one that was almost unpredictable in 1950 and the rapidity of development of this new visage traces in no small way to its fertilization by federal money. Whereas a faculty member could once be accommodated adequately in a single 15 x 20 room, say, now the common requirement is for several thousand square feet to house elaborate and sophisticated equipment and the technicians to operate it. This is no more than the physical manifestation of what much of today's research requires. And a spin-off from modern research is the rise of new kinds of courses and methods of instruction, all calling for additional and often specialized laboratory facilities. For some years, then, it has been necessary to divert space originally designed for one purpose to entirely new needs. Given the same kind of research and teaching that predominated fifteen years ago, we could have accommodated to anticipated growth. But with growth came change, dramatic change, and therein lies the true history of the Department.

### Indiana Zoology and its Makers

Seated around a table in the chairman's office in Biology Hall early in January, 1949, the members of the faculty of the Department of Zoology composed themselves for a photograph. Listed in alphabetical order, the group consisted of: W. R. Breneman, P. S. Crowell, S. D. Gerking, A. C. Kinsey, L. A. Krumholz, H. J. Muller, F. Payne, W. E. Ricker, T. M. Sonneborn, T. W. Torrey, and W. J. vanWagtendonk. The newest member of the group was P. S. Crowell who had come from Miami University (Ohio) the previous fall. Lamont C. Cole, ecologist and entomologist, had resigned the previous August to assume a post at Cornell (where he is still located) and his successor, Frank N. Young, was not to come from the University of Florida until the following September. It is convenient to take this nucleus of men and their activities and trace separately the developments that have stemmed from and emerged around them.

Just one year from the time the above mentioned photograph was taken, Dr. Ricker was on his way to Nanaimo, British Columbia, to take a position with the Canadian Fisheries Research Board. It may be recalled that Ricker was not only handling our courses in limnology and biostatistics, but was the Director of our Biological Station at Winona Lake. Thanks to a financial working agreement with the Indiana Department of Conservation, the Station had been flourishing as the field headquarters of the so-called Lake and Stream Survey. Drs. Gerking and Krumholz were also associated with the Survey, the former being concerned primarily with problems of fish production and food turn-over in lakes, the latter with population problems in natural and artificial farm ponds. Both these men also contributed teaching services to our introductory courses in general zoology and comparative anatomy.

The search for Ricker's successor culminated in the appointment of Dr. David G. Frey as of June, 1950. Trained at the University of Wisconsin, Dr. Frey was at the time at the University of North Carolina. He not only assumed Ricker's post as Director of the Biological Station and the Survey, but brought great expertise in general limnology and the evolutionary history of lakes. Over the years hence, he has produced a series of exquisite papers on the palcomorphology of lake sediments, as well as training numerous graduate students and providing distinguished teaching in general and advanced courses in limnology. At one time or another, too, he has taught the Department's course in Ornithology. (Parenthetically, this course has also been handled on occasion by Dr. Crowell and for the past three years by Dr. Robert Johnson, now retired from the School

of Education. Our most expert ornithologist, however, is Professor Val Nolan of the School of Law who has also held the title of Research Scholar in the Department of Zoology. Professor Nolan will assume an active position in the Department in the fall of 1968.) Sabbatical leaves have twice taken Dr. Frey to study the lakes of Great Britain and central Europe; and during the past year (1967-68) he has been in the Philippines in conjunction with a working agreement between Indiana University and the University of the Philippines. During his absence, his place has been filled by Visiting Professor Jaroslav Hrbacek of Prague, Czechoslovakia.

It was destined that Dr. Frey assume the directorship of the Biological Station and the Lake and Stream Survey at the very time the future of these enterprises was becoming cloudy. Decaying buildings, increasing lake pollution, and the crowding of surrounding summer residents at Winona Lake gave us concern. Some remodeling and refurbishing of the buildings was accomplished in the spring of 1951, but our thoughts turned increasingly to the possibility of removing to a new site. We were uneasy, too, over the stability of the financial support from the Department of Conservation. Such uncertainties were an important factor in Dr. Krumholz' earlier decision (June, 1950) to assume a research post at the Oak Ridge National Laboratories. (Krumholz subsequently served as Resident Director of the Lerner Laboratory on Bimini in the Bahamas and presently is at the University of Louisville.) Saul Salla (Ph.D., Cornell) was appointed (July, 1953) as Research Associate in the Lake and Stream Survey to replace Krumholz. He, like his predecessor, did some part-time teaching, taking over the course in limnology while Dr. Frey was on sabbatical leave during 1953, and pinch-hitting for me when I was shelved by illness for a few weeks during the spring of 1954.

Our fears for the financial stability of the Biological Station and the Lake and Stream Survey became reality in March of 1953 following the advent of a new state administration. It was to be the misfortune of the University and the entire state for the Department of Conservation to be placed in the hands of persons neither knowledgeable of nor especially interested in matters of conservation. This was immediately obvious to Drs. Frey and Gerking and me when we met with the directorate of that Department in Indianapolis. The Department was clearly a victim of the political spoils system in its worst form: jobs were the payoff for party support; "conservation" was to consist only of the kinds of enterprises, e.g., the raising of rabbits and planting of fish, that made voters happy. We, who had come to the meeting to establish rapport and discuss plans of mutual interest, were quickly and in a humiliating fashion led to understand there was no interest in the continuance of an enterprise that had been going on for over twenty years. During ensuing weeks, strenuous efforts were made to exert influence on and through the Governor, but in May our contract was unilaterally cancelled by the Conservation Department.

The immediate effect of this action was to strip the Survey of all its trucks, boats, and assorted pieces of equipment, as well as money resources for the upcoming field season. The University stepped in with some emergency support, support which it augmented subsequently, so that for the duration of the political regime of 1953-57 the Survey operated purely as a University enterprise. It remained surprisingly healthy, too, considering the limitation of its resources. Fundamental researches went on apace with intermittent publication of results in volumes of "Investigations of Indiana Lakes and Streams" for which the University also provided subsidy. Papers by Drs. Frey, Gerking, and Salla (who returned to his home state of Rhode Island in 1956) as well as several graduate students may be found in the "Investigations" of that period.

A new election "threw the rascals out" and early in 1957 conversations aimed toward a restoration of the association with the Department of Conservation were inaugurated. Meanwhile, there was continued consideration of the limitations of the Winona Lake site and the restrictions it necessarily imposed upon the entire program of aquatic research. An extract from a letter I sent to President Wells in July, 1958 best tells the result of our thinking about the Station. "It is our conclusion that if the University and the Department of Zoology are to operate a Biological Station at all, it should be a full-fledged enterprise, not the partial one of several years past. By this we mean not only ample facilities for limnological research, but a summer program of teaching of appropriate courses plus a developing program of conferences, institutes, and the like. This will require an establishment far greater than we have now or ever can develop at Winona Lake. In fact, the Winona site has so deteriorated that we propose it be abandoned and a new Station be constructed at a new location". That was our goal from that day forward.

It was a goal that even yet has not been fully realized. Progress was sometimes slow and halting (the record shows seemingly endless exchanges of letters and memoranda and reports of meetings and conferences), but there was progress, ultimately great progress. Much of the burden of leadership fell on Shelby Gerking who succeeded to the directorship of the Station and Survey in the fall of 1958. In a report of this scope, only the final events and results can be recorded; the preliminaries would fill a volume.

It took over two years of discussions and negotiation, but in November, 1960 a new agreement was signed with the Department of Conservation. Unlike the earlier, loosely written one, this new contract defined responsibilities and procedures with great specificity, no small reason being that the state was to discharge its financial obligation with the aid of federal funds (Federal-aid to Fish and Wildlife Restoration Act, commonly known as Dingell-Johnson Funds) allotted to it from taxes on sporting equipment and was, therefore, responsible to a higher federal agency. Since unhappy memories were attached to the old Survey and its rather vague administrative guidelines, the new agreement established the so-called "Aquatic Research Unit" whose organization, funding, and administration were precisely spelled out. The Unit became effective July 1, 1962. In fulfillment of one of its obligations to the Unit, the University gave Robert Wetzel (Ph.D., California) a three year appointment as Research Associate beginning in September, 1962. His work with the Unit and his personal researches on the physiological dynamics of food turnover were exemplary. At the completion of his term, Dr. Wetzel moved on to Michigan State University and was replaced by Joseph Nelson (Ph.D., British Columbia) who has just completed the third year of his appointment and as of June, 1968 has moved to the University of Alberta. F. Douglas Martin (Ph.D., Texas) will replace Dr. Nelson on November 1st.

Long and tedious explorations covering 27 of the most promising lakes in northern Indiana finally led to the selection of Crooked Lake, just north of Columbia City, as a site for a new Station. The University then purchased 20 acres of wooded land with 690 feet of frontage on the northwest shore of the lake. Plans for a research laboratory and boat house were drawn up and in October, 1962 the National Science Foundation provided a grant of \$126,500. for the creation of these facilities. The Summer of 1964 brought the opening of a new laboratory unmatched by any other inland facility. Attractive in appearance and setting and magnificently equipped, the Station has been a bee-hive of activity from which have emerged doctoral dissertations from a number of unusually gifted graduate students. Meanwhile, except for the recent installation of a group of house-trailers, the next phase of development--- dining provisions, permanent housing, and teaching facilities---remains to be implemented.

The summer of 1967 found the Station under the supervision of Joseph Nelson, in consequence of Dr. Gerking's decision to accept the zoology chairmanship at Arizona State University. Dr. Gerking's departure happened to coincide with a new development destined to broaden further the activities of the Department in the realm of aquatic biology. Creation of the enormous Monroe Reservoir a few miles southeast of Bloomington, opened the opportunity for a wide variety of studies---biologic, geographic, economic---pertaining to water resources. There was thereby created Indiana University's Water Resources Center. An obvious and logical need was that of a second field station at this site and such a station is presently under development. Indiana University will thus have two research stations concerned with inland waters, the one at Monroe Reservoir, a body of impounded water, the other at Crooked Lake in the environment of numerous natural lakes and the headwaters of the Tippecanoe River. The decision was then made to put the two stations under the directorship of one person who at the same time should be the policy-making leader in all aspects of water resource development. Furthermore, Bloomington and Monroe Reservoir should be the principal base of operation for this person (and his graduate students), while the yet to be appointed counterpart of Joseph Nelson would serve as an assistant director in immediate charge of Crooked Lake. It happened that on the occasion of Dr. Frey's absence during 1962-63, his place was filled by Dr. H. B. Noel Hynes, the distinguished British limnologist of the University of Liverpool. Dr. Hynes subsequently went to the University of Waterloo, Canada and then agreed to return to Indiana during the spring of 1968 to assume the aforementioned directorship of field stations. Having second thoughts, however, Dr. Hynes reneged on his decision, so as of now the position remains unfilled.

It has been noted that the beginning of my chairmanship was marked by the immediate need to replace Lamont Cole and soon thereafter William Ricker. Frank Young was Cole's successor; David Frey, Ricker's. It was a time, too, of rapidly increasing enrollments and attendant need for expanded teaching service. Although there were eleven men on the Zoology faculty, the teaching service available from them was illusory. Dr. Payne had earned the well deserved reward of freedom from teaching for the years remaining before his retirement. Dr. Kinsey was also out of teaching, devoting his energies entirely to the Institute for Sex Research. Dr. vanWagtendonk's principal obligation was to the Sonneborn research program in protozoan genetics and only his desire to give an occasional offering of a course in Comparative Biochemistry brought him at all into teaching. Drs. Gerking and Krumholz, too, had their principal obligations elsewhere, the Lake and Stream Survey; and Drs. Muller and Sonneborn exercised a deserved freedom to adjust their teaching to the best interests of their distinguished research programs. So it was that the Department found itself giving too few courses for too many students and those few courses derived largely from six persons.

My journal of the first two years of the chairmanship is replete with notes on how best to exploit our limited manpower, what new courses should be considered, what courses might be dropped, how might dormant courses be resuscitated---always with two thoughts uppermost, the protection and encouragement of current research programs and the opening of new avenues of teaching and research through the acquisition of additional manpower. I shall speak in more detail later to many of the adjustments ultimately made in the departmental curriculum; for the moment let me only set the stage.

Dr. Breneman (spelled in alternate semesters by Dr. Gerking) was handling the basic introductory course in Animal Biology and the course in Endocrinology. Dr. Young gave the one course each in Entomology and Ecology and for a brief period led summer field junkets into the southeastern states. Dr. Frey taught the basic course

in Limnology and was in the process of developing graduate courses in that field. Dr. Sonneborn gave the introductory course in Genetics and had blueprinted a series of graduate courses on the genetics of microorganisms. Dr. Muller was identified with an undergraduate laboratory course in Genetics and with a graduate course on Mutation. In the spring semester of 1950-51 he also presented the first of what were to be intermittent offerings of Evolution, a course that had lain dormant since Kinsey's withdrawal from teaching four years previously. Dr. Crowell was handling the junior level course on invertebrates and had taken over from me the course in Comparative Vertebrate Anatomy. I myself remained in charge of the general course in Embryology and the senior level course in Experimental Embryology. The last named points to an avenue of development that was inaugurated in 1951.

The outlines of the new biology were beginning to emerge by 1950 and nowhere was this more apparent than in embryology and genetics. This is not the place to trace the history of developmental biology, but one may be reminded that just ten years earlier the interests of embryologists had begun to turn sharply toward the physiological and biochemical factors that lie behind visible differentiation and morphogeneses. That is, attempts were being made to translate the somewhat nebulous concepts of induction, determination, potency, gradients, and the like into measurable entities. Witness the pioneering studies on the relation of protein and carbohydrate metabolism to the problems of induction and developmental gradients, and histochemical studies on cytoplasmic segregation. There were also hints that nucleic acids were involved in the manufacture of proteins and the first attempts to relate nucleic acids to gene reproduction were being made. The years of World War II were ones of slow progress, but by the time of which I speak, 1950, the lines of development of genetics and embryology and their beginning convergence were becoming so obvious that departmental identification with some aspect of these endeavors was dictated.

Our search for a young man of promise led us into a diversity of research areas. We emerged with James D. Ebert (Ph.D., Johns Hopkins) who at the time was at the Massachusetts Institute of Technology. Dr. Ebert was just beginning his sophisticated exploitation of serological techniques for the identification of biochemical differentiation in the early chick embryo. He joined the Indiana faculty in July, 1951 and was destined to remain five years. During that period he distinguished himself as a person of extraordinary intellectual capacity, brilliantly prosecuting his research in chemical embryology and doing scholarly teaching. The undergraduate course in Experimental Embryology acquired a new format in his hands and he proceeded to develop a series of graduate seminar courses in chemical embryology. In February, 1956, Dr. Ebert left Indiana to become Director of the Department of Embryology of the Carnegie Institution of Washington, a post that he still holds. However, our ties with Dr. Ebert have remained close over the years and it was our pleasure to have him return as the Patten Foundation lecturer for six weeks during the early spring of 1963. (For the record, may it also be noted that Sir Julian S. Huxley was Patten lecturer in the spring of 1951.)

Dr. Ebert was succeeded by Robert W. Briggs (Ph.D., Harvard) who, following a brief stay at McGill University, was working at the Lankenau Research Institute in Philadelphia. With Dr. Briggs' arrival in the fall of 1956, the program in experimental embryology assumed a new direction that may best be described as developmental genetics. Exploiting the exquisite technique of nuclear transplantation, Briggs was then making and continues to make fundamental contributions to the solutions of problems of nuclear differentiation and the genetic control of embryonic differentiation. Strength was added to this enterprise in 1957 with the appointment of Dr. Rufus Humphrey as Research Scholar in Zoology. Humphrey had had a distinguished career at the University of Buffalo and upon his retirement there was induced to transfer his research activities to Indiana. The transfer included the

extraordinary colony of Mexican axolotls of known genetic strains that Dr. Humphrey had built up over the years. Herein lay an unparalleled reservoir of eggs and embryos for embryonic and genetic analysis, a reservoir from which have emerged significant investigations on the fate of primordial germ cells, the source of regeneration blastemas, and the embryogenesis of a variety of organs and tissues under the influence of mutant genes. Over the years, numerous domestic and foreign investigators have come to work in the Briggs' laboratories for varying periods of time and a succession of gifted graduate students has been attracted to experimental embryology. Throughout, the program has received generous research and fellowship support from the National Institutes of Health. In recognition of his own research stature, Dr. Briggs himself has been elected to both the American Academy of Arts and Sciences and the National Academy of Sciences, and he presently holds the title of Research Professor of Zoology.

Just as it did when it passed from my hands to those of Dr. Ebert in 1952, the course in Experimental Embryology assumed still another visage with Dr. Briggs, for any such advanced course tends to reflect the interests of the person giving it. So it is that with a decision that I myself should reassume this course in September, 1967, it once more began to feature a more historical and comparative approach. Not unexpectedly, however, the lecture notes used in 1950 served little purpose in 1967. The problems and concepts of the late forties are not today's problems and concepts. In turning the general course in Experimental Embryology back to me, Dr. Briggs then introduced a new graduate level course in Problems of Development wherein genetics and embryogenesis come to a focus. At the same time, Dr. Briggs continues to operate a laboratory course for a selected number of graduate students. This course is unique in that it serves as a proving ground in the techniques and concepts of experimental analysis of embryogenesis for potential doctoral students.

With my energies having been channeled largely into administrative functions, coupled with the fact that my forte is more that of a teacher than an investigator, my own research contributions have been modest by comparison. Yet I like to think that my studies on the morphogenesis of the vertebrate kidney have some merit and that through these and my teaching I have contributed to the over-all program in developmental biology. So also has the continuing work of Dr. Sears Crowell. Crowell and his students have conducted numerous studies on growth, morphogenesis and regeneration of coelenterate polyps. A regrettably brief association with the Department was that of Dr. Willem A. vanBergeijk, expert on the embryogeny and phylogeny of the vertebrate ear. He came to Indiana from the Bell Telephone Research Laboratories in the fall of 1966 to assume a joint appointment in Zoology and the Center for Neural Sciences. He died suddenly and unexpectedly a little over a year later.

Come the fall of 1968, the program in developmental biology will be strengthened further by the addition of Dr. George Malacinski and Dr. John Sinclair. Malacinski received his doctorate here at Indiana in 1966 and, interestingly enough, in bacteriology rather than zoology. But because the problems of development recognize no organismal boundaries, his training and experience nicely complement other approaches to the issues of differentiation. Thus, he has proceeded naturally from doctoral studies on the bacterial oxidation of orthophosphite to postdoctoral studies at the University of Washington on the ontogeny of pancreatic enzymes. Sinclair (Ph.D., Chicago) will bring expertise cultivated through postdoctoral work at the Department of Embryology of the Carnegie Institution on RNA and protein synthesis during amphibian development. The presence of these two promising young men will enable us to implement those portions of the core curriculum (of which more later) pertaining to cellular and developmental biology.



Work in genetics has been prominent for so long that to many people genetics and Indiana University have become almost synonymous. Because genetics is so pervasive, recognizing no boundaries in the organismal world, its history at Indiana is linked to all the subdivisions of the biological sciences. Thus, at the time of the writing of the first chapter in this story, there were not only Drs. Muller and Sonneborn identified with the Department of Zoology, but Dr. Ralph Cleland in Botany and Dr. Salvador Luria in Bacteriology. Dr. Cleland has now retired, but continues his studies on the genetics of Oenothera: Dr. Luria, expert in viral genetics, left in 1950 to go to the University of Illinois and later transferred to the Massachusetts Institute of Technology. The thing is that over the years the program in genetics has been equally broad. In addition to research grants to individuals, there has been massive support of the total program by the Rockefeller Foundation and the National Institutes of Health, the latter providing for fellowships as well as research costs. Dr. Cleland was succeeded by Dr. Marcus Rhoades, distinguished investigator in the genetics of maize, and he was later joined in the Department of Botany by Dr. Drew Schwartz working in biochemical genetics. The many graduate students who to this very day specialize in genetics have therefore had extraordinary resources at their disposal. In fact, it has been a common practice for graduate students identified with one department to carry out their doctoral researches under mentors in another department; and many seminars and graduate level courses have always had an interdepartmental flavor. But it is with the history of Zoology that we are concerned, interdepartmental cooperation notwithstanding.

Dr. Sonneborn's research has taken on added luster with the passage of time. The protozoön, Paramecium, has given up many fundamental answers to the question of the mutual role played by cytoplasm and nucleus in morphogenesis. The Sonneborn laboratories have been a strong magnet attracting a succession of domestic and foreign investigators, and many gifted graduate students have completed their studies under his critical and stimulating direction. The University named him to a Distinguished Service Professorship in 1953 and he received the Cleveland Newcomb Prize of the American Association for the Advancement of Science in 1946, the Kimber Award of the National Academy of Sciences in 1959, and the Mendel Medal from the Czechoslovak Academy of Sciences in 1965. Invitations for special lectures have been a regular occurrence and he has traveled widely throughout the world to participate in various meetings and conferences. As recently as this past spring he was on tour as a national lecturer for the Society of Sigma Xi. Withal, Dr. Sonneborn has continued to be a dedicated and exciting teacher, in recognition of which he was given the Lieber Award for Distinguished Teaching in 1967. His introductory course in genetics has shown increasingly large enrollments and his graduate courses in the genetics of microorganisms have contributed mightily to the training of doctoral students. Many graduate students will also ever remember the critical but friendly give and take of the seminars conducted at his home.

There is inevitably a certain amount of turnover in the personnel of a research laboratory; technicians come and go and those in higher echelons move on to new careers. It has already been noted that Dr. vanWagendonk left in 1960. But two others have been part of the scene for many years. Miss Myrtle Schneller has served conscientiously as principal research assistant to Dr. Sonneborn for all the years in Jordan Hall and earlier. Dr. Ruth Dippell was a Research Associate equally long; and upon her retirement from Wellesley College in 1962, Dr. Mary Austin was given an appointment as Research Scholar.

The mentioning of Miss Dippell (Ph.D., Indiana) leads logically to two related circumstances. Our course in Protozoology has been on the books for years. It was originally developed and offered by Dr. Sonneborn, but other pressures on his time

and energy soon precluded his association with it. It has been kept alive only through intermittent offerings, principally in the summer, and upon at least two occasions Dr. Dippell was in charge. But come the fall of 1968, Sidney Tamm (Ph.D., Chicago) will join the staff. He has been doing postdoctoral work for the past two years at the Gatty Marine Laboratory of the University of St. Andrews, Scotland on problems of flagellar development in Protozoa. The plan is to stabilize instruction in protozoology in his hands. The course in Cytology, so essential to trainees in genetics, was originally identified with Zoology and given by Dr. Payne. For a brief period following Dr. Cleland's coming (1938) to the Department of Botany, he and Dr. Payne offered it jointly. The course was then shifted to Botany and over the years, until he retired, Dr. Cleland was alone in charge. The plan was that the course would then once more become the responsibility of the Department of Zoology. However, fruitless efforts to recruit a cytologist of international stature left the course with Botany and in the hands of a succession of "pinch hitters". Dr. Cleland himself came out of retirement to do the job four years ago; in 1965 Dr. Harold Callan of the University of Edinburgh served as visiting professor and took it on; in 1966 Dr. Rhoades stepped in. Finally, in the fall of 1967 Dr. Dippell was named Associate Professor of Zoology and at long last the course was shifted back to Zoology and put in her hands. She is eminently qualified for the assignment. She is broadly informed in general cytology and is a skilful practitioner of the art of electron-microscopy.

The coming of Dr. Hermann J. Muller to Indiana in 1945 has already been recorded. Except for intermittent leaves for travel and study, he was destined to be associated with us for over twenty years. They were years of extraordinary achievement by a man of extraordinary intellectual powers. His laboratories, manned by a large array of research assistants and technicians and under the immediate direction of a succession of research executives (I. Herskovitz, I. Oster, S. Zimmering, W. Lee, and R. Reinhardt) continued to explore the intricacies of Drosophila genetics; he wrote persuasively and lectured widely in the interest of educating the public to the dangers inherent in exposure to ionizing radiations; he devoted himself increasingly to humanitarian and social problems, especially with respect to the necessity of elevating the genetic level of mankind. Withal, he directed a succession of graduate students, gave the undergraduate course in laboratory genetics and, intermittently, Evolution, and offered graduate courses in mutation and radiation genetics. The graduate courses, coupled with those of Dr. Sonneborn on the genetics of microorganisms, provided the backbone of training for advanced students.

Nobel Laureate in Physiology and Medicine in 1946, Dr. Muller received the Kimber award of the National Academy of Sciences in 1955, the Darwin Medal of the Linnean Society of London in 1959, and the Alexander Hamilton Award from Columbia University in 1960. He was a foreign member of numerous European and Asian academies and institutes and was a member or fellow of a host of domestic professional societies as well as the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences. Upon his retirement here in 1964, Dr. Muller went to the City of Hope in Duarte, California for a year's work and thence to the University of Wisconsin. He returned to Bloomington in September 1966 and we looked forward to continuing years of his stimulating presence. His health had obviously declined in the interval, however, and it is with sadness that we record his death on April 5, 1967.

Dr. Muller's retirement left two important undergraduate courses, Laboratory Genetics and Evolution, unmanned. The former is now in the hands of George Hudock (Ph.D., Harvard) who joined the faculty in the fall of 1965. Whereas the course under Dr. Muller was essentially one in Drosophila genetics, it now exploits viruses,

bacteria, algae, and protozoa as well. Dr. Hudock's training and his own researches on the genetics of photosynthetic systems in Chlamydomonas eminently qualify him for the task. Dr. Hudock also participates in the newly evolving Core Curriculum, about which more will be said later; and with prodigious enrollments in general genetics requiring more frequent offerings, he alternates with Dr. Sonneborn in the giving of this course. The course in Evolution has been taken over by Craig Nelson (Ph.D., Texas). Dr. Nelson, a student of amphibian taxonomy, was added to the faculty in September, 1966. His other activities will be spoken of later. Further strength in the realm of genetics will be added this coming September, 1968 through Dr. John Preer. Dr. Preer is a former student of Dr. Sonneborn and received his degree here at Indiana in 1947. He has made an enviable record for himself at the University of Pennsylvania where, in addition to important contributions as a teacher and administrator, he has pursued the issue of cytoplasmic inheritance in Paramecium.

Although interest in endocrinology at Indiana dates back to at least 1930, it initially manifested itself only by way of seminars and as a component of courses in vertebrate embryology. As noted in the earlier chapter of this tale, the first formal course was developed by R. L. Kroc and upon his departure in 1944 was continued in the hands of Dr. Breneman. Not only was and is Dr. Breneman a superb teacher (he was given the Lieber Award for Distinguished Teaching in 1955), but there have emerged from his laboratory a series of distinguished research studies on the physiological interrelations of the endocrine glands of the domestic chicken, and many former graduate students trained by him now occupy responsible positions throughout the country.

One of these students is Frank J. Zeller who, upon the acquisition of his doctorate in 1957, was added to the faculty. Dr. Zeller has continued the work on avian endocrinology in the Breneman tradition while at the same time identifying himself as a most versatile and dedicated teacher. At one time or another he has stepped in to teach some one of all our basic introductory courses as well as the course in Endocrinology. At long last his teaching assignment has been stabilized and he is now responsible for B100 (Man and the Biological World) and the graduate laboratory course in endocrinology that was originally developed and introduced by Dr. Breneman.

Another one of Dr. Breneman's students is James P. Holland. After receiving his doctorate in 1961, Holland went to the University of Wisconsin for postdoctoral study and thence to Howard University. He returned to Indiana in September, 1967 as Associate Professor of Zoology. The basic course in endocrinology is now in his charge and as of September, 1968 he will also, because of his experience with a comparable course at Howard, handle a regular fall offering of Z215 (Developmental Anatomy). His research is in thyroid physiology and he is using delayed implantation of blastocysts in the rat as a critical endpoint in the analysis of thyroid interactions.

It has been documented that limnology, i.e., aquatic ecology, has been part of the Indiana tradition since the turn of the century. But little attention was given to terrestrial ecology until the coming of Lamont Cole in 1946. He was to remain only two years and, as already noted, was succeeded by Professor Frank N. Young. Young's interests and activities have been diverse, suggesting perhaps that by its own pervasiveness ecology leads its practitioners into diverse fields. He is essentially a taxonomist, as measured by his continuing studies on the evolution of water beetles; but a modern taxonomist must to a degree think in terms ecology, so Dr. Young's researches (and those of his graduate students) have always had an ecological cast and when called upon to do so, he was able to handle instruction in ecology in

a most competent fashion. By the same token, he could and did take over the course in Evolution from time to time. Unlike many departments elsewhere, ours has never prosecuted the field of entomology. Yet, dating back to Dr. Kinsey's day and beyond, we have always offered a basic course in the biology of insects and Dr. Young has offered this course every spring since he joined the faculty in 1949. In this connection, note should be taken of the splendid teaching collection of insects that Dr. Young has developed around the nucleus originally assembled by Dr. Kinsey. There is more to be added about the last years of Dr. Kinsey's activities, but it is logical to report at this juncture that the tremendous collection of gall wasps (Cynipidae) upon which Kinsey's authoritative evolutionary studies were based was sent in 1958 to the American Museum of Natural History. Continuing with Dr. Young, an interest in parasitology, stemming I suspect from his army experiences during World War II, has for some years been channeled into a lecture-laboratory course in this field.

In reiteration of the point of pervasiveness of ecology, persons other than Dr. Young should again be noted as having contributed to this phase of the Department's activity, to wit, Drs. Frey and Gerking and the assorted research associates in various aspects of aquatic biology. Then, in the fall of 1964, we were joined by Charles J. Krebs (Ph.D., British Columbia) whose revealing studies of arctic lemmings marked him as a leading young scholar in the whole field of population dynamics. The lecture-laboratory courses in ecology became his responsibility, thus releasing Dr. Young for regular offering of the course in Parasitology. Dr. Krebs has also developed a graduate course in biostatistics, a discipline previously represented first by a course given by Dr. Ricker and later by the intermittent offering by Dr. Gerking of a seminar type course on the Biology of Fish Populations. Rapidly attracting promising graduate students, Dr. Krebs' researches on populations of small mammals, i.e., field mice, go on in both laboratory and field. Suitable facilities for studying small populations under controlled laboratory conditions have been set up in the Jordan Hall animal quarters and field studies proceed on a small farm purchased by the University near Belmont some 10 miles east of Bloomington.

The newest faculty addition who in some degree is identified with ecology is Craig Nelson. As noted earlier, Dr. Nelson is a student of amphibian evolution whose activities have encompassed collecting junkets into Central and South America. The course in Evolution is not only now in his hands, but he has also taken over the senior-level course in Vertebrate Zoology which for some years was offered by Dr. Crowell.

The faculty structure of the Department would not be complete without some mention of the Regional Campuses. The resources of the University are of course not confined to the Bloomington Campuses; beginning many years ago as "extension centers", full-fledged programs are rapidly developing at Fort Wayne, Indianapolis, Kokomo, Jeffersonville (Southeast), East Chicago, and Gary (Northwest). Our offerings have long been confined to introductory courses, notably, Animal Biology and Developmental Anatomy, and the instructional staff has commonly been recruited locally from qualified high school teachers and the like. But as these regional centers now move toward becoming four-year institutions in their own right, there is the obvious need for a wider offering of courses and this means not only more personnel, but full-time personnel. Accordingly, Professor Wilbur Gorham has been a regular faculty member at Fort Wayne for some years and more recently Professor William Hebard has assumed such a status at Southeast, Professor Herman Wilhelm at Kokomo, and Professor John Dustman at Northwest.

It should be mentioned, too, that course instruction during the Summer Sessions has involved only modest participation by the regular faculty. Over the years, a

succession of persons from other colleges and universities has been imported for summer service. Moreover, we have exploited the Summer Sessions for apprentice-training of qualified graduate students. Many of them have been given in this fashion the experience of full responsibility for courses before going out to regular positions in other institutions.

The foregoing account of the membership and activities of the faculty has necessarily brought some statements of courses taught. But the listing is incomplete and there may well have been left an inaccurate impression of courses being a reflection only of faculty happenstance. On the contrary, the Department's course offerings have always been determined by specific needs and conditions, or, to put it differently, there has always been an overall pattern and each course has occupied its appropriate niche in that pattern, and in considerable measure faculty members have been chosen deliberately to implement it. What has been the pattern?

For the undergraduate, it has been one which first provided a grounding in the fundamentals of general zoology and/or biology from which, then, a student might proceed along one or more threads, depending upon his needs and interests. One thread has led through the more traditional biology of animals; invertebrates and vertebrates as groups and such restricted categories as insects, birds, and protozoa. Another has been along more pervasive lines: parasitology, ecology and limnology, genetics, and the sine qua non, evolution. Still another has been the thread of the physiological and purely experimental: endocrinology and experimental embryology.

For the graduate student, there has always been one important guiding principle: opportunities for specialized graduate study should be restricted to those areas with which faculty members with expertise and authoritative scholarship were identified. That is, we have never pretended to offer specialized training in all areas of zoology; better to do a few things well than everything less than well. I can recall how frequently I have written to the unsophisticated student applicant to say that if he wanted to specialize in ornithology or economic entomology, say, Indiana was not the place for him. But if he wanted genetics, taxonomy and evolution, ecology, limnology, experimental morphogenesis, or endocrinology---we had superior resources to offer. With respect to formal courses, these resources have deliberately been kept to a minimum in the belief that beyond the master's degree much of a student's education should be self-education and research. The library, suitable laboratory facilities, and the critical supervision by a faculty member of scholastic distinction have been the important things. At the same time, we have not hesitated to exploit the resources of related departments, notably in botany, microbiology, biochemistry, and physiology. And we have always felt free to cross departmental lines in the sense that a student identified with one department might carry on his doctoral research under the aegis of a faculty member in another department. There will be more to say about interdepartmental communication in another context, but for now a return to the undergraduate curriculum.

Even before 1948, Dr. Payne had from time to time suggested that a course in human biology might be an attractive and valuable offering to the general undergraduate student body of the University. The idea was discussed intermittently thereafter, but it was not until early in 1952 that we submitted to the Curriculum Committee of the College of Arts and Sciences a proposal for a lecture-laboratory course entitled "Man and the Biological World" (B100). As the title implied, the course was to deal with basic biological principles and their implications with respect to the human animal. The course was designed for one semester and was intended to appeal to those students throughout the University who otherwise might have no contact with biological science. It was to be, in other words, a terminal course.

Recognizing (and hoping), however, that some students might thereby be stimulated to carry on, provision was made for them to by-pass the introductory course in zoology and move directly into intermediate level courses.

The proposal for B100 met initial resistance from the Department of Botany. Starting first with a Botany proposal for a competitive course, discussions ranged over schemes for one- and two-semester courses in which members of both departments would participate. The upshot was a compromise wherein "Man and the Biological World" would be a single-semester, 5 credit package offered in one semester by Zoology and in the alternate semester by Botany. This is the pattern that obtains today, except that for several years now the Zoology Department has also presented a run of the course in the Summer Session.

I myself started a pilot-run of the course in February, 1953 with 30 students selected (with the aid of the Office of the Junior Division) from all areas of the University. In the second year, while still tinkering with the laboratory program, enrollment was again restricted. Thereafter, it was opened to all comers and each year since has shown an increase in enrollment. One factor in this increase resides in the adoption (1957) of a basic curriculum for the entire University wherein all students must take at least one 5-credit course in laboratory science. The result was that many students selected B100 from the several options open to them. The quality and attractiveness of the course itself, however, has been no mean factor; thus, in the fall of 1967-68, 486 students were enrolled. The Botany version of the course has shown a parallel growth and recently as many as 76 students have enrolled during the Summer Session. After being "spelled" by Dr. Gerking on two occasions, pressure of administrative duties forced me to relinquish the course permanently in 1958. It then became the charge first of Dr. Zeller and then, beginning in 1961, of Dr. Gerking. Gerking now having left the staff, it has returned to the capable hands of Dr. Zeller.

There are probably no more standard items in the curricular fare of most departments of Zoology than courses in embryology and comparative vertebrate anatomy. So it was with us until along about 1953, and even before, I began to think more and more of how illogical it was to separate these two aspects of vertebrate morphogenesis. They are, after all, only two facets of an analysis of the total operation responsible for new body form. Whether one considers the origin of the individual per se or its derivation through a line of evolutionary descent, structure and development are indivisible. Ergo, there emerged in the spring semester of 1955 a new integrated course, "Developmental Anatomy" (Z215) replacing the previously separate courses in comparative anatomy and embryology. Except for Summer Session offerings, this course has been my "baby" every spring since its inception, or should I say conception. With enrollment now having reached our laboratory capacity of 400 students, September, 1968 will see the beginning of a regular fall run in charge of Dr. Holland. It should be noted, parenthetically, that the creation of Z215 was accompanied by the introduction of a senior-level course on the vertebrates (Z406) with Dr. Crowell in charge until this past year when Dr. Craig Nelson took over.

A step-wise development of the past five years has been the subdivision of certain 5-credit course packages, notably Entomology, Parasitology, and Ecology, into separate laboratory and lecture courses. This modification has been dictated by three circumstances. First, the values of laboratory experience were being lost through excessive enrollments. Second, not all students are interested in or have talent for certain kinds of laboratory experience. Third, the construction of programs for students required the greater flexibility provided by 2- and 3-hour courses. If nothing else, the quality of laboratory instruction has vastly improved

with the reduction in numbers of student participants.

Ever since the days of Jordan and Eigenmann the opportunity for qualified undergraduates to carry on independent study and research has been one of the attractions of the Department. The number of students for whom this opportunity could be provided has necessarily declined percentage-wise; after all, there is a limit to laboratory facilities and, more importantly, to the numbers that an individual faculty member can or will supervise. Under the pressure of other activities the entire faculty admittedly permitted this function to languish somewhat during the late 50's. Came then a revitalization of the Honors Program in the College of Arts and Sciences and the Department undertook positive steps to recruit students for this program. One step was the creation (1965) of a course entitled "Perspectives in Zoology" (Z200). Some five members of the staff, representing the diverse research fields in the Department, participate, each assuming responsibility for three weeks of lectures, discussions, demonstrations, and laboratory exercises in the field with which he is identified. Students are enrolled by invitation only and each is presumed to have the interest and talent for subsequent participation in the Honors Program. Z200 thus tells the faculty which students truly have these qualifications and it tells the students not only something of the research fields open to them, but gives them a basis for selection of a specialty for honors work. Students from this Z200 "pool" then move on to semi-independent work under the direction of a faculty member of their choice during their Junior and Senior years. Thanks to the efforts of Dr. Sonneborn who presently chairs the departmental Honors Committee supervising the program, financial subsidy has been acquired for honors students via an Undergraduate Research Participation Grant from the National Science Foundation.

We like to think that the curricular patterns provided for our undergraduate and graduate students have been sound ones. Yet, except for the innovations just described, there has been no overall renovation in thirty years. Perhaps none is called for; although course titles may have remained the same, every course has constantly been updated and modified in keeping with new knowledge and changing concepts. Nonetheless, under the instigation of Dr. Breneman, a group of faculty "task-forces" will undertake during the coming year a scurting of every segment of our curriculum. No course will be considered sacrosanct. Depending upon the recommendations of these task forces and the ensuing discussions, another year may see a greatly revised lineup.

The steady increase in numbers of students, both undergraduate and graduate, has been an obvious component of some of the circumstances already described. To the departmental administrative officer, this has posed the chronic problem of relatively diminishing faculty resources; to the individual faculty member, it has posed problems of logistics, maintenance of personal contacts with students, accounting, and paperwork. A few stark figures will suggest the growing magnitude of these problems. Whereas during the late 50's roughly 1000 students were enrolled in all courses during the academic year (fall, spring, and summer), in the year 1960-61 the total had risen to 1744. But this was only the beginning, for each following year brought new increases and in the year just closed (1967-68) the total reached 4721. A change in the distribution of students also occurred. In 1960-61, only 33% of the total enrollment was in courses of the 300 and above level; in 1967-68, 50% were in upper level courses. The latter statistic tells two things: (1) an increasing number of undergraduates taking courses beyond the elementary level, even to the point of completing majors in the Department; (2) and increasing number of graduate students.

Whereas at the beginning of my tenure as chairman in 1948 we had approximately

40 graduate students, of which no more than half were headed for the doctorate degree, the number has risen steadily to a 1967-68 total of roughly 100 with 83 identified with doctorate programs. Two circumstances have accompanied this increase; a steady rise in the number, both absolutely and relatively, of women pursuing graduate work and an extraordinary increase in financial subsidy by way of fellowships provided by assorted federal agencies. The latter has itself, of course, contributed to the greater number of students in that it has provided the wherewithall for many who otherwise would have been unable to pursue advanced study. However, these federal subsidies have at the same time not been an unmixed blessing. The increasing size of undergraduate courses and the accompanying burgeoning of laboratory sections has created critical needs for competent graduate teaching assistants. Today we require thirty or more assistants compared with only a dozen or so ten years ago. The crunch is that the stipends for teaching assistants have never been fully competitive with tax-free fellowship stipends, thus students have understandably sought fellowships in lieu of assistantships. Did we not have a departmental requirement that all doctorate candidates give us a minimum of one academic year of teaching service, few of the top echelon of students would serve as assistants at all. Even so, many students go on fellowships as soon as they have "served their time", so to speak, with the result that there is a minimum of carry-over of teaching experience from one year to the next. This has been no mean problem for the harassed faculty member and departmental administrator trying to maintain quality instruction in undergraduate laboratories.

### Institute for Sex Research

Although the Institute for Sex Research has been a largely autonomous organization, by reason of two simple facts its history has been linked to that of the Department of Zoology. First, Dr. Alfred C. Kinsey, its founder and first Director, was Professor of Zoology; therefore, many aspects of the Institute's early development routinely came under the purview of the chairman of the Department. Second, until very recently a small segment of the Institute's finances (in addition to Dr. Kinsey's salary) resided in the departmental budget and to that extent the Institute was a departmental enterprise. This is not the place for the total history of the Institute, but it is appropriate to record those matters that bear some relation to the Department of Zoology.

The work of the Institute began on a relatively modest scale with financial support from the Medical Division of the Rockefeller Foundation and the National Research Council's Committee for Research on Problems of Sex. Its working quarters consisted of Dr. Kinsey's original office-laboratory plus two small adjacent rooms in old Biology Hall. The Institute's first major publication, "Sexual Behavior in the Human Male" (Kinsey, Pomeroy, and Martin), in 1948 brought immediate changes. A hot glare of publicity descended upon Kinsey and his co-workers and the University itself and with it, controversy and debate. In show-business parlance, Kinsey became a "hot property" for the lecture circuit. Sizeable royalties from the book nurtured an enlargement of the Institute's activities with the accompaniment of additional personnel, increased library acquisitions, and diversification into art and anthropological relics. All this called for more working space, so early in 1949 the University administration agreed to relocate certain occupants of Wylie Hall and completely remodel the bulk of the basement of that building for the Institute. (We have already noted that part of the first floor of Wylie was at the same time reworked to provide adequate laboratory facilities for Dr. Sonneborn and his associates.) The job was completed during the following year and the Institute shifted to Wylie in April, 1950, there to remain until the opening of Jordan Hall in 1955.



Work within the Institute proceeded apace and in 1953 the second major book, "Sexual Behavior in the Human Female" (Kinsey, Pomeroy, Martin, and Gebhard), was published. Its appearance elicited, happily, less titillation from the general public; more importantly, to professional readers the book went far toward meeting the criticisms of statistical analyses that had been leveled against the earlier one. Volume two, however, was only a way station along a road of additional projects which had been mapped, and almost without pause Dr. Kinsey moved ahead with unabated energy.

But unremitting 18-hour working days and an exhausting schedule of travel and lectures took their toll. Kinsey's rugged physique began to crack under the strain and in June, 1956 he suffered a heart attack. I recall so vividly a conversation I had with him early in August. I urged him to think of his responsibility to himself, his family, and to his colleagues and to enter into rest and relaxation for whatever period required to restore his health. As he walked toward my office door he turned and said: "I'll think about it, but if I can't work, I'd rather die". That was to be the last time I would talk with him; he died on August 25, 1956. I can think of no better final words about him than some of those I spoke on the occasion of his funeral.

"It is not my intention to trace the history of the present Institute, much less to outline the nature and scope of its program so well known to you all. I wish, rather, to dwell for a moment on the qualities of this man, Alfred Kinsey, which made it all possible.

There was boundless energy for the labors of every order of magnitude. There was consummate skill in gaining the confidence and respect of persons in all walks of life. There was integrity and devotion to objective science that commanded the support and cooperation of fellow professionals in all areas of human endeavor. There was courage in the face of prejudice and misunderstanding. There was loyalty, reciprocated in kind, to the members of his immediate staff. There was breadth of vision requisite to the building of the broad foundation upon which the Institute rests. Withal, there has derived a monumental record on human behavior which now and in the future will go far toward aiding man in understanding himself".

Dr. Kinsey's death posed the immediate problem of the future of the Institute. The question was not whether it should continue; rather, how it should be administered. An initial suggestion was for the creation of a co-directorship involving Paul Gebhard (an anthropologist, Ph.D., Harvard) and Wardell Pomeroy (a psychologist, Ph.D., Columbia) who had long been associated with the Institute. It was shortly decided, however, that leadership should be vested in Gebhard as Executive Director, with Pomeroy to have the subsidiary title of Director of Field Research. In order to maintain the connection with the Department of Zoology, I myself was added to the Board of Trustees. Further tie with the Department was created by an administrative decision to place the counterpart of Kinsey's salary in the Zoology Budget for use, following my review and approval, in bringing in outside research consultants from time to time.

Since the pioneering days of data acquisition were largely over even before Kinsey's death, the character of the work of the Institute had already begun to change; his death only hastened the process. Acquisition of data through interviews and other devices was not to stop, nor has it ceased to this very day, but emphasis was to be placed more on the evaluation of the data already in hand with respect to special problems dealt with only in passing in the first two major publications.

There were thus published in 1958 a modest-sized volume on "Pregnancy, Birth, and Abortion" (Gebhard, Pomeroy, Martin, and Christenson) and a very sizable one in 1965 on "Sex Offenders" (Gebhard, Gagnon, Pomeroy, and Christenson). (Incidentally, a change of publishers may be noted. The original two volumes on male and female behavior were brought out by W. B. Saunders Co.; the latter by Harper and Row.) A change of complexion was also furthered by the recommendations of numerous external consultants, a change in three respects carrying down to this very day: (1) financial structure; (2) research projects; (3) staff and administration.

1. Whereas, after its original subsidies had run out, the Institute subsisted largely on its own resources derived from book royalties (not counting the University's sizeable investment in physical plant and equipment, plus some lesser amounts already noted), it was clear by 1963 that new sources of revenue must be sought to replace the rapidly declining royalties. The solution came in a sizeable grant (1965) from the Mental Health Division of the National Institutes of Health, renewal of which is presently being negotiated. Lesser amounts subsequently came from various private foundations, sales of magazine articles and paper-back book rights, and gifts. The Indiana University Foundation has also provided some support and, as we shall see in another connection, shifts in certain salaries to the University salary structure have been made or are projected.

2. An early high-priority project, following the acquisition of funds from the National Institutes of Health, pertained to data-retrieval. In fact, the project was a recommended requisite for the granting of NIH funds. The over 18,000 case histories in the Institute's files were originally transcribed by a position code and abbreviated writing that for reasons of security could be known by only three or four persons. Quite aside from the inefficiency of the system, it was essential that the data be transferred to punch cards and/or computer tapes in order (a) to make the data more widely available to Institute members and (b) to make the data available to outside scholars while still preserving the anonymity of the individual cases. A second project consisted of determining which of the persons whose cases are a part of the record had died since they had been interviewed and to determine what, if any, relationship existed between sexual patterns and cause of death. More recent studies are those on the social mores of college youth, sex education, and homosexuality.

3. A consideration of staff and administration necessarily brings some overlap with budget and research. It is necessary, too, to confine attention to the principal personnel and related developments to the exclusion of the host of supporting workers---secretaries, code clerks, librarians, statisticians, photographers---as well as workers in other locales who have collaborated with or consulted with Institute workers. We have already recorded the principals identified with the first published volume, Kinsey, Pomeroy, and Martin. The last-named, Martin, was still an undergraduate when he became associated with Dr. Kinsey. He left the Institute in 1960 to undertake graduate work at Johns Hopkins. Following a year's leave of absence, Pomeroy left the Institute in November, 1964 to set up a private counseling service in New York. From 1950 until her recent retirement, Mrs. Cornelia V. Christenson played a prominent role as Research Associate and her name is attached to the books on abortion and sex offenders. Although no longer an active worker, Mrs. Christenson remains on the Board of Trustees. John H. Gagon joined the Institute as a Research Associate in 1959, assuming also a part-time appointment in the University's Department of Sociology. In addition to his collaboration on the book on sex offenders, Gagon has been identified recently with the data retrieval project and to a lesser extent with the college youth study. He left the Institute this summer to join the Sociology Department of the University of New York at Stony Brook.

William Simon became Research Associate in the Institute and Assistant Professor of Sociology in 1965 and has participated in three projects, college youth, sex education, and data retrieval. He, too, has left to join the Institute for Juvenile Research in Chicago, Dr. Alan P. Bell, with a broad background in theology and counseling psychology became associated with the Institute in 1966 and is currently developing a project on sexual development during childhood and adolescence, as well as serving as field director for the project on sexual deviance. Albert Klassen joined the Institute in 1966 for a two year stint as Research Sociologist, to be concerned primarily with data analysis. The newest addition to the staff will be Dr. Martin Weinberg, formerly on the faculty at Rutgers University, who will join the Institute in September. He will also be an Associate Professor in the Department of Sociology.

One of the recommendations made as a contingency of NIH support was that the decidedly insular character of the Institute should be broken down through the creation of an Advisory Board composed of persons external to it. It was felt, and rightly so, that policy decisions which had always been made internally should have the benefit of detached, objective views of individuals unconnected with the Institute. After all, Kinsey himself had made most of the original decisions and except for me, all the trustees have always been workers in or closely identified with the Institute, an arrangement conducive to myopia. Such a Board, consisting of nine members derived from such diverse fields as psychiatry, education, sociology, folklore, and art was created in 1965 and is now regularly consulted.

Any organization whose life depends upon the availability of funds from outside sources, federal agencies or otherwise, leads a precarious existence. At the very least, there is the recurring necessity to "sweat out" applications for renewal of grants and much time and energy must be diverted from basic obligations to the never-ending search for money. Accordingly, these last two or three years have seen a search for some means of establishing financial continuity and stability, a search that promises to recast the Institute's relation to the University. As a first step, part or all of the salaries of certain of the principal investigators have been assumed by the University; more specifically, their salaries lie in the budgets of the departments, e.g., anthropology, sociology, in which they hold joint appointments. The next step is yet to be taken. A first suggestion was that the Institute enter into a contract with the University under which the Institute made various commitments to the University in exchange for increased financial support. As of this writing, however, a more sweeping proposal from the University is under discussion. The plan is that in exchange for its assets, the Institute will become a University-owned and supported enterprise somewhat comparable to the Center for Neural Sciences. The present Institute would then remain within the larger organization solely as a holding corporation to own highly confidential data and erotica that the University Trustees would not care to possess. If and when this arrangement is consummated, the Institute's present Board of Trustees will be abolished and the last vestige of the ties with the Department of Zoology will disappear.

#### Division of Biological Sciences

It was becoming increasingly evident as early as 1960 that the departmental structure of the biological sciences at Indiana was not appropriately geared to the biology of the times. The prominent research issues of the day were more often biological than zoological or botanical or bacteriological; molecular and genetic biology, nurtured by sophisticated biochemistry and the elucidation of the architecture and replicative mechanisms of DNA, were revolutionizing studies of the genetic control of differentiation; a new breed of biologists, few of whom considered

themselves zoologists or botanists per se, was emerging; a new generation of students, conditioned by modernized textbooks, was coming out of the high schools. Our conventional departments were being challenged by these circumstances and the simple kind of informal cooperation that had served us well no longer seemed able to meet the challenge. How might we design new types of courses and curricula? How could we recruit faculty personnel who did not identify themselves with conventional disciplines? How could we move frontally toward the acquisition of money, equipment, and laboratory space essential to the advancing frontiers of biology?

Informal discussions and hallway conversations went on for a long time, culminating in the early fall of 1962 when a group of us met with President Stahr and Chancellor Wells and other administrative officers of the University to present our views as to what would be required to keep Indiana at the forefront of modern biology. At the request of President Stahr, our needs and objectives were subsequently presented in writing. In response, the Indiana University Foundation committed itself to sizeable financial support. But the commitment was "contingent upon presentation of a plan for organization and unification of biology".

Extended discussion by departmental faculties and chairmen resumed and there finally emerged a charter for a new "Division of Biological Sciences". Reduced to its essentials, the charter insures a retention of the identity and a high measure of sovereignty of the individual departments while at the same time providing mechanisms for the furtherance of the common good. Four departments operate under this umbrella; Anatomy and Physiology, Botany, Microbiology, and Zoology. Immediate administration is conducted by a Director, and Assistant Director, and an Executive Committee composed of the chairmen of the four departments. There are a number of standing committees, most notably one on curriculum.

In the interval required to recruit a Director for the Division, Dr. Sonneborn of Zoology served as Acting Director during the academic year 1963-64 and Dr. Charles Hagen of Botany during 1964-65. Dr. Frank Putman, distinguished researcher in immunochemistry, came from the University of Florida School of Medicine to assume the directorship in the fall of 1965. At the same time, Dr. L. S. McClung of the Department of Microbiology (Bacteriology) was named Assistant Director.

The history of the Division itself will undoubtedly be written at some future time. We need concern ourselves only with those matters that have influenced or become part of the past five years of the Department of Zoology. These fall into three categories: physical facilities, faculty, and curriculum.

The stronger leverage that could be exercised by a divisional approach as opposed to the departments operating separately or even consonantly is no more evident than in the case of physical facilities. The earlier described takeover and remodeling of Morrison Hall was a divisional enterprise as has been some of the attendant rehabilitation of Jordan Hall. The current planning for a major addition to Jordan Hall is likewise being conducted on a divisional basis. The needs of all departments for sophisticated and expensive equipment such as electron microscopes, spectrophotometers, and ultracentrifuges have been filled in the most economical way by a pooling of resources in an Instrument Center. NIH and NSF grants to the Division have furthered the development of the Center whose holdings now exceed \$400,000. in value. All technical personnel and maintenance facilities of the Instrument Center are under divisional administration.

The Division has no faculty of its own; every faculty member is attached to some one of the four departments. The recruitment of new faculty members, however, has

been greatly facilitated since the inception of the Division. Not only has each department continued to make its own case for budgetary allotments for faculty additions, but in the interest of promoting biology in general, budgetary assignments have been made to the Division as well. Once an appointment is made, the new faculty member affiliates with the department of his choice and a budget transfer to that department is then made. It is through this combination of departmental and divisional approaches that Zoology has added five staff members for the coming fall of 1968.

The needs and interests of the biologically oriented student, as opposed to those pursuing conventional majors and degrees in the individual departments, are served by the academic program of the Division. This consists of a series of interdepartmental and graduate courses. For undergraduates, the previously described "Man and the Biological World" (B100) serves non-science majors. A year-long program of "General Biology" (B105 and B106) is projected, but has not yet been implemented. The true nucleus of the Division's curriculum, however, lies in the so-called Biology Core Curriculum consisting of a series of five lecture-laboratory courses identified with five levels in the hierarchy of biology: "Cellular and Subcellular Biology" (B305); "Genetic Biology" (B306); "Developmental Biology" (B307); "Organismal Biology" (B308); and "Ecological Biology" (B309). The first two are already in operation; the others will be shortly. In addition, the Division offers a number of honors courses: "Current Problems of Biology" (S150); "Reading for Honors" (B399); and "Honors Research in Biology" (B499). These and supporting courses in the physical sciences and elsewhere in the biological sciences, plus requirements in English, foreign language, social sciences and humanities, comprise the architecture for a B.S. Degree in Biological Sciences.

The principal interdepartmental graduate courses offered by the Division are "Molecular Aspects of Biology", Lecture (B501 and B502) and Laboratory (B511) and (B512). Also under the Division's aegis are: "Institute for Teachers of High School Biology" (B500); "Seminar in Ecology and Environmental Biology" (B570); and "Special Topics of Genetics" (B600). Other such courses are likely to evolve as new faculty members become established. The only degree presently offered in Biology is the Masters of Arts for Teachers. Programs for the conventional degrees Master of Arts and Doctor of Philosophy remain in the individual departments. But now, more than ever before, each department freely taps the resources of the other departments in the Division.

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