

ACTA BIOLOGICA

ACADEMIAE SCIENTIARUM HUNGARICAE

ADIUVANTIBUS

A. ÁBRAHÁM, B. FALUDI, B. GYÓRFFY, L. HARANGHY
J. SZENTÁGOTHAJ, I. SZÖRÉNYI, I. TÖRŐ

REDIGIT

R. MAUCHA

SUPPLEMENTUM 2

PROCEEDINGS OF THE SECOND MEETING
OF THE HUNGARIAN BIOLOGICAL SOCIETY

Szeged, May 19–21, 1958



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A kiadásért felel az Akadémiai Kiadó igazgatója

Műszaki felelős: Farkas Sándor

A kézirat nyomdába érkezett 1958. IX. 8. — Terjedelem: 3,50 (A/5) ív

46778/58 — Akadémiai Nyomda, Gerlőczy u. 2. — Felelős vezető: Bernát György

INDEX

Plenary sessions

GUBA, F.: Recent results of electron-microscopic investigations in biology	7
STRAUB, F. B.: Intermediate steps in protein biosynthesis	7
MEDWECKA-KORNAŚ, A.: Some remarks on steppe vegetation in Poland	8

Section A

NAGY, E.: The Hungarian pioneers of palynology	9
BARTUCZ, L.: Anthropological aspects of the Jazyg-Sarmatian graveyard at Hódmező- vásárhely-Fehértópart	9
RAJKAI T.: Index of the correlation between body height and age	10
BUGYI, B.: Involutional osteoporosis	11
KORMOS, J.—KORMOS, K.: A phylogenetic study of Suctoria	11
REMÉNYI, A. K.: Revision of the subfossil Canidae finds of Hungary	11
GREGUSS, P.: A petrified tree-trunk of Paleocen age from the Volga region	12
SIMONCSICS, P.: Some data regarding the miocenic climate in Hungary, obtained from palynological investigations into the brown coal of the colliery at Katalinbánya	12
SÁRKÁNY, S.—STIEBER, J.: Preliminary notes on the quantitative anatomy of the wood in <i>Fagus sylvatica</i>	13
KORONCZY-WONNESCH, I.—UZONYI-LÁTKÓCZY, A.: Some data on the strains of culti- vated mushrooms	13
BOROS, Á.: Moss geography of the Soviet portion of the Carpathians	14
BAKSAY, L.: The role of the cytotaxonomy in geobotanical research	14
BODROCKÖZY, GY.: Sandy mud-plant associations indicative of backwaters in south Kiskunság (Great Hungarian Plain)	15
PÓCS, T.: Phytogeographical conclusions from vegetation maps made in West-Trans- danubiana	15
UHERKOVICH, G.: Characteristics of the phytoplankton of the river Tisza during the autumn and winter 1957—1958, and the allied problem of the potamoplankton	16
MEGYERI, J.: Hydrobiological investigations in rice-fields	17
BERCZIK, Á.: Some conclusions of serial benthic investigations	17
IVÁNOVICS, G.—ALFÖLDI, L.—NAGY, E.: Characteristics and genesis of megacine ..	18
HORVÁTH, J.—BUDAY, F.: Effect of DNA on the antibiotic production of <i>Strepto- myces</i>	19
BACKHAUSZ, R.—FEJÉR-KOSSEY, O.: Immunochemical investigation of bean- and maize-root antigens by means of new gel-diffusion methods	19
FERENCZY, L.—GRACZA, L.—JAKOBEY, I.: Investigations on the antibacterial agent of <i>Cannabis sativa</i>	20
RÉTHY, L.—SZABADOS, Th.: Influence of changed environmental factors upon the toxin production of the variants of the <i>Corynebacterium diphtheriae</i> P. W. 8. strain ..	20
NOVÁK, E.: A new metabolic pathway in fungi	21
PETTKÓ, E. F.—SIPÓS, M. M.—STUR, J. K.—KRÁMLI, A.: Changes in redox potential provoked in bacterial culture media by UV, X, beta and gamma rays	21
GYÓRFFY, B.—KÁLLAY, I.: Ultraviolet-sensitivity in pigment-producing and pigment- deficient strains of <i>Serratia marcescens</i>	21
BÁLINT, A.—KOVÁCS-SCHNEIDER, M.: Effect of self-fertilization on the vitality of plants and its evolutionary significance	22

SZENDE, K. : Genetical basis of pentose utilizing capacity of <i>Ustilago maydis</i>	22
FÁBIÁN, GY. : Method for the measurement of maternal effects in the genetics of quantitative characters	23
FÁBIÁN, GY.—ERNHAFT, J. : Investigation concerning the variability of the presacral vertebrae in rabbits	23
MUNKÁCSI, F. : Isoserological tests on different duck varieties and their hybrids....	24

Section B

KÁRPÁTI, F.—STUR, J. K.—MAZAREÁN, H. H.—KRÁMLI, A. : Redox potential as indicator in tumorous rats.....	25
ELŐDI, P.—KELETI, T.—SZABOLCSI, G. : The role of functional groups in the catalytic activity of dehydrogenases	25
FEJÉR, D.—KÓNYA-ELEK, É. : Two new peptides found in the bleeding sap of maize	26
POZSÁR, B. I. : The lipid metabolism of chloroplasts.....	26
STUR, J. K.—KRÁMLI, A. : Cultivation of algae in continuously working fermentors	27
MÁRÓTI, M. : The metabolism of young roots and shoots in organ cultures.....	27
DÉVAY, M. : Development of rhizobial infectibility in the roots of certain Papilionaceae	28
HORVÁTH, I. : Annual periodicity in the weight and metabolism of Scotch-pine saplings	28
GÁSPÁR, L.—DÉVAY, M. : Metabolic connections between the main stem and the lateral shoots in maize	29
MÁNDY, GY. : A new experimental method in ecology and its results	30
PÁRDUCZ, B.—MÜLLER, M. : The ciliary mechanism of potassium reversion	30
BICZÓK, F. : Osmoregulation and protoplasm structure	30
MÜLLER, M.—RAPPAY, GY. : Cytochemical studies on unfed and fed <i>Amoeba proteus</i>	31
ÁBRAHÁM, A. : Morphological bases of the neural regulation of renal function	31
STAMMER, A.—MINKER, E.—HORVÁTH, I.—ERDÉLYI, L. : The structure of the peripheral transmission apparatuses and the forms of their connection	32
PAÁL, M. : Histochemical investigations concerning the suprarenal gland of mice with special regard to sexual differences	32
PÓSZALAKY, Z. : Comparative histochemical investigations concerning spermatogenesis	33
VÁGÁS, E. : An analysis, by means of new mucopolysaccharide reagents, of the "bright" and "dark" cells described from the submaxillary gland of Mammalia	33
NAGY, M. : Investigations concerning giant cells of rat placenta	33
HATTYASY, D. : About the nerves of the pulp of the white rat and their possible biological role	34
FARKAS, B. : Structure and function of otoliths	34
TÖRÖK, L. J. : Studies on the morphogenetic role of the nervous system in <i>Dugesia</i> (= <i>Euplanaria</i>) <i>lugubris</i>	35
CSABA, GY.—HEGYI, K. Cs. : Experiments with the heterotransplantation of hepatic tissue	35
KULCSÁR-GERGELY, J.—FEKETE, I. : Investigation of the effect of progesterone on tumorous animals	36
JENDRASSIK, L.—FAISZT, J.—BARTHA, T. : The fundamental laws of muscle activity	37
KONOK, I. : Physiological investigations in connection with the neurosecretory activity of central nervous system of the insects	37
MÖDLINGER, G.—KONDICS, L.—KOVÁCS, J.—KURCZ, M.—ÖDROFER, M. M. : Diurnal rhythm in the endocrine organs of white mice.....	38
SZÉKELY, GY. : The role of the specificity of sensory areas in the development of reflexes	38
MONTSKÓ, T.—LISSÁK, K.—TIGYI, A.—MAJOR, A. : Comparative data regarding the neurohumoral regulation of calcium metabolism	39
HÁMORI, J. : Intermedin production of the intermediate lobe of the pituitary gland following experimental lesions of the hypothalamus and the hypophyseal stalk	39
KNOLL, B. : Comparative study of the higher neural functions of mice and rats ...	40

INDEX AUTORUM

A		Hámori, J.	39
Ábrahám, A.	31	Hattyasy, D.	34
Alföldi, L.	18	Hegyí, K. Cs.	35
B		Horváth, I.	28
Backhausz, R.	19	Horváth, I.	32
Baksay, L.	14	Horváth, J.	19
Bálint, A.	22	I	
Bartha, T.	37	Ivánovics, G.	18
Bartucz, L.	9	J	
Berczik, Á.	17	Jakobey, I.	20
Biczók, F.	30	Jendrassik, L.	37
Bodrogközy, Gy.	15	K	
Boros, Á.	14	Kállay, I.	21
Buday, F.	19	Kárpáti, F.	25
Bugyi, B.	11	Keleti, T.	25
C		Knoll, B.	40
Csaba, Gy.	35	Kondics, L.	38
D		Konok, I.	37
Dévay, M.	28,29	Kónya-Elek, E.	26
E		Kormos, J.	11
Elődi, P.	25	Kormos, K.	11
Erdélyi, L.	32	Koronczy-Wonnesch, I.	13
Ernhaf, J.	23	Kovács-Schneider, G.	22
F		Kovács, J.	38
Fábián, Gy.	23	Krámlí, A.	21,25,27
Faiszt, J.	37	Kulesár-Gergely, J.	36
Farkas, B.	34	Kurcz, M.	38
Fejér, D.	25	L	
Fejér-Kossey, O.	19	Lissák, K.	39
Fekete, I.	36	M	
Ferenczy, L.	20	Major, A.	39
G		Mándy, Gy.	30
Gáspár, L.	29	Maróti, M.	27
Gracza, L.	20	Mazareán, H. H.	25
Greguss, P.	12	Medwecka-Kornaś, A.	8
Guba, F.	7	Megyeri, J.	17
Gyórfy, B.	21	Minker, E.	32
		Mödlinger, G.	38
		Montskó, T.	39
		Müller, M.	30,31
		Munkácsi, F.	24

N		S	
Nagy, E.	9	Sárkány, S.	13
Nagy, E.	18	Simonesics, P.	12
Nagy, M.	33	Sipos, M. M.	21
Novák, E.	21	Stammer, A.	32
O		Stieber, J.	13
Odorfer, M. M.	38	Straub, F. B.	7
P		Stur, J. K.	21,25,27
Paál, M.	32	Szabados, Th.	20
Párducz, B.	30	Szabolcsi, G.	25
Pettkó, E. F.	21	Székely, Gy.	38
Pócs, T.	15	Szende, K.	22
Pósalaky, Z.	33	T	
Pozsár, B. I.	26	Tigyi, A.	39
R		Török, L. J.	35
Rajkai, T.	10	U	
Rappay, Gy.	31	Uherkovics, G.	16
Reményi, A. K.	11	Uzonyi-Látkóczy, A.	13
Réthy, L.	20	V	
		Vágás, E.	33

Abstracts of papers read at the plenary sessions

RECENT RESULTS OF ELECTRON-MICROSCOPIC INVESTIGATIONS IN BIOLOGY

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Electron-microscopic investigations made into the structure of biological objects during recent years have reached a stage at which we are able to explore larger molecules. Present investigations are concerned with the exploration of structures in the range of 10 Å magnitude.

Magnifications of this order have been made possible by the following factors: (i) theoretical problems concerning interactions between material and electrons have been cleared up in many respects, and the consequent practical conclusions utilized in the manufacture of microscopes; (ii) methods of preparation have made considerable progress.

As regards the field of mechanical construction, microscopes provided with several lenses, stigmator and contrast diaphragm have been introduced. As regards methods of preparation, it is especially the improved method of preparing ultrathin (micro) sections (100 to 500 Å) which has meant a great progress. The methods of fixing, embedding and sectioning has also been elaborated.

The new microscopes and methods enable investigators (a) to study cell-structure, cytoplasm, cell-components (mitochondria, microsomes, nuclei), plasma membranes, cilia and isolated proteins on objects of animal, plant or microbial origin; (b) to study the structure of muscle, nervous, connective and other tissues; (c) to study structural problems both from a general physiological and a pathological point of view (muscular contraction, pathological alterations of connective tissues, reciprocal effect of viruses and host cells, etc.).

At present, and for some time to come, the tendency of electron-microscopic investigations must remain a descriptive one, as far as biology is concerned. Development points to an increasingly wider use of the electron microscope in cyto- and histochemistry which will throw fresh light upon the structure of biological matter.

INTERMEDIATE STEPS IN PROTEIN BIOSYNTHESIS

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The mechanism of protein biosynthesis can be attacked by either direct or indirect methods. A number of data has accumulated on the time curve of incorporation of radioactive amino acids into proteins. A lag period in this curve may be interpreted as proof of the existence of a precursor. However, such experiments can be evaluated only with great caution as most of them are obtained with systems the permeability barriers of which may simulate a lag period. Another indirect method which has been used, involves the comparison of the labelling of the same amino acid in different parts of the protein. This has led to controversial results.

The observed amino acid activation by the pH 5 enzymes is very likely connected with protein biosynthesis. The appearance of the activated amino acid in the soluble RNA and afterwards in the microsomal proteins may reflect the path of protein synthesis, although it is difficult to exclude non-specific reactions of the amino acid-adenylates.

The study of the amylase-synthesis affords good possibilities for the study of intermediate precursors. Earlier experiments have shown that the process can be clearly divided into two stages. The final stage may be observed also in a soluble, cell-free system. Experiments are presented to show that in a cell-free preparation, obtained from labelled tissue slices, a protein fraction is transformed into amylase. The process requires the presence of only two amino acids. The role of nucleic acid is discussed. It is shown that during the transformation of the precursor protein into amylase there is an increased turnover of RNA.

SOME REMARKS ON STEPPE VEGETATION IN POLAND

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and

INSTITUTE FOR NATURE CONSERVATION OF THE POLISH ACADEMY OF SCIENCES, CRACOW

Steppe vegetation — rather poor in Poland — is comparatively best developed in the south of the country, on the plateaus of Lublin and Matopolska, and is restricted even there to the areas with loess, calcareous or gypseous soil. The steppe vegetation is mainly composed of relict Pontic or Pannonian species of plants which have come to Poland from Podolia in the east or from Czechoslovakia and Hungary in the south.

The xerothermic plant associations growing on the gypseous soil in the region of the river Nida have been studied by the authoress from a phytosociological and cartographical point of view. Owing to the varying configuration of the region, its microclimate, soil and vegetation display great diversity. The gypseous rendzinas — alkaline and sufficiently rich in nutritive substances — show a rather high concentration of sulfates and a presence of chlorides. The entire vegetation of this area, natural and synanthropic, displays a purely xerothermic character. The southward slopes, with a thin, dry and stony layer of "rendzina", are covered with the *Sisymbrio-Stipetum*, a pioneer association, rich in therophytes and dominated by gramineous plants such as *Festuca valesiaca*, *Poa bulbosa* f. *vivipara* and *Stipa capillata*. These species, together with *Veronica praecox*, *Hieracium echioides*, *Sisymbrium polymorphum* and similar plants — may be regarded as regional characteristics of the association. The next in the line of succession is the meadow-steppe association *Thalictro-Salvietum* growing on a soil rich in black humus down to a depth of a metre. It is dominated by the following characteristic or differential species: *Agropyron intermedium*, *Medicago falcata*, *Thalictrum minus*, *Eryngium campestre*, etc. It does not show any evolutive tendency toward shrubs (on the contrary to *Inuletum ensifoliae*, an analogous association growing on cretaceous marl soils).

The authoress regards all these associations as belonging to the order *Festucetalia valesiaca* and to the alliance *Festucion valesiaca*, to which also belong the numerous steppe associations, in Czechoslovakia and Hungary. These associations are not very rich in Poland, especially not in those species which are regarded as characteristic species of such associations in countries more favourable to the growth of xerothermic plants. There are, on the other hand, several species which — common in the said countries — prosper in Poland only under especial ecological conditions of habitat and become the characteristics of a single association.

Abstract of papers read at the sessions of the section A

THE HUNGARIAN PIONEERS OF PALYNOLOGY

ESTHER NAGY

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The beginning of palynological investigations goes back to the last century. Hungarian botanists published palynological works almost simultaneously with those published abroad. In accordance with the three trends of evolution of palynology, I ranged these works into three groups. The first group includes the papers dealing with the description of the various forms of spores and pollen grains. In his papers on the evolution of spores and pollen, L. JURÁNYI gives the description and the figures of some spores and pollen grains. The title of his best-known work is "Über den Bau und die Entwicklung des Pollens bei *Ceratozamia longifolia* MIQ." (1870). The paper "On pollen, with special regard to the Angiospermae of Hungary", published by I. BALÁZS in 1896, represents the first Hungarian study on pollen morphology with the description of the pollen of 64 families of Angiospermae. In connection with the biometric examination of dioecious and monoecious plants, P. GREGUSS published from 1925 on in several papers interesting data on the sizes transpiration possibilities of the pollen of floriferous plants. His paper "Die Sporen der mitteleuropäischen Pteridophyten" includes the description and the figures of the spores of 92 fern species. The second trend of palynological investigations, presenting a paleobotanical evaluation, is also represented by P. GREGUSS. His paper "Pollenanalytische Untersuchung des freigelegten Mammut- und Kohlenfundes von Óthalom (Szeged)" (1940) was in Hungary the first paper publishing original photographs of fossil pollen grains. The third trend of palynological investigations, furnishing also a geological evaluation, is represented by B. ZÓLYOMI. It was he who, in his paper "Vegetationsstudien an den Sphagnum-Mooren um das Bükk-Gebirge in Mittelungarn", published in 1931, first applied in Hungary the method of statistical evaluation and on the basis of well-logging, presented a stratigraphical evaluation of the post-glacial period. In "The history of ten thousand years in pollen grains" (1936) he sketches the history of the post-glacial forest and, finally, in his paper "Die Entwicklungsgeschichte der Vegetation Ungarns seit dem letzten Interglacial" (1953) he gives a description of the method applied, of the evolution of the post-glacial vegetation in Hungary as well as of the circumstances of formation of Lake Balaton. Synoptical studies were published by G. MOESZ and R. Soó, melitopalynological works by J. STITZ and B. HAZSLINSZKY on the basis of their investigations.

ANTHROPOLOGICAL ASPECTS OF THE JAZYG-SARMATIAN GRAVEYARD AT HÓDMEZŐVÁSÁRHELY-FEHÉRTÓPART

L. BARTUCZ

DEPARTMENT OF ANTHROPOLOGY, UNIVERSITY, SZEGED

The Sarmatian age which ranges over nearly the whole of the first five centuries of our era belongs, anthropologically, to one of the least explored periods. While M. PÁRDUCZ

studied it from an archaeological and J. HARMATTA from a historical point of view, we are aware of no work that would have approached this age from an anthropological angle, a phenomenon due — no doubt — to the small number and the fragmentary condition of the anthropological material. It was 10 years ago that the author began the collection, archaeological verification and typological arrangement of skeletal material concerning Jazyg-Sarmatians in the present territory of Hungary. So far, 708 graves dating from the Ist and IInd period of the Sarmatian age have been excavated and — according to this investigations — not more than 14 per cent of the skulls and 7 per cent of the skeletons have escaped destruction. The most valuable part of this surviving material are these 20 authentic skeletons which, found in 23 graves of the cemetery at Fehértópart, were saved and conserved by M. PÁRDU CZ. The present paper is the first report on the result of analyses made by the author in this connection. The absence of young people (from 10 to 30 years) and the comparatively early death of females are conspicuous features of the material at issue. Typologically, the material displays a striking bipolarity: it falls, essentially, into two sharply distinguishable categories: a strongly dolichocranial and a strongly brachycranial one, with but very few mesocranial types between the two groups. The percentage distribution of the various types is this: Nordoid, 25; Mediterranean, 20; East Europoid, 5; Dinaroid, 5; Pamiroid, 15; Turanoid, 30. While dolichocranial types are conspicuously more numerous among males, brachy-hyperbrachycranial types dominate the material of females. To determine the ethnogenic significance of character-variations and typological varieties displayed by the anthropologic material, will be the task of those investigations which have been started by the author in connection with skulls and whole skeletons found in other Jazyg-Sarmatian graveyards.

INDEX OF THE CORRELATION BETWEEN BODY-HEIGHT AND AGE

T. RAJKAI

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In order to place investigations concerning body development on a solid basis and to impart greater accuracy to its evaluation, it is necessary that body characters — in the first place the body-height as the basis of evaluations regarding other characters — should be brought into a close correlation with some factor showing invariably uniform change. In connection with living organisms, time is the only factor of this nature. If we want to study the changes in the increase of body-height as they manifest themselves at the various ages of an individual, we have to refer our measurements to the age of that individual at the time of our investigations.

Any index expressing the ratio between body-height and age has to satisfy two requirements: (a) it should indicate the correlation between body development (as manifested by body-height) and age at the time of vigorous growth by a possibly constant value, but (b) indicating fluctuations of growth. In other words, the index in question should be both relatively stable and highly sensitive. An index of this kind will be obtained by the following formula:

$$I = \frac{\text{body-height in cm}}{\sqrt{\text{foetal age in months}}}$$

where foetal age = number of months since birth + 4 months.

According to results derived from mass investigations and from serial investigations of single individuals, the values obtained by the above formula decrease from the initial value 32 at birth to the one characteristic of the individual or the examined group till the age of 3 years (regressive section); these values remain more or less constant between the age of 3 years and the beginning of puberty (constant section); they first rise and then decrease once more during puberty (peak section of puberty). Divergences of height due to sex, race or environmental factors are accurately shown by the index. Its mean value varies between 24 and 29 according to ethnic differences.

INVOLUTIONAL OSTEOPOROSIS

B. BUGYI

CSEPEL POLYCLINIC, BUDAPEST

Relying on radiological examinations and calcium tests, the author claims that there is no pathogenic difference between the presenile and senile forms of osteoporosis.

By determining the calcium level of the blood 5, 60, 120 and 180 minutes after intravenous injections of calcium gluconate, determining further the urinary calcium, the organism's reduced calcium-retention is to be demonstrated and thus we have a method which enables us to diagnose senile osteoporosis at a time when no radiological symptoms can yet be detected.

Senile gastritis is proved by the author to play a significant part in the origin of senile osteoporosis: deficient mastication, hypacidity, reduced gastric motility and a diminished amount of intrinsic factors in the gastric juice, together with a deteriorated digestive activity of the small intestine, give rise to osteoporosis.

A PHYLOGENETIC STUDY OF SUCTORIA

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The types of swarmer formation in Suctoria (heteromorphic cell division, combined cell division, external gemmation, circumvaginate and invaginate internal gemmation) are very important indexes for the establishment of taxonomic categories and phylogenetic relationships. On account of their swarmer-organization, semi-circumvaginate gemmation and of their manner of life both the *Pseudogemma* and the *Pseudogemmides* have proved to be synonyms of *Urnulla*. Combined cell division is a common feature of the *Parapodophrya* and the *Thecacineta*. Both develop the ciliary zone in invaginate pouches, and the body of both is halved by longitudinal fission at right angles to the ciliary zone. The nearest relatives of both genera are to be found in the family of the Ophryodendridae.

The organization of the swarmers displays — both in the families characterized by circumvaginate and those characterized by invaginate gemmation — parallel mutational and adaptive changes as regards the development of the anterior, pedicel-forming and the posterior — adhesive — scopula (this is no vestigial "pharyngeal" organ!). The double scopula of the Acinetidae and Discophryidae is a feature common with the similarly double scopula as found in the unciliated swarmer of the Ophryodendridae.

It was possible to follow the process of anisogamy and internal conjugation from the isogamous to the anisogamous conjugation of the adult animals, and — further — to the external and internal conjugation of the adult animals and the swarmers. (Investigations concerning *Urnulla* and, chiefly, the genera of Discophryidae: *Cyclophrya*, *Catharina*, *Discophrya*.)

REVISION OF THE SUBFOSSIL CANIDAE FINDS OF HUNGARY

A. K. REMÉNYI

BUDAPEST

The synthesis of the Canidae finds from the Carpathian-Basin is so far lacking in the literature. Author investigated the canid find-material dated by human artifact supplements originating from 50 Pleistocene, paleolithic aged cave-deposits and 80 Holocene, early neolithic-mediaeval aged (mostly open area) sites. The find-material found in the Carpathian-Basin during the past 150 years had been summarized with regard to all literary publications, therefore the examination done includes all the material and contribution available. The

existence of the following species could be stated: (1) Common wolf (*Lupus*) abundant, in the glacial periods a very tall form, in the interglacials and since the postglacial till now a medium sized form, which occurs sporadically yet today. (2) Gold jackal (*Thos*) is represented by two uncertain finds. Its presence is dubious as it is today. (3) Wild dog (*Cuon*) occurs only in the late Pleistocene by a single find. (4) Common or red fox (*Vulpes*) very abundant. The Pleistocene form could be considered the same as the recent form. (5) Arctic fox (*Alopex*) is in the Würm 3 level-marking. It disappears with the retreat of the ice-cover. (6) Domesticated dog (*Canis familiaris*) abundant. There arrive here "ready" forms with the earliest neolithic cultures: a herdsman's dog of short stature (*palustris* type) and a hunting dog of medium size (*intermedius* type) both very variable. The very tall watch-dog (*matris optimae* type) can be found first only in the Iron age, while the nomadic equestrian people bring the northern greyhound (*graius* type) during the Migration period. The Conquering Hungarians found here a developed canid fauna which they adopted.

A PETRIFIED TREE-TRUNK OF PALEOCENE AGE FROM THE VOLGA REGION

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The examined petrified finding of a tree-trunk from the Volga region originates from the sand and sandstone stratum of the kamisin layer. According to literature, this layer has been in contact with the sea, which is proved by marks of boring shells. There are mentioned besides *Podocarpoxylon* bored by *Teredo*, petrified *Cupressinoxylon* and *Cedroxylon*, the fruits of *Dyctotoma problematica* and *Fraxinus ornoides*, further the remnants of *Dryophyllum dewalquea*, *Quercus iicenstrupi* HEER and other evergreen plants. This association of obviously continental flora was drifted together at the sea-shore, subsequently. This layer was stated to be upper Paleocene but it could be lower Eocene. Unfortunately, there are no details known about age and way of petrification, but the activity of boring shells was possible only before petrification in the state of floating wood. The crumpled structure of the wood hints at that supposition. The exact xylotomic examinations proved that this petrified wood has no genetic relation to *Cedroxylon* or to the species existing at present. Therefore the identification: *Cedroxylon* is without doubt erroneous. It belongs rather to genus *Sequoioxylon* as a new species. Author proposes on the basis of exact xylotomic characteristics to call it differently from the known sort of *Sequoioxylon* (*Taxodyoxylon*), *Sequoioxylon volgensis* nov. sp. GREGUSS.

SOME DATA REGARDING THE MIOCENE CLIMATE IN HUNGARY, OBTAINED FROM PALYNOLOGICAL INVESTIGATIONS INTO THE BROWN COAL OF THE COLLIERY AT KATALINBÁNYA

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The author analyzed 20 samples of brown coal taken from Pits I and II of the Katalinbánya colliery in the Salgótarján Coal Basin. He detected 115 kinds of Sporomorphae in the samples, a smaller part of which he classified down to families, and the greater part as far as genera.

Seeing that the climatic requirements of families and genera are rather wide, taxa of this kind could not be used in climatic determinations. Therefore, macrofossils were used as intermediaries between the sporomorpha, that had been determined generically, and the recent species. Those of the more frequently occurring macrofossils were selected which belonged to genera indicated by the sporomorpha, stood closest to recent species both chrono-

logically and spatially, and could be considered as ecologic factors of bog-formation or were supposed to have lived in dryer spots near the bogs.

Of the recent species thus obtained by the mediation of macrofossils, 15 live in Mediterranean, 2 in East Asiatic, 4 in Pacific-Northamerican, 25 in Atlantic-Northamerican, 7 in Indomalayan and 4 in American-tropical floral regions.

Data furnished by meteorological stations situated in the said regions show that the January mean temperature must have been 11° C, that in July 25° C, the annual mean temperature 18° C, and that, further, the amount of the evenly distributed annual precipitation must have been somewhat more than 1200 mm. From these data it follows that the Burdigalian (or, according to the most recent theory, rather Lower Helvetian) climate of Katalinbánya was more or less the same as the hot and moist subtropical climate of our days.

Since the above figures are in good correspondence with the data obtained with the aid of the macrofossils found in the Hungarian Miocene formation, the author thinks he is justified to suggest that data based on spore-morphology and obtained through the mediation of macrofossils can be regarded as reliable in respect of Miocene climate.

PRELIMINARY NOTES ON THE QUANTITATIVE ANATOMY OF THE WOOD IN *FAGUS SILVATICA*

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In the year 1957 the Institute assumed the task of carrying out investigations on the anatomy of wood in *Fagus sylvatica*, one of the many species scheduled for a thorough examination within the "10-Year Plan for Timber Research" set up about in 1953 by the Hungarian Academy of Sciences. From the all in all 50 samples collected by the Sopron Institute for Wood Technology, 8 trunks coming from the mountains Bükk and Mátra were examined. In the selection and the quantitative analyses of the various anatomical features, the same methods were applied which proved to be reliable in the course of previous researches carried out on different *Populus* species. The graphs illustrating the variations in the width of the growth-rings show a maximum embracing a period of 30—40 years, followed by a somewhat shorter minimum. Considering that, depending on the calendar date of the first year rings, there are differences to be observed between the different trunks, it seems obvious that the above phenomenon is of ontogenic character. Otherwise, however, a great number of concordances have been observed in the general trend of the graphs. It is not without interest to compare our curves with the growth-diagrams elaborated by MÜLLER-STOLL for the beech-stands of the Beskides, situated at 260 km from the Mátra and Bükk mountains. Going back to a 100 years there is, especially as to the top minima, a general concordance to be observed in the graphs. This statement may be of basic importance for building up a system a dendrochronology in Hungary. The total volume of the ground-tissue decreases during an initial period of about 30—40 years from 60 to 70%, to 30—40%, whereas the total volume of the vessels increases from 10—20% to 30—50%. The dimensions of the vessels are increasing towards the cortex, while their number shows a decreasing tendency. The annual variations are influenced, among others, by climatic factors. Since many samples have not yet been examined, conclusions drawn from the present results cannot be considered as definitive.

SOME DATA ON THE STRAINS OF CULTIVATED MUSHROOMS

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This is the first detailed treatment of the strains of the cultivated mushroom (*Psalliota bispora* LANGE (TRESCHOW)).

The authors have conducted systematic comparative experiments for the last 3 years with the object of gaining a thorough knowledge of the different strains which would enable them to collect useful data for breeding purposes and to study the process of hereditary transmission in edible mushrooms.

Apart from employing the comparative methods as usual in connection with green plants, the authors elaborated also a special experimental method based on the peculiarities of mushroom-growing. The experiments were made on small plots (2 m²) with 5 iterations; the arrangement of the different strains was determined by the microclimatic conditions of the premises chosen for the experiments. All essential properties of the plants were kept under observation.

The key and the comparative description of the strains that have so far been determined are based on the results of 10 experiments. Of these strains the authors have worked up 20 until now, and — as regards productional value — found significant differences among them.

MOSS GEOGRAPHY OF THE SOVIET PORTION OF THE CARPATHIANS

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Approaching the range of the Carpathian Mountains from the Great Hungarian Plain, it is in the section which belongs to the Soviet Union that we encounter the narrowest phytogeographical belts. Proceeding along the river Latorca, one finds the zone of oaks restricted to the Great Plain and the foot of the hills; from Munkács (= Munkačëvo) onward it is followed first by the belt of beech trees and then, in close succession, by the belts of silver firs and spruces. In accordance with this situation, it can be observed that the categories of mosses requiring a high amount of atmospheric humidity, showing a high acid tolerance and dwelling usually in areas characterized by coniferous forests, are increasing in number within short distances.

The snow-capped mountains towering above the forests which cover the slopes of the Carpathians in the counties of Bereg and Máramaros, are the home of many kinds of alpine mosses. However, because of the monotonous sandstone and the infrequent occurrence of steep and rugged rocks, the moss-flora of these parts is considerably poorer and much more monotonous than that one finds in the northern and Transylvanian section of the Carpathians. The moss level follows that of the floriferous plants; it is richer in the coniferous than in the deciduous zone, and the *Anthelietum juratzkanae* is a characteristic feature of the snowy mountains of Máramaros. It is absent from the mountains of Borsava, while the *Oligotrichum incurvum* occurs in these parts also. Important *Sphagneta* are encountered in the valley of the river Talabor and the mountain-group of Gyil.

An extension of the Great Hungarian Plain, which belongs to the Soviet Union, contains interesting bog relicts. Bog forests of alders (with the *Pallaviciana lyellii*, *Leucobryum glaucum* and *Heterophyllum haldanianum* near Pósaháza as their most famous features) at the fringe of the former Szernye(Sernë-)-moor, as also peat-moss bogs near Fornos, which existed up to a few decades ago, are hidden in this area.

THE ROLE OF THE CYTOTAXONOMY IN GEOBOTANICAL RESEARCH

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Abstract not received.

SANDY MUD-PLANT ASSOCIATIONS INDICATIVE OF BACKWATERS IN SOUTH KISKUNSA'G (GREAT HUNGARIAN PLAIN)

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The climate of South Kiskunsa'g is known to be poor in precipitation. Although the mean annual rainfall is not more than 500 to 550 mm, it is so unevenly distributed that there are extremely abundant and protracted rainfalls in spring which leave low-lying areas covered by backwater.

It is in the different culture coenoses that the most striking alterations are caused by the suddenly changed environmental conditions. Associations of mud-plants are formed from which it is possible to draw inferences to the soil conditions of the inundated areas and the extent of the inundations.

A) The original flora is destroyed in areas that are under water for a longer period, and, after the water has been drained off, the sandy soil of the low-lying areas (classes II, III and IV), the following plants will appear on the fresh muddy sand:

a) *Cypereto-Juncetum gnaphalietosum luteo-albi* and

b) *Cypereto-Juncetum cholorocyperetosum glomerati*. If the soil remains unploughed, two aspects can be distinguished in both types:

on sandy soils of the 1st class (in the place of broken-up marsh and meadow associations), characterized by a higher humus content and elutriatable fraction, there appears the

c) *Cypereto-Juncetum chenopodietosum glauci*,

while in places with humus-sandy surface soil and slightly alkali subsoil we find

d) *Cypereto-Juncetum heleochloetosum schoenoidis*.

B) The original culture coenosis is not destroyed in areas which remain under water for a comparatively short time only, and the abundant water supply favours the development of hygrophilous weed associations, such as

a) *Hibisceteo-Eregrastidetum pooidis lythretosum hyssopifolii*, and

b) *Gnaphalium luteo-album* fac.

The preparation of accurate maps of the various backwater-indicating plant associations enables us to recognize those sandy areas of South Kiskunsa'g which are exposed to the danger of inundation.

PHYTOGEOGRAPHICAL CONCLUSIONS FROM VEGETATION MAPS MADE IN WEST-TRANSDANUBIA

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In the course of preparing phytogeographical maps of the regions "Órség" and "Vendvidék" in West Hungary the vegetation of these regions was found to show many features in common with the vegetation of that belt of coniferous-deciduous mixed forests which covers a great part of East Germany and Poland and continues in a northeasterly direction. The author regards Hungary's westernmost part (i. e. that extending to about the line of Körmend), as also the Styrian Basin which — extending to about the line Graz—Deutschlandsberg—Maribor and displaying a similar vegetation — forms a continuation towards the west of the said Hungarian region, as an isolated member, situated in the eastern border region of the Alps, of the above-mentioned zone of mixed coniferous-deciduous forests (Nadel—Laubmischwald—Zone, Nadellaubwaldregion). This area was accepted up to recent times (SCHARFETTER's modern phytogeographical map of Styria) as belonging to the belt of deciduous forests, and it was only in HAYEK's map of Styria, published in 1928, that the above theory appeared in a rudimentary form for the first time.

The area in question is covered by vast pine forests (*Dicrano-Pinetum* = *Pineto-Vaccinietum*) alternating with the characteristic mixed forests first described from Poland (*Pineto-Quercetum*), and with less important deciduous forests. The distribution of the forest associations is governed by the mosaically changing base rock composed of gravel, sand or

clay. This picture is varied by spots of spruce-covered land on the northern slopes in the western part of the area, and the sphagnum bogs which appear in many of the valleys. Even at the crown level of the deciduous forests growing on the clayey base rock, which is less susceptible to becoming podsollic (*Fagetum silvaticae*, *Querceto-Carpinetum* and *Potentillo albae-Quercetum*), a huge number of coniferous trees can be found (*Pinus silvestris*; to the west also *Picea excelsa*, *Abies alba* and *Larix decidua* ssp. *europaea*). A characteristic feature of this area are the marshy pine forests (*Dicrano-Pinetum molinietosum*) which — in some cases — are of considerable size, further alder bogs (*Cariceto elongatae-Alnetum*) the crown level of which, too, is varied by Scotch firs. It is at the moss level of these forests that we encounter in the area under review the *Sphagnum robustum*, *Sph. compactum*, *Sph. squarrosum*, *Sph. acutifolium* and the *Sph. fimbriatum* which latter — though growing in northern area — is rare in the Alps even.

Similar, isolated members of the zone of mixed forests are known in the northeastern part of Bavaria, at the foot of the Chech Forest, and in the Frank Jura. The author regards as belonging to this area also the pine forests in the northern border region of the Alps which extend from the eastern half of the Schweitzer Mittelland through Bavaria to the Inn valley; and, possibly, even a part of Lower Austria.

As regards the floristic division of the area at issue, a solution should be adopted that would bring the opinions of Hungarian authors into line with the — in many respects — divergent attitude of recent Austrian investigators, and would, both in the Austrian and Hungarian part of the region extending at the foot of the Eastern Alps, conform to the views of those local experts who are most familiar with the areas in question.

The former floral district Praenoricum is, thus, elevated to the rank of a floral region. Within this region we can distinguish: (i) Castriferreicum which occupies, chiefly on Hungarian territory, the northeastern part of the Praenoricum: it still displays a slightly Pannonian character; (ii) the floral district of Styriacum, the northwestern part of the region, which occupies a great part of the Styrian Basin and is rich in dealpine elements; it is only the fringe of this district which projects into Hungary, till the neighbourhood of Szentgotthárd; (iii) Petovicum, richer in Illyrian elements, constitutes the third floral district: it includes the area of Göcsej in Hungary.

Such a division of the Praenoricum gives a correct impression of its character as a ransitory one between the Pannonicum, Illyricum and Noricum (Eastern Alps). It would seem advisable to accept this whole region as a wide transitory zone instead of adding it to one of the existing floral provinces.

CHARACTERISTICS OF THE PHYTOPLANKTON OF THE RIVER TISZA DURING THE AUTUMN AND WINTER 1957—1958, AND THE ALLIED PROBLEM OF THE POTAMOPLANKTON

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Each particular phase in the condition of the River Tisza is characterized by a well-definable algal association. At the outset and in the course of the autumn of 1957, for instance, when the weather was warm and dry and the water-level low, an association of algae dominated by *Melosira granulata* var. *augustissima* f. *spiralis* was observed in the river, while, in the cooler water at the end of that autumn, an association characterized by the predominance of *Melosira granulata* var. *augustissima* f. *spiralis* — *Melosira varians*, *Synura uvella* was formed. The sudden sharp drop of temperature associated with a low water-level at the beginning of December gave rise to an algal association mostly composed of *Synura uvella*, *Melosira varians*, *Cymatopleura solea*, *Mallomonas*, while in midwinter — when the temperature moved continuously around the freezing point and the river remained uncongealed — another association, composed of *Synedra ulna*, *Nitzschia sigmoidea*, made its appearance. In the very sparsely populated association with an extremely reduced number of constituent species, as observed in the completely frozen river at the beginning of February, there is only one species, *Synedra ulna*, which has a dominant role on account of its comparatively large quantity.

A detailed analysis of the results leads to the following conclusions: (1) That what is covered by the collective term "potamoplankton" contains, besides true planktonic organisms a great number of non-planktonic organisms as well so that the special term potamoplankton should be sharply distinguished from the general term of plankton; (2) given a continuously low water-level and a relatively high water-temperature, true planktonic organisms can nevertheless arise in great numbers in the water of rivers; (3) sudden changes in the water-level and the temperature are particularly conducive to causing considerable modifications in the composition of the algal associations.

The term "potamoplankton", since the category it covers reflects natural reality and because the concept is useful in practice, should be maintained. As regards the question whether we can speak of specific potamoplankton, it is certain that — in larger, slowly-flowing rivers (the rate of flow being, to some extent, dependent on the actual level of the water) — a specific potamoplankton may be formed which is, therefore, a function of definite seasonal conditions. Such a phytoplankton was that observed in the Tisza in autumn, 1957. Because of the rapid rate at which the various states of the river succeed each other, a potamoplankton of such specific character has usually no time for being developed.

HYDROBIOLOGICAL INVESTIGATIONS IN RICE-FIELDS

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Limnologically, the rice-fields studied in the present investigations are similar to the periodical bodies of water encountered on the Great Hungarian Plain. The fauna observed in the water of fields sown with rice (Rotatoria, Phyllozoa, Cladocera, Ostracoda, Copepoda) is identical with that found in the periodical alkali pools which, so rich in vegetation, are scattered over the Great Plain. While, generally speaking, the composition of the populations in the different rice plots is always the same, slight differences are nevertheless observable, their extent depending on the quality of the soil, the age of the rice-fields and the composition of the water with which they are overflowed.

There exists a pronounced parallelism between the composition of the plankton and the development of the rice-plant. The number of the various species is relatively small during the period following the first overflow; most of them are identical with those populating the pelagic zones of natural waters. With the progressing development of the plant, a gradual increase in the number of those species can be observed which are indigenous to the littoral zones rich in vegetation.

Apart from harmless forms, great numbers of *Triops cancriformis* and *Leptostheria dahalacensis* have been observed to propagate especially in the water of older rice-fields. They appear in huge masses during the period which follows the sprouting of the rice, and are detrimental to the growth of the plant. Their vigorous movement disturbs the loose mud and makes the water so turbid as to become impermeable to sunlight. Want of light will, of course, delay the plant's development. *Triops cancriformis* may, moreover, cause considerable damage by biting off the seedlings or by plucking them out of the loose mud.

SOME CONCLUSIONS OF SERIAL BENTHIC INVESTIGATIONS

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Serial quantitative and qualitative investigations into the macrofauna of the bottom sediment below the open water of some Hungarian shallow lakes of eutrophic character have been conducted by the author. Their object was to obtain information about the various faunal compositions of different types of bottom sediments and, thus, to contribute data to benthic productivity.

The macrofauna of muddy spots rich in organic matter was found to be dominated by *Chironomus plumosus* MG. which made up 95 to 98 per cent of the population. The rise of at least 3 generations per year of this species could be ascertained in the lakes examined. The yearly production may vary considerably in one and the same portion of the bottom of a lake. (Even differences of 40 to 60 per cent are possible!) Such variations depend on the climatic conditions reigning at the time of swarming. On account of the significantly occurring swarmings and the said predominance of the *Ch. plumosus*, the abundance of the sedimentary macrofauna undergoes rapid and considerable changes. A population of *Ch. plumosus*, for example, which weighed 783 kg/hectare was observed to diminish to 73 kg within a few days.

Besides *Ch. plumosus*, other Chironomida-larvae, the larvae of *Chaoborus crystallinus* and also *Tubificidae* were found in significant numbers in those muddy-sandy, etc. portions of the bottom of the examined lakes which were less rich in organic substances. Examining different spots at the bottom of one and the same lake it was found that the percentual proportion of the species composing the population of any particular spot had remained rather unchanged from year to year. Likewise constant seemed to remain, over a number of years, the ratio between the respective abundance-values of the different parts of the bottom.

The above data concerning temporary changes in the biomass of the benthos are worthy of attention with a view to production biology.

CHARACTERISTICS AND GENESIS OF MEGACINE

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The iso-antagonism of some *Bacillus megaterium*-strains is due to a proteinous substance which was termed by the authors *megacine*. The production of megacine is induced by UV light or other agents and always accompanied by cytolysis. This phenomenon is strikingly suggestive of the behaviour of certain lysogenic (phage-carrying) strains. Systematic investigations showed nearly 50 per cent of 200 different *B. megaterium*-strains, isolated from soil samples, to be megacinegenic. "Spontaneous induction" occurring in young cultures of megacinegenic strains, may provoke lysis which invariably releases the formation of megacine. "Spontaneous lysis", or the so-called induced lysis, does not give rise to infective phage-particles.

A search for non-megacinegenic mutants was made in spore population of a few megacinegenic strains. By the usual velveten replica method non-megacinegenic mutants were isolated all of the strains studied. The proportion of non-megacinegenic mutants varied from 0,2 to 10% in individual strain and in different lot of spore material, respectively. The non-megacinegenic mutants did not display any aberrant growth pattern, they could be induced by UV light. It is safe to assume that there is a genetic factor perpetuated in megacinegenic cells governing the hereditary character of megacinegeny. Whether this genetic unit has to be regarded as a defective prophage or as one which has got into the cell in the course of phylogenesis, still constitutes an unsolved problem.

The range of action of the megacine may be summarily described as follows:

Megacine has a bactericidal effect upon cells. It is neither adsorbed on the cell-surface nor does it affect the cell-walls.

When megacine concentrates were added to young cultures of indicator bacteria, the turbidity of suspension gradually decreased but lysis of cells could not be detected by phase contrast microscopy. Instead of this, intracellular components escaped into medium and finally only empty cell wall remnants were seen. The increased permeability of cells was also demonstrated by the escape of UV material.

Similarly adaptive, beta-galactosidase gradually appeared in washed cell suspension by addition of a low concentration of megacine. Bacterial protoplasts disintegrate under its effect. The "breakdown" of the cells' osmotic barrier is a consequence of injured plasma membrane. Megacine seems to be the depolymerizing enzyme of the plasma membrane.

EFFECT OF DNA ON THE ANTIBIOTIC PRODUCTION OF STREPTOMYCES

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Though, in general, the transformative action of the DNA has been much investigated, authors have neglected to study transformations occurring in the production of antibiotics by *Streptomyces*.

The authors examined the effect of DNA, isolated from *Streptomyces globisporus* of wide bacterial spectrum, on the respective antibiotic production of a strain of *Streptomyces erythrochromogenes* which affects solely Gram-positive bacteria, on a strain of *Streptomyces flaveolus* of narrow bacterial spectrum, and on a strain of *Streptomyces griseus* which in ordinary circumstances does not produce antibiotics. The method described by MIRSKY and POLISTER was used for the isolation of the DNA. The isolated nucleic acid gave a positive diphenylamine reaction, and its UV absorption spectrum was at 2600 Å. The spectrum showed it to be practically free from protein.

While the potency of the effect of the isolated acid varied in accordance with the method employed, all of the three test strains gave a positive response: in general, their bacterial spectrum became wider, but — in some cases — prolonged DNA treatment completely destroyed the capacity of producing antibiotics. Other properties of the DNA-treated strains underwent hardly any change: a slight difference in the pigment production was observed, and *Streptomyces flaveolus*, treated with DNA, was found to co-agulate milk.

Summarizing our results, we claim that (1) the antibiotic spectrum of *Streptomyces* is changed by DNA; (2) the change is not in accordance with the character of the donor; (3) the transformative action always depends on the manner in which the test strain is treated with the DNA; (4) the production of antibiotics stops in certain cases completely after a prolonged treatment with DNA; (5) treatment with DNA as a method to widen the bacterial spectrum and increase antibiotic production is inferior to the methods of induced mutation.

IMMUNOCHEMICAL INVESTIGATION OF BEAN- AND MAIZE-ROOT ANTIGENS BY MEANS OF NEW GEL-DIFFUSION METHODS

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The authors studied the antigenicity of 6-day old root homogenates of bean and maize plants. Homogenization was performed in two ways: by the laceration of the tissues in the presence of saline at room temperature, or by presence of saline at room temperature, or by pulverization following freezing with liquid nitrogen.

To be able to study the antibody response of rabbits, they were repeatedly inoculated with the homogenates, in some cases with, in others without, adjuvants. Aluminium hydroxide gel or FREUND's adjuvant (Arlacel and Bayol) were employed as adjuvants. Antibody production was elicited by means of the second method only.

The reaction of the antibodies and the root homogenate was analyzed by means of gel-diffusion (both one-dimensionally in tubes and comparatively on plates), as also by means of immune electrophoresis.

Results obtained allow to regard these methods as suitable not only for an immunological evaluation of antigens but also for the serological investigation of racial differences.

INVESTIGATIONS ON THE ANTIBACTERIAL AGENT OF CANNABIS SATIVA

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In the preceding years the antibacterial activity of the seeds of several hundred plant species was investigated. In 1956 a communication was published by the senior author to the effect that the seeds of the hemp — like the seeds of several other plants — have a significant bacteriostatic substance on their surface.

According to our recent investigations, this substance occurs primarily in the resin covering the terminal organs of the plants: inflorescence and leaves. It gets from these to the surface of the seeds. In the popular therapy based on centuries' old experiences the resinous organs of this plant are applied for treatment of inflammatory diseases.

Obtaining of the antibacterial substance was commenced from the resinous organ of *Cannabis sativa* "Bologniensis". Through purification with solvents, a very effective, orange-colored, amorphous, inodorous, thermostable preparation was obtained which is well-soluble in organic solvents and very poorly in water.

The activity of the preparation was tested with the horizontal agar diffusion method against Gram-positive and Gram-negative bacteria, yeasts and molds.

The preparation was active against all the Gram-positive bacteria investigated, ineffective, however, against Gram-negative bacteria, yeasts and molds.

The active preparation gives chemical bashish reactions.

INFLUENCE OF CHANGED ENVIRONMENTAL FACTORS UPON THE TOXIN PRODUCTION OF THE VARIANTS OF THE CORYNEBACTERIUM DIPHTHERIAE P. W. 8. STRAIN

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The authors conducted a series of experiments with a view to studying the toxin production, under varying conditions, of the *C. diphtheriae* P. W. 8. OKI., Toronto, Wiessensec. (The variations consisted in nutrient media of different compositions, different O₂ atmosphere, different periods of cultivation, etc.). Their investigations proved that no diphtheria toxin of permanently constant value can reliably be obtained if the world's most wide-spread medium, namely that prepared from horse or beef broth digested with pancreas enzyme (POPE and LINGGOOD) is used. By means of serial chemical analyses made in the course of experiments which had the object to prepare a nutrient medium suitable for the production of a toxin of constant high value, the authors determined the optimum requirements of the *C. diphtheriae* in respect of iron (Fe⁺⁺), carbohydrates and "growth factor". They succeeded in preparing a medium which makes it possible to produce toxin of standard value and has given satisfactory results in practice. Many experiments were made with shaken and aired cultures, and it was found that such cultures give a toxin which has a considerably higher value and is chemically purer than toxins obtained from the usual stationary cultures. The production of such a high-potent toxin requires of course, the choice of an optimal toxin-productive variant and a careful control of the said environmental conditions.

A NEW METABOLIC PATHWAY IN FUNGI

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Although it was known for a long time that malonate is present in vegetable materials and could serve as substrate of several bacteria and enzymes prepared from animal tissues, nobody reported recently about the utilization of malonate by fungi. Previously it was demonstrated that *Botryotinia fuckeliana* and several other fungi are capable of utilizing malonate. It was also shown that malonate was degraded to CO_2 and oxalate via acetate and succinate. In the present study it was observed on malonate-grown cells of *Candida albicans* that the initial attack on malonate depends upon an oxidation. The lag period in aerobic CO_2 evolution and the initial lower value of R_Q and the lack of anaerobic CO_2 evolution suggests this explanation. This was confirmed by poisoning the oxidation with iodacetate, fluoride, azide and dinitrophenol which resulted in the inhibition of aerobic CO_2 evolution. On the other hand, the poisoning of decarboxylation by sulphanylamid could not cause the complete inhibition of oxidation till malonate was present in the reaction mixture and the level of inhibition was increased slowly with time. From changes of R_f values it was established that probably glyoxilic acid is an important intermediary of malonate degradation and the end-product is an other carboxylic acid which was isolated by paperchromatography from cells and fermentation fluid. This acid is oxidizable of permanganate and its R_f value is near to oxalic acid but the identification of the compound was not accomplished yet. The data obtained with *Nocardia asteroides* were similar to *Candida albicans* in view of R_Q and oxidation.

CHANGES IN REDOX POTENTIAL PROVOKED IN BACTERIAL CULTURE MEDIA BY UV, X, BETA AND GAMMA RAYS

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It is known that if the culture fluid in which micro-organisms are grown is exposed to UV rays, their metabolism will suffer certain changes. Knowing that the redox potential (RP) and the metabolism of cultures are closely correlated, the authors made experiments with a view to observing the changes occasioned by visible light, UV, X, β , and γ rays in the RP of various nutritive media. The results observed were these: RP in proteinous fluid and solid media diminishes by 300 mV under the action of UV rays, and by 100 to 120 mV under that of soft X rays, while no change is effected by exposure to hard X, β and γ (Co^{60}) rays. The diminution provoked by UV rays is durable which points to a strongly increased redox capacity of the nutritive medium. The prodigiosin production of *Serratia marcescens* cultures grown on such medium was found to have diminished: it became normal again when the redox capacity of the medium had come to be exhausted by the culture.

ULTRAVIOLET-SENSITIVITY IN PIGMENT-PRODUCING AND PIGMENT-DEFICIENT STRAINS OF SERRATIA MARCESCENS

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It was reported that pigmented strains of *Serratia marcescens* are more resistant to UV-irradiation than the pigment-deficient ones. In our experiments about 10^7 cells per ml were irradiated from a source of 500 watt high pressure mercury lamp. Three different types of survival curves were obtained among the six strains of different origin. The UV-sensitivity

varied independently of the pigment content and the degree of photoreactivation with fluorescent lamp was approximately equal in all cases [DRF values about 2]. However, the pigment-deficient variants of the same strain were more sensitive. Aqueous suspension of prodigiosin extract gave some protection only against the higher UV-doses, independently of the pigment content of the cells. When the endogeneous pigment production was enhanced by culturing in media supplemented with glycine and alanine, the UV-sensitivity was only slightly influenced, on the contrary, the resistance of the cells grown in the presence of 1,5% NaCl was markedly increased, although their pigment formation was suppressed. The same protection effect was observed within the ranges of lower UV-doses when the cells were grown in the presence of citrate, azide, yeast extract or nucleic acid hydrolysate. However, this increased phenotypic resistance turned into sensitivity at higher doses of UV-irradiation. The interpretation to be given to this behaviour is not clear yet. The results obtained indicate that the UV-sensitivity changes significantly with different growth conditions and the ranges of the phenotypic variations could be greatly extended according to the metabolic state of the cells. Summing up: there was no unambiguous correlation between the intensity of pigment formation and the level of phenotypic radiation resistance.

EFFECT OF SELF-FERTILIZATION ON THE VITALITY OF PLANTS AND ITS EVOLUTIONARY SIGNIFICANCE

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In DARWIN's "The Effects of Cross- and Self-Fertilization in the Plant Kingdom" (1877) it is stated on the evidence of a great number of experiments that cross-fertilization is useful, self-fertilization harmful to plants. Writing of self-fertile plants, he substantiates this theory by adducing results obtained from cross-breeding between different varieties or breeds of the same species. What DARWIN actually demonstrates, is not so much the harmfulness of self-fertilization as the *usefulness* of cross-breeding.

Were this rule of universal validity, self-fertile plants ought to have vanished long ago.

Analyzing data collected in respect of the propagation of 1531 plant species, FRYXELL (1957) found 14,6 per cent of the examined species to be self-fertile. This shows that, in a part of the vegetable kingdom, self-fertilization has to be regarded as a practical manner of adaptation developed in the course of evolution.

Several factors are responsible for the fact that self-fertile plants possess sufficient vitality. Of these favorable factors, the available amount of pollen has been studied by the present authors. Leaving 1, 2 and 3 anthers on spring wheat, and 1, 5 and 10 anthers on pea, they found the percentage of seed-setting to have been 65,6—92,6—100 and 12—48—100, respectively.

Wheat plants grown from seeds fertilized by one anther showed more vigorous vegetative growth and yielded about 9 per cent less crop than the controls. The vegetative growth of pea plants developed from seeds fertilized by one anther, too, was more vigorous than that of the controls.

The above findings seem to demonstrate the beneficial effect of the available amount of pollen in self-pollinating plants.

GENETICAL BASIS OF PENTOSE-UTILIZING CAPACITY OF USTILAGO MAYDIS

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The colonies with d-xylose utilizing phenotype of cells of a monosporidial line, grown in glucose medium develop after spreading on xylose-agar-medium between the 3rd and 15th days (= lagphase-heterogeneity). Most of the cells form colonies, which fact raises

the question, whether this change of phenotype occurred in the information system of the genetic pattern of the organism or in the receptor system. As the lag heterogeneity was eliminated after repeated passages on d-xylose and because the long lag in liquid xylose medium was also diminished, it may be suggested that some selection mechanism operated resulting in the stabilization of the xylose utilizing ability. The colonies of the cells — kept in liquid xylose medium and tested at intervals during the time when no visible growth was observed on xylose agar plates — appeared after a gradually shortened lagphase-heterogeneity, *i. e.* the cells passed through a stepwise adaptational change to utilize xylose. Between the individual cultures at the time of testing there is a great variability in the number of xylose utilizing cells, which indicates the discontinuous nature of this adaptation. According to the calculations, the mutational rate is high (about $1-2 \cdot 10^{-3}$). Therefore it is assumed that because on the xylose-agar-plates there is a background growth, resulting in the formation of microcolonies containing 10^4-10^5 cells, some changes may have occurred in the information system of some cells in the microcolony during this latent growth, enabling them to utilize the d-xylose as a sole carbon source.

METHOD FOR THE MEASUREMENT OF MATERNAL EFFECTS IN THE GENETICS OF QUANTITATIVE CHARACTERS

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The following formula has been set up by the author to express deviations in the reciprocal hybrids of the F_1 generation:

$$\frac{\left(1 - \frac{a_1}{a_2}\right) \cdot 100}{2}$$

where a_1 means the lower and a_2 the higher of the deviating reciprocal hybrid values. The substituted value may be the mean value referred to adult animals, the coefficient of regression, the coefficient of allometric growth, or the value expressing velocity of growth. The greater the deviation of the reciprocal hybrids from the hypothetical middle position is, the higher the percentage of deviation will become.

Relying on the evidence of a number of examples, the author demonstrates that, as a rule, the mean values of adult animals or growth rates (size or weight as functions of time) arrange themselves in the following order of size: great statured parent $>$ F_1 hybrid of great-statured mother $>$ F_1 hybrid of small-statured mother $>$ small-statured parent. If, however, the velocities of allometric growth are computed, the sequence may be the other way round because of the more rapid growth in certain developmental phases of the small-statured species.

INVESTIGATION CONCERNING THE VARIABILITY OF THE PRESACRAL VERTEBRAE IN RABBITS

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Variations of the presacral vertebrae were studied by the authors in the wild-rabbit, an inbred domesticated rabbit strain, and their reciprocal F_1 hybrids.

New data are added to the well-known results of SAWIN *et al.* regarding variations of vertebrate column, by the inclusion of the wild animals and the reciprocal hybrids.

The type of the vertebral column of the wild animals was found as a strong dominant character. No such dominance was observed in respect of the type of vertebral column as

possessed by the tame-rabbit strains in the experiments of SAWIN. In this connection, authors point to the stable conditions of dominance which have developed through evolution in the wild animal and become unstable and diffuse through domestication.

Deviations observed in reciprocal hybrids enabled the authors to point to definite maternal effects in the development of the lumbar region.

Notwithstanding a strong dominant tendency towards the wild animal, the assumption of a simple monofactorial inheritance is refused by the authors on account of the pedigrees. Their investigations justify them in regarding the observed mode of transmission as belonging to that type of inheritance which is characteristic of discontinuous quantitative character.

SOSEROLOGICAL TESTS ON DIFFERENT DUCK VARIETIES AND THEIR HYBRIDS

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The experiments had the object to determine the blood group of Muscovy (*Cairina moschata*), Peking and Khaki-Campbell (*Anas platyrhynchos platyrhynchos*) ducks, as also that of their hybrids. It was intended to demonstrate the presence of isoantibodies by means of agglutination tests performed in saline-albuminous media, further by the use of enzymatized cells and also with the aid of the COOMBS-test. Having seen all these methods to be failed to produce a perceptible agglutination, it must be concluded that natural isoantibodies do not occur in the serum of ducks. For the purposes of the COOMBS-test anti-duck globulin was produced in rabbits. By absorption with human and duck erythrocytes it was possible to determine the titre of the anti-duck globulin with incomplete anti-Rh antibody (anti-D): it was found to be 1 : 281. Thus, anti-duck globulin reacts also with human incomplete antibodies.

To whichever blood group of the ABO-system they belong, human erythrocytes are agglutinated by duck sera. At the same time, the erythrocytes of ducks of any variety are agglutinated by human sera, and it is a fact worthy of note that, surprisingly, it is the AB-serum, free from natural agglutinins which produces the most vigorous agglutination in duck erythrocytes.

With the aid of appropriately absorbed immune sera it was possible to demonstrate specific antigenic properties for each particular variety of ducks, and the use of the type-sera enabled the author to determine those antigens in the erythrocytes of the hybrids which were characteristic of the parental race. Contrary to MCGIBBON, the present author failed to discover such antigens in the hybrids which would not have been demonstrable in the parents

Abstracts of papers read at the sessions of the section B

REDOX POTENTIAL AS INDICATOR IN TUMOUROUS RATS

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Relying on the results of earlier investigations made in the Institute, a method has been elaborated for the continuous measurement of redox potential (RP) in vertebrates of the higher orders. The method makes it possible to follow the changes in the RP of healthy animals during a number of weeks; values thus measured with intervals of 1 or 2 days showed fluctuations of 15 to 20 mV.

The method in question seemed to be also suitable for the continuous measurement of changing RP in tumorous and bacterially infected animals. Between the implantation of the tumour and the consequent death of rats, RP was observed to have diminished by 200 mV, while the reduction was not less than 500 mV after 4 to 5 days in animals that had been infected with bacteria.

The experiments allow the conclusion that neoplastic cell proliferation goes hand in hand with a diminution of the RP.

Further experiments had the object to find out whether it is possible to provoke a prolonged change in the RP of healthy animals without exitus lethalis. So far, intravenously administered thioglycolic acid has given the most durable result in this respect.

Experiments now in progress have the aim to ascertain if specific anti-tumour substances may be selected by means of electrometric measurements *in vivo*.

THE ROLE OF FUNCTIONAL GROUPS IN THE CATALYTIC ACTIVITY OF DEHYDROGENASES

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The role of the SH groups played in the oxidation processes catalysed by some dehydrogenases was studied (Crystalline mammalian muscle 3-phospho-D-glyceraldehyde dehydrogenase — PGAD, and yeast alcohol dehydrogenase — ADH).

It was found that by blocking about 3 of the 36 to 40 SH groups of the ADH with p-chloromercuribenzoate (PCMB) the oxidation of straight chained alcohols can be inhibited, whereas to inhibit the oxidation of branched chained alcohols, all the SH groups of the enzyme have to be blocked. The natural co-enzyme, the diphosphopyridine-nucleotide (DPN) may be replaced by alloxan when straight chained alcohols are oxidized and in this case the catalytic action is not inhibited even if all the SH groups of the enzyme are blocked with PCMB. Therefore it may be concluded that the role of the SH groups in the catalytic effect is to bind the natural co-enzyme (DPN) while taking no part in the binding of the substrate.

In the reactions catalyzed by PGAD, the oxidation of simple aldehydes (DL-glyceraldehyde, acetaldehyde) can be prevented by blocking of about 3 of the enzyme's 13 to 14 SH

groups, whereas all the 13 to 14 SH groups have to be blocked to achieve complete inhibition of the natural substrate, the 3-phospho-D-glyceraldehyde.

It was found that by blocking the SH groups of PGAD with increasing amounts of PCMB there is a progressive decrease of dehydrogenase activity and a concomitant increase in its digestibility. From the point of view of digestibility, the completely inactivated PGAD represents an intermediate form between the active (resistant) and the urea denatured (easily digested) protein.

According to the above data, the "essentiality" of the SH groups and the effect of inhibitory agents upon the steric configuration of the enzymes are discussed.

TWO NEW PEPTIDES FOUND IN THE BLEEDING SAP OF MAIZE

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The precipitate separated from the bleeding sap of maize (variety "Martonvásár FB") by means of concentrated aqueous mercuric acetate solution containing HgCl_2 , was washed, suspended in alcohol, and then decomposed with H_2S . The ingredients contained in the alcoholic solution were then chromatographed one-dimensionally by means of 80% phenol as solvent. Acetone containing 0,1% ninhydrin was used for the development. In addition to the ingredients described earlier two spots could be observed which, so far, have not been studied in detail. One was yellowish brown ($R_f = 0,40$), the other deep bluish violet ($R_f = 0,55$). They proved to be uniform substances in two-dimensional chromatograms also. After hydrolysis by means of hydrochloric acid 6, or sometimes 7 ninhydrin-positive constituents could be distinguished in circular and 10 components in each case in two-dimensional chromatograms. Scarcely any yellow peptide was visible in the bleeding sap of a second variety of maize ("Szegedi sárga lófogu"), while it contained a considerable amount of bluish-violet peptide. Experiments have proved that the amount of peptides in the bleeding sap of the mentioned two varieties of maize undergoes changes during the growth of the plants, and it is justified to assume that not even the mutual proportion of the amino acids of which the peptides are composed remains quite unchanged. While the occurrence of peptides appears to constitute a property of the species, their composition may be somewhat changed by external factors of cultivation.

THE LIPID METABOLISM OF CHLOROPLASTS

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Histochemical analysis proves that diseased chloroplasts develop a hypertrophy of fatty substances. Not only the total amount of lipids is increased but also the interproportion of the individual fractions is changed. Referred to the dry-matter content, the total amount of lipids in the leaves of healthy spinach (*Spinacia oleracea*) is 2,9 per cent. Their great majority, i. e. 2,2 per cent, is placed in the chloroplasts, while the rest is scattered in the plasma, the mitochondria and the microsomes. A characteristic increase in the lipid content of leaves treated with a solution containing 0,02 per cent of trace elements (Mn, Cu, Zn, Ni, Mo) was observed: the total amount of lipids was 3,2 per cent, with 2,4 per cent in the chloroplasts and 0,8 per cent in the plasma, mitochondria, etc. The percentage distribution of the lipid fractions of chloroplasts isolated from healthy leaves, referred to the dry-matter content, is this: vegetable pigments and non-saponifiable substances, 0,8 per cent; phospholipids, 0,7 per cent; neutral fats, 0,2 per cent; lipoprotein-fatty acids, 0,4 per cent. These proportions undergo a considerable change 5 days after a treatment of the leaves with trace elements: while the quota of vegetable pigments and non-saponifiable substances (0,6%) and that of phospholipids (0,5%) decreases, the quota

of neutral fats (0,4%) and lipoprotein-fatty acids (0,8%) rises. Since the iodine number of the phospholipids and lipoprotein-fatty acids is nearly equal (60—80) it is safe to assume that the increase of the lipoprotein fraction is a direct result of the degradation of the phospholipids, while the actual fattening of the chromoplasts should be attributed to a *de novo* formation of neutral fats.

CULTIVATION OF ALGAE IN CONTINUOUSLY WORKING FERMENTORS

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The authors gave in 1955 an account of their investigations into the fundamental problems of continuous fermentation. Experiments made in this respect having enabled the authors to gain valuable data concerning the construction of the fermentors and the technique of fermentation, they elaborated a method of the continuous production of yeast or rather ergosterol. Besides making production continuous, the method raises the amount produced per unit of time. Encouraged by these results, the authors began the continuous cultivation of alga strains isolated and analysed by FELFÖLDY in the Biological Institute at Tihany. The purpose of the experiments was to study the sterol production of the algae with particular regard to pharmaceutically valuable sterols. Experiments concerning the continuous cultivation of *Chlorella vulgaris* and *Scenedesmus obliquus* strains on inorganic nutritive media gave completely satisfactory results. The sterol content of the algae grown in such cultures was always at least equal to that of algae cultivated with the old method: the total sterol content of both the *Scenedesmus obliquus* and the *Chlorella vulgaris* was found to be half a percent or more. Experiments now in progress have the object to establish the best method of the continuous production of Chondrilla sterol, and to increase algal sterol production.

THE METABOLISM OF YOUNG ROOTS AND SHOOTS IN ORGAN CULTURES

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Literature is only a few reports on comparative investigations about the metabolism of the roots and shoots of young plants. Authors usually deal with only the one particular organ, especially in experiments with cultures of isolated organs. The author has, therefore, begun investigations in the course of the last years to comparing the metabolism of two organs, especially that of their centres of growth and development, *i. e.* their meristematic zones, where the process of metabolism is most vigorous. Common pumpkin (*Cucurbita pepo*) was used in these experiments. The manner in which the experimental material was prepared, as also the methods of analysis, had been described in earlier papers on this subject.

Changes in the number of cells, the increase of dry-matter, and changes in the nitrogen content of the respective isolated organs were compared in the course of the present experiments. The number of measurements performed was sufficient for mathematical evaluations, the results of which were then either referred to the whole organ or to its dry-matter content or to single cells.

Observations regarding the meristematic zones of non-papilionaceous (*e. g.* pumpkin) seedlings showed the total increase in the number of cells to be more intensive in the roots than in the shoots, irrespective of whether the plants had been left intact or isolated in cultures. The experiments proved moreover that later the organ is isolated (*i. e.* the more aged the plant), more time it will take to adjust its metabolism, *i. e.* later the organ will begin to grow. This shows that young organs are readier to adapt themselves to changed nutritional condition than more differentiated older plants.

Similar results were obtained in respect of the increase in the dry-matter content of the examined organs.

Observations of the N-metabolism, as referred to the organs, gave the result that, in intact plants, roots were better supplied, while, isolated, the two organs did not differ in this respect. Compared with the initial phase, both organs became somewhat lower in nitrogen content. Relying partly on his earlier investigations and partly on literary data, the author is inclined to attribute this phenomenon to exudation into the nutrient medium and disturbed metabolism.

As regards total N and insoluble (protein) N, as referred to the cell, the roots were found to be in a more favourable position than the shoots both in intact plants and in cultures (the ratio being 2 : 1, as a rule). These results emphasize the importance of the root seedlings which manifests itself also in the process of metabolism even in non-papilionaceous plants.

DEVELOPMENT OF RHIZOBIAL INFECTIBILITY IN THE ROOTS OF CERTAIN PAPILIONACEAE

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The interaction between certain papilionaceous plants (bean, pea) and the *Rhizobia* living with them in symbiosis was studied in the initial phase of the association. The capacity of being infected (infectibility) of the examined papilionaceous plants does not develop until germination has reached a certain degree (usually on the 4th to 5th day), and many biochemical changes in the cells of the hair roots can be observed during this period of development. For infectibility to develop, the presence of sprouts, or, more exactly, that of the growing point of the sprouts is indispensable. The biological action of the shoots can be explained neither by their assimilative activity nor by a reduction of the auxin level after their removal. Shoots exert a temporary effect only, and their later removal (after 5 days) does not affect infectibility.

The biochemical investigations extended to the more important phases of P, N and carbohydrate metabolism. Those of the observed processes which seem to be associated with the development of infectibility are the reduction of the ribo- and deoxyribonucleic-acid level of the cells, enhanced activity of the succinic acid hydrogenase and the simultaneous diminution in the activity of the malic acid hydrogenase. The copious excretion of malic acid observed in papilionaceous roots is probably due to the last-named process. A further interesting phenomenon is a change in the glycocoll and arginine content of the cells which, too, seems to be connected with the development of infectibility in the roots. Biochemical investigations show that the biological action of the shoots has nothing to do with the regulation of host specificity.

ANNUAL PERIODICITY IN THE WEIGHT AND METABOLISM OF SCOTCH-PINE SAPLINGS

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The experiments described by the author were made in the years 1955—1957 at the Biological Station at Alsógöd.

It was found that the increase in weight and the uptake of nutrition have an annual periodicity not only in adult trees but in saplings as well, and that such periodicity in the roots is different from that in the shoots.

The maximum increase in the weight of shoots occurs in July—August. It amounts to about 80 per cent of the whole annual increase.

The increase in the weight of roots shows two peak periods: a vernal (March—May) and an autumnal (September). Weight increases at a higher rate in autumn than in spring: about 25 per cent of the total annual increase occurs in the spring months and 50 per cent in autumn.

The increase in the amount of N in the roots is not significant until August, whereafter a sudden rise can be observed, whereas — as regards shoots — the N content rises considerably during the summer months also. While the situation is similar in respect of P, the differences are larger. Referred to whole saplings, this temporal displacement is well demonstrated by the fact that 40 per cent of the total N and nearly 50 per cent of the total P get into the plants after the middle of August.

The dry weight of the saplings remains more or less unchanged during the winter period of "quiescence". Yet, there occurs in this period a "migration" of substances from the shoots to the roots in which N compounds play a significant part. (The ratio between roots and shoots rises from 0,55 to 0,70; the total N content of the shoots diminishes by 15 per cent, that of the roots increases by 30 per cent).

It can be observed that roots grow considerably in length during the winter period. The rate of growth is in close connection with soil temperature. This phenomenon, together with the said "migration" of substances, admits the conclusion that, during winter, life processes are more vigorous in the roots than in the shoots.

The increase in weight, and the manner and sequence in which stuffs are sucked up are similar in one and two-year old saplings, and it is only in the rate at which these phenomena occur that a difference can be observed. As regards first-year saplings, a 2-month postponement of the seed time (April—May) makes no difference so that, apparently, the said periodical changes are not governed by the age of the saplings.

The author is of the opinion that an observation of the course of weight-increase and the rise of the total N and P content gives a valuable clue for the most convenient time at which top-dressing should take place. The importance of top-dressing is enhanced by the fact that woody plants absorb nutritive elements chiefly through their horizontal roots. Experiments seem to prove that, as regards first-year fir saplings, a single top-dressing with N and P in July would give the best results, while it should be preceded by a top-dressing with N in early spring in the case of second-year saplings. These conclusions should, however, be put to further tests by additional experiments which might also decide the question whether top-dressing is better performed in the first or the second year.

METABOLIC CONNECTIONS BETWEEN THE MAIN STEM AND THE LATERAL SHOOTS IN MAIZE

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In connection with the removal of offshoots, the authors studied the metabolic correlations existing between the main stem and lateral shoots at various stages in the ontogenesis of maize plants. Besides cutting the plant to obtain breeding sap, also isotopes were used for the experiments which were made with the hybrid maize, type Mv 5. It was found that as soon as the lateral shoots develop their own roots, their absorption of mineral substances becomes independent of that of the main stem. The bleeding sap of the main stem contains considerably more organic N (80% of the total) and organic P (approx. 50% of the total) in the presence than in the absence of lateral shoots. Organic N is probably a peptide composed of several amino acids, and it is by means of the peptide that most of the nitrogen is transported. The organic P-form is probably phosphorylated sugar. The main direction of the sap-current is towards the reproductive organs of the main stem. It is more than probable that there exists a significant flow of assimilates from the lateral shoots towards the main shoot. Lateral shoots are, therefore, not only not harmful but — especially during the period of differentiation and ripening — promote the development of the main shoot by a vigorous assimilation of the absorbed substances as is proved by the said higher amount of nitrogen and phosphorous compounds in the breeding sap of the main shoot.

A NEW EXPERIMENTAL METHOD IN ECOLOGY AND ITS RESULTS

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Abstract not received.

THE CILIARY MECHANISM OF POTASSIUM REVERSION

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With a view to gaining a closer insight into the physiological mechanism of potassium reversion, the authors made use of two new methods. The first was an apparatus, constructed according to the description by FERGUSON, based on the principle of dark field illumination. It enables the photographic registration of any movement performed by infusoria (e.g. *Paramecium multimicronucleatum*). The second was the application of the osmium-haematoxylin quick-fixing method which enabled the authors to stop the ciliature of the animals in the characteristic phases of their retrograde movement and so to reconstruct the changes in the ciliary activity during the whole course of the avoiding reaction.

That path obtained in 0,02 M potassium chloride solution is first almost quite straight, to become more and more winding with a simultaneous gradual slowing-down of the retreat. This retreat passes finally (after some 15 seconds) into a rotatory movement around the rear end of the body.

The metachronic ciliary waves observed on fixed animals have on almost longitudinal course, with a slight turn to the right, over the whole surface of the body (inclusive of vestibulum) in the initial phase of the retreating movement. The direction of the active ciliary beats is slightly forward, toward the right side of the body. Specimens fixed at later stages of the reversion show the same characteristic pattern of the retrograde movement on the caudal part of the body; yet, at the same time, there appears around the forepart of the body a backward spreading zone of a system of waves winding to the left at a 45°-angle and being characteristic of normal forward locomotion, when the cilia beat backward to the right.

A detailed analysis of the pictures leads to the conclusion that (1) the effect of potassium on the cilia manifests itself through a modification of the impulses which primarily co-ordinate the locomotion; (2) ciliary beat is turned during reversion only through an angle of 30° from the normal direction; (3) only a comparatively short initial phase of what is described in literature as reversion can be regarded as a pure locomotory response elicited by potassium. Soon after the beginning of reversion a peculiar "Rückregulation" becomes operative in the forepart of the body of the *Paramecium*, a process which readjusts the ciliary activity of the animals to the physiological equilibrium corresponding to normal forward locomotion.

OSMOREGULATION AND PROTOPLASM STRUCTURE

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The contractile vacuole, *i. e.* the organ of osmoregulation in unicellular organisms, responds not only to impulses reaching it from the outside through the plasma membrane but also to those occurring in the protoplasm during the life processes. Phenomena of the latter kind proved to be measurable, such measurements being based on the sol or gel condition of the protoplasm, the dehydrated or hydrated state of the protein molecules, and expressed by means of the changes observed in the frequency of the pulsation of the contractile vacuole and the amount of watery contents dispersed per unit of time.

Experiments with *Platyophrya lata* showed that, essentially, vacuolar activity depended on whether the organ of osmoregulation was included in the zone of the protoplasm responsible for the contraction of the body-end. Rapid contractions of the *Pyxidium asymmetricum*, effected by means of swarming myonemes and associated with the folding and unfolding of the protoplasm's protein molecules, were nearly always followed by a shortening of the period of pulsation. (The intermolecular water space was increased by the syneresis following the folding of the protein molecules.)

The correlation between osmoregulation and plasmatic structure is conspicuous especially during the formation of the cyst. Following its beginning the *Platyophrya lata* soon assumes the shape of a spherule. Meanwhile, the protoplasm containing proteins in globular form loses eight times more water than before. During the formation of the cyst, the protein molecules assume a peculiar orientation (gelification), the osmoregulation first diminishes at a rapid rate and then ceases. At this moment a spontaneous loss of water (syneresis) accompanied by a shrinkage of the protoplasm is seen to set in. Changes in the protein chain, induced mechanically and by radiation, were rapidly followed by a dilatation of the vacuole, the soliflying of the protoplasm and renewed osmoregulation.

CYTOCHEMICAL STUDIES ON UNFED AND FED AMOEBA PROTEUS

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In order to investigate the morphological and cytochemical aspects of the digestion in *Amoeba proteus*, unfed and fed animals were examined in vivo and in fixed preparations. The amoebae were fed on *Tetrahymena pyriformis*. The unfed samples served as controls. The nucleic acids were visualized with the methyl green-pyronine stain and with the FEULGEN reaction in the fixed total mounts and sections. The proteins and polysaccharides were demonstrated with DANIELLI's diazonium reaction and PAS staining, respectively. The wall of the ingestion vacuoles is as well visible as the pellicle and displays a strong PAS reaction. The wall of the digestion vacuole is, on the contrary, hardly visible and almost PAS negative. That points to the deep changes in the vacuolar wall at the commencement of the digestion. The ingested food organisms are gradually fragmented. The RNA, proteins, and polysaccharides in them give initially granular reactions, but later become homogeneous. As far as the cytochemical picture allows to draw a conclusion in this respect, it may be stated that the total RNA and polysaccharide content of the food organisms is utilized, while a part of DNA and proteins remains indigested and is egested.

MORPHOLOGICAL BASES OF THE NEUTRAL REGULATION OF RENAL FUNCTION

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Results of experiments made with the use of various methods for the demonstration of nerve fibres on the kidney of a number of vertebrates (*Cyprinus carpio*, *Rana ridibunda*, *Emys orbicularis*, *Lacerta taurica*, *Varanus griseus*, *Rallus aquaticus*, *Larus ridibundus*, *Gallus domesticus*, *Ardea cinerea*, *Columba domestica*, *Epimys rattus*, *Canis familiaris*) have led to the conclusion that the different parts of the kidney are under strong nervous influence. The nerves, in the form of plexuses, enter the kidney along the arteria renalis, vena renalis and the ureter. The intrarenal plexuses, running on partly in the vessel walls and partly in the perivascular connective tissue, consist — in the main — of unmyelinated fibres, but they contain also thicker myelinated fibres, the latter being the sensory elements of vessels,

ducts and the renal pelvis. The blood vessels, arteries in particular, are richly innervated. Systems of delicate plexuses are placed in the two outer layers of the vessel wall. Specialized nerve endings were not encountered either in the tunica adventitia or media. The nerve fibres form capsule-like figures around the Malpighian body; in the glomerulus there are generally very few impregnable nerve fibres. Nerve fibres follow the canals, too; they form plexuses around them and come into the closest contact with both of their layers. This contact is twofold. There are nerve endings which, to judge by their position, must be regarded as interoceptors, while others seem to regulate excretion. Particular, thick fibres of the pressoreceptor type are encountered in the outer layer of the renal pelvis, while intraepithelial fibres run and terminate in the lower layer of the uropoietic epithelium. The juxtaglomerular apparatus can be assumed to be supplied with sensory nerves. Ganglia were found in the sinus renalis only; frogs are exceptional in this respect, for, in them, the parenchyma, too, contains ganglia and single nerve cells.

THE STRUCTURE OF THE PERIPHERAL TRANSMISSION APPARATUSES AND THE FORMS OF THEIR CONNECTION

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The authors examined the innervation of the musculature in the intestines of Annelidae in the soles and adductors of Mollusca, in the striated muscles of the body, diaphragm tongue and eyes, in the tissue of the cardiac muscles and in the smooth muscles of the blood vessels, bladders, intestines and the inner eye-musculatures of vertebrates.

Simple conditions are found at the nerve endings of the above-mentioned muscles in invertebrates, where no peculiar end-formation has been found, merely the gradual thinning of the innervating end-fibres, at best ending in small heads could be seen. In the intestine musculature of the leech the nerve fibres are parallel with the muscle fibres, they are varicose endings in terminal end-bulbs. The varices may serve to increase the stimuli carrying surface. In the adductors of *Unio* and *Anodonta* the nerve fibres form an angle with muscle fibres ending in a terminal knob. It is also possible that a nerve fibre due to its position innervates simultaneously several muscle fibres.

The terminal lamellae commonly described in textbooks appear only in the species of reptiles, in the striated muscles in vertebrates. In the striated muscle fibres of fish and frogs merely the long-running fibre branches denote the motoric end.

In the innervation of the smooth muscle tissue dense plexus systems are encountered. However, in the plexuses of the motoric end-branches are ended in every case. If not always, still very frequently, the end-ring appears especially in thin (8–10 μ) sections. Identical conditions are found also in the innervation of the cardiac muscles. The end plexus system is always present wherein the terminal branches are ending.

Finally, the conclusion may be drawn that the rightness of neuron-theory the independence of fibres and their free endings are supported not merely by the striated muscles innervated from the cerebrospinal nerves, but also by the smooth and cardiac muscles innervated from the vegetative system.

HISTOCHEMICAL INVESTIGATIONS CONCERNING THE SUPRARENAL GLAND OF MICE WITH SPECIAL REGARD TO SEXUAL DIFFERENCES

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Histochemical experiments were made on the suprarenal of sexually mature male and female, infantile male and female, as also of pregnant white mice.

The principle was established that, in the evaluation of reactions, the sexual and actual hormonal condition of the animals must always be taken into account. The lipoid contents of the adrenal cortex was observed to diminish during lactation.

As regards the formations which give a strongly positive plasmal reaction, their presence in the medulla of the suprarenal gland of sexually mature female animals is regarded by the author as correlated with the acetal-phospholipid content of the myelin sheaths. This observation might help to furnish further data towards explaining the differences existing in the innervation of the adrenal medulla of male and female animals.

COMPARATIVE HISTOCHEMICAL INVESTIGATIONS CONCERNING SPERMATOGENESIS

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The present experiments had the object to obtain data for the elucidation of the problem of the acid-fast staining of sperms. The sperms of a number of invertebrates (Planaria — *Dugesia lugubris*; earthworm — *Octolasion complanatum*; snail — *Helix pomatia*) as also of vertebrates (carp — *Cyprinus carpio*; crested newt — *Triturus cristatus*, frog — *Rana esculenta*; cock; turkey; duck; parrot; rat; guinea pig; dog; donkey; sheep; bull; man) have been studied. Though with different intensities, the sperms of all these races proved positive to acid-fast stains. The acid-fast substance was observed to appear at the maturation of the sperms in their head, in close association with the chromatic matter. No such substance was encountered in immature sperms. Isolated from the sperm of bulls, the acid-fast substance in question displays a structure similar to that of fatty acids with a long carbon chain and a high molecular weight (mycolic acid). Our investigations have led to the conclusion that the said substance ensures the stability of the sperm-head, or rather of its nucleoprotein constituent, and is, therefore, of fundamental significance in fertilization.

AN ANALYSIS, BY MEANS OF NEW MUCOPOLYSACCHARIDE REAGENTS, OF THE "BRIGHT" AND "DARK" CELLS DESCRIBED FROM THE SUBMAXILLARY GLAND OF MAMMALIA

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A number of earlier authors described, under the term of bright and dark cells, certain figures which — found in the submaxillary gland of several mammals, of insectivores and rodents in particular — were regarded as transitory forms between the two principal types of salivary-gland cells, *i.e.* the serous and mucinous cells. It was by means of the usual lowly-sensitive mucopolysaccharide methods that the existence of these cell-forms was established.

By the use of those new mucopolysaccharide reagents which were first employed in Hungary (Astrablau, alcian blue) it is possible to show that a distinction between "bright" and "dark" cells, as made in the past, has no histochemical foundation if applied to squirrels, gophers, rats and mice. Cells in various secretory phases in the submaxillary gland of moles, hedgehogs and rabbits were also described as separate and independent forms.

The histological observations made by the author extended to the secretory phases of the glandular cells induced by artificial means, *i.e.* chemical agents, such as pilocarpine and atropine, further to a fluoroscopic study of the glandular cells. Results yielded by histological examinations are substantiated by data obtained from paper-electrophoretic analyses — made with the FEENEY—MCEWEN method — of the glandular secretion.

INVESTIGATIONS CONCERNING GIANT CELLS OF RAT PLACENTAE

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The statistical method of nuclear variation was employed to study the problems in connection with rat placentae. No work of this nature seems to have been published so far.

Measurements were based on the formula $V = \frac{\pi}{6} AP^2$, and FISCHER-INKE's nomograph was used for computations.

Results : average nuclear volume of giant cells makes log 3,15 on the 9th, log 3,95 on the 11th, log 4,25 on the 14th, log 3,85 on the 16th and log 3,75 on the 21st day. The paper describes two ways in which decidua cells are disintegrated by mature giant cells : decidua cells are either conglomerated among the giant cells in which case their nuclei undergo later karyorhexis, or they are phagocytized and undergo cytolysis within the giant cells. So-called "pseudonuclei" arise in the latter case, and it is emphasized by the author that, when conducting measurements, only nuclei surrounded by marked nuclear membranes and containing definite nucleoli can be regarded as the true nuclei of giant cells. No mitosis seems to occur in giant cells, and the only acceptable theory to explain the formation of giant cells is their origin and growth from trophoblasts.

The author is inclined to accept the theory of the maternal origin of the "glycogen carriers" (German term : "Glycogenträger") since measurements have proved the average nuclear volume of the decidua basalis to be identical with that of the "Glycogenträger" *i.e.* log 1,75.

ABOUT THE NERVES OF THE PULP OF THE WHITE RAT AND THEIR POSSIBLE BIOLOGICAL ROLE

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The continuous growing incisors (CGI) and the molars (M) of the white rat have quite a different innervation. The pulp of the CGI has only unmyelinated, the M on the other hand have many myelin-sheathed fibres of medium size. These fibres form in the pulp a very rich marginal plexus and lose their sheaths there. Such a plexus does not exist in the CGI. My opinion that the nerves in the CGI have no sensory function, could be verified by us recently with electrical stimulation (HATTYASY and GYETVAI). The origin of these fibres in the CGI is not yet cleared, because through denervation they degenerate (HATTYASY and PÓNYI). It can only be said that these fibres are not of the vegetative kind which take their course with the art. carotis.

In the pulp of denervated M the high rate of the newly formed s.c. secondary-dentin is striking, especially on surfaces which are not involved in the mastication-act. It can be supposed with good reason — I think — that there exists a regulating function of the sensory pulp nerves. If this regulation ceases to function, as in the case of the CGI physiologically, or in the M in the denervation-experiment, then the effect will be an active and quick forming new dentin-layers. It is possible that the sensory nerve is acting also in a similar way on the growing-rate of the CGI : the result of denervation is a quicker growing-rate of these teeth. (LEIST, PÓNYI). In protracted sleep ORSÓTS—BARTHA obtained the opposite effect. In my opinion, in sleep there must be some vegetative centres switched off and in this way the braking influence of the sensory nerves will be stronger.

STRUCTURE AND FUNCTION OF OTOLITHS

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Otoliths are characteristic calcareous concretions within the membranous labyrinth of the ear of Vertebrata, known by the name of otoconia in higher vertebrates. We find the most characteristic and most varying forms of these organs among the large earstones of the bony fishes (Teleostei) : they formed the subject of many investigations concerning the audition of fishes. Investigators who studied the structure and function of otoliths, *e.g.* WERNER, DE BURLET, VON FRISCH and others, prepared ordinary and microsections of the organs in question, but nowhere had complete serial transversal, sagittal and horizontal 5 to 20 μ -thick sections yet been made. By using appropriate microtechnical methods, we succeeded in making such serial sections at Szeged as long as 25 years ago, which

enabled us to study these organs in a precise connection with the soft parts of the labyrinth and the other parts of the animals' body. Investigations of this kind disclose hitherto unknown phenomena regarding not only the structure of the labyrinth and the otoliths included in it, but — on the evidence of their relations to the maculae acusticae — regarding their functioning, as well. Having been proved beyond any reasonable doubt that the otoliths are perfectly immovable which, under normal conditions, are quite incapable of changing their position relative to the maculae and cannot — even by so much as a millimicron ($m\mu$) — get nearer to or farther from them, they must no longer be regarded as sense organs serving to convey sensations of "position" (MAGNUS); moreover, otoliths are neither resonators nor figures which respond to the vibrations of the endolymph and so transmit stimuli to the "auditory hairs" (DE BURLET). Earlier theories were but results of faulty microtechnical methods and superficial observations; the term "statolith" has to be abolished in respect of vertebrates. Otolith is the correct term because the function of these organs is to protect the "sensory gland cells" of the maculae and, generally, the "sensulae" from sounds and mechanic vibrations arriving from various directions, while the actual process of sensation takes place below the otoliths, in the "subotolithic space". Otoliths are internal scales formed in the labyrinth, homologous to outside scales, and differently structured from the latter only on account of their particular position. Investigations of chick embryos have proved "otoconia" to be granules and crystals arising in the "microcapillaries" which protrude among the epithelial cells of the macula.

STUDIES ON THE MORPHOGENETIC ROLE OF THE NERVOUS SYSTEM IN DUGESIA (= EUPLANARIA) LUGUBRIS

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Author studied, in the first place, the morphogenetic role, which the nervous system plays in the regeneration of the eyes; the studies were carried out on fragments cut out from various regions of the body and having only a part of one of the ventral nervous trunks, respectively, having only lateral nerves from the central nervous system. He found that, under normal conditions, the fragments having only a part of a nervous trunk regenerate only one eye, at the same time as the controls, while the rudiment of the second eye appears with a lapse of 2—3 days. The difference of size existing between the eyes endures for a month approximately. Examination of the serial sections has shown that the regeneration of the first eye is induced by the anterior end of the old nervous trunk, which develops a new ganglion-half, while in the case of the second eye, the inductor is the second ganglion-half which regenerates later. The regeneration of the head ganglion takes place not by self-differentiation, but with participation of the rest of the central nervous system. Regeneration of the ventral nervous trunks always proceeds gradually in cephalo-caudal direction. Fragments containing no nerve trunk also regenerate two eyes with a lapse of time. In them, regeneration of the ganglion and the nerve trunks proceeds with participation of the lateral nerves, and the regeneration of the ganglion always precedes that of the eyes. Absence of the eye-regeneration always goes with a missing or defective regeneration of the central nervous system. Regeneration of the nervous system and of the eyes might be inhibited by a strong contraction in fragments which are limited by four, or by three but relatively large woundsurfaces; the pharynx, however, regenerates in such cases too. On the basis of the result obtained, author concludes that the properties of the "time-graded regeneration field" are connected, besides other factors, with the structure of the nervous system, in the first place, with the gradual decrease of the number of nervous cells in cephalo-caudal and medio-lateral directions.

EXPERIMENTS WITH THE HETEROTRANSPLANTATION OF HEPATIC TISSUE

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An earlier paper of the senior author established the theory of the existence of three phases in the life of heterotransplants. The present experiments had the object to test

the validity of the theory if applied to different tissues of one and the same organ which displayed different degrees of vitality and were also different in respect of ontogenetic development. The liver of rat embryos was transferred in the liver of guinea pigs; the transplant, together with the surrounding regenerative tissue, was then explanted in order to study its power of survival and proliferation. The experiments led to the conclusion that, if hetero-transplanted, the epithelium of the bile duct behaves differently from that of the hepatic parenchyma. Local traumatization destroys the latter as early as the first phase of transplantation, so that it cannot be observed in the subsequent phases, while the epithelium of the small bile ducts — having survived and even started to proliferate during the first phase — assimilates alien proteins during the second phase and retains its vitality even after the immunologically critical first week. This shows that the theory regarding the three phases remain valid also if applied to different tissues of one and the same organ. The assimilative readiness of the ontogenetically younger tissue helps it to survive the immunologically critical phase.

INVESTIGATION OF THE EFFECT OF PROGESTERONE ON TUMOROUS ANIMALS

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and

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Earlier investigations of the authors demonstrated a difference in the behaviour of sexually mature and 14-day old infantile rats as regards the "take" and growth of transplanted GUÉRIN's tumour. This observation gave the impulse for the study of the hormonal conditions of tumorous animals. To observe the action of the corpus-luteum hormone on sexually mature, castrated and infantile animals was the object of the present experiments.

As regards "take" in sexually mature tumorous animals, there appeared no difference between the tests that had been treated with progesterone and the untreated controls. Yet, the treated animals survived a week longer the controls. The transplant seems to grow slower and metastases are less pronounced in the test animals. Their oestruation becomes protracted, and even stops altogether in certain animals.

As regards now "take" in, and time of survival of, castrated animals, there is no difference between tests and controls. Metastasis is more vigorous than in the first group. No oestrous cycle was observed in the tests, while untreated controls began to oestruate at the time of the implantation of the tumour. Some of the castrated animals were alternately given follicle hormone and progesterone in order to maintain the oestrous cycle: the implanted tumour began to grow later in these animals, but — once it had "taken" — it developed quite as vigorously as in the controls. Metastases were very marked.

Tumours transferred to 14-day old rats took later than those implanted to sexually mature animals. The administration of progesterone hastened this process so that tumours in infantile animals treated with the hormone took earlier and developed quicker than in the untreated infantile controls. Oestruation was observed to set in at the implantation of the tumour in the progesterone-treated group.

Observations showed *Ascaris* ovum-homogenate to stimulate the growth of GUÉRIN's carcinoma. Combined administration of the homogenate and progesterone caused the homo-implant to take much earlier in sexually mature and especially in 14-day old infantile rats than in the corresponding controls.

The authors do not undertake to give a generally valid opinion that would apply to all possible effects of the progesterone-treatment: they depend on the age and the hormonal conditions of the animals.

THE FUNDAMENTAL LAWS OF MUSCLE ACTIVITY

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The authors call the attention, on the one hand, on theses, which — although widely accepted in the muscle physiology — yet are surely erroneous. Such a thesis is the law of all-or-none, which stands in contradiction with the phenomenon of superposition, and may cause misunderstandings. Likewise erroneous is that explanation of superposition, according to which there are more contraction nodes on the fibre during tetanus. LAPICQUE's thesis of isochronism is a well-known but erroneous opinion. On the other hand, HILL's thesis on the equality of tension-production both of the twitch and the tetanus — although not generally accepted so far — will be of great importance if it is finally proved.

Their own experimental results are: pergens (*i.e.* macroerg phosphates) do not change in consequence of contraction, but in the case of doing work or displaying active force. The strength of twitch and tetanus may be modified contrarily by the same influence (*e.g.* load, Ca). Imperfect tetanus always shows a tendency of becoming perfect ("perfeccionism"). The laws of electric irritation of the muscle were established in respect to the maximal contraction. For emergence of maximal twitch, a minimal value of both impulse duration and intensity is indispensable. For the formation of the whole strength of tetanus, if the frequency is high enough (and intensity supermaximal), a minimum of impulse duration is sufficient. Natural impulses of the frog ischiadicus are of equal effect with a minimal ($< 0,05$ msec) direct impulse duration.

PHYSIOLOGICAL INVESTIGATIONS IN CONNECTION WITH THE NEUROSECRETORY ACTIVITY OF CENTRAL NERVOUS SYSTEM OF THE INSECTS

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Using the method of paper chromatography, the author analyzed — in different developmental phases following the fourth instar — the cerebral, suboesophageal, thoracic and abdominal ganglia of the central nervous system — as also the haemolymph — in the larvae, prepupae and pupae of the *Celerio (Deilephila) euphorbiae* (Lepidoptera). The chromatograms were developed with ninhydrin, and their evaluation was based on the fluorescence and its colours as seen in UV light.

The presence of four fluorescent substances was observed in all the ganglia of the variously aged animals. Taking them in the order of diminishing R_f -values, these substances showed the following properties. Compound N/1: fluorescence yellowish green, $R_f = 0,35$; N/2: fluorescence bluish violet, $R_f = 0,24$; N/3: fluorescence bluish green, $R_f = 0,10$; N/4: fluorescence whitish-blue, did not move from the starting point.

A total of about 120 animals was used for the preparation of the chromatograms which definitely showed the appearance and disappearance of the said fluorescent substances in and from the ganglia and the haemolymph, as also the changes in the concentration of the compounds, phenomena that can be unequivocally correlated with known physiological processes.

Several fluorescent substances were observed in the haemolymph; most of them were amino acids and only three could be identified with the compounds encountered in the ganglia.

A comparison of chromatograms made at different developmental stages proves that the production of the compound N/1 begins in the ganglia during the last larval ecdysis; it is likewise during this period that N/2 is more vigorously produced and discharged into the haemolymph. The same applies to N/3. The production of all these substances diminishes during the critical period, and — with the exception of N/3 — all disappear from the central nervous system. During the prepupal phase, only a small amount of N/3 can be traced in the

abdominal and thoracic ganglia and in the haemolymph. After the larval ecdysis even this compound can be detected in the blood only. The compound of the fourth type (N/4) which did not move from the starting point, displayed, in comparison with the other substances, a rhythmicity in the opposite sense so that it could be observed in all ganglia, as also in the haemolymph, also after the larval ecdysis.

Investigations made by the author, concerning the chemistry and function of the described fluorescent substances, seemed to confirm the conclusions of L'HÉLIAS, GERSCH and UNGER that these substances (identifiable with the above-mentioned N/2 and N/3) represent compounds of the pterin-type and are active factors in the regulation of ecdyses, metamorphosis and other physiological processes.

DIURNAL RHYTHM IN THE ENDOCRINE ORGANS OF WHITE MICE

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If white, male mice are kept at constant temperature and under given conditions of light, well-definable diurnal changes in the structure of their suprarenal, thyroid and pituitary glands and the interstitial cells of the testis can be observed. Such observations are substantiated by measurements concerning diurnal activity and oxygen consumption.

It is the quantitative change of the birefringent lipids, and — within them — that of cholesterol, which reveals the most conspicuous daily rhythm in the cortical layer of the suprarenal gland. It contains the highest amount of lipids in the evening and the lowest one in the morning. Nuclear volume in the lower third of the zona fasciculata, too, shows diurnal fluctuations: cell nuclei appear to be biggest at midnight and smallest at midday. If the medullary tissue of the adrenal is fixed by potassiumdichromate-osmic acid we can well distinguish so-called bright and dark cells during the day, while — at night — the difference between them is not so sharp as a consequence of the increased secretion of adrenaline.

Structural differences between thyroid preparations fixed at different times of the day show that this gland is least active in the morning, more active at noon, most active in the evening and again less active at midnight.

Observing the nuclear volume of the interstitial cells of the testis we can see a maximum at midnight and the lowest point in the evening.

The highest amount of acidophilic cells in the anterior lobe of the hypophysis is encountered in the evening, the lowest one in the morning. Basophilic cells: the number of PAS+ and AF+ cells is highest at midnight, lowest at midday, while — in the case of PAS+ and AF— cells — the minimum is observed likewise at midday but the maximum in the evening. The highest number of nuclear vacuoles in the cells of the intermediate lobe is observable in the evening, the lowest at midday.

Spontaneous activity, too, displays a definite diurnal fluctuation: between 6 p.m. and 3 a.m., *i.e.* during the major part of the dark period, a high-grade motor activity is apparent; it is followed by a period of quiescence till 6 a.m.; then comes a short period of renewed activity lasting two hours, to be followed by a long quiescence till 6 p.m.

Measurements of oxygen consumption gave the following result: between 7 and 9 p.m. invariably more oxygen is consumed than between 2 and 4 p.m.

All these experiments lead to the conclusion that there exists a pronounced correlation between the structural and functional rhythm of the examined endocrine organs on the one hand and spontaneous activity and oxygen consumption on the other.

THE ROLE OF THE SPECIFICITY OF SENSORY AREAS IN THE DEVELOPMENT OF REFLEXES

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Two groups of newt larvae (*Pleurodeles*) were used in the experiments made by the author. Eye in the first group and limb in the second group was transplanted into the

posterior-head region near to the gills. Reflexes, elicited by stimulating of the transplants and conveyed by the fibers of the vagus ganglion were studied after metamorphosis. Stimulation of the cornea of the transplanted eye evoked a normal corneal (lid closure) reflex in the eye of the same side, while the response to the stimulation of the transplanted limb was just the usual contraction of the gill muscles. This phenomenon appears to be in complete harmony with that of the resonance principle established by P. WEISS. It seems as if the cornea had remodulated the vagus fibers forcing them to transmit nerve patterns of corneal type to the center. If, on the other hand, the foot of the transplanted limb was cut off and the formative blastema stimulated, the response was just the same corneal reflex which would have been produced after the stimulation of the eye. This corneal reflex, however, disappears after the complete regeneration of the foot, but can be revoked by its repeated amputation. The following explanation of these phenomena is offered. It is known that only nerve endings of lowly differentiated level are to be found in the cornea. Likewise, undifferentiated nerve endings are encountered in regenerative blastemas. On the basis of this experiment it is supposed that corneal specificity in the sense of WEISS does not play any role in the establishment of the corneal reflex. The central nervous system, probably, seems to be capable of analyzing the different type of stimuli evoking from differently differentiated terminal endings and is able to direct them toward different centrifugal reflex pathways.

COMPARATIVE DATA REGARDING THE NEUROHUMORAL REGULATION OF CALCIUM METABOLISM

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With a view to studying the neural regulation of parathyroidal activity, the authors vagotomized dogs at different heights and investigated their serum-Ca, P and alkali-phosphatase activity. In connection with Ca-metabolism and various endocrine glands, the gonadal system was examined. Following bilateral cervical vagotomy, the value of serum-Ca was first found to decrease and then to increase by degrees, while the reverse process was observed in respect of serum-P. The activity of serum alkali-phosphatase increased similarly to that of the Ca.

Alterations following bilateral subdiaphragmatic vagotomy were quite similar.

Bilateral cervical vagotomy performed on pigeons provoked a change in the serum-Ca level, such change being the reverse of what was observed in mammals.

After a gradual decrease during 4 to 5 days, the serum-Ca level is restored to a considerable extent in parathyroidectomized albino rats, and only a minor part of the animals is lost. If, however, the parathyroid gland of previously castrated rats is extirpated, the Ca level of their serum goes down — on an average — to 6,25 mg %, and the rate of mortality rises considerably. The gonadectomy of rats is also followed by decreased serum-Ca level, but there is no restitution in this case.

No significant change in the Ca level of the serum was observed in gonadectomized dogs.

Gonadectomy in pigeons induced a drop of the serum-Ca level from 11 to 8,5 mg % on the 3rd to 5th day after the operation.

INTERMEDIN PRODUCTION OF THE INTERMEDIATE LOBE OF THE PITUITARY GLAND FOLLOWING EXPERIMENTAL LESIONS OF THE HYPOTHALAMUS AND THE HYPOPHYSEAL STALK

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It is known from experiments on lower vertebrates (Amphibia) that, if the hypophyseal stalk is cut through or the hypothalamus destroyed, the intermediate lobe becomes hypertrophic and produces more intermedin than in the normal. A similar increase in intermedin

production and concomitant hypertrophy was observed in connection with transplanted isolated intermediate lobes. Experiments made in our Institute indicated that destruction of the hypophyseal stalk of white rats is followed by the hypertrophy of the intermediate lobe. The present experiments were performed to investigate in white rats (Wistar strain) more closely the mode of hypertrophy of the intermediate lobe and secretion of intermedin after hypothalamic and pituitary stalk lesions. The *Phoxinus laevis*-test was employed for the determination of the intermedin activity of the intermediate lobe. Planimetric and karyometric methods were used for a quantitative determination of the hypertrophy of the intermediate lobe. Lesion of the hypophyseal stalk was found to induce hypertrophy of the intermediate lobe, accompanied by a considerable decrease (to approximately the half of the original volume) in the volume of the nuclei. After complete transection of the hypophyseal stalk, practically, all intermedin disappeared from the intermediate lobe, partial lesions of the stalk — provided the hypophyseal stalk and its vascularization be intact — do not provoke any change in the production of intermedin, nor are they followed by a hypertrophy of the intermediate lobe. The experiments led to the conclusion that, while interruption of the connection between pituitary gland and hypothalamus causes hypertrophy of the intermediate lobe in mammals, this is not accompanied by an increased intermedin content of the gland — as is the case with Amphibia — but, on the contrary, by a considerable reduction or complete lack of hormone production.

COMPARATIVE STUDY OF THE HIGHER NEURAL FUNCTIONS OF MICE AND RATS

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If placed in a specially designed appliance, mice and rats will, under the effect of an electric current of 110 V, jump to the top of a glass bell. Under appropriately arranged experimental conditions, it is soon possible to elicit this jumping reflex without electric shock, sole by means of environmental and other associated conditioned stimuli.

Given identical experimental conditions, there is a sharp difference between the behaviour of rats and mice. With mice, it is usually possible to elicit the jumping reflex without electric shock in the first experiment already; a rest of a few hours, or one of 12 to 24 hours at the most, will, however, cause the reflex to disappear. In the overwhelming majority of the mice not even daily experiments over a period of 2 to 3 weeks suffice to form a permanent conditioned reflex.

Rats behave differently. A few experiments are enough to form a permanent conditioned reflex in the majority of these animals. For weeks, even months, they will continue to jump to the top of the glass bell under the impulse of environmental and other conditioned stimuli.

The behaviour of mice points to just a summation reflex, such as can be observed also on a lower level of the nervous system (*e.g.* spinal cord), while a true conditioned reflex is formed in rats.

Employing the appropriate method, it is possible to cause rats to find a wooden box at a, for them, unknown place under the effect of a conditioned stimulus, while mice — in exactly identical experimental conditions — have proved completely incapable of such higher achievement.

The above-described method of comparing the nervous responses of rats and mice, offers the possibility of studying the dynamics of the genesis of temporary associations.

Ara: 10,— Ft