THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

ISSUED BY
SCIENCE SERVICE
1115 Connecticut Avenue
WASHINGTON, D. C.

EDWIN E. SLOSSON, Editor
HOWARD WHEELER, Manager

SUBSCRIPTION: $5 A YEAR, POSTPAID

No. 78 Saturday, October 7, 1922

NEW LIGHT ON THE ORIGIN OF LIFE

By Dr. Edwin E. Slosson

Was the first living being a plant or animal? How could either originate out of non-existing matter?

These are questions that have hitherto baffled scientists. They could trace back, more or less satisfactorily, the lines of development of plants and animals to the simplest and most primitive forms of life but there they ran up against an insurmountable wall, on the near side of which was the world of living organisms and on the far side the world of inert mineral and inorganic matter.

We all know that non-living matter can be converted over into living matter for we do that ourselves whenever we eat or breathe. We all know that green plants have the power of building up sugar and starch and wood (the so-called carbohydrates) out of the water of the soil and carbon dioxide of the air, for we can see them do it any sunny day. But it is life only that can bring into the living organism this inorganic material. Water and carbon dioxide, which is plain "soda water", does not spontaneously change over into sugar or starch to grow into a plant. It requires green colored granules of the leaves, called chlorophyll, to effect this transformation.

But chlorophyll is a very complicated chemical compound. It is formed only by green plants as they develop in the sun's rays from white sprouts. So the plant must exist before chlorophyll is formed. But on the other hand a plant could not exist unless it got its energy from the sugar and other stuff stored up previously by some chlorophyll-bearing plant. Even the simplest green plant cannot live and grow on its nutritive salts in the sunshine unless it has a bit of plant-stuff to feed on as a starter.

We might surmise as a way out of the dilemma that animal life came first on the earth and in decaying supplied the primitive plants with the necessary organic food stuff. But here we are blocked because animals are parasites of plants. They live on the sugars and so forth that the green leaves have stored up by means of sunshine.

So this was the perplexing situation. Plants can feed on animals or other plants. Animals can feed on plants or other animals. But where could the first animals or plants get their food when there was nothing but mineral matter in the world? It was worse than the old question, which came first, the hen or the egg?

But of late we are beginning to get light on the problem. The wall between the living and non-living is crumbling down. Certain sugars and proteins, such as the plant forms that we eat, can now be made in the laboratory out of inorganic material. Artificial cells have been constructed that grow and crawl and feed themselves and stick out feelers and sub-divide very much like living cells. It has been found that

ultra-violet rays, that is, light of such short waves that it cannot be seen, can convert water and carbon dioxide into sugar as chlorophyll does.

These short waves are not contained in the sunshine that reaches the earth today but it is found that ordinary rays may act the same way in the presence of certain substances such as iron rust in water. These same energetic rays are able to incorporate the nitrogen of mineral salts into compounds like the protein of the living cell. So here we see the possibility that the action of the sunlight on the sea in primordial periods - or even in the present - might produce sufficient food to give a single cell a start in life and enable it to grow and multiply and develop into other and higher forms.

But how this primal cell got to going in this way the biologists are only beginning to surmise. Dr. E. J. Allen at the recent Hull meeting of the British Association for the Advancement of Science ventures the theory that the first organism was of the animal sort and spherical shape but that it gradually grew a tail or whip that enabled it to rise to the sunny surface of the sea whenever it sank below and that it there acquired the chlorophyll by which it could make its own food out of the air and water. This is far from knowing what did happen in those early days, but it is a great advance to be able even to speculate as to how it might have happened since not many years ago it seemed that it could not happen at all.

READING REFERENCE- Bohn, Georges. La forme et le mouvement; essai de dynamique de la vie. Paris, E. Flammarion, 1921. Osborn, Henry F. The origin and evolution of life. N.Y. C. Scribners' Sons., 1917.

CONSTANTINOPLE CONDITIONS MENACE HEALTH OF EUROPE

Constantinople today is the powder magazine of Europe menacing the health as well as the peace of the world.

A serious epidemic in this cosmopolitan city might have dire consequences to Europe because of its considerable commerce with the West. This is the opinion of the Health Committee of the League of Nations that has investigated conditions in the Near East. According to advices to the U. S. Public Health Service, the right honorable C. Addison, M.P., First Minister of Health of the British Empire, declares that these facts about the Constantinople situation deserve urgent consideration as they are "boldly stated in the report by men, who, owing to their scientific training, are careful to avoid exaggerated language."

A plague appeared in Constantinople in 1919 and vigorous action was taken under the supervision of the medical officers of the Allied forces. Vaccination against smallpox and preventive inoculation have also been carried out on a very large scale. But Constantinople, with a population of well over a million, still lacks an infectious diseases hospital and a cleansing station which can deal with typhus and relapsing fever, and other sanitary machinery. The water may readily become polluted, and this may produce an epidemic of cholera on a very large scale.

The allied governments, it is declared, have difficult health problems to face in the guarding of the sanitary frontiers of western Europe, which stretch from the Baltic along the lines of the boundaries of western Russia, through the Straits of the Dosporus and the basin of the eastern Mediterranean as far as the Red Sea.

"The need of defending this frontier can not make the dramatic appeal of a war between contending armies," says Mr. Addison. "But from the point of view of the

health of the western peoples, upon which our future prosperity and contentment depend, it is as imperative that our medical advisers should be given the means to preserve the sanitary cordon as intact as possible, as it was necessary in 1918 to resist the attempt of the Teutonic Powers to break through the Channel ports."

NEAR EAST ALWAYS CONSIDERED SANITARILY "GUILTY"

The Near East is considered unsanitary and dangerous by public health experts until it proves itself clean. When the moving of troops and the burning of cities causes civil populations to move from their homes and when military lines partition a country sanitary conditions practically always become worse.

Greater precautions than ever will be taken by U. S. Public Health Service officials in guarding this country from invasion by foreign epidemics due to war-like moves around Constantinople.

Representatives of the U. S. Public Health Service are stationed at strategic points in Europe where they can observe and report the development of any dangerous sanitary condition that might spread to America through travellers. Every American consular official is constantly alert to menacing health conditions and a flow of reports is constantly coming to the State Department on the health of the world.

Western Europe and all Europe east of Gibraltar is continually under suspicion, but the fear of disease decreases toward the west. Though all of the Mediterranean littoral is constantly in danger of epidemics the eastern portion is most menacing.

In ill-fated Smyrna, smallpox, typhus fever and bubonic plague were endemic there before the burning of this city and cases of smallpox and typhus are always present in Constantinople. Typhus is always dangerous because of the prevalence of "cooties" in Poland, Russia, Turkey and the Balkan states. The ever-present sparks of these dread diseases may be fanned into a wide-spread epidemic at any time.

Rigorous methods are taken to assure the cleanliness of travellers and immigrants arriving in this country. At every port of debarkation in Europe, delousing, vaccination, and other sanitary measures are practiced, and at our ports a thorough check inspection takes place.

READING REFERENCE- Lybyer, A. H. Turkey under the armistice. Journal of International Relations, 12:447-73 April, 1922. Patrick, M. M. Social conditions in Constantinople. Survey, 47:557-8 Jan. 7, 1922. Salano, S. Constantinople today. National Geographic Magazine, 41:647-80 June, 1922.

Since May, 1921, U. S. Mail planes on the transcontinental route have carried mail a distance equal to 50 times around the world at the equator without the loss of a single life.

100,000 tons of coal per year were formerly required to run the St. Gothard Railroad from Lucerne to the Swiss-Italian frontier, but now its complete passenger and freight traffic is run by hydroelectric power.

Nearly 60 per cent more lobsters were shipped out of Norway this season than last.

AIRPLANE USE LIKELY IN CONSTANTINOPLE CONFLICT

British action against the Turks may offer an opportunity for a demonstration of the superiority of new methods of aerial warfare developed since the world war. Such is the opinion of army aviation experts.

The air forces have never had a chance to show what they can do on their own in actual combat. During the world war, airplanes were first used as an auxiliary to the army and navy for observation purposes. At first they were not even fighting units. When dropping projectiles was attempted, it was found that heavy artillery shells and sighting devices were unsuited for aerial work and it was necessary to develop through careful experimentation new types of aerial bombing equipment. Now the American army air force is prepared to use 4300 pound bombs, carrying one ton of TNT. They believe that they have demonstrated that the largest battleship afloat can be sunk from the air, and their airplanes are armed with 37 mm. semi-automatic cannon, as many as sixteen to a plane, that can put a tank, machine gun nest, locomotive or motorboat out of commission. New methods of aerial attack on infantry and cavalry have been developed. The Kosciusko Air Squadron operating with Polish troops against the Russians was able to do great damage to the cavalry by swooping down to within 10 to 15 feet and using machine guns on the troops directly beneath who could not return fire because of their excitement and the speed of the planes.

Military experts explain that the objective of any invading army is to occupy or destroy the centers of industry, finance, transportation, and government of the enemy. Air service officers point out that the air force can do this directly without the necessity of breaking through surface boundaries that would impede a land army.

Because of the extreme mobility and directness of the air forces it is predicted that they will be able to operate effectively in the regions around Constantinople. If the British are able to bring into action sufficient planes they should be able to subdue the Kemalists with as much ease as they have policed and administered Mesopotamia where the aerial force, supplemented with only a few infantry to guard hangars and fields, have been able to keep the country in complete control.

While the British are understood to have only small air forces in the Near East at the present time, recent plans for home defense entail the raising of large aviation forces additional to the 2000 pilots now in the service. The Turks have practically no aviation equipment and it is also unlikely that they can adequately defend themselves against air attacks.

Psychologically, air attacks are very effective. This advantage would be greatly enhanced in operations against superstitious people like the Turks. In the recent civil war in China one airplane nearly put an army to rout. The constant menace of overhead attack would prove wearing even on such well trained ground-fighting troops as the Turks. The menace of aerial bombs is particularly harmful to civil populations and if gas is used the worry is long continued and is mentally and physically effective.

BRITISH ASSOCIATION PRESIDENT

Sir Ernest Rutherford Cavendish, professor of experimental physics at Cambridge since 1919, and from 1907-1919 professor of physics at Manchester University, was unanimously nominated for the presidency of the British Association for the Advancement of Science at the Liverpool meeting next year.

WOOD MAKES GOOD SUBSTITUTE FUEL

By burning wood unfit for use other than as fuel, many consumers will be able to keep perfectly comfortable this winter in spite of the unusual coal and transportation situation. U. S. Forest Service officials claim that if only wood as is best fitted for this purpose be taken, it can be substituted for coal in many sections to the benefit of our forests.

Wood can be used in most coal furnaces and stoves with a few simple adjustments. A coal-burning stove can be converted into a wood-burning stove by removing the fire-brick and substituting lighter brick. If the grate is too coarse for wood, a sheet iron cover over part of the surface will make it suitable.

Short lengths of wood can be burned in an ordinary coal furnace or stove and even in steam, hot-water, or warm air furnaces. The best form of wood is short blocks, from eight to twelve inches long, preferably of hard wood.

The best method of firing is to keep the furnace full of wood packed close with a moderate draft to give the desired amount of heat. As the wood burns more should be added in order to keep a deep bed of burning fuel which effects economy. Banking the fire at night requires an extra supply of the largest blocks and special attention to closing the dampers tight. It is not necessary to buy new grates for burning wood, although the ordinary coal grate is not well adapted to that purpose. A good way is to add a little nut coal to the fire at the start, allowing a layer of coal ashes to remain in the grate.

A furnace designed for burning coal can be made into a "Wilson heater", which is one of the most economical stoves for burning wood, by removing the grate bars and laying the fire brick on the floor of the ash pit. The wood fire, built on the fire brick, can then be made to burn very slowly by keeping the ash pit door tightly closed and the ventilator in the fuel door open.

The simplest and most effective way to use wood, however, is to combine it with coal. A quarter to half of the coal ordinarily used can besaved by making the fire with wood blocks and adding coal on top. To avoid gas explosions when burning small sizes of coal in this way care should be taken that the whole fire is not covered with fresh fuel at one time.

ECLIPSE OBSERVATIONS SUCCESSFUL

Lick Observatory, Calif. Sept. 21.-

Cable reports from the Lick Observatory eclipse party announce the successful observations according to its plans for photographing the solar corona and its spectrum and for taking photographs of the regions of sky near the sun for a test of the Einstein theory, Dr. R. H. Tucker, acting director, announced this afternoon. The conditions of sky and weather at the eclipse station at Wallal on the northwest coast of Australia were fine and there is every expectation that the measures to be made of the photographs will give some definite results of high importance. Some preliminary measures will be made at the station but the final results of the clipse observations will be known later after the return of the astronomers to this country in November. The party also includes astronomers from Canada and New Zealand. The text of the cable was sent by aeroplane from the nearly uninhabitated coast region to the nearest city. The Australian government and the people have welcomed the American astronomers and have helped their plans in many essential ways.

FALL BEGAN SEPTEMBER 23

Fall began Saturday, September 23, 3:10 a.m. (Eastern Standard Time) when the sun crossed the equator going south. Day and night at that time were equal in all parts of the world. While this is the time of change from summer to fall in the northern hemisphere, spring is commencing to the south of the equator.

At this time the sun passes through the zenith at the equator and, theoretically, is on the horizon at the poles of the earth. But owing to atmospheric refraction which causes the sun to appear above the horizon before it has actually risen and to remain above the horizon after it has actually set, it remains visible for two days or so after fall has really begun. Then the long winter night sets in at the north pole and the sun will not appear above the horizon for six months. At the south pole the sun appeared on the horizon about September 21, due to the scattering of light, and will create a six-month day by remaining in the sky until next March. Because atmospheric refraction always increases the height of an object above the horizon, the long polar daylight is increased at the expense of the polar night by several days though in mid-latitudes this lengthening of the day at the expense of the night ranges only from two to eight minutes.

AVERAGE HOME MERELY HALF-LIT

The average American home is on a psychological spree. It thinks it is all lit-up, but it is not. M. Luckiesh, director of applied science, Nela Research Laboratories, Cleveland, Ohio, presented to the Illuminating Engineering Society meeting at Swampscott, Mass., on Sept. 26, the results of a survey which shows that most householders are unaware of the possibilities of modern lighting.

His data covered actual installations in fifteen hundred middle class homes throughout the country and included number of rooms, type of lighting fixtures in each room, the material which shares or envelopes the light source, the number of sockets, total wattage to be used, number of portable lamps, brackets, and other features. Comparing the results of this survey with what he termed "the conservative ideal average middle class home", he claims that it shows that the average wired residence today may be considered as only "half-lighted".

DAYLIGHT IS OFTEN COSTLY ILLUMINANT

Daylight is not free. M. Luckiesh and L. I. Holliday, of the Laboratory of Applied Science, National Lamp Works of Cleveland, Ohio, told the Illuminating Engineering Society meeting that, under certain conditions, sunlight costs more than artificial illumination.

Windows, they pointed out, waste coal as the amount of heat radiated through a window is far greater than through a wall, and they are more expensive to build than the same amount of wall space. In congested areas and large buildings, the expense of erecting and maintaining light courts is a considerable addition to the overhead on the valuable ground they take up.

Under many conditions, these scientists claim, a given area could be lighted to an adequate intensity with artificial illumination continuously at a lower cost than that necessary to provide daylight.

KNOCKS DAY-LIGHTS FROM SHOW WINDOWS

How the merchant may overcome the sunlight reflection in the plate glass of his show window was explained by Ward Harrison and H. T. Spaulding of the Engineering Department of the National Lamp Works, Cleveland, in a paper before the Illuminating Engineering Society.

By lighting important objects in the display with high power spot lights, the objectionable reflections from the bright sky on the outside could be done away with, they said. In this way, window displays can be rendered effective without an excessive amount of power being required. Light intensities of 1,000 to 2,000 foot-candles are required.

BLAMES BAD LIGHT FOR POOR GRADES

Attributing many absences from school and failures in studies to defective eyesight among children caused by poor lighting of school buildings, Prof. H. B. Dates of the Case School of Applied Science, Cleveland, Ohio, urged the need of improvement and explained to the Illuminating Engineering Society in its 16th annual convention the proper installation to use.

"The lighting of many of our school buildings", he said, "is far below the standards prevailing in commercial and industrial establishments. This is an unfortunate condition, as the eye of the young child is in a formative state and undue strain at such a period will surely react at a later date. Such conditions should be remedied"

Prof. Dates analyzed conditions found in a survey of the Cleveland schools, described the methods ofttest, gave comparative figures on different systems investigated, as well as the specificiations arrived at.

PREDICT TIME WHEN FOLKS FEEL GLOOMY

Approach of "psychological darkness" can be predicted by the electric light engineer. A. Smirnoff, of the Potomac Electric Power Company, Washington, explained to the Illuminating Engineering Society a system which may prove of great value to power companies in enabling them to forecast the exact time when people in stores and offices will get that gloomy feeling and switch on their lights.

With the sudden darkening due to clouds or the approach of a shower, users in the business districts of our cities turn on the lights and suddenly throw an extra load upon the power plant. To take care of this unexpected peak, large central power stations maintain expensive storage batteries or additional generators.

If the power plant operator could receive ten to fifteen minutes warning, says Mr. Smirnoff, he could start his machines and so save the expense of running them when not needed. This warning can be had by the use of measuring devices called photometers or thermopiles located at strategic points in the surrounding country. A light intensity of 1500 foot candle in the open air causes the down-town consumer to begin turning on electric lamps, Mr. Smirnoff has determined from charts covering many different days. They use artificial light even though this intensity is hardly dark enough to absolutely require the additional illumination.

The heat of the sun light is automatically recorded by the photometer. Meteor-

ologists at the U. S. Weather Bureau have determined the light equivalent of solar energy thus recorded, and when the photometer records show the heat equivalent of 1500 foot candles, the operators at the power stations are warned of the heavy loads to come.

READING REFERENCE- Ford, Arthur H. Store lighting; a discussion. Univ. of Iowa, 1914. Industrial and school lighting; papers summarising developments in different countries. Illuminating Engineer, 14:176-8. Sept, 1921. Luckiesh,M. Lighting the home. N.Y. Century Co., 1920. Trotter, Alexander P. The elements of illuminating engineering. London, N.Y. Sir I. Pitman & Sons. 1921.

ATTACK BATTLESHIPS WITH TORPEDO PLANES

When torpedo planes on Sept. 26 attacked the battleships Arkansas and Wyoming at sea north of the mouth of Chesapeake Bay seventy-five miles from Hampton Roads Naval Air Station, this was the first demonstration of the use of a squadron of airplanes maneuvering together in a torpedo offensive against ocean craft ever attempted by this country.

The Davis-Douglas type of machine adopted as a result of the recent competitive tests for torpedo carrying planes was not available for this trial.

The older planes used special devices for launching the torpedo forward and down into the water where its own mechanism drives it toward its goal. The torpedo plane is one of the outstanding developments since the War in making aircraft a real part of the Navy.

At the close of the World War, airplanes were operating as naval auxiliaries from a land base. They were in effect a land force because they could not light on and take off from the ships and so be an integral part of the fleet wherever it might go.

The invention of an effective launching device and the construction of a successful airplane carrier by the Navy have gone a long way toward making airplanes a practicable aid in scouting, defending ships from attack by hostile aircraft, and as an offensive weapon such as is being developed in the torpedo plane.

An airplane-carrying ship, commissioned last year, has started on its first experimental cruise to train navy airmen in taking off and lighting on a carrier at sea. This boat is an old converted collier with its smokestacks rigged out from the sides so as to make room for the overall platform which furnishes a landing field for the planes.

This boat has been adapted for experimental purposes and makes only about 14 knots. Speed cruisers which will be adapted to this use will, however, afford a much easier and more practical carrier. Their greater speed will nearer approach that of the airplanes and so render the landings less difficult. By the use of planes especially designed to be carried in knock-down form and to be assembled on board the boat, a great number of planes can be carried by one of these ships which will accompany a fleet as a tender for all its aircraft.

The war called attention to the desirability of having an air scout accompany a ship and a launching system was devised in which the planes took off from the top of

gun turrets. This method depended uponthe direction of the wind and was impracticable because it might necessitate the battleship swinging out of battle formation to get the wind for launching. By the use of the recently invented launching device, however, the plane can be catapulted from the ship's deck without any suchdelaying maneuver. This launching device, the carrier ship, and the torpedo plane, Navy experts say, will have a profound influence on future sea fighting and may even revolutionize naval warfare.

FINDS LAW TOO LAX TO STOP MADDOGS

Mad dog bites are on the increase. Officials of the Bureau of Animal Industry say that there were twice as many cases of rabies during the year ending June 30 as there were the year before and point to the fact that many of these occur during the seasons when dog-muzzling is not required.

If all dogs could be muzzled during six months or more each year or all vaccinated against the disease, it is believed that rabies could be entirely driven out of the country. In the District of Columbia the law extends from July 9 to October 23, or less than a third of the year. A number of cases were examined in the Washington laboratory during April, May, and June andppsitive evidence found.

The danger of this disease is seen from a report recently received. Both a child and a student were bitten by a dog. The dog later showed symptoms of rabies and five days after these symptoms appeared the child was given the Pasteur treatment, but the student, who was not treated, died 21 days after being bitten.

JELLYFISH GYMNASTICS NO HELP TO SCHOOL CHILD

"Jellyfish gymnastics, or stupid, silly games, played half-heartedly, have little place in the proper physical development of the growing child," declares Dr. E.Blanche Sterling, acting assistant surgeon, United States Public Health Service, in commenting on the health of school children. In planning exercise with a view to the promotion of good posture, she suggests,they should be simple and vigorous and play full of energy and vim.

The posture of school children cannot, however, be said to depend chiefly on any one condition, she holds. Defective vision, adenoids, and bad tonsils tend to have a bad effect on the child's posture. Where hygienic conditions in a school are not the best there is an increase of poor posture. Good nutrition is a contributing factor to good posture, but by no means an indispensable condition. Condition of the teeth, she claims, has no effect. Dr. Sterling's findings are based on a study of three elementary schools at Bedford, Indiana.

The chimney swift, one of the most abundant and best known birds in the United States, migrates as far as the northern coast of the Gulf of Mexico and then completely disappears. Where it spends the five winter months is unknown.

The Pekin city government has ordered broad-wheeled carts with tires 4½ inches wide to replace the 1½ inch tires of the Peking two wheeled, springless carts which have been cutting up the roads for centuries.

Sheiks in Arabia now wear wrist watches with radium dials.

TABLOID BOOK REVIEWS

"The Properties of Electrically Conducting Systems". Charles A. Kraus, professor of chemistry, Clark University. pp. 415. The Chemical Catalog Company, One Madison Avenue, New York City.

The latest issue of the invaluable series of Scientific Monographs published by the American Chemical Society. This is the first time that the facts of electrical conductance through both electrolytes and metals have been brought together and interpreted according to the modern theory of the electron.

o o o o o o

"Letters of a Radio-Engineer to His Son". John Mills. pp. 265. Harcourt, Brace and Company, New York City.

Clear and competent explanation of the fundamental principles of wireless telephony. The apparatus and processes are worked out step by step with the aid of numerous diagrams. It really explains why and how.

o o o o o o

WEATHERMAN EXPLAINS WHY SEA IS DUSTY

The phrase "Isn't it dusty on the ocean today" is no joke to the weather experts. Willis Edwin Hurd, of the U. S. weather Bureau, has an explanation for recent accounts of dust found on ships in the North Atlantic hundreds of miles from land.

Some seaman sighting a fine white haze near the West Indies attributed it to volcanic origin. Checking up all the incidents of this kind reported about the same time from other ships, Mr. Hurd concludes that the dust came from some African desert, was carried to sea, and there caught up in the northerly and easterly winds of the trade belt.

Last year a similar instance was reported from the Yellow Sea at the time of a severe storm over the Mongolian Desert. Dust from Australia has been borne a distance of about 1,500 miles to New Zealand. It has been calculated that the total amount of dust swept by the sirocco from the Sahara Desert to Europe year after year during the last 30 centuries is equivalent to an average of at least 5½ inches. Indeed, the Sahara dust has been distributed not only over Europe but over parts of Africa, Asia, and the Atlantic Ocean.

AMATEUR MAKES RECORD RELAYING 408 RADIOGRAMS

The record radio relayer is F. B. Ostman, operating amateur station 20M at Ridgewood, N.J. He has reported to the American Radio Relay League that he received and retransmitted 408 citizen messages during the month of August. Previous comparable records do not approach this feat by 100 messages, and the accomplishment is also remarkable because of the weather unfavorable to radio work that is prevalent in August. All of the traffic was handled by means of a spark transmitter which has a reputation for not being efficient when the static is heavy. Amateur stations are usually operated only two or three hours on three or four nights of the week.

The soils in central Czecho-Slovakia - old Bohemia - are almost identical with the soils of southeastern Pennsylvania known as chester soils.
