

AUTHORS' ABSTRACTS AND BRIEF ARTICLES

B. THE SECTION OF BOTANY

Vegetative Growth, Development, and Reproduction in Kentucky Bluegrass:—MORGAN W. EVANS, Wooster, Ohio.

A study was made of growth, development, and reproduction in Kentucky bluegrass (*Poa pratensis* L.), the most important grass in lawns and pastures in the northeastern United States. The effects of fertilization with nitrogen upon this grass were also studied.

The formation and growth of leaves on established shoots, the lifetime of the leaves and the lengths to which their blades grow, and also the lifetime of both reproductive and barren shoots are described. Vegetative reproduction, through lateral branch shoots and through rhizomes, and the time of the year in which each type of branch develops, are discussed. The initiation of the inflorescences, through the formation of protuberances on the growing points during the winter months and the development of these inflorescences in the spring, are described. A number of illustrations, including several graphs, one of which shows the annual cycle of growth, development, and reproduction, accompany the report.

*A Report on the Progress of a Three Year Study of the Plants, Microclimates and Soil Conditions at Neotoma Valley, Hocking County, Ohio**:—JOHN N. WOLFE, RICHARD T. WAREHAM, HERBERT T. SCOFIELD, The Ohio State University.

Since October, 1939, the writers have made weekly observations of the plants and have measured climatic and edaphic factors in many habitats at *Neotoma*, a typical, cliff-bordered valley in the so-called Sugar Grove region of Hocking County, Ohio. Over 400 man-days have been spent in the field in an attempt to measure and record in detail, extremes and variations of the following: precipitation (1 station); maximum air temperatures (34 stations); minimum air temperatures during fall, winter and spring (143 stations); evaporation from atmometers (42 stations); soil temperatures at depths of one foot (16 stations); minimum and maximum temperatures beneath leaf mold (10 stations); stream water temperatures (2 stations); continuous records of temperature and relative humidity (4 stations); soil moisture equivalents and fluctuations (15 stations); and light intensity (3 to 7 stations). Stations are located on the ridges, various slopes, cliff tops, cliff faces, cliff ledges and crevices, valley bottoms and habitats in the cove at the valley head.

Precipitation and temperature data are obtained daily at one station at the mouth of the valley. Brief studies (5-24 hours) of three habitats have been made simultaneously at various seasons of the year, with many of the above factors measured at half-hour intervals or less.

The flora of the area is being listed and plants are observed with reference to distribution, time of flowering, time of flower initiation, rate and season of growth, abscission of organs, and condition of plants at various seasons of the year. The ecology of the mosses and lichens is being studied.

A standard Weather Bureau recording precipitation gage; standard minimum and maximum thermometers, Taylor minimum-maximum thermometers of the Six type, recording hygrothermographs, Livingston atmometer cups equipped with mercury traps, Weston illumination meters, Eder-Hecht photometers, and a Leeds and Northrup portable potentiometer comprise the equipment used.

The following are only a few of the data obtained in different habitats in the valley in 1941. Annual maximum air temperatures at some stations did not exceed 80° F. In other habitats the annual maximum reached 120° F. These annual maximums occur in some habitats in the spring, in others during the summer or fall or both. Depending on the habitat, annual minimum air temperatures ranged from -25° F. to +14° F. Soil temperatures at one foot were never below 36° F.; leaf mold minimum temperatures ranged from 26° F. to 31° F.

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The frost free season varied from 125 to 254 days. The total relative evaporation from atmometers from May 1 to October 1 ranged from 1 to 6; one weekly range was 1 to 80. Growth occurred in some plants during certain periods through the winter, and some grew under the snow. More than 100 species of vascular plants retained green leaves through the winter season. The moss flora of the valley includes 114 species.

The field work has been partly financed by grants from the A. A. S. through the Ohio Academy of Science. By courtesy of Mr. L. B. Corwin, Project Supervisor Muskingum Conservancy District, certain costly equipment has been made available, without which no such comprehensive study could be carried on. We are indebted to the owners of the land, Mr. E. S. Thomas and Mr. M. M. McInturf, for much help, and also to our own department for making available certain equipment. The writers wish to express their thanks for this assistance.

It is planned to continue the investigation through 1942, after which a detailed report will be published.

*Some Water Relations of Two Species of Lichens**:—LAWRENCE E. YARMAN and HERBERT T. SCOFIELD.

The exposed sandstone cliffs of the gorge region of Hocking County, Ohio, are interesting plant habitats. The somewhat sparse plant communities are composed largely of certain species of algae, bryophytes and lichens. At Neotoma, a tributary valley of Clear Creek, two lichen species are prominent on the southwest facing cliff walls and cliff tops. *Gyrophora dillenii* is restricted to the near-vertical walls and *Umbilicaria pustulata* occurs on both walls and cliff tops.

Because of the obvious importance of water in a bare rock habitat and because of the paucity of information concerning lichen water relations, the writers are investigating the water relations of these two species of lichens. The problems proposed are to find out when water is absorbed and where the water comes from, how long water is retained, and what environmental factors are associated with changes in water content.

To date, the data obtained concerning these problems merit the following brief summary: (1) diurnal fluctuations in water content of some magnitude occur throughout the summer; (2) absorption of water vapor at night may be considered an usual phenomenon; (3) precipitation water is rapidly absorbed and on a typical warm summer's day may be lost in a few hours; (4) daytime loss of water may be related to any factor that steepens the vapor pressure gradient between the plants and the air such as direct solar radiation which causes a rise in lichen temperature considerably in excess of air temperature.

Thiamin Production by Actinomyces viridochromogenus:—J. ARTHUR HERRICK and CONST. J. ALEXOPOULOS, Department of Biology, Kent State University.

Actinomyces viridochromogenus was grown on an alkaline liquid medium. The cultures were then filtered, the filtrate acidified and autoclaved. This filtrate was found to support a heavier growth of *Stereum gausapatum* than similar media which had not previously supported *A. viridochromogenus*. Similar, but more pronounced results were obtained when *Phycomyces blakesleeanus* was substituted for the *Stereum*. When *P. blakesleeanus* was grown on agar plates previously inoculated with *A. viridochromogenus*, *Phycomyces* produced a much denser mycelium and a crop of sporangiophores in the vicinity of the *Actinomyces* colony. Since the growth of the *P. blakesleeanus* is a recognized assay for thiamin it is concluded that *A. viridochromogenus* produces thiamin in culture.

A Cytogenetic Analysis of Pollen Abortion in a Species, an Interspecific Hybrid, and a Polyploid of Solanum†:—ELTON F. PADDOCK.

Solanum Douglasii Dunal and *S. nodiflorum* Jacq. are diploids ($2n=24$) of the *S. nigrum* complex, commonly known as Black Nightshades. They are native in California. All the

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†Contribution from the Department of Botany, Ohio State University, No. 453.

pollen of hybrids between them is visibly aborted. The grains are empty and collapsed. Some strains of *S. Douglasii* are similarly completely male sterile, in others some of the grains do not abort, while in still other strains no grains abort. All plants studied were at least partially ovule fertile.

In completely male sterile *S. Douglasii*, abortion of the pollen grains occurs before degeneration of the tapetal layer.

Mean chiasma frequency per P. M. C. at IM is statistically significantly higher in male sterile and partially male sterile than in male fertile strains of *S. Douglasii*. Hence the abortion of pollen grains in these instances is *not* a result of chromosome pairing failures with such attendant anaphase distributional irregularities as would derive from a reduced chiasma frequency.

The mean chiasma frequencies per P. M. C. at IM in the original *S. Douglasii* x *S. nodiflorum* hybrid and its backcross progeny from pollination by *S. nodiflorum* are also statistically significantly different. Yet all the hybrid and backcross plants are completely male sterile. The decapitation-induced allotetraploid form of the original hybrid is also completely male sterile. Its chromosomes form multivalents. Thus, among completely male sterile plants, there are such fundamental cytological differences as to justify the conclusion that pairing irregularities have only a minor rôle, if any, in causing pollen abortion.

The genetics of pollen abortion is being investigated. Data at hand provisionally indicate the situation in the strains of *S. Douglasii* to be governed by two linked factors approximately 12.5 crossover units apart, the double recessive being completely male sterile. Pollen abortion in the hybrids, backcross progeny, and the allotetraploid seems best explained by complementary factors plus zygotic selection.

The investigation was supported in part through the grant of a Muellhaupt Scholarship.

C. THE SECTION OF GEOLOGY

Cause of Asymmetrical Drainage Pattern in Eastern Ohio:—G. F. LAMB, Mount Union College, Alliance, Ohio.

Many drainage patterns in this area having the principal stream of nearly east-west trend are notably asymmetrical in having longer tributaries on the north than on the south. This peculiarity applies to areas of widely varying size ranging from less than one square mile to more than 50 square miles.

It is found in regions of stratified rock that range from Silurian to Permian in age, and is most strikingly developed in areas where the rock is dominantly shale, as in the case of the Conemaugh and Dunkard Series. On the average north side tributaries are found to vary from less than 2 to 6 or more times the length of south side ones.

This asymmetrical character is known to occur in some degree in contiguous territory well beyond eastern Ohio and over an area of more than 30,000 square miles. It is therefore more than a local incident and due to some general cause.

Evidence is at hand that it is not due to the primary stream shifting laterally down dip; likewise that dip 5 times as great as the general dip has little or no effect on the length or course of streams; that anticlines and synclines are not the controlling factor. There is evidence that fault lines of small or of large throw exercise little or no control.

A study of streams at work under changing conditions seems to reveal that the *amount of sunlight* is a potent, and probably the dominant factor.

Flow Structures in the Berea Sandstone and Bedford Shale of Central Ohio:—JOHN R. COOPER, Ohio Wesleyan University, Delaware, Ohio.

The structures in the Berea sandstone and the Bedford shale described in the past as "concretionary" or "disturbed" layers are shown to result from contemporaneous mass movements on the free surface of deposition. The top of the disturbed rock was generally truncated by erosion before the overlying undisturbed beds were laid down. Lateral movements

of the rock are evident in many instances and at many levels in the formations. These movements and others in which *lateral* movement is not readily apparent are interpreted as surface flows and slides, made possible by clay beds and seams which not only flowed readily but also acted as a lubricant between the sand layers permitting them to slide past one another. Comparable flows in modern subaqueous sediments have taken place on slopes as gentle as two or three degrees. Local slopes considerably greater than this existed on the Berea sea bottom as proved by cross bedding and channel fillings.

D. THE SECTION OF MEDICAL SCIENCES

Sequelae of Plumbism: Some Case Reports.—EMERY R. HAYHURST, Columbus, Ohio.

Three compensation cases, all native born whites of various racial descents, suffered severe lead poisoning for 5 or more months after exposure in different well-known lead hazardous semi-skilled occupations, the last exposures occurring in 1937. In each case a number of fellow-workers were similarly concurrently afflicted. Numerous luetic tests were negative, except in one instance (Case III). Intelligence level, personal hygiene, customary diet and work habits appeared good in all cases.

Case I.—Female, age 17 when exposure (as decorator of glassware) began in 1935. Two attacks, 1935 and 1937. Continued ill-health followed, but she resumed work for 9 months to July, 1938, then miscellaneous jobs to early spring of 1940 when she married (age 24). Rather stout build, previously in robust health; a basketball player. Persistent symptoms: Obstinate constipation, other gastrointestinal, some neurological findings, moderate anemia. Much dental pathology since 1937. When about 4 months pregnant (September, 1940), X-ray showed absence of haustra in descending colon and sigmoid. While under prenatal care, foetus appeared as vertex presentation. At term, following prolonged pregnancy, a frank breech was found with premature rupture of membranes. Hospitalized, experienced surgeon assisted, delivery under complete anesthesia. Soft parts of birth canal proved non-yielding, necessitating episiotomy, and, finally, use of forceps. Unusually extensive laceration occurred, but apparently normal boy baby of nearly 8 pounds delivered. Despite immediate repair, a recto-vaginal fistula followed. This was present 3 months later, when former symptoms and findings still persisted, except anemia. Literature search yields nothing on such impairment of lower bowel and birth canal in relation to lead poisoning. Affliction of child of mother, becoming pregnant during acute plumbism, is well-known, but seems remote where several years have elapsed before conception. This child appeared normal at 3 months of age except for wry neck of tonic spasm character, probably consequent upon birth circumstance.

Case II.—Male, age 44 when first examined (1940). Auto finisher of soldered parts. Father of 4 normal children, wife well. Moderate lead dust exposure for over 20 years prior to 1937, when intensification of work was followed by acute attack with complete disablement for 5 months. Health never regained. Brief attempts at work unsuccessful. Tall, erect, well-built man, former baseball athlete, also World War veteran with about two years overseas. Health first suffered in 1932: Nervous breakdown, suspected heart impairment, cough and constipation, but no diagnosis made. Seen by many clinicians, especially since 1937, and four times by myself in past two years. Chief symptoms: Gastrointestinal (marked oral pathology, pains in epigastrium, obstinate constipation), subjective heart disturbances, spells of weakness, sweating, cold extremities, irritability and emotionalism, wasting of extremities without history of definite paralysis but numerous other neurological findings. X-rays showed marked coloptosis but no definite pathology in gastrointestinal tract. Gradual weight loss from 200 to 160 pounds since 1932, chiefly involving extremities, the trunk remaining robust. Cardio-vascular-renal system intact (January, 1942). An eczematoid skin condition, involving extremities for many years, now practically healed. Diagnosis: Low grade lead encephalopathy and cord changes—a not uncommon sequela of prolonged lead poisoning. Criteria for estimating atrophy or "wasting" is badly needed.

Case III.—Male, age 61 (1942), lead putty glazer on auto bodies for many years. Stocky, below medium height, composed mien, appears younger than age. Father of 10 normal children

(2 dead irrelevantly), steady worker, no past illnesses. First attack 1931, when disabled 4 months; second attack 1937, disabled 3½ years—both attacks following increased dust exposure. Now employed as sweeper when able to work. Inveterate tobacco chewer, also pipe and occasional cigars. No oral pathology (confirmed by X-rays), although molar teeth markedly worn down; 3 teeth extracted 1940 for "rheumatism" showed no definite pathology. Suffered gastrointestinal, cardiac, joint, moderate renal and nervous disturbances during attacks, with spell of acute glycosuria in 1938. Arthralgia now chief complaint, involving extensor surfaces of extremities and avoiding spine, shoulders and hips. Sticking pains also occur in bony chest cage. Hypertension (around 170/90-100) present since 1931. Some weakness of hand grips. Nervous system essentially negative. Aortic sclerosis but palpable arteries negative. Slight permanent swelling below ankles. X-rays made of left extremities show new bone formation and peculiar exostoses about extensor surfaces of elbow, wrist, hand and fingers, knee, ankle and foot. Joints not tender, but subject to aching following use, while lesions appear not so much *in* joint surfaces but in periarticular tendon connections, and along muscular and facial attachments to bones. We believe this condition not previously reported in connection with lead poisoning. Numerous luetic tests since 1931, of both complement fixation and precipitation types, negative, except for one Kolmer complement fixation in our examination which was four plus, but with Kahn and Kline tests negative. However, inconsistency in luetic tests has long been reported in lead poisoning. Diagnosis: Lead granular kidney and lead gout.
