



### **Greetings to Ambrus Ábrahám on the occasion of his 81st birthday**

At a joint ceremonial meeting on 22 November, 1973 the Szeged Committees of the Hungarian Biological Society and the Hungarian Academy of Sciences, and the Biological Committee of Attila József University greeted Academician Ambrus Ábrahám, Professor Emeritus of Attila József University, on the occasion of his 81st birthday. The meeting was attended by representatives of the Hungarian Academy of Sciences, Attila József University and the Teacher's Training College, together with the professor's students, admirers and friends. Speeches of greeting were made by J. MEGYERI, G. FODOR and I. HORVÁTH.

Dr. JÁNOS MEGYERI, lecturer at the Szeged Teachers' Training College, made the following address:

"In the name of the directorate and members of the Hungarian Biological Society, and also of his one-time students, it is with respect and pleasure that I greet the 80-year-old Academician ÁBRAHÁM, one of the founder members of our Society, its ex-president, and an honorary member, our professor and master.

I greet him with esteem on this pleasant occasion, here in this well-remembered place, this lecture room of this institute, where he created, trained his students to love science, and stimulated them as a lecturing professor and as chairman of the lecturing sessions of our society.

We greet our professor with respect and pride. With respect because his life and work have encouraged and continue to encourage respect and high esteem in everyone who has come to know him.

In what way? By his knowledge and will-power, with which he always served the common good. We respect him because he was resolute, and did not recognize obstacles in the achievement of a good and useful aim. We respect him because he scorned and did not esteem the moaners, who considered only the difficulties, but hardly did anything, in his own frequently-used expression the "cunctators".

We respect Academician ÁBRAHÁM, for he has always applied unfaltering will-power to that work which is often tiring, which often appears dull, and which apart from intuitive recognition demands much endurance. This is scientific work: that work which is one of the most wonderful of human activities, which is a source of human prosperity and progress, which helps us to recognize ourselves, which lifts aside the veil concealing the secrets and laws of nature, and the results of which promote practical work, arm man against the forces of nature, and provide man with pleasure, with the prosperity desired in some form by all mankind, and rarely with happiness too.

His respect-demanding life and work are none other in our eyes than the fulfilment of a wonderful programme:

to research, to struggle and not to retreat.

He carried out research, and thus had a part in what is known as human struggle. He too was affected by certain forces, when many other men retreated. Academician ÁBRAHÁM did not retreat, but faced the difficulties as the slender pines of his homeland weather the storms.

In September 1917, as a third-year university student and at the time as a temporary assistant lecturer he first stepped to a teaching-desk and first stood before young people desiring to learn; he simultaneously began his research work and to report the acquired knowledge.

For nearly 50 years he stood before his students and delivered his lectures clearly, understandably, colourfully and in fine language, with imposing knowledge and without any artificial methods.

We saw that for him the institute and the teaching meant pleasure. It was here, in the teaching room and the institute, that he lived, enthused and inspired. It was here that he materialized as a full man, who knew how to be merry and how to produce a cheerful atmosphere while lecturing on problems requiring the most intense attention, in order that the good humour should freshen the students. We who were able to work in his institute were unable to decide where our professor enjoyed himself most, beside his microscope in the laboratory, or in the lecturing room. We now know that he felt equally at home in both places. We now see that Academician ÁBRAHÁM's life put into practice the conception of the unity of research, teaching and pedagogy at a time when it was not yet fashionable to talk of this as a fundamental principle of higher education.

In his workplaces at the Budapest University, from 1934 at the Teachers' Training College in Szeged, and from 1940 at the Szeged University, his work was the perfect realization of the unity of laboratory and lecturing room, of research and teaching.

The realization of this unity and of this principle of constant and undiminished intensity gave birth to his usually rich scientific results, and shaped and formed

his many, well-trained students to the respect of science, to the teaching of true knowledge, and to the love above all of the homeland.

Hundreds of his students in the most varied teaching positions (from primary schools to universities), and in research institutes throughout the country are now carrying out their work as they saw it performed by their professor, and as he advised: "Always look for and teach the true, the verified and the science. Teach by example, and not by eloquence, for intelligent teaching is possible only by example."

His research results of many decades on his scientific theme, the nervous system, the most beautiful and most complex structure, passed far beyond the borders of the whole scientific world.

The name of Academician ÁBRAHÁM was made known, recognized and respected throughout the world by more than 260 papers and a large series of independently written books and monographs. As a result of his work aimed at elucidating the fine structure of the nervous system, his name is justifiably mentioned with the same respect as the names of Camillo Golgi and Ramon y Cajal; and what is more important, his research results help the work of the physician, the psychologist and the biologist striving to clarify the numerous unsolved mysteries of life.

On thumbing through his papers and books, one understands just how much he worked, and why he is still working today with undiminished enthusiasm: for the public good, taken in the broadest sense, which should be served directly or indirectly by science.

It is with pride that we greet our 80-year-old master, and I should like to take this opportunity of expressing our thanks and gratitude to him.

We thank you, Professor, for our pride in you, and for our ability to proclaim ourselves your students.

We are filled with pride and pleasure that you too have played your part in the fact that our country and the name of Hungary is recognized abroad. We greet you, Academician ÁBRAHÁM, on the basis of the results of your work a member of many top-ranking foreign scientific societies, a lecturer at numerous conferences, and a consultant of a large number of research institutes and university departments. Not only have you travelled the world, to report the results of your constructive genius to other experts, but many have come, and still come to your laboratory to learn from you.

Your students remember with pride that in the great cities of India, Europe and America Academician ÁBRAHÁM did just the same as in his university department: he was not only a scholar reporting his results to the scientific world, but, whether speaking English or German, remained a Hungarian, dearly loving his countrymen and always ready to serve the interests of the Hungarian people. We are also proud that you trained us too to this, and again express our gratitude and respect to you.

Finally, in the name of the Hungarian Biological Society, your ex-students and the one-time colleagues of your department, let me express the sincere wish that you work long in good health for the progress of Hungarian and universal science. May your great plans and aims materialize, and may you partake in much pleasure and honour; although you never sought for and expected this latter, if you did receive it you were pleased, and still are pleased, because you are a man, and because one of man's perpetual needs is pleasure caused by the good and the beautiful.

Let us wish that you may work and create for a very long time to come, for I know that one of the principles of your life is this. As Billroth put it: "Without creation and work, life is not worth even one breath...".

Create and work, therefore, and long may you live!"

DR. GÉZA FODOR, Rector of the University, then made the following address: "It is with very great pleasure that I greet Professor AMBRUS ÁBRAHÁM in the name of the leadership of Attila József University, on the occasion of his 81st birthday, when the Presidium of the Hungarian People's Republic has awarded him the Order of Labour, Gold Grade. I wish you long life, strength, health and every success in your future work.

Unfortunately, Deputy-Minister KÁROLY POLINSYKY is otherwise engaged, and is unable to attend this ceremony to make the award, and thus the task has fallen to me to read out and pass on to the Professor the letter of Dr. MIKLÓS NAGY Minister of Education: "Dear Professor, allow me to add my name to the list of, those greeting you on the occasion of your 81st birthday, in recognition of your outstanding scientific activity, your teaching work at the university over three decades, and your personal attitude. I greet you most warmly.

I hope that you will continue for many years to increase still further your authority both in Hungary and abroad, and to serve the interests of our socialist homeland with your activity. At this time I should like to inform you that on this occasion the Presidium of the Hungarian People's Republic has awarded you the Order of Labour, Gold Grade.

Please accept my sincere congratulations and good wishes."

Again I wish you long life, strength, health and every success in your work."

The next speaker was Professor Dr. IMRE HORVÁTH, Chairman of the University Biological Committee, who spoke as follows: "In the name of the Biological Committee I greet Academician AMBRUS ÁBRAHÁM with respect and affection on the occasion of his 81st birthday, and wish that long may he work and create in our midst.

Reference has already been made at this ceremonial meeting to personal experiences, and I too should like to do this. In recent years we have been dealing increasingly with questions of teaching and educational work. Looking back on my university years, I frequently think of Professor ÁBRAHÁM's lectures. These always meant an experience to me, and as regards their form and content each was a work of art. Professor ÁBRAHÁM frequently recounted to us students that he attached great importance to the university lectures; even as an elderly professor, he would spend 4—5 hours preparing for each lesson. I do not know whether every university lecturer can say today that he has prepared conscientiously always for his lectures and practicals. I am afraid that we perhaps speak more of the educational work than we actually do towards it, not least of all with our individual examples. I respect Professor ÁBRAHÁM as a world-famous scholar, but I respect him particularly as a university teacher.

Again I wish you, Professor ÁBRAHÁM, strength, health and a long life rich in creative work. I wish that you will be the example for an ever greater number of university lecturers."

Greeting addresses were also made by Dr. JÁNOS SZENTÁGOTHAJ, Professor of the Semmelweis Medical University, Budapest, Vice-Chairman of the Hungarian Academy of Sciences; Dr. JÁNOS BALOGH, Professor of Loránd Eötvös University, Chairman of the Biological Division of the Hungarian Academy of Sciences; Dr.

FERENC MÁRTA, Prorector of Attila József University; and Dr. LÁSZLÓ LEINDLER, Dean of the Faculty of Science József Attila University. Two students next greeted the Professor with bouquets of flowers.

After the conclusion of the ceremonial greetings Professor ÁBRAHÁM expressed his thanks to the Presidium of the Hungarian People's Republic for the second award of the Order of Labour, Gold Grade. He also expressed his thanks for the greetings, and then read out telegrams of congratulations from the Chairman and General Secretary of the Hungarian Academy of Sciences, and friends from London, Sofia and Tokyo. He further expressed his thanks to those present, and to all those who, on the occasion of the completion of his 80th year, had sent their good wishes in such a multitude of telegrams and letters.

### Scientific curriculum of Dr. Ambrus Ábrahám

Dr. Ambrus Ábrahám, retired Professor of Attila József University, Szeged, Member of the Hungarian Academy of Sciences, holder of the Kossuth Prize (1953), was born at Tusnád in the county of Csik on 20 November 1893. He attended primary school at Tusnád, and grammar schools at Csiksomlyó and Csikszekereda. In 1915 he was enrolled into the geography and biology in the Faculty of Philosophy at Budapest University. In 1919 he received his secondary-school teaching diploma, and in 1922 his doctoral diploma, with zoology as main subject, and botany and geology as subsidiary subjects. In 1917, as a third-year university student, he was chosen as assistant lecturer in the Department of General Zoology and Comparative Anatomy and Histology at the University. In the same Department he later became a fully accredited assistant lecturer and lecturer. In 1926 he was docent in "Histology of the Vertebrates", and in 1936 became associate professor. In 1934 he was appointed Professor of Zoology at the State Teachers' Training College in Szeged, and also leader of the Zoological Department. From August 1939 he was the Director of the same state Teachers' Training College. From November 1940 he was Professor of General Zoology and Comparative Anatomy in the Faculty of Science at Szeged University, and Director of the University Zoology and Biology Department. In 1946 he was elected a corresponding member of the Hungarian Academy of Sciences, and in 1960 ordinary member. He is an external member of the Royal Society of Medicine, a member of the Indian Academy of Zoology, the World Federation of Neurology and the Association of European Endocrinologists, and an honorary member of the Hungarian Biological Society and the Scientific Education Society. He is a member of the editorial committees of *Zeitschrift für mikr. anat. Forschung* and *Acta Zoologica Acad. Sci. Hungariae*. His scientific research work began in 1916 when, as a second-year university student, he won a prize in a competition "Describe on the basis of independent studies the organism and multiplication of parasitic Infusoria in Hungarian frog species". In this paper he gave the description of the parasitic Infusoria (*Opalina dimidiata*, *O. ranarum*, *O. obtrigona*, *O. similis Zelleri*, *Anoplophria intesitnalis*, *Balantidium coli* and *Nyctotherus faba*) in *Rana ridibunda*, *Bufo vulgaris*, *B. viridis*, *Hyla arborea*, *Bombinator pachypus* and *B. igneus*. When he was appointed an assistant lecturer in the General Zoology and Comparative Anatomy and Histology Department of the University as a third-year student, his interest turned to comparative histology, and before long to the nervous system. His scientific activity falls by and large into three parts: histology, hydrobiology and comparative neurohistology.

Even at the beginning of his research work he regarded histology only as a framework for him to be able to locate the nervous system in various tissues, which he made the object of examination in the most varied organs of the most different animal species from practically the whole of the animal kingdom. In one of his histological papers he described blood vessels from the multilayered cuboidal epithelium of the bladder of the rabbit, while in another, which was his doctoral thesis, he used the most varied fixing and staining procedures to investigate the histological structure of the femoral glands of the Archaeo- and Neolacertae in *Lacerta viridis*, *L. agilis*, *L. muralis*, *L. taurica*, *L. muralis maltensis* and *L. horváthi*. After a careful description of the organism he discounts the conception that the femoral glands act as the holding organ in mating. In his view the femoral glands are odour organs connected with mating, in the sense that the residues of the glandular secretion let fall by the male serve as a pathfinder for the female. He observed differences in the structure and development of the femoral glands in the two large lizard groups (Archaeo- and Neolacertae).

He regarded the hydrobiological investigations as seasonal work. In the course of this work, together with his colleagues he examined the springs of the Mátra and the hills close to Budapest or the Danube bend, and carried out extensive studies relating to the incidence of the Planariae. On this basis, from the occurrence of *Planaria alpina* they were able to draw conclusions on the extent of glaciation. With his students he later carried out systematic examinations in the brooks, springs and standing waters of the Bükk Mountain.

His comparative neurohistological studies extended to all types of organ in the most different species from the animal kingdom. If we wish to give an account of these, we must consider in turn those organ systems in which he examined the structure of the nervous system, the course of the nerve fibres, and their end-connection areas, the synapses. Before this, however, it should be recalled just what difficulties had to be faced in dealing with this extremely great problem, while he received no guidance in this either at home or from abroad. ÁBRAHÁM completed his university studies, and continued the comparative histology practicals for many years without ever having seen a single nerve cell or nerve fibre. For many long days and nights meditating at the laboratory table and leaning over the lenses of his microscopes, he himself had to find by experiment those methods which would reveal the nerve cells and the conducting and terminal systems consisting of the tremendous plexus of the processes of the nerve cells, the nerve fibres. But he succeeded. His unceasing work, endurance and steel-will were crowned with success. Following much and laborious work, he succeeded in developing methods which could overcome the problems awaiting solution, but not without difficulty, for this must be reckoned with everywhere and at all times by anyone having an interest in the structure and functioning of the nervous system. For us to be able to give a brief indication of this colossal activity, we must consider those organ systems on which ÁBRAHÁM carried out his neurohistological investigations, and to point out the results which he attained in the course of these.

When he had developed impregnating procedures suitable for the demonstration of the fine structures, he gladly devoted time to the intraepithelial fibres. Mainly of interest to him were the pathways of these, their connection to the epithelial cells and their termination. At present he is trying to acquire information with the electron-microscope as to whether there are synapses at the terminals of the intraepithelial nerve fibres running into the epithelia, and if so, then what the effect on

these is of the course of the keratinization in the keratinizing epithelia. Are they keratinized (which is probable), and if so, then are they re-formed? Are there intra-epithelial synapses, or not? He has carried out his examinations on the skin of man, the dog (*Canis familiaris*), the elephant (*Elephas indicus*), the mole (*Talpa europaea*), the hedgehog (*Erinaceus europaeus*), the green lizard (*Lacerta viridis*) and the mars frog (*Rana ridibunda*). He has also followed the fate of the intraepithelial fibres in his investigations on lip cancer in humans, when he found that there are intact nerve fibres in the cancerous tissue.

As regards the organs of movement, he studied the nerve supply of the sphincter of *Anodonta cygnea* and established that the individual fibres of the nerve fibre plexuses end in terminal heads on the muscle fibres. He further reported that there are no nerve cells in the sphincter. He demonstrated the synapses in the oculomotor muscles of vertebrates, and followed the degeneration in frogs after the transection of the nervus oculomotorius.

He demonstrated the sensory nerve terminal systems in the region of the gastrointestinal system from the lips of humans, from the roots of moustache hairs, from the palate of the bear (*Ursus arctos*), the rat (*Epimys rattus norvegicus*), the dog (*Canis familiaris*) and hen (*Gallus domesticus*), and from the palatine tonsils of humans. He described the receptor apparatus in the pre-stomach of birds (*Anas anas*, *Gallus domesticus*), and proved that the nerve fibres supplying the smooth muscle cells end epicellularly in terminal heads. In the gastrointestinal tract of snails he showed that the terminal fibres of the nerve fibre plexuses interspersed with nerve cells end freely. Here he ran into the theories of ISTVÁN APÁTHY regarding continuity, and saw that the APÁTHY neurofibrils are nerve fibres which pass not through the body of the nerve cell, but below or above it. His research of the intestinal sections began with the bony fish (*Esox lucius*, *Tinca vulgaris*) and continued with the reptiles (*Emys orbicularis*) and the birds (*Gallus domesticus*, *Columba domestica*, *Anas, anas*). He described intramural plexuses and nerve terminals in the smooth muscle tissue from all three origins.

He described nerve terminal organs of a sensory nature from the region of the breathing apparatus in the lung of lizards (*Lacerta agilis*), and from the walls of the interalveolar septa, reported ganglia and nerve fibre plexuses in the lung of *Emys orbicularis*, pressoreceptors from the swimming-bladder of bony fish (*Cyprinus carpio*, *Carassius carassius*), and characteristic intraepithelial fibres from the epiglottis of mammals (*Felis domestica*).

The circulatory organ system is the region where ÁBRAHÁM worked much and where his name will perhaps be longest remembered in the annals of the international neurological literature. In his papers in this connection, which appeared in very great numbers, he deals with the nerve supply of the heart of fish, amphibia, reptiles, birds and mammals, including man. In a treatment extending to all parts of the heart and to every layer of the wall structure, he describes the nerve terminal organs of the myocardium, the intracardial ganglia, the interneuronal synapses and the receptors from the epicardium, the myocardium and the endocardium.

ÁBRAHÁM also carried out studies, similar in number and value to those on the heart, on the innervation of the vessels. Of these, which extend equally to the large vessels of birds, mammals and man, particular mention must be made of those referring to the tunica intima and the tunica media. As regards the former, in contrast to all opposing assertions he proved that it is free of nerve fibres. In the case of the latter he demonstrated that the nerve fibres entering the adventitia form a double

plexus: one of denser texture on the boundary of the adventitia and a looser one towards the intima. He showed that on the arcus aortae and the vena saphena the nerve fibres of the smooth muscle cells end in terminal heads.

His favourite objects were the coronary vessels, the arcus aortae and the sinus caroticus. From the first of these he reported nerve fibre plexuses and nerve terminal formations, the latter pointing to a receptor function in their structure. From the arcus aortae, which he studied in mammals (*Canis familiaris*, *Bos taurus*, *B. bubalus*, *Ovis aries*) in addition to humans, he described the terminal system of the aortic nerve and showed that, besides the considerable agreement in this, there are also significant differences. From a neurophysiological point of view too he reported an important structure from the arcus aortae of cattle, where the neurofibrillar end-plate layer is surrounded loop-like by a capillary, as proof that a neural end-plate of greater extent has greater oxygen and nutriment requirements. In his examinations of the many different forms of the sinus caroticus (*Homo*, *Canis familiaris*, *Ovis aries*, *Bos taurus*, *Sus scrofa domestica*), he found that the end-plate systems exhibit more appreciable differences than those described from the arcus aortae.

The glomus caroticum, mainly of humans, is still a favourite research area of Professor ÁBRAHÁM today. Besides describing the structure, he demonstrated that the nerve fibres of vagal and glossopharyngeal origin end in terminal rings on the glomus cells. In his electron-microscopic examinations he found efferent synapses in the human glomus. In his view these remain unexplained if the glomus is considered exclusively as a chemoreceptor.

His results relating to the innervation of the vessels and to the heart have been published in monograph form. The work appeared first in German, and later, with a few variations and additions, in English.

He found the kidney of *Varanus griseus* most suitable for the demonstration of the nerve fibres of the renal tubules. On those tubule sections which can be regarded as ductus papillaris forms he demonstrated rich systems of nerve fibres and terminal plexuses, such as had never been observed in work related to the innervation of the kidney. As everyone else to date, ÁBRAHÁM was unable to detect the nerve supply of glomerulus but he could follow the nerve fibres up to the boundary of the glomerulus. He reported an almost unimaginable mass of nerve fibres from the larger arteries of the kidney (arteriae interlobares, arteriae interlobulares) and the wall of the renal pelvis in dog. In the dog kidney he could also follow the nerve fibres in the walls of the tubuli recti, and between the tubules found fibres which he classified as receptors. He detected receptors in the simple columnar epithelium lining the efferent tubules in the kidney of carp.

Among ÁBRAHÁM's neurohistological studies, a considerable place is occupied by the reproductive apparatus. His examinations were made on the penis of *Lacerta agilis*, *Epimys rattus*, *Felis domestica*, *Sus scrofa domestica*, *Bos taurus*, *Capra hircus*, and on the prepuce, glans penis and clitoris of humans. From the penis of the lizards he described simple intraepithelial fibres from the keratinizing stratified epithelium, which is covered in a special form towards the lumen by tapering keratinous squamae. The pictures which he reported on the receptors of the penis of mammals are so different, that from a single well-impregnated section it can be stated to which animal they pertain. Particularly characteristic are those relating to the prepuce and glans penis of humans. In the clitoris the complicated glomerulus systems predominate. They vary in position and number. Those lying directly below the epithelium are striking in form, richness and complexity.



Investigations relating to the central nervous system began on the nerve system of *Opisthodiscus diplodiscoides*, a parasitic trematode in the rectum of *Rana ridibunda*. These investigations provide information on the form of the system, and on the position and structure of its elements. The detailed account of the finer structures is given in those papers of ÁBRAHÁM describing the structure of the brain centres of *Dytiscus marginalis*, the synaptic connections of the visceral ganglion of *Aplysia californica*, the phylogenesis of the neurone, the mitosis of the cortical nerve cells of *Rana ridibunda*, and the giant synapses found in the motor nucleus of the nervus oculomotorius in *Cyprinus carpio*. An account of the structure of the cerebral cortex and the synapses is given by those studies carried out with an electron-microscope on the cerebral cortex of *Lacerta agilis*.

Research on the vegetative nervous system began with the human ganglion coeliacum. The interneuronal synapses were described, and among them a concentric plexus system which in a nest-like form encloses the body of the nerve cell. As regards the knowledge of the structure of the paravertebral ganglia, and mainly the synaptic connections, of particular importance are the comparative examinations carried out by ÁBRAHÁM on the ganglion stellatum and on the surgically removed paravertebral lumbal ganglia of patients with various vascular diseases. In the course of these, much evidence emerged that the terminal heads, the pericellular plexuses and other similar formations which at times appear en masse on the cells, are the terminals of the preganglionic fibres, and as such are interneuronal synapses. He distinguished two forms of these formations: a simpler one, and a more complicated one. In accordance with the Kirsche nomenclature, he classified the former as a synapsis with a low transmission surface, and the latter as a synapsis with a high transmission surface.

In studies on the adrenal gland extending to all of the vertebrates higher than the fish, nerve cells, nerve fibre plexuses and interneuronal synapses were described from the adrenal of *Rana ridibunda*, *Emys orbicularis*, *Columba domestica*, *Ardea cinerea*, *Rallus aquaticus* and *Fulica atra*. The adrenal medulla of mammals proved free of nerve cells possessing rich nerve fibre plexuses and terminal rings. He also performed electron-microscopic examinations on the adrenal of *Bufo viridis*. In these he made conclusions on the osmiophil and lipid cells, and also the summer cells, and described the transformation of the tubular mitochondria. He reported two axosomatic synapsis forms of the osmiophil cells, and established that there are Golgi bodies in the erythrocytes.

He dealt much with neurosecretion. He demonstrated that there are tremendous unipolar cells on both sides of the central line in the protocerebrum of *Dytiscus marginalis*. These produce masses of neurosecretion granules, which pass into the cranial nerves on intracerebral tracts consisting of neurites and crossing one another, and hence into the corpus cardiacum respectively corpus allatum. In addition to many publications describing his results in examinations with the light microscope, there are also others dealing with electron-microscope work.

In Professor ÁBRAHÁM's immense research work on neurohistology, virtually every form of sense organ was subjected to examination. A new sense organ was reported from the terrestrial Isopoda, and again from these animals he described the antennal receptors. He reported receptors from the antenna and uropodium of the Amphipoda, receptors and effectors from the gnathopodium, and receptors from the microscopic hairs covering the tergites. He described sense organs from

the antenna of *Trixalis nasuta*, and Johnston's organ from the antenna of *Diestramena marmorata*. He reported receptors of the crista acustica and macula acustica from the membranaceous labyrinth of *Cyprinus carpio*. He described the synapses from the sclera and cornea of mammals, and the stratum gangliosum from the retina. He carried out electron-microscope studies of the retina of *Rana ridibunda* and Eimer's organ in *Talpa europaea*. On the above topics ÁBRAHÁM published more than 260 papers. These appeared in *Állattani Közlemények*, *Studia Zoologica*, *Annales Biologici Universitatis Szegediensis*, *Annales Biologici Universitatum Hungariae*, *Magyar Tudományos Akadémia Biológiai Osztályközlemények*, *Orvostudományi Osztályközlemények*, *Akadémiai Matematikai és Természettudományi Értesítő*, *Acta Biologica Acad. Sci. Hung.*, *Anatomischer Anzeiger*, *Morphologie und Oekologie der Tiere*, *Zellforschung und mikroskopische Anatomie*, *Mikroskopisch anatomische Forschung*, *Acta Anatomica*, *Zoologischer Anzeiger Nature* and the publications of various international symposia and congresses. The papers were reported in *Zoologischer Bericht*, *Anatomischer Bericht*, *Berichte über die wissenschaftliche Biologie*, *Biological Abstracts* and *Excerpta Medica*.

From both scientific and pedagogic aspects, the college and university lecture notes of Professor ÁBRAHÁM are of great value; these have been published in very different fields, in accordance with the requirements of the syllabus, under titles such as "General zoology, comparative anatomy, histology and physiology", "Zoophysiological anatomy", "Comparative Study of the Animal Organism", etc. Mention must also be made of his books, the first of which "Anatomy, physiology, hygienics", written jointly with his students, appeared in 1958; enlarged and in a somewhat different form, it was published again in 1971 under the title "Anatomy and physiology". In 1961 appeared his two-volume "Comparative Study of the Animal Organism" (1055 pages, 678 figures), in which he described the comparative functional anatomy of the animal kingdom. This work is a text-book for the university students.

In 1964 the Magyar Tudományos Akadémia published his monograph "Die mikroskopische Innervation des Herzens und der Blutgefäße von Vertebraten" (475 pages, with 217 original Figures). The work was very warmly received by the foreign reviewers. Very favourable reviews of the book were given by *Berichte über die gesamte Biologie*, *Mikroskopie*, *Wiener Medicinische Wochenschrift*, *Zentralblatt für die gesamte Neurologie und Psychiatrie*, *Biologisches Zentralblatt*, *L'Année Biologique*, etc. Extremely fine appreciations were expressed by letter by those to whom ÁBRAHÁM sent the monograph.

With a few additions and changes, the monograph appeared in English in 1969, under the title "Microscopic innervation of the heart and blood vessels in Vertebrates including man" (with 222 original figures), as a joint publication of the Magyar Tudományos Akadémia and Pergamon Press, Oxford. Forewords were written by C. Heimans, Professor of Pharmacology at the University of Ghent, a Nobel Prize winner, and by E. Neil, Professor of Physiology at the University of London. The work was rated highly by the specialists in this field.

Pictures from ÁBRAHÁM's neurohistological works were published by Adams in "The Comparative Morphology of the Carotid Sinus", and by Bullock and Horridge in "Structure and function in the nervous systems of invertebrates". Six pictures were used by Bloch and Cuskey, who wrote the chapter "Cardiovascular system" in the two-volume work "Crebs Textbook of Histology", published in New York.

A valuable and much-admired part of ÁBRAHÁM's research work consists of the internationally unique collection of more than 19,000 neurohistological preparations, part of which is known everywhere throughout the world. In this a large proportion of the organs of almost every typical representative of the animal kingdom are treated. Some of the preparations are unique, and the majority of them display the greatest degree of perfection attainable with neurohistological techniques. Much of the material is Hungarian in origin, but there are some specimens which he obtained for processing from Los Angeles, Cleveland and London. Among the preparations are some prepared in Naples when ÁBRAHÁM carried out neurohistological examinations at the Hungarian bench in the Stazione Zoologica in 1938.

The preparations are arranged in four cupboards in Professor ÁBRAHÁM's laboratory. Cupboards, preparation holders and preparations are all numbered. The first cupboard contains preparations prepared from human organs. Among these practically every organ of man is represented. In the same cupboard follow the domestic mammals, and the more-easily accessible forms living in the wild. In the second cupboard are the other mammals and the birds. In the third cupboard are arranged the birds, the reptiles, the amphibia, the fish, the molluscs, the echinodermata and in part the arthropoda. The fourth contains the other arthropoda and the worms. Also arranged in this cupboard, under the label "appendix", are those preparations not fitting into this classification. Next follows the "Spetialia", the preparations shown abroad and those from which drawings and photographs were prepared for his lectures and publications. The entire collection consists of neural preparations; only in the fourth cupboard are there a few hundred section which deal with the neurosecretory systems of the insects, in addition to their nervous systems. At the end of the collection are the more than 350 stained preparations, which were the very first histological preparations of ÁBRAHÁM. These were prepared in part for his doctoral dissertation, and in part for demonstrations. A large proportion of the preparations were prepared by ÁBRAHÁM himself, but particularly in more recent years he has received much help from his coworkers. As a result of his activity an ÁBRAHÁM school of comparative neurohistology has developed. The collection is extremely valuable. The preparations deserve every protection, for they are irreplaceable, they contain much that is new, even after what has already been published on them, and they serve as the basis for electron-microscope examinations. But there is also another reason why this valuable treasure must be preserved and highly estimated, and in this unforgivable sins have been committed. Even before ÁBRAHÁM there were neurohistologists in Hungary. One was TIVADAR MARGÓ, who dealt with the innervation of insect muscles. Not one of Margó's preparations has survived. Another was MIHÁLY LENHOSSÉK, who was one of the founders of the neuron doctrine. It is not possible to see even one of Lenhossék's preparations. Ábrahám's departmental predecessor was the famous neurohistologist ISTVÁN APÁTHY. His preparations too have been lost in the main. Altogether only a few have remained, and even these were acquired with some effort by ÁBRAHÁM; they are now kept in the drawer of his writing-table. It was due to great thoughtlessness and negligence that these preparations, which were of such high value, have disappeared. It would be a serious and unforgivable crime against Hungarian science and culture if a similar fate awaited the neurohistological preparations produced by ÁBRAHÁM and his school.

Professor Ábrahám's grandeur, and his ability and efforts to develop an ideology on the basis of what he saw and experienced, were expressed in his love to watch

what others were doing elsewhere, and also how they did it. He loved objective comparisons for, as he often put it, these are the bases and measuring units whether what is done at home is of value, is of permanence, and makes a contribution to men being better and the earth more beautiful. On a number of occasions he visited Germany, Bulgaria and England, and he also went on trips to Italy, Austria, Rumania, India, Czechoslovakia, France, Belgium, Holland, the Soviet Union and the United States. In 1930 he delivered a lecture at the Eleventh International Zoology Congress in Padua. He was member of the international zoology congresses in Lisbon, Paris and Washington. In 1956 he spent a month in Rumania, during which he gave lectures at the Academy of Sciences and the Medical University, and held demonstrations on neurohistology in the Department of Histology in the Medical University, in the Pavlov Institute, in the Physiological Institutes of the Academy and the Medical University, and in the Department of Endocrinology, and in the Department of Comparative Anatomy and Histology in the Biology Faculty in Bucharest. He held neurohistological demonstrations in the Departments of Histology and Forensic Medicine of the Medical University in Jassi, in the Department of Anatomy of the Medical University in Marosvásárhely, in the Physiological Institute of the Bolyai University in Kolozsvár and in the Department of Histology of the Medical University in Temesvár. In 1957 he participated in the congress held in London to commemorate the 300th anniversary of the death of Harvey. At the same time he gave neurohistological demonstrations in the University Anatomy Department in Oxford, in the Medical Research Institute, and in the Department of Biology of the Medical University in London. In 1958, at the invitation of the Ministry of Health, he spent two weeks in the People's Republic of Rumania. During this time he delivered lectures to the Morphological Society at the Medical University in Jassi, and at the First Rumanian Congress on Psychiatry and Endocrinology. On the same visit he held discussions and demonstrations in the Department of Histology in the Medical University in Jassi, and in the Department of Comparative Anatomy and Histology at the Biological University in Bucharest. From 20 January until 12 February 1959 he paid a visit to India. In Delhi he participated in the 46th Indian Science Congress, in Bangalore in the Golden Jubilee of the Indian Science Institute, and in Agra in the Festival Meetings of the Indian National Academy. During his stay in India he held lectures and neurohistological demonstrations in Delhi, Bangalore, Agra and Bombay. In 1960 he gave a lecture in Brno at a symposium dealing with the methods of theriological research, and organized neurohistological demonstrations in the Department of Anatomy at the University. In 1961 he delivered a lecture at the Eleventh International Congress on Entomology in Vienna. From 13 to 28 February 1963 he visited England as a guest of the Royal Society. He held lectures and neurohistological demonstrations in Aberdeen, Edinburgh, Cambridge and London. In July 1963 he delivered a lecture at the international conference "Modern Trends in Neuromorphology", arranged in Budapest on the occasion of the 100th anniversary of the birth of Mihály Lenhossék. In September of the same year he lectured in Brussels at the "Seconde Réunion Européenne d'Endocrinologie Comparée", and in Sofia at the "V. Symposium International des Histologistes". In August 1964 he took part and gave a lecture in the "II. International Kongress für Histo- und Cytochemie in Frankfurt am Main." In July of the same year he participated and lectured at the XII. International Congress of Entomology in London. In May 1965 he delivered a lecture at the First Romanian Congress on Animal Physiology. In July 1965 he lectured at the 2nd Conference of Anatomists and Histologists in Sofia.

In the following month he took part in the International Symposium on Phylogenesis and Ontogenesis of the Forebrain in Frankfurt am Main – Niederrad. By invitation he gave a lecture on "Phylogenesis of the nerve cell". In November 1965 he participated and lectured in an international symposium on Baroreceptors and hypertension in Dayton, USA... After the symposium he gave lectures in the university in Columbus and in Cleveland at the Annual Meeting of the High Blood Pressure Society. He held lectures in the University and the Department of Physiology in Philadelphia. In July 1966 he lectured at an international symposium on Arterial chemoreceptors in Oxford. In 1967 he participated in the Third Conference of Anatomists and Histologists in Plovdiv, Bulgaria. In August of the same year he gave a lecture at the Fourth Conference of European Comparative Endocrinologists in Karlsbad. During July 1968 he spent 10 days in Leningrad and in the course of this visited the Pavlov Morphological Institute in Koltuschi. He lectured to the staff of the Institute, discussed their research work, inspected their preparations, and provided information and advice. In March 1969 he gave a lecture at the 54. Congress of the Association of Anatomists in Sofia, and in August of the same year participated and gave lecture in the Fifth Conference of European Comparative Endocrinologists in Utrecht. In August 1970 he lectured and was section chairman at the Ninth International Congress of Anatomists in Leningrad. In 1971 he was section chairman and delivered a lecture at the Sixth Conference of European Comparative Endocrinologists in Montpellier, and in August 1971 he took part in the Seventh Conference of European Comparative Endocrinologists in Budapest.

Professor ÁBRAHÁM continues his work. His research areas remain the nervous system, the cerebral cortex, the synapses, the receptors, neurosecretion, the cardiovascular system and the sense organs.

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