The ever increasing interest in the problem relating to man—environment interactions on a world-wide scale is explained by the circumstance that the new conditions of work, steady development of industrialization and chemicalization, and continuous pollution of the atmosphere account for a rise in the incidence of familiar diseases, as well as for the occurrence of new affections, some of which are being differentiated as distinct nosological entities.

Also, hitherto completely unknown diseases appear, such as vegetative polyneuropathy of the upper limbs (milkmans disease), vegetative polyneuritis (in bookbinders, printers, spinners, typewriters and the like), vibration disease after the denomination proposed by E. Tz. Andreeva-Galanina (1955), and coined in the literature also with the terms "dead fingers' syndrome" and "pseudo-Raynaud with occupational etiology" (in persons exposed to the effect of local and systemic vibrations etc). In the literature the notion "bird—breeder's lung" has been adopted as a separate disease entity among farming workers. In England the so-called "summer asthma" was described among farmers during intense field work, as well as conditions such as "lung of mushroom growers", the so-called "farmer's lung" etc.

Industrialization and specialization of agriculture results in differentiation of the farmer's work while the tendency for urbanization brings him closer to the town inhabitant. Environmental pollution is by no means limited to large urban communities and industrial centers. Thus, according to data submitted by the Kiev Institute of Hygiene and Occupational Diseases, the dust concentration in the breathing zone of tractor drivers amounts to 44—242 mg/m$^3$, with dust particles measuring up to 5 microns, i.e. endowed with a great penetrating ability — up to 90 per cent.

Pollution of the working milieu and atmosphere with heavy metals, gases and the like is accepted as a factor of utmost importance in the etiology and pathogenesis of the ever more frequently encountered myocardio-pathies.

The retrospective survey of the 15-year-long period since the Medical Faculty in Varna was established gives us sufficient reason to affirm with satisfaction that most of the Chairs have developed successfully a number of important issues relating to the problem "man—working conditions" and "man — environment."

The deleterious effect of intense physical exertion is universally known, and it should be added that irrespective of the extensive adoption of automation and mechanization, the performance of many working operations is characterized by the presence of undue loading. Among the problems studied already for many years at the Chair of Physiology are the following: effect of physical work in general, and physical overexertion in particular on the amount and function of sweat glands (75, 76, 77), role of overstrain in the development of occupational brachialgia (49), evaluation of energetic and
gas exchange and hemodynamics during intense brain work (79, 37), psychophysiological investigations among glass blowers (80). Detailed and comprehensive analysis of the obtained data has led to the inference that the basic changes in this particular category of workers should be considered as the sequelae of the overheated microclimate effect, which in turn strains the regulatory mechanisms linked to homeostasis. It has been established that performance of dosed physical work under conditions of mental and emotional tension exerts a beneficial action on physiological processes. Theoretical contributions have been made to the interpretation of changes in the general neurovegetative and organic reactivity of man in conditions of high psychoemotional strain, as well as to the problem concerning the mechanism of triggering and maintaining the activity of eccrine sweat glands. The role played by heat as a triggering mechanism in the function of sweat glands by way of hypothalamic influencing has been also outlined.

Studies of phagocytic activity of neutrophil granulocytes in individuals under conditions of high cortical strain show a 100 per cent increase, as compared to controls, dependent on age (11, 125). The reported data point to participation of the adrenergic system in the regulation of this important protective cellular mechanism.

Researches into the factors causing neurosis among female workers from the state enterprise “Drouzhba” have been carried out by the Chair of Neurology with emphasis being laid on the essential role played by vibrations produced by electric sewing machines (64). Also, occupational impairment of the hearing sense of a sound-perception type has been established among workers in the timber industry (122). The study of a great number of workers from the timber industry and from a battery plant shows a high percentage of cases with pharyngitis, rhinitis, sinusitis, otitis, laryngitis and other affections (98, 100, 126). The degree of involvement is directly dependent on the length of service in a given factory or working place. Researches conducted by a number of doctors from the Chair of otorhinolaryngology, covering a total of 400 workers from the chemical industry, show that a considerable per cent have inflammatory and atrophic changes, directly related to the noxious influence exerted by some of the articles produced whose concentration in the working atmosphere exceeds the allowable one (121).

Changes in the internal organs under the effect of low frequency vibrations have been studied in the Chair of Pathoanatomy (26, 101). Changes are found in the vascular wall permeability (24, 25) leading to fibrosis (30). Particularly alarming are the alterations in coronary vessels and myocardium, presenting a clearcut picture of coronary and myocardium sclerosis (27). In addition, upon treatment with low-frequency vibrations, involvement of the functionally active parenchyma in the myocardium, lungs, kidneys and liver is also established (9, 27, 29, 102), attesting to the presence of noticeable cellular and tissue metabolism disorders. The findings in the nuclei of myocardial muscle cells (27), and the dystrophic changes in the testes, pointing to variations in amino acid composition (60) deserve special attention. It is worth noting the researches conducted by members of the Chair in terms of the combined influence of low frequency vibrations and some toxic substances as the result of which sinergism and intensification of the changes is observed (29, 30, 101).
In the Chair of Skin and Venereologic Diseases studies have been carried out to clarify the epidemiology, pathogenesis, prophylaxis and possibilities of treating occupational skin diseases in a number of important industrial branches in the cities of Varna and Devnja, and in rural regions, as well as the type of the most frequently occurring allergens, participating in the etiology of allergic skin diseases in Varna (12, 13, 14, 15, 123). On the ground of experimental data an attempt is made to elucidate some aspects of the contact allergic inflammatory reaction of the skin (53, 90, 91, 92). Methods are sought for to clarify the major role played by the thymus in the immunologic reactions of a delayed type, respectively contact inflammatory reaction of the skin (53).

A research has been conducted in the etiology of contact allergic dermatitis and eczema as related to occupation in various industrial branches — building, dyeing trade, metal and machine building (93, 94). On the basis of the results obtained the enhanced activity of mast cells outside the zone of the focus of experimentally induced contact allergic dermatitis may explain the phenomena of increased nonspecific irritability of skin in persons affected with dermatitis and eczema, where any nonspecific agent could provoke the appearance of new foci (36). It is furthermore established that in patients with contact allergic dermatitis and eczema, the blast transformation of lymphocytes from the peripheral blood under the effect of etiologic contact allergens (sublimate, potassium bichromate, cobalt chloride, formalin, penicillin) bears a nonspecific character, and could hardly be employed as an “in vitro” method for diagnosing contact allergy. In contrast, blast transformation of lymphocytes from the peripheral blood under the effect of analgin and novocain in patients with contact sensitization to the latter is endowed with a specific character, and therefore may be employed as an “in vitro”, method for contact drug allergy diagnosis. Also clarified is the etiology of contact allergic dermatitis and eczema due to living conditions (93).

With the progress of civilization, the morbidity and mortality rate of cardiovascular system disorders show an increase, and accordingly some authors classify them under the heading of the so-called civilization diseases. In countries with a high civilization and urbanization level they cause the death of nearly 57 per cent of all registered patients. In the same countries a rise of mortality due to heart ischemia and atherosclerosis is recorded, whereas in countries with rather low developmental level, the incidence of the mentioned above conditions is much smaller. According to WHO statistics one of the basic causes of lethality among Europeans is heart ischemia. Almost 20 per cent of the total world population suffers from high blood pressure. Researches conducted at the First Internal Clinic of the Medical Academy—Sofia show an increase in the number of cases with atherosclerosis and hypertension, and a decrease of cases with rheumatic cardiomyopathy.

The noxious effect of a number of metals whose aerosols greatly contribute to biosphere pollution, is long since described in the literature. Apart from the rather older data concerning the influence of lead on vessels, more recent researches point to changes in the myocardium, and to the development of a wide range of cardiac malformations. There are also reports on cardiopathic an cardio-sclerotic effect exerted by various metals such as mercury, zinc, cobalt etc.

In the Chair of Hygiene and Occupational Diseases the effect of manganese has been studied under experimental conditions for many years, and the
results thus far obtained show serious disturbances in protein and lipid metabolism, catecholamine exchange, and distribution of microelements (16, 71, 111, 117, 118, 119, 24). Among workers in contact with manganese ore, amino acid concentration falls to the lowermost limit of the physiological norm. Along with that, both under experimental conditions, and in the course of laboratory observations, it has been demonstrated that manganese influences the activity of a number of enzyme systems, taking part in the process of transsulfurization, SDH, CO, as well as in those not related to active membrane transport (111, 112, 113). It has been established that persons working in manganese mining industry, run a real occupational risk (4, 5, 6, 7, 8, 72, 111, 114). The study of total morbidity rate among underground workers in manganese mines demonstrates a higher incidence of cases with temporary disability in comparison with the general population. The data from the study of workers render possible the incorporation of serum iron determination in the complex of laboratory indicators, employed in the evaluation of manganese-extraction workers (73, 74, 112, 113, 115, 116). A member of the research team of the Chair carried out anthropometric and other investigations in nursery schools from a center with highly developed chemical industry. A tendency of physical development retardation and changes in the hemodynamics of children, aged 3 to 4½ years, was established however, with a tendency being present for normal values to be reached about the sixth year of life (95, 96, 97).

Researches into the action of some industrial poisons (lead, mercury) have been conducted in the Chair of Medical Chemistry and Biochemistry and in the Chair of Pathoanatomy (lead, copper, zinc). Besides the changes in activity of a number of enzymes and sulfhydryl groups, essential for the vital functions of the organism, also changes in protein and carbohydrate metabolism are observed (2, 23, 42, 43, 44), as well as definite structural alterations in a variety of organs (33). Prolonged treatment with zinc acetate results in changes in the quantity and pattern of collagen proteins in the myocardium (35). A fibroblast action of metals (lead and zinc in particular) is established, mainly manifested in the vascular wall of the myocardium, which points to the role they play in the development of arterio-, coronaro- and myocardiosclerosis (3, 21, 22, 23, 130, 131, 132). The latter effect is dependent not merely on the dose, but also on the age of the animals experimented upon (24, 25). This particular action of heavy metals is due both to the direct effect of metal cations on the metabolism of substances, and to the impaired permeability of vascular walls — a fact corroborated by depolimerization of the ground substance in the aortic wall, observed under the effect of copper sulfate, and by the enhanced permeability of the wall in animals receiving zinc acetate for a long time (24, 33). It has been moreover proved that some of the metals aggravate the formation of atherosclerotic plaques in experimental atherosclerosis (22, 129).

Changes in a number of enzymes and in the structure of the intestinal wall were likewise detected in saturnism, at testing to absorption derangements in the intestine, and explaining clinical complaints on behalf of the gastrointestinal tract among workers with clinically proved chronic lead intoxication (63).

Actually, in the Chair of Nervous Diseases researches are in course into the deleterious PVC effect on the nervous and bone system (15, 50).

Environmental pollution attributable to vegetation protection means represents a special problem. It is a matter of preparations of paramount im-
Man and the factors of environment

Importance which in turn explains their large-scale production and mass utilization. It is well known that at present, only in the United States about 2 million tons pesticides are produced annually (99). Their use in certain cases leads to undesirable consequences for the living organisms (animal and human), and upsets the equilibrium in nature since our helpful allies in combating pests are also affected. A fact that should be by no means overlooked is that they lend themselves readily to transportation at great distances from the site of application. Thus DDT was detected in the liver of penguins and seals in the Antarctic zone where this particular preparation was never used. Since most of these substances are slowly disintegrated (up to 10—15 years), they are capable to pass via soil and various animal organisms into higher members of the animal world, man inclusive. It has been proved that more than 95 per cent of the pesticides penetrating the human organism come with food, the so called residual amounts of pesticides in the foodstuffs of plant and animal origin. J. Dorst (18) writes that “Since ancient times, man has struggled against pests in the agriculture, but only the chemical industry has provided him with means endowed with a power unheard of... But, as it has always been, whenever a new tool falls in the hands of man, he lacks limits for its application.” The Soviet scientist Y. Medvedev (66) states that “...the chemical war declared to insects reveals a vast and unfamiliar field where-from serious consequences may be expected.”

The chairs of anatomy, histology, embryology and pathoanatomy deal with changes occurring under the effect of pesticides employed in agriculture in the Varna district. In the Chair of Pathoanatomy a detailed study has been conducted on the structure of internal organs of experimental animals during chronic intoxication with pesticide preparations lindan, zolon, vofatox and ramrod. The changes observed depend on the dose and substance administered and are assumed as an expression of their systemic toxic effect (101, 104, 133). A certain tropism of the various substances is recorded relative to individual organs. Thus vofatox exerts a marked effect on the myocardium and lungs (132, 133). The ultimate effect established consists in the development of foci with diffuse sclerosis in the myocardium, interstitial pulmonary sclerosis, involvement of the terminal branches of the bronchial tree, and appearance of pulmonary adenomatosis (31) in some animals, as well as nephrotic changes in the kidney (30).

However the potential for adaptation to these harmful substances, as well as for the development of recovery processes within the damaged structure after discontinuing their application should be stressed. It has been found out that the adaptation capacity to these particular noxae, and the capacity for recovery of some of the organs, the liver for example, are appreciable. One month after the cessation of prolonged zolon intoxication (for 2 and 4 months), a practically complete recovery of the enzyme activity, and of the glycogen reserve in hepatocytes is recorded (28, 102). Enhanced SDH activity is a doubtless proof of the intensification of energy metabolism, assumed as a compensatory response of the organism to the systemic toxic action of zolon and vofatox (28, 101). In the renal tissue, apart from the practically full disappearance of circulatory disorders following cessation of vofatox intoxication, also an increase in RNA amount is noted, while the intensity of AP and ATP in the epithelial cells of convoluted ductules is equalized with that in the control animals (27, 103). SDH activity augments in some of the
epithelial cells which is most likely an expression of enhanced metabolism within them, contributing to the activation of excretion of the noxious substances, produced as the result of intoxication. Unfortunately, in the myocardium and lungs regeneration is effected through proliferation of the connective tissue, and consequently, it leads to substitution of active parenchyma for mesenchymal tissue (31, 132). Similarly, regardless of the nephron structure restoration, in the kidneys of vofatox poisoned animals sclerosis of the walls of arterioles and periadventitial tissue, as well as proliferation of collagen fibers in the interstitium is observed (104).

Also evidence is available that the pesticides utilized lead to changes in the lymph tissue (spleen, lymph nodes, lung). It is a matter of changes which, considering their character, point to serious immune equilibrium disorders (103, 104, 133). This is confirmed by experiments made with the purpose to study the terms and degree of healing of artificially induced wounds under conditions of chronic lindan intoxication (51, 52).

The studies on changes in the testes upon intoxication with pesticides under natural and experimental conditions are of particular interest (chairs of anatomy, histology, embryology and pathoanatomy). In the course of investigating wild rabbits, killed in the Tolbuhin district over lands cultivated for three years with a combination of various preparations for vegetation protection, structural changes are found in the testes pointing to derangement in the normal course of spermatogenesis, with a general reduction and deterioration of the quality of spermatopoiesis (17). Similar results, showing a suppression of spermatopoiesis, were also obtained in the Chair of Pathoanatomy during experimental treatment with the herbicide ramrod (60).

The data referred to above are of utmost importance since recently, there are literature reports on the embryotropic and teratogenic action of DDT, lindan, parathion, malathion, ciram, maneb etc. Reports are also available on the birth of children with malformations whose mothers were intoxicated during work with pesticides. Since in the past decade, the increased incidence of children born with congenital monstruosities is widely discussed, a fact presumably relating to the influence exerted by certain substances used in agriculture, in the Chair of Pathoanatomy a retrospective study was conducted along this line, but it failed to provide serious reasons for fears, at least for the time being (32). It may well be true that our findings do not reflect the real situation as part of the children undergo operative treatment of the congenital malformation in other hospitals throughout the country.

The Chair of Social Hygiene, proceeding from the modern concepts about the unity and equilibrium between organism-personality and environment, also marks serious progress of the research activity along this line. Studies dealing with the medico-geographical peculiarities in the structure of total morbidity rate in the Varna district, covering the period 1965 through 1972, have been carried out (40, 67). A medico-geographical map has been worked out on the basis of occupational pulmonary affections in the Varna district (68). The method employed for thorough investigation of morbidity with temporary incapacitation has been further improved, and its application has enabled to study the level and structure of morbidity rate in various factories and enterprises (41, 69, 70, 88). Part of the activity of the Chair is dedicated to health problems arising from the scientific-technological revolution and urbanization, such as the influence of the large town on children’s health, and on the
physical development of young men and women. A systematic study of problems relating to economical effectiveness of public health measures is also undertaken.

A substantial part of the research work in the Chair of Microbiology and Virology is focused on the problems concerning man's environment. The seasonal dynamics of a number of infectious diseases (45, 47), and their conditioning by occupations (45) are outlined. Systematic studies on the etiological characteristics of various diseases affecting workers from the industrial plants in Varna and Devnja are also carried out (48, 110). The role played by Listeria bacteria in some affections of workers engaged in animal breeding farms, canning industry, and meat production centers throughout the region is also studied (81, 82, 83, 84, 85, 86).

It is evident that researches aimed at eliminating the noxious effect of environmental factors receive primary attention. In this respect the endeavours of the chairs of pharmacology, medical chemistry and biochemistry, hygiene and occupational diseases are noteworthy. Thus in the Chair of Pharmacology studies are performed on the influence of mono- and dithiol compounds in experimental poisoning with mercury, adding phenobarbital at non-sedative doses — the classical inductor of enzymes related to the function of rendering them innocuous in the organism. The researches are conducted with a view to utilize the results in the treatment and prophylaxis of mercury intoxication in human beings. Phenobarbital treatment of workers in the mercury electrolysis shop of the Devnja plant, at non-sedative doses, is forthcoming.

In the Chair of Medical Chemistry and Biochemistry successful attempts have been made at restoring enzyme activity, impaired under the effect of lead salts, using ascorbic acid (42, 43, 44).

Of particular interest and prospective for the practice are the studies on the possibility of rendering harmless heavy metal ions in sewage waters and mercury ions, using modified natural mineral sorbents, as well as the comparative study to determine the sorbent with the highest activity (19, 20, 54, 55, 56, 57, 58, 59). Research associates from the Chair of Medical Chemistry and Biochemistry have attained serious and encouraging results on the latter issue which has an essential practical bearing on the health state of the Varna district.

Members of the Chair of Hygiene and Occupational Diseases, based on a number of experimental researches and studies on workers from the manganese production, have undertaken a comprehensive investigation on the effect of amino acid diets on the occurrence and course of lead and manganese poisoning (7, 74, 114, 115, 117). It is established that rich in proteins foodstuffs do not interfere with the development of the intoxication process, but definitely influences the character and degree of changes, and maintains at a lower level manganese concentration in the blood and liver, and affects the amino acid depot (72, 119).

The biological implication of the constant magnetic field and of water treated in constant magnetic field (CMF) has been also determined (105, 106, 107, 108, 109). It is experimentally demonstrated that CMF treated water attenuates the deleterious effect of single treatment with high temperature (105, 106, 122). On chronic treatment the effect is unfavourable. In vitro observations show that such water increases the solubility of phosphate renal concrements about 90 per cent, as compared to common drinking water.
Considering the geographical position of our district, the problem of the effect of meteorological conditions assume paramount importance. Here special attention is called to researches performed by the Chair of Nervous Diseases and Neurosurgery on lethality caused by cerebrovascular syndromes with a special reference to a number of meteorological factors in Varna (65). It is evident that the highest incidence is recorded during the winter season—a fact explained by humidity, temperature and other meteorological factors. An experimental study of the desensibilization effect of the Black-sea coast is also carried out (89).

Essential for the practice are also the researches performed by the Chair of Infectious Diseases and Epidemiology into convalescent viral hepatitis patients, undergoing treatment at the seaside health resorts (balneo- and heliotherapy, Varna spa water etc) (38, 39, 120). Emphasis is laid on the favourable effect of sea water in hepatic diseases.

The Clinic of Rheumatology and the Chair of Social Hygiene jointly study the problem of meteoropathology in myocardial infarction under conditions of the Bulgarian seacoast line near by Varna, while the Chair of Otorhinolaryngology investigates the influence of climatotherapy on the lymphoid pharyngeal ring.

All researches listed above would have no practical bearing whatsoever if they were not directed to the working out of measures for eliminating and prophylaxis against the sequelae of the environmental noxious factors. We have the pleasure of stating hereby that most of the Faculty chairs have attained considerable success.

On the ground of the researches performed in the Chair of Hygiene and Occupational Diseases, a ministerial decree No 78 was issued (June 5, 1975), regulating the granting of special privileges to workers engaged in manganese-threatened environment. Concrete recommendations have been made by the same Chair aimed at working environment sanation in the State Agricultural Farm “S. I. Peev” — Beloslav. Based on data submitted by the Chair of Social Hygiene concerning the influence of non-productional factors, the District Council of Bulgarian Trade-Unions staged a special symposium on prophylaxis. The Chair of Nervous Diseases and Neurosurgery made adequate suggestions utilized in the design of the new building for the state industrial enterprise “Drouzhba”.

The social surroundings of man play an important role in the system man—living conditions. The Chair of Psychiatry and Medical Psychology studies the impact of social environment on the occurrence, course and prophylaxis of mental and psychosomatic diseases in 22 reports (of which one monograph, and one textbook). Discussed are the problems relating to life intensification and acceleration in the conditions of scientific-technological revolution, urbanization and migration, and substitution of manual for mental work (40, 41, 45), as well as the psychological climate in the society in general, in the working collective, and in the public health units, in particular (43). More specific studies are made of certain aspects of neurosis morbidity rate in the two biggest plants in the Varna district (KZ and Elprom) (44). The medico-social problems of chronic alcoholism, depressive conditions (50) and suicides, as well as the prophylaxis against suicides (49) and the other social and antisocial acts among mental patients are also discussed (42). The overall experience of the Chair in this field is summarized in a more extensive work
dealing with the relationship between mode of life and mental health, written jointly with a team from the Chair of Marxism—Leninism (75).

Regardless of the substantial work done by the various chairs on problems relating to man and his environment, in the future a more effective form has to be found that would promote the realization and practical implementation of a number of interesting and rather important for the prophylaxis and therapy results, attained by the chairs of pharmacology, medical chemistry and biochemistry, skin diseases, hygiene and occupational diseases, pathoanatomy, psychiatry and medical psychology.

In conclusion, we feel justified to affirm that the actual problems related to man and his environment have invariably been within the scope of the research work of the Medical Faculty — Varna. There are many achievements in this field deserving special attention and recognition. The results of this activity are reflected in the numerous published works and reports submitted to meetings, conferences, congresses and symposia, as well as the successfully defended theses.

We have to admit that as yet, we have failed to organize our efforts in a fashion providing for a complex approach not merely to the solution of problems of worldwide interest, but also of the issues which are essential for our district, characterized by steadily developing chemistry, industry and agriculture. It is mandatory that all clinical units be included in the research projects along with the theoretical chairs.

Instructional programs should be prepared in a manner that future physicians become well acquainted with the various tasks stemming from this particular problem.

We ought to be always aware of the idea postulated by K. Marx and F. Engels: “Man not only actively adapts, but also changes the nature, placing in front of him goals determined in advance”.

REFERENCES

ЧЕЛОВЕК И ФАКТОРЫ ОКРУЖАЮЩЕЙ СРЕДЫ

М. Златева

РЕЗЮМЕ

Сообщаются достижения научно-исследовательской деятельности отдельных кафедр за период от основания Медицинского факультета в городе Варне до настоящего времени. Они направлены на изучение воздействия физического напряжения, метеорологических условий и других факторов на функцию различных органов; низкочастотных вибраций и некоторых профессиональных и сельскохозяйственных ядов на метаболизм веществ и морфологическую структуру внутренних органов и половой ткани. Исследована возможность восстановления поврежденных структур после прекращения действия вредного фактора. Проследено течение ряда инфекционных болезней, в зависимости от профессии; эпидемиология, патогенез и профилактика профессиональных кожных болезней и, особенно, аллергических; значение загрязнения окружающей среды на подрастающее поколение и др. Особенно большое практическое значение имеют исследования антидотного действия некоторых веществ в отношении ряда ядов, обезвреживание ионов тяжелых металлов в сточных водах, значение предохраняющего питания при отравлении марганцем и свинцом и др.

В результате системных исследований выяснены патогенетические механизмы ряда отравлений в условиях эксперимента и рабочей среды и даны ценные рекомендации для профилактики и лечения.