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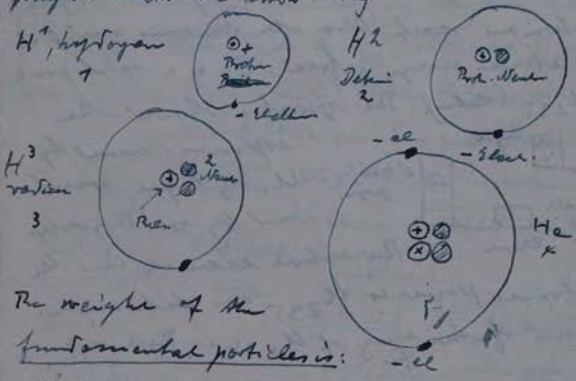
About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

The periodic table is represented by 92 atom types. The atom smashing was the means to investigate the nature of the atom. It was found that like in the universe there is a nucleus and there are rotating around the latter the electrons. The nucleus is composed of Protons and Neutrons. ~~Rutherford~~ Until 1939 there was only an investigation on the electron cloud around the nucleus surrounds. Since that time the nuclear physics starts. We know today



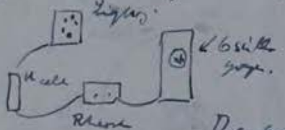
The weights of the fundamental particles is:

Neutron	1,00892	in g:
Proton	1,00812	Proton $1,673 \times 10^{-24}$
Deuteron	2,01473	Neutron $1,644 \times 10^{-24}$
~~Prot.~~ (He)	4,00389	Electron $9,106 \times 10^{-28}$.
Electr	0,000549	
Positron	0,000549	
Meson		In the ~~nucleus~~ nucleus
Neutrino		there is a tremendous concentration of power which overcomes the electrostatic repulsion of the Protons

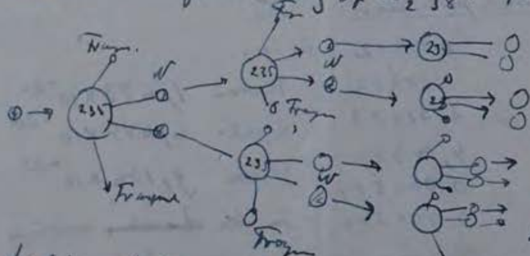
Thereby the weights of the atoms is reduced ~~as~~ as He has the atom weight 4,03302. But in the nucleus as He-nucleus

4,00280 so, there is a
0,03022

This becomes free as energy when the atom is split. And this is the key point of the atomic power. This results of the fact, that the particles are so close together. There is a very tiny distance between the protons. Einstein made the law. $E = Mc^2$, energy & mass are to change to each other, they are identical. 1939 starts nucleophysics with the discovery of U_{235} (with Hahn). If C + O are burnt, energy becomes free, it is an exothermous reaction. Also when Neutrons and B. are united atomic energy is freed. Ba is a split product of U_{235} (Hahn). The speaker showed the

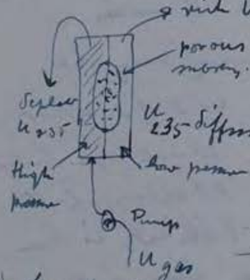


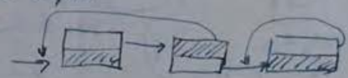
explosion, caused by U. by light, sound and by oscillograph. The active element in the use of atomic power is U_{235} and deli... relative and farther away of U_{238}. There is a



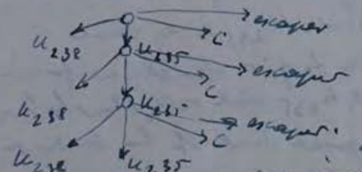
main reaction when the U_{235} which were several Million of years since there was carbon [illegible] on earth. is smashed by neutrons (Dalton...), especially by slow moving neutrons, then it is split, and energy became free.

The U_{235} is the main 'agent' of the atomic power today. It is 140 times more effective than ordinary U_{238} of which it is an isotope. The nucleus of this U_{235} has the same protons as U_{238}, but 3 neutrons less. The nucleus is like a drop of water, packed tight with 92 protons and 146 neutrons. But this nucleus is very instable and split by smashing with a neutron. There are 2 ways for producing at. energy; either we produce pure U_{235} which is very scarce. Here U gas is mixed with U_{235} gas. This purification takes place in automatic cooling batteries (Factories in Tenn.)





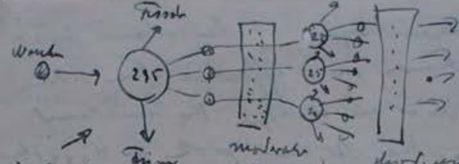
high pressure. The other way is the chain reaction with the U_{238}. Thereby a



U_{235} and 2 new elements are artificially produced: Neptunium and Plutonium. Both are instable and especially the latter is also used for producing at. power.

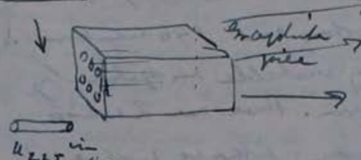
Protons are always the same #.

The neutron decides the weight of the element (Isotopes, Alloy) atoms of the same element with different weight.



Now we check 2-3 discharges 1". The process may be controlled. (Oscillating range, some are lighter record)

pile



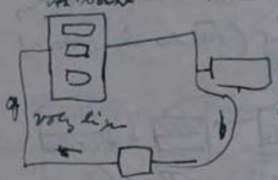
→ heat

Holes and waste heat

Separate. Polonium and the radioactive elements

U_{235} in the core.

1 atomic bomb can, dropped on city hall destroy the whole area around 4 : 5 miles



The heat energy may be used for power plant, gas boiler heating, but the difficulty is the protection against the dangerous radiation. They have to find a material resistant enough against heat. U_{235} is very rare. Perhaps, it may be possible to find other elements from Th-, which may be used with U_{235} which really belongs to the Actinium family. In the mean a great deal of the tendency energy is product of atom splitting (He or other) perhaps in this way atomic power may be obtained.

Hay-Fever.

H. plants, allergogenic flora of Uruguay (R. Paz-Ferreira & P. Rocard) Arch. Soc. de biol. de Montevideo 10: 274-284 Sept. 42

H. plants. Allergogenic flora in Argentina (G. Ruiz Moreno & R. H. Molfino) An. r. Inst. micr. fis a pl. a la patología 3: 177-188-41.

- data on Argentine allergogenic fl. (M. R. Carter, G. Ruiz Moreno & R. H. Molfino) 3: 169-178.-41

introduction to study of allergizing flora of Brazil (E. Mendez) Rev. paulista de med 20: 257-316, May 42

problem of Brazilian pollinosis (A. Oliveira Lima) Brazil med 56: 49-52 Jan. 24-31, 42

schreiben.

Wie ist nun die Geschlechtsverteilung an den Blütenständen des Bergahorns und wie spielt sich hier die Umschaltung von einem Geschlecht auf das andere ab? Zunächst ein paar Worte über den Aufbau der Blütenstände selbst;diese sind,wie bereits erwähnt,hängende Rispen;an deren unteren Teilen befinden sich verzweigte Seitenäste.Diese werden nach der Spitze der Blütenstände zu immer kürzer und blütenärmer und etwa vom letzten drittel der Hauptachse an sitzen ♂ Blüten an dünnen Stielen direkt an derselben.Diese Hauptachse spielt eine viel größere Rolle bei den Blütenständen des Bergahorns als bei denjenigen des Garten- oder Feldahorns;sie geht über in die Endblüte des Blütenstandes.Die "Bergahorn-Blüte" beginnt mit dem Öffnen dieser Endblüte und den Endblüten der Seitenäste. Dieser Vorgang spielt sich auf dem ganzen Baum einheitlich ab,wenn dieser mit ♂ Blüten zu blühen beginnt;anders ist das aber der Fall an Bäumen,die mit ♀ Blüten anfangen.Ist die Endblüte des Blütenstandes ♀ ,so blüht diese mit den übrigen ♀ Blüten.An solchen Bäumen findet man aber immer Blütenstände,an der wohl die Endblüten der Seitenäst ♀ ,die Endblüten der Hauptäste auch ♂ sind. Hier bleibt dann die Hauptast-Endblüte geschlossen;sie eilt nicht mit den Seitenast-Endblüten den übrigen Blüten voraus.Es ist also beim Bergahorn gegenüber den bisher beschriebenen Ahornarten ein Unterschied in soferne,als an ♀ beginnenden Bäumen die Blütenstände nicht einheitlich sind im Gegensatz zu den ♂ beginnenden;hier sind alle Blütenstände gleich zusammengesetzt.Es hängt das wohl mit der Tendenz der Pollen-Überproduktion zusammen,welche auch bedingt,daß viel mehr Bäume mit ♂ Blüten beginnen und viel mehr von diesen Blüten tragen als ♀.

Zu Beginn der Blütezeit ist die Hauptachse noch nicht ausgewachsen;sie streckt sich während des Blühens.Zu dieser Zeit findet man am unteren Teil der Hauptachse zahlreiche,in der Entwicklung zurück gebliebene Blüten,die auf kurzen,dünnen Stielen direkt an dieser sitzen.Man kann anfänglich noch nicht sagen,ob diese Blüten zu ♂ oder ♀ werden,denn sie sind sehr stark behaart. Sie spielen aber bei der Umschaltung des Geschlechts des Blütenstandes eine große Rolle.Bleiben wir zuerst bei Bäumen mit ♂ Blühbeginn.Es blühen,wie wir

Dr. Theodor Philipp H a a s ,
Botanist.

712 - 14 Spruce St. Philadelphia 6. Pa.
October 27th 1944.

American President Lines,
Genral Offices,

To put in page 7 after .... is most important for the agriculture of Manchoukuo:

From the Khingan mountains I have not seen very much because we passed them mainly during the night. After Harbin, and until Mukden the land around the Sungari is very flat. On our left side we see hills, they belong to the edge of the Eastern Mountains. We move in southern direction, and the further we come to the South, the more subtropicals the landscape becomes. Especially after Heinking we saw fields with Soya-Beans with their blue flowers. The Soya-Bean, Glycine hispida L. is the most important crop of Manchuria. Over four millions tons were produced in 1939, 60 % of the world crop. In 1940 the greatest part went to Germany by way of the Trans-Siberian Train. It was the short time of the Russo-German "friendship". The soya-bean is mentioned by the Chinese Emperor Shennung, the father of the Chinese agriculture, in 2800 B.C. We saw large fields of "kaoliang" (pronounced "gaoliang"), a kind of millet, and after the soya-bean the most important plant for Manchoukuo. The scientific name is Sorghum vulgare L. ("kao" means "tall"). It is a grass like our corn with a hight of more than 3 m (= 9 feet). Millet (Panicum miliaceum) and kaoliang are the most important food plants for Manchuria. The fruits are pealed and then cooked and eaten as cereal. The stalks of kaoliang is used for fuel. The plant is so important that the Manchurian one sen pieces (made from aluminium) show a kaoling. Also wine is made from the fruits (like from rice). We saw also hemp- and maize fields. Hemp is raised mostly for oil (the name is Canabis sativa L.). Maize, of course, is American. It came to the Far East rather early through the Portuguese who landed in China first in 1516 under Raphael Pestrello; it is mentioned first in 1585 as an Indian food from Mexico by J. Gonzales de Mendoza. The Chinese were informed of the existence of America a few years ago by the Italian Jesuit Matteo Ricci.

help which enabled him to sail to the West where he wanted to find the "Island Brazil".On the place of this island he discovered Labrador,and reached the American Continent before Columbus (May 24th 1497).South America,which was as a big continent first recognized by Amerigo Vespucci (therefore Waldseemüller proposed 1705 to name it "America",a word which was used 1538 by Mercator for the whole double continent), was named first "Terra di Vera Cruz".When a large amount of dyewood was discovered there,the name was changed into "Terra di Brazil",our Brazil of today!

Tea. It is a problem when the plant which is used today for making tea,came to be used for the first time in China.Tea was known there for a long time,but it is quite possible that other plants were used for this purpose.A Chinese friend told me that even today the people in North China use other plants because Thea sinensis,the plant from which our tea originates,is too expensive for them.The botanist tells us that the scientific name for this plant is Thea sinensis L. and that it belongs to the Tea family,the"Theaceae",to which our room plant Camelia and our beautiful garden plant Franklinia Alatamaha Bartr. ex Marsh also belong.

The tea plant is by far no tropical plant.In the greenhouses of botanical gardens it is kept in cool houses.Used for the beverage are the young leaves. During the drying process they have to undergo a fermentation and oxydation; therewith they get black.In Japan green tea is drunk.When you come into a Japanese home or inn,the first thing,offered you is a cup of green tea.It is drunk without sugar.It would be quite possible to raise tea in our country as it is done in Russia,but labor work is too expensive,and the leaves have to be collected by hand.Therefore it is much better to buy it from our allies.

Probably the first description of tea,from which we can state that Thea sinensis is meant,is to be found in the travel report of the Arabian trader Sulayman in 851,verified by the Mesopotamian geographer Abu Zaid of Ziraf.It reads as follows:

"Among the things which China produces in abundance, the king has reserved to himself the monopoly on salt and on an herb, dried in a certain manner, which, after drawing in hot water, the Chinese drink. This dried herb is sold in all cities for immense sums. It is called "sakh". This plant has more leaves than clover, it smells somewhat stronger than this, however has a bitter taste. In order to prepare tea, water is at first boiled and then poured over this herb. This pouring serves as an antidote against every indisposition".

We observe also here again the stimulating action of the caffein, or in this case tein, chemical the same. Also about the origin of the word tea much has been written. It may go back to a word like "ch'a" and from this comes the Russian word "tschai", also used in Turkish language. Also our own word tea goes back to it. In Europe tea was used for the first time in the 17th century. It is also a very important beverage in Russia. It is prepared there in the so called samovar. Even in the Transsibirian Railroad you may receive tea at any time; every car has its samovar!

Sugar. For making a beverage or meal sweet honey was used in the antiquity in Europe. The Greeks who on their expedition to India under Alexander the Great saw so many strange things, found the sugar cane about 300 B.C. The Greeks saw on that occasion also the banana, the cotton plant, the mangrove and other things the knowledge of which was lost later on. Strabo reports that Megasthenes, one of the followers of Alexander, told of a "reed which gives honey without bees". From India the sugar cane spread out. In 286 A.D. it came to China, about 500 A.D. to South Persia and to Arabia, and in the 8th century it came to Egypt. In the 9th century sugar cane was cultivated around the whole Mediterranean area. For this fact the Arabs are responsible. They have done so much for the distribution of economic plants. For instance they brought rice from India to Spain, at that time under the rule of the Arabs. The Spaniards have brought the rice during wars to Italy where in the plains of the river Po the plant has today its northernmost stand.

Because the used of sweeted beverages, like coffee or tea, was not so abundant during the middle ages, the demand for sugar was not very large. Sugar was used mostly as a medicine, as a drug. The Arabs also invented the method of refining the sugar with the result that it became consistent, solid and lost its stickyness

kein verdauendes Enzym nachweisen können.

Die Kannenblätter lassen sich von den gewöhnlichen Laubblättern ableiten:Sie entstehen durch Einstülpung der Blatt-Oberseite.Nicht allzuselten kommen Zwischen-Formen (Abb. links oben;es sind bereits mehr Kannen vorhanden;die Kanne rechts unten ist besonders gross;sie ist dunkelrot gefärbt Man beachte den Unterschied im Aussehen des Deckels,jenachdem man ihn von innen oder von aussen betrachtet;Kanne rechts unten!) Jede Kanne besitzt einen Deckel;dieser schliesst - wie bei Nepenthes - während der Entwicklung die Kanne ab.Ist diese beendet ,so öffnen sich die Kannen,indem der Deckel in einem Winkel von 45° vom Rande absteht.Wie bei Nepenthes ist der Deckel unbeweglich:Eine einmal geöffnete Kanne schliesst sich nicht mehr.Im Gegensatz zu Nepenthes hat er aber eine breite Ansatzstelle (vergl. Abb. v. Nepenthes.);er ist ein Auswuchs des unteren Teiles der Blattspreite,während bei Nepenthes der Deckel in der Nähe der Blattspitze entsteht Hier herrscht noch manche Unklarheit über die Entwicklung des Deckels der Nepenthes-Kanne.

Die Cephalotus-Kannen sind,wenn sie ausgewachsen sind,auffällig rot gefärbt;sie halten sich ziemlich lange.Wie die Nepenthes-Kannen besitzen sie einen wulstförmigen Rand,der mit Leisten,die krallenartig in die Kannen Mündung hineinragen,bestzt sind.Es werden hier wohl Beutetiere anlockende Stoffe abgesondert.Der Deckel wirkt,von innen gesehen,wie ein transparentes Fenster.Die Kannen sind so gebaut,dass ein Entweichen der gefangenen Insekten unmöglich ist.Der wulstförmige Rand hat seine Fortsetzung in einem die Mündung umgebenden breiten inneren Rand.(Man kann ins Innere der Kanne sehen;hellere Färbung.)Dieser endigt mit einer Ausbuchtung gegenüber dem tiefer gelegenen Teile der Kanne.

Zahlreiche und verschieden gestaltete Drüsen scheiden schon bevor die Kannen sich öffnen,ein Sekret ab,was auch bei Nepenthes der Fall ist.Aussen hat jede Kanne 3 Leisten,eine mittlere,die senkrecht zum Kannenrand steht und 2 seitliche,die schräg dazu verlaufen.Sie sollen den Insekten das Hinein-

We have to speak later of the significance of this geographic error.

~~How Justinian 550 A.D. the origin of the silk was known to Persia~~

I already mentioned that the Chinese exported only the silk, but tried to keep secret the origin of that wonderful fiber. The Chinese traveler Hüan-Tsang (629-645 A.D.) tells us how in 419 A.D. the secret escaped from China and how the silkworm and the Mulberry tree came out first of China. This is a really amusing story. He writes: "At one time this country (Sogdiana, Bukhara of today) did not know the Mulberry tree, and not the silkworm. The ruler of the Eastland guarded the secret and had also strongly forbidden that the customs officials let pass seeds of the Mulberry tree and eggs of the silkworm. Now, the King of Khotan asked in a submissive and humiliated language for the hand of a Chinese Princess. The King of the Eastland who was favorably disposed to foreign folks, agreed. The envoys of Khotan told to the Princess: 'Our country never possessed therefore silk. You must bring with you seeds of the Mulberry tree and eggs of the silkworm. Then you may be able to get for yourself the beautiful cloths which you have at home!' When the princess heared these words, she secretly supplied herself with the seeds of the Mulberry tree and with the eggs of the silk worm and hided them in the wadding of her hat. This hat was not examined by the customs officials. The Princess brought these precious subjects safely out of China and carried them into her new land. In spring the Mulberry seeds were sown and when the time of the silkworm had come the leaves were collected in order to feed the silkworm. The queen let cut a law into stone which sounded as follows: "It is forbidden to kill silkworms. When all moths are flown out, the cocoons may be used." From this country which was probably the ancient "Serinda" the knowledge of the origin of the silk and the silkworm itself came to Byzantium under Emperor Justinian 550 A.D. A Persian brought the eggs and the Mulberry seeds in a hollow limb, an internode of a bamboo, safely to the Emperor. When spring came the Persian fed the worms with leaves of the Mulberry and they developed wings. In this way the Occident received the knowledge that the silk is the product of worms, the silk worms. It took still centuries until the Occident could supply itself with silk.

I wish to go now two "side roads" again: the one is the invention of paper and its results, the other is follows, and - the discovery of America. Both events are to lead back to our silk!

were found Romains coins from the time of 25 - 200 A.D. The silk was tremendous ex-
pensive in Rome. It is reported that at the time of Emperor Aurelianus (275 A.D.)
1 kg. silk costed 5187 and under Juntinian 550 A.D. 17,180 Gold fs. We know that
Emperor Augustus used already silk cloths. The large expenses for silk was one of
the causes of the decadence of the Roman Empire.

Of greatest importance were the investigations of Macedonian siktrader Maës
Titianus about the land road to China about 100 A.D. Titianus was perhaps in Central
Asia in the land of the "Serers" which were a Skythian folk, today known as Tocharer;
they were the Chinese "Yue tschi" of the time of Wu-ti Chang Ch'ien 120 B.C.
The Tocharer which wanted Wu-ti as allies against the Huns, were an Indogermanic
folk which later only became Buddhists. These people and the Persians were the traders
of silk between China itself and the Occident. The Tocharer were still about 800 A.D.
in East-Turkestan. [illegible] It is also a possibility that Titianus collected travel reports of Chinese silk traders.
Probably he was in the possion of a Chinese "Travelbook" through East-Turkestan as
they are mentioned in chapter 96 of the "Han-Annales". The traveling in this tremen-
dous Chinese Empire was well organized. The Chinese traveler Kan-Ying (98 A.D.) reports:
"Along the most important roads they build bungaloes in certain distances in
order to change the horses. The carrier of urgent messages and the traveling inter-
preters are able to do their job at any season of the year." This was at the time of the
Han Emperor Ho-ti (88-105 A.D.) It seems that at that time already foreigners were in
that country and were perhaps also occupied with silk trade. It is also possible that
Titianus was a silk-worker in Tyrus. In every case the famous geographer Marinus of
Tyrus, a contemporary of Titianus, was informed of the experiences of Titianus. May be
that he had also the information of other travelers in Central Asia or the Far
East. Marinus was the first who calculated the size of the European- Asitatic Double
Continent. He estimated the distance of the West Coast of France to the East Coast
of Asia much larger as it is indeed, and therefore, if his idea would have been
correct the ocean, of course also the Atlantic Ocean, would have been much smaller as
it is. Ptolemy of Alexandria who lived about 50 years later than Marinus
has accepted the calculations of Marinus, whose original work is lost.

page 336 (continuation)

Other compositae as the wormwoods, sagebrushes, mugworts, goldenrods, sunflowers, asters, dahlias, daisies and dandelion;

The pigweed family .....

page 341 line 15 : (The text has to be changed in the following way:)

The Hemp family (Cannabinaceae), including only hemp (Cannabis sativa L.) and hop (Humulus lupulus L.)(Both are considered by others belonging to the mulberry-family (Engler-Prantl, "Die natürlichen Pflanzenfamilien"), or to the nettle-family ("Index Kewensis")).

(1) Hemp, True hemp, ...

page 341 line 42 (the following sentence has to be put in:)

.... hops of commerce, used to flavor malt liquors. Hop is a dioecious plant. This means there are plants which possess only staminate flowers - they are called male - and such ones with only pistilate flowers - named female. The pollen is transfered by wind. Only the male plants can cause pollinosis. Hop grows in thickets .....

page 258. (line 7 and 8:

The stamen consists of the [illegible] anther and the filament (Fig. 73)

page 298 , line 7 and 8,9,10 (The text has to be changed in the following way:)

The stamen consists of the filament and the anther (fig. 73), where the pollen grains are formed and temporarely stored. The pistil is composed of a swollen lower part, the ovary, containing the ovules (from which the seeds develop), and a longer or shorter slender part, the style, whose end is used as a receptive organ for the pollen, the stigma.

page 299 , line 2 and 3 :

Before the stamens reach maturity, the four sacs are completely separate.

page 299 , line 6 and the following lines (The text has to be changed in the followingway:)

The function of the pollen is to fertilize the ovules, thereby producing seeds. The pollen grains have to be transfered from the anther to the stigma. This precess is called pollination. Upon the stigma the pollen begins to germinate, producing the pollentube which contains the male sex cell. The pollen tube grows through the tissue of the style and reaches the ovule. Here fertilization takes place. In most cases the pollen is carried from one flower to another one - cross pollination. The transfer of the pollen can be accomplished by animals (insects, birds, small mammals), water or wind. Only wind borne pollen is to bring in reaktion to the hayfever, only the latter can come into contact with the hypersensitive structures of human beings.

The quantity.....

page 310 , line 22, 23 and 24, :

As a rule the gymnosperms, evergreens such as pine, spruce, hemlock, fir, cypres, arbor vitae, cedar and redwood, are less important in this regard than the trees and shrubs, belonging to the angiosperms, the higher flowering plants

e 326 , line 18 and the following lines. (The text has to be changed in the following way)

Our discussion will be faciliated by considering the weeds according to their botanical grouping. This will be done roughly in the order of relative importance of the groups as follows:

The Composite family to which belong:

The ragweed group (Ambrosieae), including the ragweeds, false ragweeds, marsh elders, and cocklburs.

it would be possible to get more or less independent of the weather if [illegible], is not to say until yet. Author believes that the practical significance of the use of the G.s. lies more in the ripening of normal fertilized fruits than in raising of unfertilized ones. If all fertilized flowers furnishes good developed fruits than it is possible to resign on unpollinated flowers. The function of the g.s. starts from the developing seed. It seems to be that the auxin production of the seeds is often undernormal, may it be that fertiliztion was not complete, or that there were not ovules enough, or it may have its cause on genetical base or unfavorable envirement conditions. The fruits drop off earlier, or remain small. Other causes, like dessasis, lack in food, damage, have, of course, nothing to do with this problem. From America and Europe there are known very godd results in apple-, pears-and plume trees by spraying of the flowers during or shortly after the anthesis. The spraying of the trees with g.s. solution prevents the later dropping off. Also for not edalpe fruits the treat-ment with g.s. may be important, if we w and fruits drop off want to obtain seeds. In plants where the asexual propagation dominants, like in the potato, it would be important to get seeds for breeding purposes.

10 Some further possibilities for the use of g.s.

Without any doubt there are still numerous further possibilities for the practical use of g.s, Author names some examples. The spraying of Chrysanthemum buds with a solution of g.s. caused a curling of the perianth leaves of the ray flowers. This may be perhaps of value in flower gardening. If it is possible to increase the lifetime of flowers is not decided yet, but it may be possible. Perhaps it may be possible that by the use of g.s. capsel fruits don't open and the seeds don't fall out a fact which would be helpful in gardening. In agriculture this problem can only be solved by raisin particular varietiesIn tree- and fruit tree nurseries by the use of g.s. it was possible to widen the angle of the branches which is advantageous. Good results were stated in America.

III.

In this article Author wante to give a general views about the possibilitiss of the use of g.s. Leading is until yet America.

Autor gives 134 different references.

when we had a mild winter - I could not find any U. cleistogama, and also in the sand I could not see any runner, though the alga was intact. In June 15, 1947, on another place in the N.J. pinebarrens I found some flowering plants (also with cleistogamous flowers and a few seedlings. These latter showed still the presence of the brown seed. This seed produces a relatively short, bent shoot which begins soon to form a branching center. From here start a number of shoots which again produce branching centers and which as usual possess bladders and which end with phylloclades. Concerning our question about overwintering, I would say in mild winters, the plants survive, perhaps only the branchin centers, which, because of their small size, are very difficult to see. In strong winters the plants die, and only seedlings appear in the next year; the seeds survive.

Utricularia cleistogama has its name from cleistogamous flowers. These are whitish, very tiny structures, which develop a fruit, looking like a pinhead. The brown inflorescence stalk, developing in the branching center, has a length of about 3 cm and has a few scale like bracts. The fruits have a central placenta and many relatively large brown seeds. Below the first flower, in the axil of a bract, there is probably a growth point, because from ther starts frequently a new cleistogamous flower with a peduncle, reaching a length of about 1 - 2 cm. This can be repeated several times.

Goebel shows in his articles several terrestrial Utricularias, also with phylloclades. Such land Utricularias grow in the Western hemisphere, and also in East India. e.g. Utricularia elachista Goeb. He writes on page 78(14): "Utricularia elachista ist ausgezeichnet durch ihre ausschliesslich kleistogamen Blüten. Es ist nicht unwahrscheinlich, dass sie zu einer mit chasmogamen Blüten versehenen Art gehört."
The figures on plate VIII show an astonishing similarity to U. cleistogama. And the same is also to say of the bladders (comp. fig. # 38, plate VIII).

Goebel writes in his "Organographie" that cleistogamous flowers would represent a hunger- , a starvation form. This is true. The food supply is on places where U. cleistogama grows, rather limited. In Medford Lakes there is a locality on the edge of the road where a pitcher plant (Sarracenia purpurea) grew which was much larger than other pitcher plants, growing in the nearby bog. As Dr. E.T. Wherry (Penn. University) supposes dust particles from the road may fertilize the plants. In 1945 and 46. I saw on the same spot plants with chasmogamous, yellow flowers, characteristic of U. subulata L.

would be another method which is based on the probable Auxin content of the urine of herbivorous animals. In South-Italy and somewhere else it is customary since olden times to let the seed swell in cattle urine. New Italian investigations have acertained the value of this old peasant method which recalls the experiments with growth substances.

Yet more important for the practise are today the following synthetic growth substances:

1. β indolyl-acetic-acid (heteroauxin), indolyl-butyric-acid and also their K salts and different esters.
2. α naphtyl-acetic-acid and its salts and esters (also some other, until yet less important naphtyl compounds)
3. Phenyl-acetic-acid and similar compounds,
4. Aethylen.

All these substances are produced synthetically by the chemical indurstry and are available as pure products and at prices which makes their use economical. On account of these fact that all growth substances, when used in a higher concentration, act gtooth stopping and poisonous, it is necessary to keep oneself strictly to the prescribed concentrations.

I.

Now follows in 10 chsperts the different use of the growthsubstances and its possibilities.

1. Rooting of Cuttings.

One of the most striking and earliest observation of the function of growth substances is the production of roots. Following the way of the distribution of the growth substances, numerous roots appear, and not only on spots which normally incline to root production, but also on not predestined parts of the stem, on leaf veines, and even on the outsurface of potatoes, etc.

Heinz Friedrich:

Ueber die praktische Bedeutung von Wuchsstoffen in Gartenbau, Land- und Forstwirtschaft.

Biologische Reichsanstalt für Land- und Forstwirtschaft.

Angewandte Botanik, vol.))', # 3 & 4, May - August 1943, Pag. 251 - 273.

I.

So-called growth substances, influencing the growth of plants in a specific way, even if present in smallest quantutites, are used in the practise of horticulture, agriculture and forestry, since we are able to produce them artificially. Today the research in this field is still so young that it is not possible to look over all possibilities. To give a definition about growth substances is nearly impossible. Many substances, even every foodstuff, influences the growth, many of them very specifically. As growth substances in a closer sense we signify only such organic compounds which demonstrate an activity similar to that of the vegetable growth hormone Auxin. The function of those substances which chemically at the greatest part - not all - are related to each other, is rather the same. Investigated among others are increasing and decreasing stretching growth of coleoptiles, shoot internodes, roots, the production of different growth conditioned bendings, the development of root primordias, multiplying and thickening of tissues etc.

Some authors believe that all these appearences are caused by the growth hormone Auxin and that the so-called growth substances influence only the development and the distribution of the Auxin. Other investigators suppose only a preparative function of the growth substances which easies the activity of the Auxin. Besides the Auxin the growth substance β indolyl -acetic - acid was stated natural in plants.

Auxin itself (Auxin a and Auxin b) is not suited for the practical use in a larger extent, because pure it is too expensive and too sensitive. An old custom is to split on the base cuttings which don't make roots very easily, and to push in the incison a cereal grain. The Auxin which develops during the germination of the latter stimulates the development of roots of the cutting. Of much more practical value

Today there is made use of this fact and we have good working directions for the treatment of cuttings with water soluble ,powdery or pasty growth substances preparations.Author mentions especially "Belvitah" (I.G.Farben).Most of the praparations are easy soluble K salts of β indolyl-acetic-acid.The results may become better by the use of more active compounds and the growth substances may be used also for very difficult cases.So,the problem of the rooting of cuttings may be solved in the gardening practice.But it is to consider that the particular growth substances cause only the formation of root primordia,not the growth of the roots.Therefore the cuttings are exposed to the influence of the growth substances not for a longer duration.The use of the growth substances should only start the development of roots;afterwards the latter continue to grow normally.

The treatment of cuttings with growth substances penetrates more and more into the gardening practice.With it the vegetative propagation of plant species is possible,replacing the propagation by seeds or expensive grafting.Also root cuttings,like shoot cuttings,may be used.For the grape-vine growing and in forestry this method has great possibilities.The rooting of grape-vines with heteroauxin and "Belvitan" is already proved.

2. Grafting and Woundhealing.

The stimulation of the callus formation by growth substances is used in order to speed the growing together of cutting and substrate.The cutting- and substrate-surfaces have to come in contact with each other as fresh and as clean as possible,in order to grow together.Often it is better to treat with the grwoth substance solution only either cutting or substrate.Also "Belviatan" is very helpful.It also may be possible that wounds of trees caused by heavy snow, hurricanes etc. may close more quickly,if growth substances are used.For fruit trees this fact may be especially important.

3. Early Sprouting.

Some authors could bring winter buds to sprout by treating them (or whole twigs) with growth substances.For instance this was successful with Strathiotes and Syringa.Known are also the experiments of Molisch with Ethylen, excreted by

apples. The small amount of Ethylen increased the process whilst larger concentrations delay it. Phenyl compounds - in contrast to Naphthyl oxides - functioned early sprouting to potatoes. If the sprouting-mean for potatoes Ethylenhydroxin, and also Phenol- and Cresol compounds act like growth substances is not known. The activation of auxin would play a part. Some, not very much known yeat extract substances have also an early sprouting function.

b Dormant winter buds contain nearly no auxin, but when they sprout the auxin content rises rapidly to a maximal value. Auxin addition may increase the "bleeding" and the metabolism of the plants. Therefore it is supposed that there are relations between growth hormones and the sprouting of the buds which may become important.

4. Retarding of Sprouting.

Better known is the opposite function of the growth substances. Many observations were made. There seems to be correlations with the growing terminal bud, and it may be that an auxin stream goes down from the tip. Growing leaves stop the streching growth of younger leaves. (Goebel gives a hint to the relations between the leaves and the development of the axil buds, which, reserved for the next year, develop in the same year if the leaves are destroyed, for instnace by eating of insects or drought etc. The abstractor) They can be replaced by artificial growth substances on cut off shoots. How the growth substances act once increasing, another time decreasing towards the growth is unknown. Perhaps this fact has its cause in the concentration. Practical use is not made very much. It is possible to delay the flowering of prunes- and cherry twigs. The stopping of sprouting may be used for the storage of potatoes, vegetables and cut flowers.

5. Ripening of fruits.

The increasing and decreasing influence of growth substances of the sprouting of shoots corresponds with similar function on ripening fruits. A bath of fruits in a in a growth substance solution of low concentration caused delay, the bath in a high concentration a speeding of ripening. We don't know here very much. But in the wholesale trade of bananas, citrus fruits etc. Ethylene is used very much.

Plants are best protected in the ground. The aerial parts die off and in form of subterranean rhizomes, tubers and bulbs these herbs pass the winter. Thereby these organs are mostly assigned to a fixed depth location which is already retained. In the subterranean organs nourishing substances - sugar and starch - are stored (they are often used as human food) which may be mobilized very quickly when favorable conditions of life are present. The plants frequently have to hurry because these conditions often exist only for a short time (for instance, if the grass grows high). Here also a similarity with desert plants. Particularly favorable are the conditions in bulbs, as we know from the kitchen-onion. A disc-shaped subterranean shoot (bulbs are also fixed to a certain depth location which is always maintained by the shrinking of contractile roots), the bulb-axis, bears large, subterranean leaves, the bulb scales. The outside ones are dry-membranaceous, a protection for the inner, juicy fleshy scales, in which, besides water, sugar and other reserve substances are stored. Bulb plants are particularly frequent in steppes and deserts and also many of our spring plants, like snow-drops, tulips, hyacinths which we buy in flower-shops belong to them. So much for herbs.

How is it now with woody plants, with trees and shrubs? Excluding conifers - evergreens - these have indeed an entirely different appearence in winter than in summer. They all pass through a winter rest period. Also the "evergreens", spruces, firs, pines, yews don't assimilate during the winter-cold period. Foliage-trees and -shrubs get rid of their leaf-adornment in fall, especially magnificent in the north-eastern parts of this country. There are many among them which assume a wonderful red, as Dogwood, Sassafras, Red Maple, Staghorn Sumach and others. Afterwards the leaves separate themselves with their petioles and storms carry them away. This phenomenon is a process of life; on dead branches the foliage dries and does not drop off. Autumnal defoliation which to us appears so mournful and reminds us of the transitoriness of life, is for trees and shrubs an absolute necessity. By defoliation, emission of water which in greatest degree takes place

Macfadden
and E. R. Sears
"
Journal of Heredity - 1945 (44 on 46)
Artificial synthesis of Triticum spelta
from T. dicoccoides and Aegilops squarrosa
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are whitish, very tiny little creatures which develop to a fruit, looking like a pin head. The brown inflorescence-stalk has a length of about 3 cm and has a few scale like leaves. The fruits have a central placenta and many, relatively large seeds. Below the first flower, probably in the axil of a leaf scale, has to be a growth point because from there strats a new cleistogamous flower with a peduncle, reaching a length of about 1 to 2 cm. This can repeat itself several times. Goebel writes in his "Organographie" that cleistogamous flowers present a hunger form. This is true. The food supply is, on places where Utricularia cleistogames grows, rather limited. In Medford Lakes there is a locality on the edge of a road. There grew a pitcher plant which was much larger than other pitcher plants, growing in the nearby bog. As Dr. E.T. Wherry supposes, dust particles from the road may fertilize the plants. In 1945 and 1946 I saw on that spot plants with chasmogamous yellow flowers, characteristic for U. subulata I saw such plants later on, especially at the end of the season, in Oceanville and in Bishops Bridge. In this way Fernald is correct. U. cleistogames is a variety, and as we can say with great probability, a hunger variety of U. subulata.. U. cleistogames is much more abundant than subulata and there also transitions between cleistogamous and chasmogamous flowers. Other terrestrial Utricularias to produce cleistogamous flowers. It is this an adaptation of these plants to survive under such difficult conditions, under which they have to live.

As in Utricularia inflata several questions came to my mind! The first question is: "Why does U. cleistogames always live together Zygogonium ericetorum ?" How do they come together?" I suppose that the alga is first on the spot. The locality in Medford Lakes is under water until June (to prevent the freezing of the cranberries). Afterwards the alga sheet develops and later the Utricularia is to observed. I had no opportunity to study the germination. The plants bloom during the whole season and they also have ripe fruits. I suppose the seeds are distributed by wind and when they find upon the alga sheet favorable conditions, they begin to germinate. Perhaps with the rain water the seeds penetrate deeper into the substrate. Another question is: "How passes U. cleistogames and

Observations on Utricularia inflata and Utricularia cleistogama.

a Contribution to the Biology of Utricularia.

In his article "Morphologische und biologische Studien", chapter V., "Utricularia" in the "Annales du Jardin Botanique de Buitenzorg" [1.] 1891, G o e b e l , my teacher, writes: "Man mag die Utricularien betrachten in welcher Beziehung man will, stets wird man finden, dass sie zu den interessantesten Pflanzenformen gehören, mag es sich nun handeln um ihre Morphologie, Anatomie oder Biologie".

This article deals with observations made during 1945 - 1947 on two Utricularia species, growing in the New Jersey pinebarrens. It illustrates the sort of research which should be done on the native flora. I will report on U. inflata which grows in abundance at Medford Lakes, N.J., and U. cleistogama, growing in the same area.

Utricularia inflata was studied in an artificial pond (Ill. # 1.), owned by local residents. I visited this place which is easy to reach from Philadelphia, many times during the period. During the flowering time the plant forms star-like floating organs which keep the inflorescences upright above the surface of the water. (comp. ill. # 3.)

The genus Utricularia is distributed throughout the Old and the New World. Its representatives are either free floating in freshwater, some are living submerged in the mud, and others as terrestrials in a wet substratum. U. inflata belongs to the first, U. cleistogama to the last type.

There has been very little written about the life history of these species. We have literature about taxonomy and distribution, and studies on the bladders. But apparently nobody has observed the life cycle of these extremely interesting plants.

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1) Annales du Jardin Botanique de Buitenzorg, vol. IX., Leyden 1891, pag. 41.

that capsel fruits don't open and the seeds don't fall out,a fact which would be helpful in gardening.In agriculture this problem can only be solved by raising of particular varieties.In tree and fruit tree nurseries [redacted] by the use of growth substances it was possible to wide the angel of the branches which is advantageous. Good results were stated in America.

III.

In this article author wanted to give a general view about the possibilites of the use of growth substances .Leading until yet is America.

Author gives [redacted] 134 different references.

to protect this animal, this "culture fugitive", or to give to it a more or less large piece of land, a "reservation" where it may exist according to its customs of living. In fact the Indians in U.S. were "culture fugitives" from the white man who came to the shores of this continent. Plants also may be "culture fugitives" especially in a dense populated country like in Europe, and they have to be protected in order to prevent their disappearance. Plants with especially beautiful flowers have to be protected against robbers, not only in our country or Europe, even in the tropics. In Sumatra, for instance, it was not allowed to dig out the big tubers of the Araceae Amorphophallus titanum which has inflorescences of a length of 2 m.* In ~~South~~ Bavaria the "Edelweiss", beautiful Leontopodium alpinum in the ~~Alps~~ was protected and even the big ~~Gentiana lutea~~ whose roots were used to make a liqueur. Also in our woods flower lovers must be careful. If the use of a piece of land is changed by the owner, the balance among the living organisms is disturbed and plants and also animals which no longer find living conditions must disappear. A different kind of fertilizing which changes the salt containt of the soil, may destroy those plants for which the new conditions are not suitable: They ~~must disappear as "culture fugitives"~~, as well as the animals for which these plants were a fodder, must disappear. Also the same thing happens in the tropics if a piece of primeval forest is used for the cultivation of other plants, even of food plants by the natives. In this place the conditions of light, moisture etc. have changed and many plants don't return even if this spot is no longer used and is left to itself. These plants were "culture fugitive". On the other hand, man has given to many living things new possibilities for existence by changing the life conditions of the surrounding world. They arrive as "culture followers". I will give a very interesting example, which happened during the last 20 years in the center of the Bohemian Forest ~~north of Munich~~. The erections of electric power stations ~~plants~~ made it necessary to built large dammed lakes. The living conditions for birds became so favorable that a new bird world developed unknown before in this area, and most interesting region. ~~Also~~ sometimes the customs of life may change. We know birds, originally living in the wooods which now find their food in the cities. Wild ducks once living near ponds and lakes, far away from any civilized place, pass their time near waters in the cities,

*It was 1937 in blossom in the conservatories of the New York Botanical Garden.

in parks and rivers.The same is true with the mouse or rat;they all are "culture followers"!Then we have the great army of undesirable insects which we signify as "vermin". They all were originally native of forest and field,have migrated to the human settlements and pass their "underworld life" there!

In speaking of plants,the "culture followers"here are the "weeds".In the neighborhood of man,in his fields and gardens,even in the streets of his settlements they find living conditions which they use.The words "weed",or in the animal kingdom "vermin",are human definitions of plants and animals,seen from the human standpoint;it is the "anthropocentric" viewpoint,already mentioned in the introduction.The "weeds" are not desired by man, and,seen from the standpoint of the plants,their travelling was "voluntary";they followed man - I would like to say "with intention".If we strike in our garden against certain weeds and we see that they come again and again then we may understand what we mean by saying:They travel"with intention"!

But,let us speak first of the "unvoluntary" journeys which the plants made,with,or better "by" man.In this way the plants often have a very interesting history.Though we cannot go too far into detail we have to speak therewith also of a great part of history of culture, because these journeys are in a close relation to the development of mankind. Man,in the earliest stage of civilization,may have collected plants,the fruits of which he could use for nourishment.He was a "collector and hunter" even when he hunted animals for food. This must have taken place;our teeth are constructed for mixed,food,for vegetable and animal food.This early man may have tried to grow, and to raise food plants in the neighborhood of his home:the beginning of agriculture!He may have prefered those plants which had qualities being useful for him.The early man must have had a very great knowledge of plants because as E.D.Merrill,at once mentioned - of the about 250 000 plant species known in the world only about 100 furnishes food plants and the list of these has not esentually increased since these early times!

Man prefered plants with especially useful qualities.In this way the cultivated varieties of our cereals may have developed the qualities which they possess today.We don't know where and when this process first started.The genetists occupy themselves with this question.The qualities which prefered man must not be of advantage to the plants themselves.If the grain of the cereal drops from the spike without the involucrum of the

necessary that the root system and the propagation possess certain adaptations.The soil mostly is a very tough,grayish,bad smelling clay,very poor in oxygens.So it is helpful for the plant if the germination of the seed already takes place in the fruit and is transfered to the mother plant.This is termed "vivipary" and is demonstrated in this country by our native Rhizophora Mangle. (Rhizophora means "bearer of roots;the tap roots of the young germplants on the shrubs).The tap roots of the germplants reach a length of about 10 cm and the point of gravity lies very close to the root tip.In this way the young germplant falls like an airplane bomb in the soil.Ill. 1.show such germplants;they hang like bombs on the twigs of the shrubs. On the ground the young plants produce very quick side-roots and thus they are anchored and protected against the ocean waves.

Other means of "self-distribution" are growth movements and one of the most fascinating examples is the peanut (Arachis hypogaea).The plant is native in Brazil, but it is cultivated today in all warmer countries of the world.It belongs to the legumes.The peanut has little orange flowers and the pedunclesof these flowers grow toward the light as every flower stalk does.But after fertilisation they turn away from the light and grow into the ground.At the beginning of this process the young fruits are very small and so it is realtively easy for them to penetrate into the soil.When they are in a certain depth they begin to grow and reach their normal size. It is supposed that the fruitwall is able to take upp food from the soil,because fruits which have not reached the soil remain small and undeveloped.If hairs which find like root hairs,we we on the fruit wall participate on this process we dont know.

A certain progress is observed when the mother plant casts away the fruits and seeds.This happens in two ways.The first one is that the fruits contain tissues with a very high cell pressure,the other possibility is that the fruits occurs in a high expansion when they dry out.What concerns the first way,we have in our native flora the " touch me not's",the fruits of Impatiens species.If we touch the ripe fruits slightly they explode and the seeds are cast away.The fruits of a few members of the Cucumber family: Cyclanthera explodens,native of South-America,and Ecballium Elaterium,the Squirting Cucumber,at home in the Mediterranean,work much better (Ill.2).The seeds of the latter are thrown away at least 10 m.The inside of the fruit

solved in the gardening praxis.But it is to consider that the particular grwoth substances cause only the formation of root primordia,not the growth of the roots. therefore the cuttings are exposed to the influence of the growth substances not for a longer duration.The use of the grwoth substances should only start the development of roots;afterwards the latter continue to grow normally.

The treatment of cuttings with growth substances penetrates more and more into the gardening praxis.With it the vegetative propagation of plant species is possible replacing the propagation by seeds or expensive grafting.Also root cuttings like shoot cuttings,may be used.For the grape-vine growing and in the forestry this method has great possibilities The rooting of grape vines with heteroauxin and Belvitan is already prooved.

2. Grafting and Wound-Healing.

The stimulation of the callus formation by growth substances is used in order to speed the growing together of cutting and substrate.The cutting- and substrate - surfaces have to come in contact with each other as fresh and as clean as possible,in order to grow together.Often it is better to treat with the grwoth substances solution only either cutting or substrate.Also Belvitan is very helpful.It also may be possible that wounds of trees,caused by heavy snow,hurricanes etc. may close quicklier,if growth substances are used.For fruit trees this fact may be especially important.

3. Early Sprouting.

Some authors could bring winter buds to sprout by treating them (or whole twigs) with growth substances.Successful was this for instance with Strathiotes and Syringa. Known are also the experiments of Molisch with Aethylen,excreted by apples.The small amount of Aethylen increased the process whilst larger concentrations delayed it. Phenyl compunds - in contrast to Naphtyl oxyds - functioned early sprouting to potatoes.If the spouting mean for potatoes Aethylenhydroxin,and also Phenol- and Cresol compounds act like growth substances is not known.The activation of auxin would play a part.Some,not very much known yeast extract substances have also an early sprouting function.

Dormant winter buds contain nearly no auxin, but when they sprout the auxin content rises rapidly to a maximal value. Auxin addition may increase the "bleeding" and the metaboloem of the plants. Therefore it is supposed that there are relations between growth hormones and the sprouting of the buds which may become important.

Retarding

4. Keeping back of Sprouting.

Better known is the opposite function of the growth substances. Many observations were made. There seems to be correlations with the growing terminal bud, and it may be that an auxin stream goes down of the tip. Growing leaves stop the stretching growth of younger leaves. (Goebel gives a hint to the relations between the leaves and the development of the axil buds, which, reserved of the next year, develop in the same year if the leaves are destroyed, for instance by eating of insects or drought etc. - The abstractor). They can be replaced by artificial growth substances on cut off shoots. How the grwoth substances act once increasing, another time decreasing towards the growth is unknown. Perhaps this fact has its cause in the concentration. Practical use is not made very much. It is possible to delay the flowering of prune- and cherry twigs. The stopping of sprouting may be used for the storage of potatoes, vegetables and cut flowers.

5. Ripening of fruits.

The increasing and decreasing influence of growth subatances of the sprouting of shoots corresponds with a similar function on ripening fruits. A bath of fruits in a growth substance solution of low concentration caused a delay, the bath in a high concentration a speeding of ripening. We don't know here very much. But in the wholesale trade of bananas, citrus fruits etc. Aethylen is used to cause a quick ripening of the unripe and green shipped fruits. In as much we have a specific function of the grwoth substances is unknown.

Hastening

6. Speeding of the Germination.

On account of the fact that growth substances became known first on germ plants (Avena), investigations were made pretty soon on seeds and embryos. We know today that seeds are rich in auxinand that without auxin normal germination is not possible. If the reserve of growth substances is taken away from the seed, then deveopment of root

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6. Hastening of the Germination.

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7. Hastening of the General Development

by Treating of the Seeds with Growth Substances.

Many experiments were made by Americans,Russians and Germans.(The Russians try to hasten the development of crop when they raise cereals and vegetables in the Arctic. - The abstractor).The results are different.About the theoretical base we don't know anything.Even we don't know how much of the growth substances penetrate into the seed.Author describes some methods of the treatment.

8. Hastening of the Development

by Treating of the Young Plants.

In the place of the treatment of the plant in the stage of the embryo in the seed,the young plant,or parts of them,may be treated during the later development Author predicts no importance of this method for agriculture.If it may be helpful in gardening is not decided yet.

9. Development of Fruits,Parthenocarpy,

Preventing premature dropping off of Fruits.

For some time it is known that fertilisation the growth hormones,containdd in great quantities in the pollengrains,play a great part.Extracts from pollen - especially rich sources of growth substances are the pollinia of orchids - may cause in different plants a development of the ovaries without fertilisation. Similar to pollen extracts also act synthetical growth substances.Under their

influence in many plants unfertilized ovaries develop to complete fullgrown seedless fruits.This parthenocarpy rarely occurs also genetically (e.g. Musa sapientum L.) Certain seedless fruits are economically important, as bananas, oranges grapes etc.It would be very important if it would be possible to raise seedless apples, pears and others by the use of growth substances.Author metions five methods of treatment of the ovaries with growth substances.It was successful with melons, cucumbers (which decline to develop parthenocarpous fruits - the raising of parthenocarpous cucumber fruits in glasshouses is an important industry in Europe), tomatoes, petunias, gladiolas, fuchsias and others. Especially active was naphthyl acetic acid Ilex opaca should have developed seedless fruits, but edible fruits were not produced up tp now.This would be very important in cases where the weather plays a great part.If it will be possible to become more or less independent of the cannot yet be said.Author believes that the practical significance of the use of growth substances lies more in the complete ripening of normal fertilized fruits than in raising of unfertilized ones.If all fertilized flowers furnish good developed fruits then it is possible to renounce on unpollinated flowers.The function of the growth substances starts from the developing seed.It seems that the auxin production of the seed is frequently undernormal, may it be that fertilisation was not complete, or that there were not ovules enough, or it may have its cause on a genetical base, or in unfavorable outer conditions.The fruits dropp off earlier, or remain small.(Already Herodot describes how necessary it is that the female date flowers are pollinated to prevent their dropping off. - The abstractor)Causes like deseases, lack in food, damage etc.have, of course, nothing to do with this problem.From America nd Europe there are known very good results in apple-, pear- and plume trees by spraying of the flowers during, or shortly after the anthesis.The spraying of the trees with a solution of growth substances prevents the later dropping off.Also for not edible fruits the treatment with growth substances may ve important, if we want to obtain seeds.In plants where the asexual propagation is dominant, and fruits drop off, like it is in potatoes, it would be important to obtain seeds for breeding purposes.

nocarpous cucumber fruits is an important industry in Europe), tomaoes, petunias, gladiolas, fuchsias and others. Especially active was α Naphtylacetic acid. Ilex opaca should have developed seedless fruits, but edable seedless fruits were not produced until yey. This would be very important in cases where the weather plays a great part. If it will be possible to become more or less independent of the weather is not to say until yet. Author believes that the practical significance of the use of grown substances lies more in the complete ripening of normal fertilized fruits than in raising of unfertilized ones. If all fertilized flowers furnish good developed fruits then it is possible to renounce on unpollinated flowers. The function of the growth substances starts from the developping seed. It seems that the auxin production of the seed is often undernormal, may it be that fertilization was not complete, or that there were not ovules enough, or it may have its cause on a genetical base or in unfavorable outer conditions. The fruits drop off earlier, or remain small. (Already Herodotdescribes how necessary it is that the female date flowers are pollinated to prevent their dropping off)- the abstractor). Causes like deseases, lack in food, damage etc. have, of cours, nothing to do with this problem. From America and Europe there are known very good results in apple-, pears- and plume trees by spraying of the flowers during or shortly after the anthesis. The spraying of the trees with a solution of growth substances prevents the later dropping off. Also for not edable fruits the treatment with growth substances may be important, if we want to obtain seeds. In plants where the asexual propagation is dominant, and fruits drop off, like it is in potatoes, it would be important to obtain seeds fro breeding purposes.

10. Some Further Possibilites for the Use of Growth Substances.

Without any doubt there are still numerous further possibilities for the practical use of growth substances. Author names some examples. The spraying of Chrysanthemum buds with a solution of growth substances caused a curling of the perianth leaves of the ray flowers. This may be perhaps of value in flower gardening. If it is possible to increase the life time of flowers is not decided yet, but it may be possible. Perhaps it may be possible that bey the use of growth substances we can reach

and shoot of the embryo is stopped. Artificial growth substances annulate this stopping. The question if bad germination is caused by a lack in growth substances is not answered yet; perhaps it may have many causes/ else.

7. Speeding of the General Development

by treating of the Sowing Good with Growth Substances.

Many experiments were made by Americans, Russians and Germans. (The Russians try to speed the development of the crop when they raise cereals and vegetables in the Arctic. - The abstractor). The results are different. About the theoretical base we don't know nothing. Even we don't know how much of the growth substances penetrates into the seed. Author describes some methods of the treatment.

8. Speeding of the Development

by Treating of the Young Plants.

In the place of the treatment of the plant in the stage of the embryo in the seed, the young plant, or parts of them, may be treated during the later development. Author predicts no importance of this method for agriculture. If it may behelpful in gardening is not decided yet.

9. Development of Fruits, Parthenocarpy,

Preventing of Dropping off of Premature Fruits.

Since a while it is known that in fertilisation the growth hormones, contained in great quantities in the pollengrains, play a great part. Extracts from pollen - especially rich sources of growth substnaces are the pollinia of orchids - may cause in different plants a development of the ovaries without fertilisation. Pollen extracts also act also synthetical growth substances. Under their influence in many plants fertilized ovaries develop to complete outgrown seedless fruits. This parthenocarpy occurs also genetically (e.g. Musa sapientum L.) Certain seedless fruits are economically important, as bananas, oranges grapes etc. It would be very importantif it would be possible to raise seedapples, pears and others. by the use of growth substances. Author mentions 5 m the treatment of the ovaries with growth substances. Successful was it with cucumbers (which decline to develop parthenocarpous fruits - the raising of

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III.

In this article author wanted to give a general view about the possibilities of the use of growth substances.Leading until yet is America.

Author gives 134 different references.

(5.I.1946)

Laienhafte philosophische Gedanken eines Naturwissenschaftlers.

"Was ihr nicht s e h t ,
das meint ihr,
sei nicht wahr!"
(Faust I.)

Es ist eine e w i g e Frage, das Problem des Lebendigen. Sie ist den Halbgott Gilgamesch vor 5000 Jahren genau so auf die Nerven gegangen wie den Schülern Buidhas, die von ihrem Lehrer auf die Frage nach dem Tode die Antwort erhielten: "Wir wissen nicht, was das Leben ist und so können wir auch nicht sagen, was der Tod ist!" Auch Confucius antwortet seinen Schülern auf eine ähnliche Frage in der gleichen Weise.

Wenn die Naturwissenschaften lehren Formwechsel (Wachstum), Stoffwechsel (Assimilation und Dissimilation) und Kraftwechsel (Energie-Leistungen) seien die Hauptcharacteristica des Lebendigen, so sind wohl dessen Erscheinungen, dessen sichtbare Erscheinungen, wiedergegeben, nicht aber die Kräfte, die diese Dinge bewirken und vor allem g e r e g e l t bewirken. Denn ist es nicht wunderbar, wenn sich aus einer befruchteten Eizelle nach einen bestimmten, gewissermassen vorgezeichneten Bauplane, der auch zeitlich festgelegt ist, ein Individuum in der Weise entwickelt, dass man sagen kann, in einen Monat ist das werdende Lebewesen so weit, nach drei Monaten so weit? Wir wollen gar nicht davon sprechen, welch überwältigender Gedanke darin liegt, dass im Tierreiche völlig frei bewegliche Individuen verschiedenen Geschlechts sich zum Zwecke der Paarung wie Magneten anziehen und, bei wild lebenden, nicht domestizierten Tieren wenigstens, nur zur Brunft-Zeit, die so liegt, dass die Nachkommenschaft zur Welt kommt, wenn sie die besten Existenzbedingungen findet. Während der übrigen Zeit sind die Keimdrüsen, die auf den Wege über das Zentral-Nerven-System diese Anziehung bewirken, rückgebildet. In anderen Fällen unterbleibt die Weiterentwicklung des befruchteten Eies bis zum nachsten Fruhjahre, wie es der Fall ist beim europaeischen Reh oder bei der Fledermaus, wo die Begattung im September erfolgt. (in Europa). Die jungen Tiere kommen dann auch erst zur Welt, wenn für sie der Tisch reichlich gedeckt ist. Unsere modernen Farbenfilme zeigen so schön, wie bei Jungvögeln im Nest das Innere der Kehle gerötet ist, sodass die Eltern mit dem Futter den Weg leichter finden kön-

Die Vögel sehen, wie wir, rot am besten. Blüten, die von Vögeln bestäubt werden, sind rot und auch Früchte, die, wenn reif, von diesen gefressen werden sollen, sind meistens rot. Auf diese Weise werden die Samen verbreitet. Jedoch, bevor die Früchte nicht reif sind, sollen sie nicht gefressen werden; sie sind daher grün und unterscheiden sich in ihrer Farbe nicht vom umgebenden Laub! Es sei an die Erscheinungen der Mimikry erinnert, die ja so weit geht, dass z.B. harmlose Insekten die Gestalt gefährlicher oder schlecht schmeckender annehmen. So gibt es Fliegen und Schmetterlinge, die sehr stark Hummeln und Wespen gleichen.

Wenn wir an die Wirkungsweise der Instinkte denken, so können wir nur wie Wotan im "Rheingold" sagen: "Mach' vor Staunen mich stumm!" "Wo fass' ich dich unendliche Natur?" ruft Faust aus! Wenn wir an das mit den Keimdrüsen in Verbindung stehende Wandern der Zugvögel denken und wie sie ihren Weg finden, dann haben wir eines der grossartigsten Beispiele dafür. Selbst Jungvögel, getrennt von ihren Eltern, finden ihren Weg in die Winterquartiere. Dass dabei auch die Vererbung mitspielt, zeigten Versuche mit Jung-Störchen, die von Europa ihre "Jungfern-Reise" nach Afrika auf verschiedenen, erblich festgelegten, Wegen unternahmen. Störche, die oestlich der Elbe geboren werden, pflegen über die Balkan-Halbinsel zu reisen, solche, die westlich der Elbe das Licht der Welt erblicken, fliegen durchs Rhonetal. Man hat Jung-Störche von England nach Ostpreussen und solche von Ostpreussen nach England gebracht. Als die Vögel, nach dem Süden flogen, benutzten sie die erblich fest gelegten Routen: Die in England geborenen und nach Ostpreussen gebrachten Störche flogen durchs Rhonetal, die Ostpreussen-Störche von England über die Balkan-Halbinsel! - Wie wunderbar arbeitet der Instinkt bei den Staatenbildenden Insekten, bei Bienen, Ameisen und Termiten, bei denen alles uhrwerksmässig abläuft. Man muss nur einmal dem Treiben der tropischen Blattschneider-Ameisen zugesehen haben, die aus Blättern und Blüten halbmondförmige Stücke herausschneiden und für die Kultivierung ihrer Pilzgärten, von denen sie leben, ins Nest tragen. Dasselbe gilt von den Pflanzen. Hier werden durch ausgeschiedene Zuckersäfte, durch Nectar, tierische Besucher - meist Insekten, aber auch Vögel und kleine Säugetiere - zur Uebertragung des Blütenstaubes von Blüte zu Blüte

jedoch,, wie Hans Driesch ganz richtig bemerkt, dass die Lebewesen den Versuch auch lebendig überstehen. Das gilt von der Tier- und von der Pflanzenphysiologie. Die ungeheueren Fortschritte von Chemie und Physik in den letzten Jahrzehnten haben die Physiologie ungemein gefördert, ja vielfach auf eine ganz neue Grundlage gestellt. Sie ist aber dabei einer grossen Gefahr ausgesetzt. Die Gefahr ist, kurz gesagt, die, dass das Leben, das Lebendige, das hinter aller physiologischer Forschung steht, nicht mehr gesehen, nicht mehr beachtet, und vergessen wird. Man glaubt mit den Werkzeugen der modernen Chemie und Physik den Lebensvorgängen zu Leibe rücken zu können und in der Lage zu sein, diese damit zu erklären.

Ist nun das Lebendige, von dem wir, wohlgemerkt, nicht wissen, was es ist, vollkommen den Gesetzen von Chemie und Physik unterworfen oder ist etwas dabei, das sich ausserhalb dieser Wissenschaften stellt? Diese Frage führt zur Frage nach V i t a l i s m u s oder M e c h a n i s m u s (Mechanismus, der alle Lebensvorgänge und - Erscheinungen an stoffliche Dinge gebunden und somit den chemischen und physikalischen Gesetzen daran unterworfen sehen will. Diese Theorie ist sehr weitgehend entwickelt, wenn man denkt, wie viele Eigenschaften wir bereits an bestimmte Stellen der Chromosomen von Drosophila lokalisieren) Diese Frage ist so alt wie die Naturwissenschaft selbst und ihre Stellungnahme dazu ist aufs innigste verknüpft mit der persönlichen Anschauung des Forschers. So wird von einem Gelehrten erzählt, er wäre wochentags "Mechanist", am Sonntag aber "Vitalist" gewesen! Dies ist ein Ausnahmefall, denn sonst stehen sich die Vertreter beider Richtungen ziemlich verständnislos gegenüber. Der nur auf Chemie und Physik Eingestellte meint, es müssten sich alle Lebensvorgänge früher oder später mit Hilfe dieser Wissenschaften erfassen lassen und glaubt mit der Voraussetzung und Einführung einer unbekannten Grösse eines "X" in die Forschung würde man sich eine künstliche Mauer errichten und sich das Arbeiten erschweren. Die andern sagen wieder mit der Vernachlässigung dieses unbekannten Etwas, das sich M ausserhalb der "exakten" Naturwissenschaften stellt, würde man von falschen Voraussetzungen ausgehen. Es ist unendlich schwer, hier das Richtige zu treffen und es kommt, wie gesagt, ganz auf die Ansicht und auf die persönliche Einstellung des Forschers an. Omar-i-Chajjam, der grosse Naturwissenschaftler, der vor nahezu 1000 Jahren in Persien gelebt hat, sagt in einem seiner Rubai, übersetzt von Friedrich Rosen:

" Die Rätsel dieser Welt löst weder du noch ich
Jene geheimnisvolle Schrift liest weder du noch ich.-
Wir wüssten beide gern, was jener Schleier birgt,
Doch, wenn der Schleier fällt, bist weder du noch ich!"

Tatsächlich gibt es Dinge, die sich nicht als stofflich, als materiell, festgelegt erachten lassen, wenngleich wir auch nicht in der Lage sind, dafür etwas anderes zu setzen., denn es fällt gerade uns Naturwissenschaftlern ausserordentlich schwer, an unkörperliche Dinge zu glauben! Das gilt sowohl von der unkörperlichen menschlichen Seele, die ja mit ihren unendlich vielen Bewusstseins-Inhalten eine Welt für sich bildet, wie auch von anderen Dingen der belebten Welt. Ist diese menschliche Seele, die ja den "inneren" Menschen ausmacht, die ihn zur "Persönlichkeit" gestaltet, nicht selbst das grösste Rätsel? Und doch sind es die Seelen, mit denen die Menschen einander näher treten und es sind auch die Seelen, wenn sich die Menschen gegenseitig nicht verstehen können. Das geht sehr weit, denn die verschiedenen Menschen reden auch eine verschiedene Sprache, entsprechend ihrer verschiedenen seelischen Einstellung. Das ist auch die Ursache, dass sich im Zeitalter von Radio und Flugzeug die Menschen gegenseitig nicht näher kommen. Es ist viel darüber geklagt worden, dass, angesichts der ungeheuren Fortschritte in Wissenschaft und Technik, die unser Leben und unsere Existenz auf eine völlig neue Grundlage stellen, die unseren Erdball so klein werden lassen, dass kein Land mehr seinen eigenen, ihm gefälligen Weg gehen kann, in den Beziehungen der Menschen untereinander und zueinander gar keine Fortschritte zu verzeichnen sind Die Bewohner der verschiedenen Länder haben zu verschiedene Kulturen und Lebensformen und sie reden eine zu verschiedene Sprache. Doch bleiben wir beim eigenen Volk Auch hier können sich die Angehörigen der verschiedenen Berufe und Gesellschafts - klassen aus dem gleichen Grunde nicht verstehen, denn auch sie haben eine verschiedene seelische Einstellung, auch sie reden eine verschiedene Sprache! Es wäre schon sehr viel gewonnen, wenn die verschieden Menschen , ganz gleich welcher Gruppe sie angehören, trotz ihres Verschieden seins, gegenseitg achten und respektieren würden!

Wir wollen an zwei Beispielen zeigen, was mit der "Unkörperlichkeit" der Seele gemeint ist, ein Beispiel , das den akustischen und ein Beispiel, das den optischen Sinn betrifft. Wir hören einen Ton; dieser hat eine gewisse Tonhöhe, Lautstärke und Klangfar-

be. Wir hören einen zweiten Ton, der auch eine bestimmte Höhe, Stärke und Klangfarbe besitzt. In dem Augenblick jedoch, in dem wir einen dritten Ton wahrnehmen, übermittelt uns unsere Seele sofort automatisch den Begriff des Rhytmus'. Oder: Ein Bild ist weiter nichts als eine mit Farben bemalte Leinwand, wenn es sich um ein Oelbild handelt oder ein Karton, wenn wir an ein Aquarell denken. Unsere Seele sagt uns ebenfalls automatisch das ist eine Landschaft oder ein Porträt. So etwas ist stofflich, materiell, nicht fest zu halten! Und dann gibt es noch so viele Beispiele von "Elementar-Eigenschaften der Seele", wie sie Hans Driesch bezeichnet. Wir können nur ein paar nennen: Das seelische Anlehnungsbedürfnis, das innige Verlangen nach Geborgensein, vielleicht ein unbewusstes Ueberbleibsel der mütterlichen Fürsorge in unserer Kindheit und eine der Hauptwurzeln aller Religionen. Wir haben zu nennen das Erinnerungsvermögen, d.h. das Vermögen, optische und akustische Sinneseindrücke festzuhalten und im Bewusstsein später, wenn auch abgeschwächt, wieder reproduzieren zu können. Die unendlich vielen "Gedächtnis-Residuen", wie sie Erich becher bezeichnet, die wir im Laufe unseres Lebens sammeln, können unmöglich stofflicher Natur sein! Diese "Gedächtnis-Residuen" sind ungemein interessant. Wir wissen, dass die Sinneseindrücke ein gewisses "Fixierungs-Stadium" in unserem Gedächtnis durchmachen, bis sie zum "Gedachtnis-Residuum" werden. Wir wissen auch, dass "Gedächtnis-Residuen", die wir in der Jugend aufnehmen, viel lebhafter sind als später erworbene und dass uns normalerweise diese ersteren durch unser ganzes Leben, bis ins hohe Alter begleiten. Und dann haben wir an die "seelische Resonnanz", das Zusammenklingen der Seelen zu denken, das Zusammenklingen oder Uebereinstimmen der Seelen, das bei Sympathie und Antipathie eine so grosse Rolle spielt. Wir haben ja schon darauf hingewiesen, dass es die Seelen sind, mit denen sich die Menschen gegenseitig anziehen oder abstossen, wir könnten sagen, wie Magneten, jedoch mit der Einschränkung, dass sich gleich gestimmte Menschen nicht abstossen, wie gleiche Magnet-Pole, sondern im Gegenteil zu Freunden werden.

Wie schwer sind wir aber auch in unserem körperlichen Wohlbefinden gestört, wenn unsere Seele durch irgend ein Ereignis gestört wird. Und seelische Schwierigkeiten bleiben wohl kaum einem Sterblichen erspart! Ueber das "Leib-Seele-Problem" ist seit dem Bestehen der Menschheit philosophiert worden. Wie lässt sich aber der sofortige Zerfall der Organismen mit dem Tode erklären? Er tritt doch erst ein mit dem Ausscheiden dieses Rätsels, das wir als das "Lebendige" empfinden und dieses Rätsel erfasst uns alle mit überwältigender Macht, wenn wir den Tod eines lieben Angehörigen ----------

The Melastomataceae are divided into

3 ~~[illegible]~~ subfam. with 148 genera and about 2800 species, and more than 500 varieties, in America are known, some [illegible] more special. The Melast. mostly tropical plants, also a few live in the subtropics. We have here [illegible] Rhexia. They are especially numerous in Brazil and Guiana. Living among different conditions, the M. show a great variety in [illegible] form. They are annual and perennial ~~[illegible]~~ herbs, shrubs and trees. They may also be climbing plants, clinging with hair roots. [illegible] veins of the leaves

The inflorescence are in general cymes, but the fl. are also solitary a [illegible] of the infl. The calyx is a tube. The calyx tube may also be bell like. Flowers mostly 5 merous but also 4, ~~[illegible]~~ or more are to be found.

The corolla is apopetalous

Tibouchina S. 5, P 5, A. 5+5 Styl. S 5, A great variability shows the connective, ~~[illegible]~~ horns sometimes long outgrowths. These outgrowths have perhaps the purpose to [illegible] insects, [illegible] the flowers are in contact with the [illegible]. It is also described a very interesting case of Myrmecophily ~~[illegible]~~ in the genus Pogonanthera in Malaya. Leaves tubes for ants, Some sp. are epiphytes and halophytes

Fruits berries or capsules

The economic value is limited. Some ones are decorative (Miconia magnifica) or furnish dye.

Rhexia

Melastoma

Miconia

Tococa lancifolia

The Vitaceae are divided into

2 ~~subfamilies~~ tribes with 11 genera and ca 680 species

The V. is a nearly a tropical or subtropical family with a great variability in forms. Australia is relatively poor in species. They prefer hot and moist localities, especially the palm[?] coastal forests.

Flowers: S. 5, P. 5, A 0+5 (haplostemonous, A before P) G 2 (also more, ovary superior) gland disc and. sometimes the flowers follow also the 4, or 3, or 6 number. Inflorescences cymose and racemic. In many cases they are transformed into tendrils (Shoot-tendrils) and the flower into cling discs. Theory if a stock is a Sympodium or a Monopodium. – The corolla drops off like a calyptra (dropping off as calyptra); pollinated by insects and also by wind.

Fruits mostly fleshy berries. Seeds very hard. (Vine leaves)

The V. are mostly climbing shrubs, but we find also upright shrubs, sometimes nearly tree like, others even have fleshy, swollen stems in which water is stored.

Some of the Vitis spec are the most important and oldest economic pl. Vitis vinifera – Phylloxera louse. + Am spec.

Vitis vinifera (Old W.) V. Labrusca L. (N. Am.)

Quinaria quinquefolia (L.) Koehne, wild Vine (East N. Canada – to Fla

Ampelopsis cordata (Va – Fla)

Cissus cactiformis. Parasites. 250 Cissus spec.

" Currori Hook f. South Africa with fleshy stem.

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the left turning la- close, is a harmless and valuable food. Yes, there is a bacillus which in the lactic acid fermentation of cane-sugar produces only the optic left turning left-lactic-acid but not the right-lactic-acid: The Bacillus acidi laevulactici! With medicinals also the double carbon bounds play a great part in their reaction, yes, it is known from vital colorings that in the living cell acid and basic substances may exist alongside each other. Driesch showed that when in very early stages, eggs of sea-urchins are divided in half, not half individuals but two smaller ones, each a whole and complete sea-urchin is formed. He shows the faculty of steering of the living in such manner that in one instance, from a certain group of cells, an organ may beformed, in another instance however, the same group of cells may form an entire animal. We know today, that this is possible only when all cells are still embrionic and before division of labor had taken place. And we know today, at what point this starts. This question however is of great importance for the creation of identical or "uniovulate", "one-celled" twins, which provide us with a vehicle for research into human heredity. What regulates the cooperation of the innersecretoric glands and of the hormones, produced by them in the human and animal body?

This is but a very small selection of examples. Are these all caused by materially fixed genes? And then, the many properties of character, the residues of memory in our soul and so many other things yet to be determined by means of substance? No doubt over the question that life's phenomena are connected with processes of chemical and physical nature, but what causes the order in their course, an order without which life is not possible? There appears ever again the "Ignorabimus" of Dubois-Reymond! Doubtlessly it is an erroneous hope if one believes sooner or later to be able to solve life's riddle by chemistry and physics.

But simpler, less tangible, facts may be brought up. It is known that chemical combinations which are contained in food and which have equal molecular weight pass through the intestinal wall at different states of speed, yes, that even the intestinal wall makes selektions. Even the amoeba, this naked little lump of albumen, already choses between digestible and indigestible objects. Even this small unicellular animalcule is "animated", provided with a "soul", and our own "soul" which we identify with consciousness is only a "soul", magnified to monstrous/.-

Nature labors with entirely different faculties, and let us say "much more elegantly" than we humans with our technical means. When we desire to bind nitrogen of the air into salts, nitrates, or other nitrogen-compounds, for instance for fertilizers, we need large apparata. The Nitrogen-Bacterias which for example live on the roots of Leguminosae and there produce root-tubercles, do the same as our apparata: They bind the nitrogen and enable the so-called "green-manuring" when the Leguminosae are ploughed into the soil. The dissolution of a herring in the retort causes the chemist great difficulties. In our stomach however, it is digested in a few hours. It may be briefly pointed out that this is due to the secretion of specific gastic juices which are already produced at the very sight of food. We must eat with appetite! Otherwise the gastic juices will not function and the food will be "indigestible". In digestion we eliminate foreign albumen and construct albumen pecular to our own type. These are all life processes.- The optical configuration of substances plays a great part. The chemical combination, turning the level of polarized light to the right react differently from that which those turns left. Right-Nicotine is much more toxic than Left-Nicotine. Right-grape-sugar, dextrose, is very detremental to diabetics while fruit-sugar,

The flowers of the orchids are iflucnced by the gravity in that way that the labellum, We speak of a resupination of the flowers.
the landing place for pollinating insects is always turned below. There are only a few exceptions of this rule. But also the whole inflorescences may grow positve geotropic. We see this in Stanopea tigrina. The inflorescences appear in Summer below the plant. They have a wonderful vanillelike smell and look as they would be made of wax. The few photos I showed you of orchids demonstrate the tremendous variability of the flowers in this family. Megaclinium may give a proof of the fact that even the inflorescence-axis may attract pollinating visitors. Therewith the the flowers are small and always only one flower blooms. The Munich Botanical Garden had a large Orchid-Nursery

2.

Prof. Walter Kupper, Director of the Garden, responsible for greenhouses and outdoorgarden, a colaborator of Goebel, was interested most in Orchids and Cacti. He mad cross-pollinations and raised the plants following the metod of Burgeff, once professor in Nymphenburg. I mean

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grapesugar-Agar. The Plants were kept mostly in Sphagnum Moss with some Polypodium
There were large water tanks for the moisture of the air in these houses.
or other fern roots. Between the two orchidhouses was pavillon for plants demanding a
higher temperature. Here were raised different Nepenthes species, these carnivorous plants, catching insects like our pitcherplants. The possess digesting juices in the pitcher, produced already before opening; the cover, once open, does not close anymore. In this house
epiphytic of the East Indies
are very interesting plants, I mention Hydnum and Myrmecodia two Rubiaceae living in Symbiosis with ants. I show you 2 extreme epiphytes Dischidia Rafflesiana and Vidalii, memebrs of the Asclepiadaceae, the Milkweed-Family. They have saclike leaf-organs beside normal leaves
into
which produce moist air inside and which an adventive root grows. In these leafsacs is detritus also and they are ihabted by ants. in this way the plants get food and enough moisture for their life. They are growing very high in the h[illegible] (in Nyphenbugr below the glass-roof), because they need much light. 2 other photos show Hoya Darwinii Loher, close related to the Waxflower Hoya carnosa. It makes also pitcher-leaves. This extremely rare plant came 1911 to Nymphenburg; the photos were taken 1939 and 40; you may see that the plant is healthy. The name is wrong; this happens sametime ; Prof. Merrill gave me the right name when I came to this countr[illegible]

Before we enter the following sidehouses we watch a little the second part of the middle hall. It has a hight of 18 m and contains taller plants, eppepically the palms. The house is not so high as other houses, or as our Horticultural Hall in Phila. Goebel

was right when he told: A lower palm shows not more than a taller one. I high greenhouse needs only more heating material. We have in this house really tropical views (Phots) The Pandanus utilis on the left side shows the rootcaps of the propproots very well. In this house were palms, Ficus Roxburgii, showing Gauliflory, Ceropegia peltata, the ant[illegible] containing [illegible] of the Moraceae of the American tropics, Brownea grandiceps, the Legume, which we have also in the Horticultural Hall. The interesting American walls were covered with porous limestone tuffa and grown with different Philodendron species which sent their aerial roots to the bottom. There was Trevesia, the Araliaceae with the beautiful leaves, Carludovica species, close related to the palms. The leaves of some species, especially palmata furnishes the material for the "Panama Hats". These roots branche only when they rich the soil. I gave only a few names. [illegible]

The next sidehouse contained tropical economic plants "Tropische Nutzpflanzen". We saw rubberplants like Hevea brasiliensis, Manihot glaziovii, Drugplants, Cassia Sennae and [illegible] - Fistula, Tamarindus, Arachis Hypogaea, our Peanut, Caesalpinea Sappan, the Brazil Wood, tropical Fruits, Pinapple, Mangostane, Papaya and many species of Bananas. Among these wild Bananas with seed containing, not edable fruits, Musa textilis, furnishing "Manila Hemp". We saw Sanseveria Ceylanica and Agave Sisalana, important fiberplants, Old- and New World Cotton plants, Sugar Cane and many others. Very conspiculous plants were the specimens of Musa Cavendish i, the Chinese Banana, one of the Banana plants which does not grow so tall as Musa Sapinetum the [illegible] mo[illegible] important Banana. Therefore it easier to watch. The next 4 Photos will show the [illegible] growth of our edable bananas. The plant is a tuber plant, not as our potatoe in which the the tuber is used up every year and is replaced by new ones. The banana tuber is very large, has many growth points. Each grwth point, each "eye" produces a pseudostem, appearing over the ground. This pseudostem consists only of the leaf subterranean and sheaths, the enlarged stalks of the leaves. They are ordered in spirals. After a while the growthpoint produces on a long thin stalk the inflorescence with the banana flowers, giving later on the bananas we eat. The inflorescence is included by bracts; it has to move through the pseudostem and to press the leafsheaths aside. The first appearance shows Photo # 1. When the inflorescence is out of the stem the bracts turn back and shortly afterwards they drop off. You see the banana flowers. They show a inferior green ovary on the tip bearing the flower. Goebel spoke little respotful of this important foodplant He said it has a "Schwindelfrucht" a fruit, when I will translate it. And he

eriopetala (the specimen cam from Hamburg).Only once a young viviparous germ plant developed,droped off and continued to grow.I photographed the whole process,and have lantern slides here in my collection.Aegiceras was brought to us by Wilhelm Troll in 1930.It had every year its white flowers and the viviparous germ plants with the turned hypocotyle (already known to the ancient Greeks).

Now back to yourbook.I spoke a few weeks ago Dr.Merrill here in Phila.He is also quite enthusiastic of your new book!It is so wonderful that you made your journey in an advanced age.It is the privilege of botanists that they reach a high age.Goebel was 70 years old when he went for the last time again to Buitenzorg and Tjibodas.It was in 1925.The result of his stay on the latter place was a work on lichens which impressed him so much there (Goebel:"Ein Beitrag zur Biologie der Flechten",Annales du Jardin Botanique de Buitenzorg,vol. 36.pag.45).Goebel died when he was 78 following an accident,immediately after having finished the last volume of the last editicu of his "Organographie".Radlkofer was with 96 years still quite well and working on his beloved Sapindaceae.So,dear Dr.Fairchild,we may expect still many books of you!

I know by name Drs. van Leuwen and Treub quite well.We had in Nymphenbur the "Annales du Jardin Botanique de Buitenzorg".The Balanophoraceae which you mentions we had in "my" museum,preserved in alcohol.Unfortunately all parasitic plants contain so many tanin stuffs which dye the liquid dark,so we had to replace the latter for several times a year.From Ammani,that former German tropical research institute in Africa,and also from all former German colonies,we had specimens in the exhibits.The problem,if science should work for more or less practical purpose, or only for science itself,was discussed during the meeting of the Philosophical Society last fall.I confess myself to the latter ideal!Take Goebel's "Organographie". It has no practical,but a tremendous scientific value!- You mentions several times the ant plant Hydnophytum and bring a photography of an anormal growth of this Rubiaceae.We had this plant in our exhibits in alcohol,and in the greenhouses besides Hydnophytum,Myrmecodia was cultivated.The plants grew quite well.Myrmecodia

seminated itself. Probably ants in the greenhouse dispersed the seeds. One of our students was working on the problem, if the ants are necessary or not. I believe his work was published in one of the volumes of "Flora" You find a very good description in Troll's book "Vergleichende Morphologie der höheren Pflanzen", Berlin 1937 - 38, a very good book. It is available here in the Academy of Natural Sciences. - I had in the museum mangrove roots of the Troll journey to Amboina and Palawan in 1929/30 (alcohol material); they were overgrown by little, feather like epiphytic red algay of a very dark color. Have you observed the same on your journey? Happens the same also in the Western Mangrove? Are you familiar with Troll's theory of the purpose of the negative geotropic growing aerial roots, like in Sonneratia, or Avicennia? - You name one of the chapters in your book : "The Fable of a Tree Climbing Crab". The story of Birgus latro seems to be no fable. I read still in Germany in a scientific magazine (I believe it was published in 1936 in Halle or Erfurt), a long article about this animal. We had in the zoological exhibits a huge specimen, preserved for many years in alcohol. The description told the adaptation of the crab to the coconut. Birgus latro was also considered as a hint that the coconut originates from Asia. I heared in Honolulu that the crab was introduced to the Hawayan Islands on account of the good taste! - The use of the larvas of ants for weaving is mentioned in Swingle's article in one of the last issues of "Asia". The Chinese use these ants in their fight against vermins. - Gnetum Gnemon we had, of course in our museum.

One personal thing in your book is so nice. When you and Mrs. Fairchild were in the danger of the taifoon, how Mrs. Fairchild came to you. When our life is really in danger - I was in the concentration camp in Dachau - then we forget everything else, and are thinking only to survive!

Dear Dr. Fairchild, please excuse my long letter. With scientists it is always dangerous. I forget to mention the most interesting booklets "War Background Studies", published by the Smithonian Institution in Washington DC. I think you are familiar with them. Today I recived # 18, "Peoples of India". But now I must finish my letter. If you would be so kind to answer my different questions, I would be very happy!

I remain respectfully yours

Of the history of tea.

In the Journal of the American Oriental Society, March 15th 1942, Dr, Derk Bodde, University of Pennsylvania, writes: "The first description of tea seems to be that made Kuo P'o (276 - 324 A.D.): The plant is small like the chih - tzu (Gardenia florida). It grows [illegible] leaves in the winter time which may be boiled to make a beverage for drinking. Today those that are gathered early are called t'u (i.e. the present day ch'a), while those that are gathered late are called ming. Another name for them is ch'uan. The people of Shu (present Szechuan) call them "bitter t'u".

It is a great problem that Marco Polo who was in China during the 13th century, does not say anything about tea. This is very strange because he discribes so many things, the use of sesam, coal, petroleum and others, but he says nothing about drinking of tea. This problem is also mentioned by Bretschneider (Botanicon Sinicum) and Berthold Laufer (sinica-Iranica). We have earlier Chinese reports of tea beverages but we don't know if really Thea sinensis, native in Assam, was used. The last phrase in the first mentioned notice: "The people of Shu call it "bitter t'u" may be a hint that in this case Thea sinensis was meant. The leaves have indeed a bitter taste; we observe this when we let the littel tea bag too long in the hot water.

Much more exact is the description by the Arabian trader Suleyman whose travel report (851 A.D.) was verified by the Mesopotamian Geographer Abu-Zaid of Ziraf. It reads as follows: "Among the things which China produces in abundance the king has reserved to himself the monopoly on salt and on a herb, dried in a certain manner, which, after drawing in hot water, the Chinese drink. This dried herb is sold in all cities for immense sums. It is called "sakh"; this plant has more leaves than clover, it smells somewhat stronger than this, however has a bitter taste. In order to prepare tea, water is at first boiled and is then poured over this herb. This pouring serves as an antidote against every indisposition."

When we compare this with the first description, we may constate a great progress in the use of tea. This progress consists in the fact that the leaves are not boiled anymore but poored by hot water.

Especially interesting is that Sulayman mentions the stimulating function of the caffein

"Tea is an antidote against every indisposition"The caffein was also the first cause of the use of coffe. Originally the beverage was prepared by extraction of the unroasted seeds with hot water or by cooking with this. Thereby is to say that the word "Coffee-bean" has nothing to do with "bean" It originates from the Abyssinian word for the plant "bun". Coffee is native in the Province Kaffa in Soth-Abyssinia. The arome which we appreciate in drinking coffee like in cocoa develops finaly during the process of roasting. It is independent of the presence of caffein and remains also if we drink "caffein-free" Coffee.

Seedless Fruits.

There is no land in which seedless fruits - the scientific name is "parthenocarpous fruits" - are better known and used than in the United States. Luther Burbank in California cultivated seedless fruits to an extend which no one had ever thought possible. But these will not be discussed here. Seedlessness in fruits, or fruits with atropied seeds occur in many cases elsewhere.

In general we know that fruits develop after fertilisation of ovules in the ovaries by the pollen. Up to a certain size and stage the development of the fruits takes place independently of pollination in nearly every plant, but afterwards these fruits stop growing and drop off if they have not been pollinated. The parthenocarpous fruits however, continue to grow to maturity like normal fruits.

Here, I will not speak of cases in which parthenocarpy is a result of the fact that a reduction of the number of chromosomes in the formation of the gametes does not take place, as for example in the Dandelion. I will give other examples. I will speak of the maple family, which I myself have studied and observed, of the cucumber and of the banana and also discuss the question of whether seedlessness in this plant may be a result of the cultivation of many thousands of years, as some scientists suppose.

We have in this country indigenous maple species and such ones in cultivation as are native on the "other side", but which are completely acclimatized. We find in the parks of Philadelphia and in its surrounding amongst others the Silvermaple (Acer saccharinum), the Red-Maple (Acer rubrum), the Sugar-Maple (Acer saccharum) and also the the Ashleaved Maple or Ash-Maple (Acer Negundo). These trees are all pollinated by wind, whilst in the Norway-Maple (Acer platanoides) and in the Sycomore-Maple (Acer Pseudoplatanus), native in Europe, the pollen is transported by insects. (The same happens also in the

native Swamp-Maple Acer pennsylvanicum).The Silver-Maple flowers in the middle of April.A short time later we see the small wings of the young fruits;they develop without any pollination,and when they have reached a certain size,further development stops and they drop off, if no pollination has taken place.Some weeks later,larger unripe fruits which,we are sure,originate from pollinated ovaries an which also contain fertilized ovules,drop off again in a relatively high number.What is the reason for this phenomen which we find also in other trees,including our fruit trees as apple trees,pear trees?Are the trees not able to nurrish so many fruits?We know that during the ripening of the fruits in many cases the growth of the flowers for the following year (in the buds) takes place!We have no answer to this question! - In another way,the fruits of the Ash-Maple develop independently of pollination;if this has not taken place,then the fruit is without seed,it is empty.The maple fruits are dry fruits,but in the Cucumber-and also in the Papaya-Plant fleshy fruits develop if they are cultivated in hothouses where pollinating insects are not present.Here we have parthenocarpous fruits.

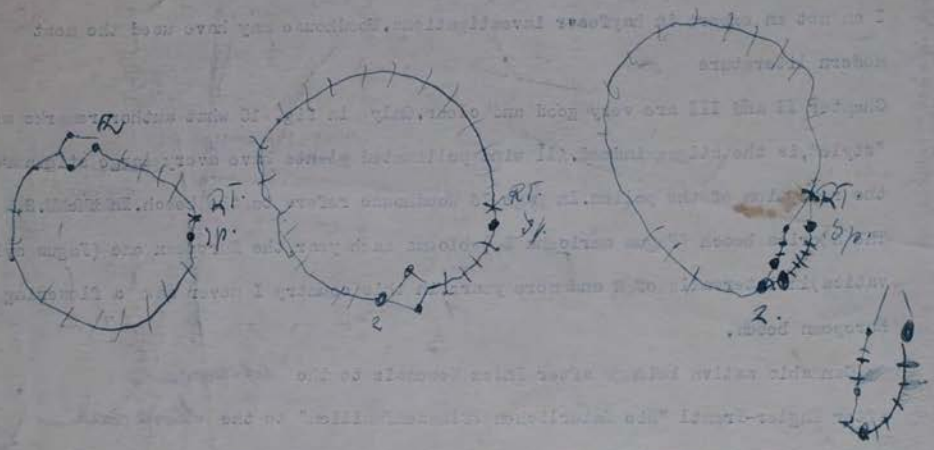
Besides the above-mentioned Dandelion,these cases are not anormal process in the life of those plants.In contrast to that in the banana which we eat,we find is as an usual occurence.Here the ovules are atriphied;the fruits develop a sweet pulp without seeds.We know that the banana has been cultivated for an unimaginably long time and now many scientist think the seedlessness has its cause in this fact. I do not want to subscribe to this assumption;on the contrary,the seedlessness of the banana fruit was perhaps the reason for its cultivation;undoubtedly it is a very old characteristic of the plant. One of the best proofs of this is the history of the date-culture. The date-palm tree is a cultivated plant which was already known to the Sumerians,the oldest cultural people we know,living in lower Meso-

The botanist cannot agree with the first sentence of chapter 1. To speak of a "purpose" is very dangerous matter in natural sciences. About "Zweckmässigkeit in der Natur" the philosophers have written very much. Besides this there are many plants which produce seeds after self pollination and even with cleistogamous flowers. Why the author uses as an example in fig. 1 a buttercap in which the conspicuous leaves are nectar leaves and where a separation between petals and sepals is not possible, I do no understand. All botanical textbooks contain good drawings of an ideal flower. Interesting is what Woodhouse writes about imperfect entomophilous and of amphiphilous flowers (pag. 4). The drying out of the pollen glue substances (Pollenklebstoffe), which are considered as the characteristics of animal pollination, is responsible for the transition of an animal pollinated plant to a wind pollinated one. The wind can only carry away a dry pollen from the anther. Here we know very little. What anemophilous flowers is concerned, we distinguish between a primary wind pollination (Gymnosperms) and a secundary one to which the wind pollinated Angiospermae belong. Herein some relics of the former insect pollination may persist.. E.g. in the ragweed pollen the spiny surface of the pollen grains. Very good are the paragraphs : "What causes hayfever and Hayfever toxity" I am not an expert in hayfever investigations. Woodhouse may have used the most modern literature

Chapter II and III are very good and clear. Only in fig. 15 what author remarks as "style", is the stigma indeed. All wind pollinated plants have very large stigma for the reception of the pollen. In page 76 Woodhouse refers to the beech. The America beech (Fagus americana L.) blooms each year, the European one (Fagus silvatica) in intervalls of 2 and more years. in this country I never saw a flowering European beech.

Cannabis sativa belongs after Index Kewensis to the Urticaceae after Engler-Prantl "Die Naturlichen Pflanzenfamilien" to the Moraceae A family "Cannabinaceae" is unknown to me. In fig. 68 the significance "seed" is - I suppose - for the layman; it is indeed a cup, formed by the involucrum, containing two oneseeded fruits. it is a part of the shoot and not of the fruit themselves.

These shortcomings are only for the botanist. For the physycian they are of secundary significance. For him is more important, to lern the technique how investigations in hayfever are made on the patient. The physycian may lern a great deal of this very interesting book.



from a distance of 30cm. The photos show the young leaves with very broad winged petioles and the dead leaves around originating from last year. I got a similar picture about 4 weeks later of the Oceanville plants. On my April visit I observed a locality where there was a fire in winter. The Dionaea was not hurt at all, and in June I was on such a place again. The grass was back and the Dionaea was abundantly blooming thogh the soil showed signs of a previous fire. The most successful visit was then in June 6, 1945. We visited the old place on the road, passing Cape Fear Mill. But by continuing the ride on that road, we came to a place which is owned by a Mr. Newton. This was also a grass savannah, but very wet, and the people were just training the land. It was very muddy there and here grew the Dionaea in such quantities that one had to be careful, not to step upon them. The plants wer partly blooming and many plants were there which were not in a blooming stage; perhaps they had not reached the age in which the plants come to bloom. The blooming time is around the first Sunday in June. I shall receive fruiting plants which I also saw last year in July, and in September I hope to be there again.

I observed two facts what the leaves are concerned: The width of the winges of the petioles and the coloration of the traps. There is - as we shall see later - a labor division in the leaf. The subterranean leafbase is used for the storage of food - starch - the petiole is assimilating organ, and the blade is than the organ for catching the prey.. The petioles of the leaves which appear in early spring, when the the inflorecence stalk is still quite short, are very broad winged. Their development is much ahed incomparison to the development of the trap the development of which seems to be somewhat delayed. It seems to me that the plants develops first the assimilating apparatus and much later the trap. Later in the season especially around flowering time, the petioles become elongated and the width of the wings has very much decreased. The traps themselves the development of which remains delayed in c comparison to the petioles reach then a relatively large size. (3 : 4 cm in length). The interior of the trap, which is indeed the upperside of the leaf, is read colored. This coloration increases with the age of the leaf an can become dark brigue red. If ultraviolet light has t to do with this coloration. I do not know; in greenhouses I did not see this intensity of the red coloration. The plants are hidden in the grass and the red coloration may attract they

not observe. What the structure of the flower etc. is concerned I have to refer of Cornelia Marschall Smith "Develoment of Dionaea muscipula I. Flower and seed, Botanical Gazette # 87, p. 507 - 530, 1929 where a great deal of microscopic work is done. My work is mainly macroscopic or what can be seen in the binocular microscope with a magnification of about 120. Smith observed the tetrade pollen and studied its development, and also the tube style and tube stigma, but she also did not oberservehow the pollentube reaches the ovules, this means if the go down along the surface of the style tube wall, The protandry she did not mention. - The plants at home started much earlier with blooming and many facts which I observed later on the flowering wildflowers, I could see at home. I even received seeds after pollinating with a brush. I have to report on them the following facts: On March 21, the December plants (collected in December 27) which had developed a closter of leaves started to bloom. I kept the plants at home directly behind the window, (South side with several hours sunshine), until the mid of March I kept the plants under a glass bell, but then I had to take the latter off on account of the length of the inflorescence stalks. (The Plants grow much better under a glass bell, because the air in a room is realtively dry. I broght in June 6, 49 again plants to my room and keep them under glass) The first flower unfolded on March 22. The next day another flower unfolded. On March 24, The stigma of the first flower had reached the female stage. After the anthesis the 5 petals curl inward and become brown; the 5 green sepals persist. The greenhouse plants did not produce seeds. The seed coat is very thick and the germination takes a long time. The surface of the pollengrains is somewhat spiny.

We proceed now to the leaves in our description of the epiterrestrial parts of the plant. The leaves are, of course the most interesting parts of the plants, because their blade forms the valve trap for catching the prey. Here we find the most abundant literatue going back to Charles Darwin and to earlier writers. We already have mentioned the fact, that on Dionaea insectivory was discovered.. Popular articles appear from time to time, often with very good photos. The June issue 1949 of the Magazine of the American Museum of Natural History contains such an article. We have to describe the leaves as an entity, composed - as every leaf - of leaf base, petiole and blade. The leaf base is already sub-

Plants are best protected in th ground.The aerial parts die off and in form of subterranean rhizomes,tubers and bulbs these herbs pass the winter.Thereby these organs are mostly assigned to a fixed depth location which is already retained.In the subterranean organs nourishing substances - sugar and starch - are stored (they are often used as human food) which may be mobilized very quickly when favorable conditions of life are present.The plants frequently have to hurry because these conditions often exist only for a short time (for instance,if the grass grows high).Here also a similarity with desert plants.Particularly favorable are the conditions in bulbs, as we know from the kitchen-onion.A disc-shaped subterranean shoot (bulbs are also fixed to a certain depth location which is always maintained by the shrinking of contractile roots),the bulb-axis,bears large, subterranean leaves,the bulb scales.The outside ones are dry-membranaceous, a protection for the inner,juicy fleshy scales,in which,besides water,sugar and other reserve substances are stored.Bulbs plants are particularly frequent in steppes and deserts and also many of our spring plants,like snow-drops,Tulips,hyacinths which we buy in flower-shops belong to them. So much for herbs.

How is it now with woody plants,with trees and shrubs?Excluding conifers - evergreens - these have indeed an entirely different appearance in winter than in summer.They all pass through a winter rest period.Also the "evergreens" ,spruces firs,pines,yews don't assimilate during the winter-cold period.Foliage-trees and -shrubs get rid of their leaf-adornment in fall,especially magnificent in the north-eastern parts of this country. There are many among them which assume a wonderful red,as Dogwood,Sassafras,Red Maple,Staghorn Sumach and others.Afterwards the leaves separate themselves with their petioles and storms carry them away.This phenomenon is a process of life;on dead branches the foliage dries and does not drop off.Autumnal defoliation which to us appears so mournful and reminds us of the transitoriness of life,is for trees and shrubs an absolute necessity.By defoliation, emission of water which in greatest degree takes place

One single plant had produced 511,208 seeds. This is easy to understand, because the stem which reaches a length of nearly 1 m, possess a great number of fruits which contain many, small seeds. The distribution of this plant is increased by the fact that pieces of the woody, brittle shoot with fruits break off and are rolled on the floor by wind as a humble weed and thereby also seeds were distributed. We have to talk afterwards of this method or weed travelling. The plants which we have chosen here as examples for the production of a great quantity of seeds, are today cosmopolites. This means spread over the entire world.

As with the cultivated plants, in some cases we can give the time of their travelling, in other cases we are not able to do this. So, it is also in the interesting group of archaeophytes, these weeds which grow only in cereal fields. They imigrated with the cereals in prehistoric times. They can be observed very well in the European cereal fields. We find in European rye fields among others, always the red poppy (Papaver Rhoeas), the blue corn-flower*(Centaurea Cyanos) and the purple Corn-cockle (Agrostemma githago). In oat fields we see as a characteristic archaeophyte (Galeopsis Tetrahit). and related species). These Wildflowers in Europe disappear again after a few seasons if these cereals are not more raised on that ground. The fruits and seeds of these archaeophytes are always among the named cereal grains. To our country came only the Corn-cockle as a wildflower. It is an interesting question wether in our cornfields, in Zea Mays, would be also such archaeophytes. Mays is the only cereal, native in the New World. Are, in our cornfields also weeds which are native in the home land of our corn and wandered with it? The big and smooth grains (perhaps) are easier to keep clean from weeds.

How become fruits and seeds of the weeds distributed? How travels the weeds with fruits and seeds? Nearly every plant has the tendency to spread. There are two ways. The first is that the plants sling away its fruits or seeds. We call this self-distribution or "autochory". The other possibility is that the plants use foreign means for this purpose, wind, water, animals. In this case we speak of "allochory". With animals, especially with birds, the plants may travel very far; the "zoochory"

is most important. The fruits and seeds are either eaten (they leave the animal with the excrements), or they are fastened in the hair or feather cloth of the animals. We speak in this case of "epizoic" in the possibility, first mentioned, of endozoic distribution. If we walk through the streets of Philadelphia and observe weeds even between the paving stones, or if we walk through forest and field and especially the dunes on our shores (even in New York) and have a real fruit- and seeds collection in our cloth, than we may understand what we meant with "voluntary travels" of plants. If we have to put out the prickled fruits of the sandburgrass, then we observe "the intention" of their travelling. The wool of sheep contains many fruits and seeds and by the wool trade these are distributed. The travels with wind and water are not less important. Air born fruits and seeds may fly as "parachutists" (Dandelion), or the hair cloth makes it possible that they are moved by wind (Milkweed, Cotton), they may have the shape of a propeller and be distributed as "screw-flyer" like the maple fruits. And if they cannot fly then they may be rolled on the floor as a tumble weed. With water very far travels are possible, especially on the oceans. If the cocoa nut is distributed first by man, we know a tropic legume the pods of which (or pieces) come by the ocean streams until the polar zones. Naturally germination is not possible there. (Entada scandens). These are the great journeys of weeds therewith in some cases certain "streets", "peregrinating-streets", are to observe.

The asexual distribution is more of local importance compared with the sexual one. It is most important for the weeds' fight for their "life room". We have aerial runners (Potentilla), stolones, subterranean runners (Achillea millefolium) and one of the most interesting forms, and characteristic for weeds, are the "rootborne" shoots, this means (shoots, deriving from roots as it is in Linaria vulgaris or Euphorbia Cyparissias and others). The thin roots, not deep below the surface of the floor, produce shoots. These "rootborne" shoots have are still problems for the botanist.

The word "weed" is, as I told, an anthropocentric idea; it is also a relative word. A plant which is in Europe a "weed", in our country may be very valuable and may be cultivated. Many European drugs originated from plants which are "weeds"

I believe that in these 9 divisions a total view may be had of the entire plant kingdom.Here is also the opportunity to show the products of this country and its interesting plants.

It cannot be avoided that the one or other specimen must be shown twice,e.g. cactus plants in "metamorphosis of shoot" and in "xerophytes".

Besides the called literature (Engler-Prantl:"Die natürlichen Pflanzenfamilien" 1st and 2nd edition,Index Kewensis and Londonensis),for the systematic division, I used especially for the"economoc plants" the following books:"Handwörterbuch der Naturwissenschaften",2nd edition (1935)Elisabeth Schiemann "Die Entstehung der Kulturpflanzen"(Handbuch der Vererbungswissenschaften,Vol3(1933),L.Reinhardt "Geschichte der Kulturpflanzen",Wilhelm Heydt "Die Geschichte des Levantehandels im Mittelalter"(Stuttgart 1879),Oet-Rassow:"Lehrbuch der chemischen Technologie" Berlin 1938,and many periodicals which I found.I considered the books of Goebel and Troll-Halle and also many American und English and French books and periodicals

In "economic Botany" matters of History of Culture or of Chemical Technology should alsobe used.I would show this by [redacted] three examples:In the texts of rubber and of coffee and tea.I

"Rubber" is made from raw cautchouc (cautchouc is an Indian word),mixed with the organic substances Balata and Factis (= oxydated linseed-oil or linoxyn) and the inorganic materials as soot or Antimonpentasulfid,or Zincum-oxyd,Baryte etc.,and sulphur powder.The raw cautchouc is first cleaned and softened by rolling with hot cylindrical wheels.Afterwards it is mixed with the other substances and thoroughly kneaded.Then [redacted] objects are molded from this mixture and heated in boilers at a temperature of 140° C, for several hours.Thereby vulcanisation - an invention of Goodyear-New Haven,Conn, about 80 years ago - takes place:The rubber becomes elastic.For making tires,the rubber mixture is poured over a cotton-tissue.The best raw cautchouc originates from the Euphorbiaceae Hevea brasiliensis L. and is imported from Brasil or from the Duch East-Indian Islands([redacted] cautchouc plantations).The raw cautchouc is obtained by slashing the trees and coagulating the gathered milky juice.This coagulation is caused either by smoke (in this case the raw cautchouc becomes brown),or by chemicals (here it becomes white).The finished rubber is colored red by its content of Antimonpentasulfid,white by Zincum-oxyd,or black by soot.Besides the natural c cautchouc,synthetic [redacted] cautchouc also is used."

Plants travel.

The higher land plants, the flowering plants, and only these will be considered here - as a rule, are rooted fast in the soil and - in contrast to animals - they are not able to move from their place; they are not capable of "locomotion". In contrast to this fact plants have made great journeys, not small trips, no, really great journeys accross countries and oceans! In this article we shall talk about this phenomenon. Because man has played such a tremendous part on these travels of plants we have to be more "anthropocentric" than generally it is usual in natural science. To qualify a plant as a "weed" (we have to discuss these later on), is an anthropocentric viewpoint. The "weeds" also have travelled across countries and seas and settled where they have found conditions, suitable for their existence. Today we find "Americans" in Europe and "plant emigrants" from Europe in our country completely at home.

We said that the plants are rooted fast in the soil; well, how is it possible, then, that they can travel? We answer this question as follows: Fruits and seeds leave the mother-plant and, before germination, before the roots have anchored them in the soil, they are very well able to travel. But not only in this way alone. The plants may even travel by means of the subterranean organs in cases where fruits and seeds are usually not suitable for propagation. These subterranean organs as tubers, bulbs etc., are generally rich in starch or sugar, or contain alkaloids or remedies against deseases. Thus they are valuable for man. He digs them out and takes them with him on his wanderings. The potato is the best example. In the shape of its tubers this plant left its home in the mountain regions of Peru, Bolivia and Equador where there is a moderate climate, and with the Indians, under the name "pappas" - used still today for this food in Mexico - it already spread out in different varieties of cultivation. It travelled with the white man to Europe and from Ireland, where first, in the Old World it became a general food, it came back to our country as "Irish potato". Not less romantic is the journey to the seedless banana*. If man travelled in earlier time he took his native food plants with him in the form of fruits, seeds or tubers, bulbs and roots. It is reported that the Phenicians when they

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*"Fruit of the Wise Man" "Frontiers" April 1942.

undertook their famous journey round Africa at the time of the Pharaoh Necho* they took with them their native wheat**. In South-Africa they stopped and sowed their cereal. The relative short time until harvest, they used for reparing their ships. The harvest gave them food for the rest of their trip. When 120 B.C. the Chinese general Chang Ch'ien returned from the West to his Emperor Wu-ti of the Older Han Dynasty he brought with him the grape - the Chinese name for it is "pu tao"; it reminds still today to the Greek word botrys" - . It is supposed that the European-Asiatic grape would originate from the region of the Caspian Sea. Besides the grape he introduced to China Alfalfa, Medicago sativa, the most important fodder for the "blood sweating horse". It may be mentioned that on that occasion the Chinese first obtained their knowledge of countries, located on the Mediterranian Sea, from people whom they called "tat-sin"***. When Columbus sailed towards the Western Hemisphere, he also took wheat with him. It may also be mentioned that the Spaniards had brought to the "New World" cattle and the horse, the horse which enabled the Indians to enter the praries and to hunt the buffalo.

Now, we intend to talk about how the plants travelled with man. Seen from the standpoint of the plant the journeys were partly voluntary, partly unvoluntary. In the same manner as in the animal kingdom, we may also, in the plant world, distinguish between "culture followers" and "culture fugitives". With these words we mean plants or animals that follow the culture of man, or which flee, which run away from it. From how many living things has the white man taken away the conditions of existence! If the customs of life of an animal do not agree with the civilisation of man, then it has to retire to an area where it may still live, and, when this is not possible, then it must die out. This is the end! If an animal can no longer find food, or is no more able to raise issue then it must disappear from the earth, even if it is only the presence of civilized man and the noise he makes which cause the animal to pine away. If we want to prevent this we have

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* 596 - 594 B.C. It is the time of Nabuchadnezar who vainquished Necho, It is the time of the Babylonian Exile!

** In the antiquity in the Near East the main cereal was Triticum dicoccum, Emmer, not our present wheat, Triticum vulgare.

*** In the same manner as alfalfa followed the horse, the mulberry (Morus alba L.) followed the silkworm which takes its leaves as a food.

and bud scales, intermediary forms which drop off with the bud scales. All bud scales are cast off when they are not needed any more. The protective organs for the bud need not always be the transformed leaves themselves. In the Elm-, Beech- and in the Tulip-Trees they are formed by the stipulae. Especially interesting is the situation in the Dogwood. The inflorescences are protected in winter by 4 bud scale like bracteal leaves. In springtime their basal parts begin to grow and to become the attractive apparatus for the inflorescences: the 4 white or pink leaves which we see on the flowering shrubs. The part of this bracteal leaves which acted in winter as a bud covering, cannot grow any more; it is the black spot on the top of these leaves. We have a double changing of a function. At first the leaf has instead of assimilating to protect the inflorescence and afterwards to attract pollinating insects for the flowers. Therefore it also changes its aspect.

Few words more about the sclerophyllous plants in our region. - Sclerophyllous plants we also find in dry countries - In this catogory we think of some Rhododendron species which does not lose its hard, coriageous leaves, as Laurel (Kalmia latifolia) or Rhododendron Catabiense. The latter has the pecularity to bring the leaves into a so-called "Frost-position" when the temperature drops below zero. Thereby the leaves take a vertical orientation and the blades are rolled in, the upperside outwards. When the temperature increases this phenomenon disappears again.

We will conclude our article by considering the aquatic plants. Naturally they are only herbaceous. Those which live submerged in non-freezing springs or brooks are very little influenced by winter. Water plants, the life of which, however, takes place on the surface of lakes or ponds or in their proximity, pass the winter at the bottom when the surface freezes. The waterlilies (Nymphaceae) have subterranean rhizomes; the leaves die in fall and decay and in spring of the following year, new ones are again sent to the surface. Other plants, particularly the free-

was right.The fruits contain only atrophied seeds;they develop also without pollination. The edable bananas are prp pagated only asexual.by the tuber.With the tuber the plant travelled at once from the tropical Asia across Africa to the New World,to the West-Indies and somewhere else.The frueits appear in double rows below a bract;collaterale accessory buds says the botanist.Only the first flowers on the inflorescence have ovaries;the later appearing flowers have also these very reduced.Therefore the inflorescence axis is cut off afterwards.This axis bears always the terminal bud.The pseudostem is herbaceous;with a strong kitchen knife you may cut through the whole stem;the bananas are the largest herbs which we know.When a pseudostem comes to fructification the growth point is used up;the whole pseudostem dies and new ones appear;you see these on the photos.A few technical matters again.As several times mentioned the plants were plant out. The beds where these tropical plants were raised were cocrete basins of a depth of about 1 m .Above the bottom were heating tubes,than above a wire screen about half a m good dark earth.In this way the plants became warmth from below.Every spring the beds were turned and planted a new.The bananas ripened mostly in November and tasted very good.This method of heating was used also for smaller plants,growing on the I will mention here especially Ginger,Zingiber officinalis,because it is kept here sometimes in flowerpots.This plant has a spreading out subterranean rhizome which sends its aerial shoots over the ground.Ginger has the peculiarity that fertile and sterile shoots alternate. But this is never to be seen when the plant is kept in pots.Other plants which were to be seen in the house were coffee and cocoa whilst tea was raised in a cooler house.I show you a photo of the cocoa tree Theobroma Cacao.The plant has small white flowers - it is a Sterculiaceae - appearing on the stem and not - as it is the rule on the young branches.We call this "cauliflory" which happens in many tropical trees.The flowers were pollinated by small tropical ants which were running around in the greenhouses.Thefuits became ripe.A want to show you in the house two interesting plants which were no economic plants:Cephaelis Mannii,a Rubiacee, and Aristolochia Goldieana, related to the Dutchmans Pipe of our gardens.Both plants are native in the tropical Africa.Cephaelis produces inflorescences on long,orange stalks which grow active to the ground.Here the white flowers are pollinated probably by ants.Aristolochia Goldieana has the largest flowers in the plant kingdom after the famous Rafflesia Arnoldi of Sumatra.The flower

here had a length of half a m and the width of the opening was 25 cm.The colors were wonderful.Outside it had a greyish green with read nerves and inside it was dark red-brown with yellow spots.I am sorry that I cannot show here photos,taken closer ore inside the flower.The bloom is really a wonder of beauty - but it smells terribly to decaying meat;it attracts for pollination carrion flies.The whole house smells in this way.The gigantic flower blooms only 24 hours.The plant is native in Central-Aftica the tropical near Fernando Po.It has tubers,ours came 1932 from Kew,and bloomed for the first time 1936.Later on it bloomed every year at the end of June and the first half of July.It passes a period of rest in winter.The flowers appear above the ground and not in the hight as it is usual in the average tropical Aristolochiaceae.

We enter now the following [illegible] which contains the large waterlilies:Euryale ferox, Victoria Regia and Victoria Cruziana,var,Trickeri.The first one is from the Old World - I have seen it in Akashi in Japan 1930 in a little lake - ,the latter are growing in old-waters of the Maranon and the [illegible] La Plata.Laotse says:"A tree which needs two arms to span its girth sprang from the tiniest shoot".This is also valid of these big waterlilies.I show you a photo of V. cruziana.It was taken in the night with artificial light because the flowers open in the night;they are night bloomers.They bloom twice.During the first evening they are white,the next morning they close and the folbw wing evening they open agagin,are pink and the next day they close again and sink below the surface of the water and ripen on the bottom.I cannot tell more about this phenomenon.The leaves have a diameter of 2 m and are able to cally an adulte person if they are protected by a Brett.The tissue of the leafes are very thin, perhaps a [illegible] mm ,but they have very bored leff veines which give the leaf their solidity.The edge is turned upright, The whole plant is very spiny a stopping of the endfoldening of the leaf.The seeds look like green peas;they are eat n by the natives as Maize del Aquqa,watermaize.In free nature thes gigantic waterplants are perennial,but in the gardens in the moderate zone they are raised annually.The seeds are kept under water.At the end of January the are planted under Water in small pots and produqe after a while a single,submerged bristle like leaf.The next [illegible] 2 leaves show the begin of the development of the leaf blade.The 3 leaf is the first m emerged swimming leaf.The photo shows such germ plants,and the following one these germ-plants in the water with the first swimming leaves;the next shows a little older stages

the fruit from falling off". Cuneiform inscriptions refer to the date-palm as male and female. If the dates were propagated by seeds, by date pits (that is, sexually), it could only be ascertained after years, when the plants had attained an age at which they were capable of flowering, whether they were male or female. Because male date-palms yield no dates, the Arabs, like the people of Mesopotamia, had a very limited interest on them, especially as they had very little space to use for cultivation. Although the date-palm - like the banana - has been propagated asexually for thousands of years, it has not lost its fertility to this day, and apart from subvarieties which the natives in these countries possess in a great number, every date has its stone.

I have told this story in a considerable detail, not only it is interesting from the botanical standpoint; it also noteworthy from the viewpoint of history of culture.

Seedlessness in fruits is a very interesting phenomen. We are able to produce parthenocarpous fruits also artificially by the use of growth-increasing substances, so called "Auxines", but we do not know scientificly very much about this subject. The natural capacity to produce parthenocarpous fruits may be latent in the plant itself. This capacity we find in different plant families, but by no means in all flowering plants. For man it may be very fortunate if it takes place. We have seedless oranges, apples, pears, raisins; the cultivation of cucumbers in hothouses is a great industry in Europe. It is only made possible by the fact that the cucumber is able to produce parthenocarpous fruits; in hothouses, the flowers are never pollinated. In other ways, the white flowers of the Vanilla-Orchid (Vanilla planifolia) must be painfully pollinated artificially by man, outside of Mexico, where it is native. Only there live the pollinating insects and without the transportation of the pollengrains (in this case an unit of them, called "pollinia") to the stigma, the plant

gets no fruits; it is not able to produce parthenocarpous fruits, and only from the fruits we can obtain the delicious Vanilla.

pot[illegible]ia, the present Iraq. One has thus a view of at least 7000 years and [illegible]om that time to the present the date-palm has been cultivated. Like many palms the date-palm is dioecious, that is, there are specimens which produce pollen only - these are the male - and others which bear only dates - these are the females. Development of dates is attained only when flowers of the latter are pollinated by pollen from the first. However one single male date-palm suffies for pollination of about 60 - 70 females. This the Babylonians knew, like the Arabs today. Date-palms have stump-deflections, offshoots at the base of the stem which are suited for asexual increase, that is to say propagation without date pits. Naturally these offshoots must have the same sex as the mother plant. This too was known to the people of Mesopotamia. They, therefore propagated the plant asexually with offshoots which they used as cuttings, and pollinated the female date flowers in order to obtain dates. Like all features of the cultivation of nutritive plants (sowing and harvesting of cereals which are connected with religious ceremonies in every race), this was related to religious conceptions of fertility. The Metropolitan Museum of Art in New York possesses sculptures with representations of an Assyrian priest holding male inflorescences over female ones. The photography of this is published by the "Courtesy of The Metropolitan Museum of Art". In the same manner as it is to be seen in this sculpture, the Arabs do it today. They hang male inflorescences in between female ones. In addition it may be metioned here that, after Alexander the Great's expedition against India, these facts were known to the Greeks. Herodotus writes (after the translation of Rawlinson (Herodotus III.. 2nd edit., vol.i., pag. 317, cited from "The Flora of the Assyrian Monuments" of Emanuel Bonavia): " The natives (of Babylonia) tie the fruit of the male palms, as they are called by the Greeks, to branches of the date-bearing palm, to let the gall-fly enter the dates and ripen them, and to prevent

- These mountains reach about 1800 m. - , are of different geological origin, and therefore of different material. Some are very old mountains, belonging to the varistic folding in the carboniferous era, and now eroded very much. Such old mountains are the Harz, and the Bohemian Forest. Other are of volcanic origine like the Eifel. We have mountains from the Triassic time, like the Keuper-Sandstone mountains on the Elbe-river, or the Jura, going from Switzerland to Middle Germany. In the highest elevation we have spruce, Picea excelsa In lower lavels oaks, Quercus Robur and Beech, Fagus silvatica, also Carpinus Betulus is dominant. All these trees give the country a lovely appearance. The forest land is indeed the comparatively original vegetation. We have only a few places with "premaeaval" forest. Such ones are in the Bohemian Forest and in parts of the Bavarian Alps. Besides these more or less cultivated forests, the "tree-communities", we have land which is used for the production of food, or for industry etc. The forest free land is used in different ways. We have Wine in especially favored regions as it is in the Rhine- and Mosel-Valley, or in the Palatinat or in Württemberg, resp. in the Main-Valley. In earlier time the cultivation of wine was much more spread out in Germany, but the product has to be spiced. This was one of the causes of the tremendous demand for spices in the Middle-ages in Germany. Wheat is cultivated in different parts of Germany for instance in the Danube-Valley around Straubung, also in East Prussia, Silesia etc. The Wheat in Bavaria was too poor inglutin, which is important in bakery. So it has always to be used with Roumanian wheat. During the last few years they raised also a variety which contained glutin enough. Also in this field the intention of autarchy. [redacted] In a part of Frankonia and Wurttemberg is raised Dinkel, a primitive variety of wheat. The scientific name of wheat is Triticum vulgaris, that of Dinkel, Triticum Spelta. It differs from wheat by the fact that the grains remain included by the glumes whilst the spike-axis breaks into pieces. Dinkelsbühl has the name of this cereal. The main cereal fo Germany is rhye. I grows on areas where the climate is too rough for raising wheat. Germany is in this field far behind Russia where different varieties are cultivated, adapted to the different conditions of existence in this vaste country. In other regions we have barley, and oats. One of the most important food is the potatoe, besides local centers, mostly raised east of the Elbe. It is a gift of America to the Old World! The same is to say of Tobaco, raised in the Palatinat, and in Baden

ne at the begin ovale swimming leaves are already roundish. In this way these primary leaves increase in size. The blades are flat spread out on the surface of the wter; in contreat to the following form of the leaves with edges turned up. When the plants have reached a certain seize - in the second half of May, the strongest plant comes into the "Victoria House". There are to raise always more specimens because the plant may dig in reserve. Until May, in Winter, the house is used for the storing of sensitive outdoor plants. We have here the Australian Acaias with their yellow flowers, Eucalyptus, but in fall also the beautiful Chrysantemum Species, later the Acaleas and alreay in March Lilacs with flowers arriving after a treatment with warm water in fall. We have here also Erica arborea, a Mediterranean little tree, already mentioned in the legend of Isis and Osiris. Of the root-wood are made the famous "Buyère Pipes". - The big waterlilies need a lot of fertilizers, including excrements of pigeons. They grow very quick and in July appear the first flowers. In Eryale ferox you may not see them because they are cleistogamous and remain mostly below the surface of the water. In this house it is very hot and moist, so it is sometimes no pleasure to go in. In late August and September with the increasing shortening of the days and the exhaustering of the soil the plants goes back rapidely; the leaves become smaller and smaller and in the first week of October they are taken out. A close picture shows Victoria Regia without water. You see the prickles, fruits, flowerbuds and may observe You see the big intercellular spaces in the leaf stalks; they are necessary for the movements of the gazes, and on the base of the leaves you may recognize the adventive roots which have to provede the tremendous leaves with accessory food for their quick growth. In the house are raised a lot of other tropical plants, as different waterlilies among them Lotos coerulea, the Aegyptian Lotos, found in TutankAmons grave. From the roof hang the big fruits of Cucurbitaceae like Benincasa cerifera or Luffa. We have here Coloquintus, Aristolochia Gigas and grandiflora, Gloriose species, Passiflora Watsoniana, Mimosa pudica and many others.

The next House contains smaller waterplants. First of all Nelumbium speciosus, the Indian Lotos." Om mani padmi hum ", O Savior in the Lotos Flower " pray the Buddhists. I have seen this wonderful plant with its umbrella like leaves and delicate pink flowers in a pond in South Manchuria. You see them in Japanese Tempelgardens in Akashi or Kyoto but also together with Colocasia antiquorum, the "Taro" furnishing Araceae in Japanese

kitchen gardens. The people use the starch containing rhizome as a food. Poesy and Prose.
In Munich the plant are kept dry during the winter to save heating material. In spring the concrete basin is filled again and the plants begin to grow and to blossom again. In this house are many waterplants, partly in aquarias with glass walls so the parts submerged can be seen. E.g. in Eichhornia crassipes, or Myriophyllum Brasiliensis with water - and landforms. Here are Neptunia oleracea, a legume with interesting flowers and aerenchyma on the stems, We see Jussieua, the Onagraceae with negative geotropic aerial roots, we have here Salvinia and Azolla and then a group of members of the tropical swamp. Among them the Egyptian Papyrus, used first for making of writing material - I may remind you that our paper of today goes back to a Chinese invention 105 A.D. -
We also see here Rice, as you konow also a swamp plant. I saw rice fields in Japan in August 1940. This were on that time wonderful green fields; the plants were overed about 10 to 20 cm with water. In this house are sometimes kept other plants; you have to use the space anyhow. One of the interesting plants was Amorphophallus Rex, belonging to the Araceae. It has a subterranean tuber which produces every year first an inflorescence and later on a big, shoot like leaf. The photo shows the flowering plant. It smells, as the called Aristolochia Goldieana, like decaying meat, produced by the big redbown smell-organ, the sterile part of the inflorescence-axis. The next phot shows the latter after dissecting the spatha. You see above the male, below the female flowers. These flower first; in this case come first the ladies; we call this phenomenon "protogyny" It occurs also in our Skunks Cabbage. The plant blooms 2 days. After the second day it does not smell anymore and it welks pretty soon. The next photo shows a leaf. The largest representative of Amorphophallus is A. titanum, 1937 it bloomed in the New York Botanical Garden. The legnth of the inflorescence axis is more than 2 m. This plant is native in Sumatra and was protected there very strong. We had also a tuber of this plant which produced a leaf every year, but it was to you to come to bloom. We had also A. Rivieri the inflorescences had already nearly 2 m in length. Separated by a glass wall was the "Mangrove House" Mangrove is a marine swamp forest growing in the tide regions including the mouth of rivers where the breakers are not too strong. It is composed from a certain group of plants, belonging to different families. The soil is very muddy and poor in oxygene. The plants have adaptations in the root system and in the propagation. Such an adaptation is "Vivipary" which I

have formed with radial ramification; the most vigorous then continues the stem. In contrast to this Goebel has planted a lateral branch as a cutting more then 30 years ago. This one is still alive to day and has retained its bilateral ramification

Text to the Photos :

Nr. 1.) Top of Auracaria excelsa cut off. New tops have developed.

Nr. 2.) Cutting 34 year old, which has still retained its bilateral ramification.

Dr. Theodor Philipp Haas

The Cultural-Historical Significance of the Silkworm.

Among the domesticated animals a tiny insect has fulfilled the most important action in the history of culture. This insect is the silkworm! It connected for the first time in history the Far East with the Occident, and furthermore it was one of the main contributing causes leading to the discovery of America! The product of the silkworm is silk, the most precious fiber we know. The first realtions between China and Rome were bound together with a thread of silk!

The Chinese have had the silkworm as a domesticated animal since immemorial times. It is, together with the honey bee the only domesticated and cultivated insect. The silk worm is the caterpillar. The silkmoth which develops from it, has lost the ability to fly. The silkworm is completely dependent upon man. The only food it takes is the leaf of the mulberry tree Morus alba L.; therefore its scientific name is Bombyx mori L. With the silkworm the mulberry tree, both native in China, traveled to the West. (Morus rubra L is native in the Eastern U.S. Several of our native plants have a native branch in the Far East). The digesting apparatus of the silkworm is adapted to the exclusive food of mulberry leaves. The silkmoth does not take solid food during its short life time. The eggs of the moth are kept cool to prevent the development of the silkworm. The latter may finally creep out when fresh mulberry leaves are available. The technique of raising the silkworm to obtain the silk later on, has been used by the Chinese since the earliest times. It is reported that in 199 A.D. a Chinese prince had brought the silkworm to Japan. This is an exception; the Chinese tried to keep secret the producing of the silk; the only exported the latter.

I asked a Chinese friend what silk is called in his country. He told me a word which sounds like "szi", or "szil". Indeed our word "silk" originates from a Chinese word.

The Romans already knew of the Chinese silk. They called the silk growing people "Seres", and their country "sericum". The Mongolian word for silk is-after Friedrich Hirth- "serke", and from this word probably originates the term "Sericum". Another fact is interesting. In the antiquity the "silk-country" was named "Sericum". But this country which was known to be verry far to the East had still another name: "Sinicum" It was used late into the Middle Age until the Occident learned that "Sericum" and "Sinicum" are identical. The knowledge of this land came by the sea route -

- through India, Red Sea, Egypt - and following the way by land - through Central Asia, Persia, Byzantium or Syria - to the Romans. "Sinicum" was the name which reached Rome by the first route, "Sericum" by the latter. The word from which "China" originates is a Malayan word. Marco Polo called that country "Cathai", deriving from the Mongolian folk "Chitan". The Chinese - as my friend told me - name themselves "Chung-Kuo" = "State, or Folk of the Mid", at once "Middle Kingdom", because they thought at one time their land would be the center of the world. Indeed 3000 years ago - at the time of the Egyptian New Kingdom - they wer the only civilised people in a vaste area. "Kuo" means "folk" or "State". "Chi-Pen-Kuo" is "Land of the Rising Sun" (=the Chinese name for the land in the East of China). Marco Polo wrote it in Italian manner "Zipangu", and from this our "Japan" is derived. "Manchoukuo" is the Manchou-State, Manchuria, and, at last, - "Asia" means the same! It is a Semitic, perhaps Assyrian, word, deriving from "Acu" = "East", "Morning Land", "Land of the Rising Sun"! In contrast to it is "Ereb", the Evening Land", "Europe"! -

The silk, not the silkworm, came to Europe at a very early date by the way of trade. But the European people had no correct knowledge of where this precious fiber came from. Silk is mentioned in the "Revelation of St. John"; in Chapter XVIII, 11. and 12. where one reads; it is to read:

> 11. And the merchants of the earth shall weep and mourn over her, for no man buyeth their merchandise anymore,
> 12 The merchandise of gold, and silver, and precious stones, and of pearls, and fine linens and purple, and s i l k ...

It is supposed that silk did not reach Rome before 115 B.C.. This was the time when the famous General Chang-Ch'ien made his trip to the West. On the Western boundary of China were living nomadic tribes who frequently inveded China. These were the - Huns, the "Hiung-nu", as they are named by the Chinese. These "Hiung-nu" were the same

great demand. It is reported that the Assyrian King Senaherib has planted cotton in his domain. It is the first time that a ~~cultivated~~ formerly cultivated plant has been ~~planted~~ introduced with mindful purpose far away from its homeland (600 B C). If one consider however that at that time already there existed in Mesopotamia something which we to-day call "Botanical Gardens", this is not at all surprising.- When the Spaniards arrived in the New World for the first time they found the natives covered with cotton cloths and Cortez found a highly developed art of cotton weaving present in Mexico. He writes (According to Watt): "The Mexicans made large webs as delicate and fine as those of Holland. They wove their cloths of different figures and colours, representing different animals and flowers." As mentioned ~~at the beginning~~ there is in the American Museum for Natural History in New York, cotton from an old Indian grave. Peru, Brazil, Mexico and Barbados are said to comprise the close homeland of American cotton species However it is there the same as with corn and the potato which, it is true, are also indigenous in America. Already before the arrival of the Spaniards they were widely distributed in different ~~regions of~~ cultivated types. The Latin name of cottn is Gossypium, a name by Pliny the Younger is present already in his Historia naturalis. The Old World species are called Gossypium arborea, obtusifolia or herbacea, the New World ones Gossypium barbadense, brasiliense or hirsutum. The cotton species, used to-day, are crossing products of Old and New World species.

In contrast with the long hairs of seeds described thus far the short seed hairs are called plant-downs and plant-silk, when these have a silky gloss. In the first ones in first place are included Kapok which originate from the Bombacaceae Ceiba pentandra, a stately tree with prickly branches, indigenous in America. Kapok fibers are used as upholstery material for instance for pillows. Since however they are very light in weight, scarcely to be moistened and resistable ~~as~~ to ocean water they are also used for the stuffing ~~of sea~~ life belts. Plant-silk originates

from milkweed species, Asclepiadaceae like Asclepias cornuti or curassavica. They sometimes serve as upholstery material only.

The fiber substances to which we shall now turn are not less important. They originate from entirely different parts of plants. It is flax or linen, hemp, ramie, jute u.s.o. which are concerned here. Of them many are soft and long and may be spun into yarn; this is particularly the case with flax. As mentioned the origin of these fibers is wholly different one. If the fibers of the plants first mentioned were in the service of the seed distribution, the fibers now to be discussed shall provide the plants with firmness. They are bast-or vascularbundle-fibers. The higher land plants require a tube system for the movement of their juices. This however is not to be taken that starting from the root on upon to the end of shoot there are tubes going through; when such are present in aquatic plants, there are but aerating chanals. One may see such ones at the petioles of the leaves of water-lilies or better of the Victoria Regia. The "vessels" are thin hairs of length of about 10 - 20 cm only in very few instances they become above 1 m long. Through the walls the juices penetrate. It is not possible to go into more detail here regarding their structure. The "vessels" are combined into "vascular bundles" according to fixed structural planes. For mechanical reasons they must have a certain firmness and the fibers which then with it are used technically as flax, hemp, jute, a.s.o.- While seed hairs however after removal of the seeds may be worked immediately the parts of plants furnishing vascularbundle -fibers must go through a process of rotting, the so-called "roasting" in which bacteria play an important part. Hereby the softer component parts are to be destroyed and the firmer are to remain behind. A "flax-roasting" is made mention of and in the same manner the fibers of hemp (Canabis sativa) jute, Ramie a.s.o. are obtained. Ramie is the "Chinagrass", Boehmeria nivea, from which Chinese first prepared paper. (It is said from fish nets, whic

Columbus did not have a clear picture of East India and China. As a result of the great error of Marinus of Tyre, taken over by Ptolemy, Columbus supposed the Atlantic Ocean far much smaller than it indeed is, and risked the crossing. In this way the discovery of America goes back to the silk trade in the antiquity. Marinus of Tyre got his knowledge by way of the silk trade!

During summer 1944 the Free Library of Philadelphia shows an exhibit concerning the discovery of America. Columbus sailed to the West in 1492. When he returned in 1493 he believed he had found a new way to the Indies and to China. It was an Italian historian, living in Spain, Peter Martyr of Anghiera, who on November 1, 1493 (!) wrote to Cardinal Ascanio Sforza that he did not believe that Columbus was in the Indies and in China. He thought that Columbus has discovered a "new World"! This is origin of that name for the Western Hemisphere.

The name "America" goes back to the proposal of the German Geographer Waldseemüller to name South-American continent after Amerigo Vespucci who recognized first the tremendous size of that land, discovered first by Columbus on August 1, 1498. This was in 1507, about 15 years after the first landing of Columbus in the West. Probably Waldseemüller wanted a similarity with the word "Africa". The land which was discovered on the South-American continent was first named "Terra di Vera Cruz", and after 1500, named "Terra di Brasil" on account of the brazil-wood which was found there in great quantities. (This wood furnishes a red dye). In 1507 South-American continent was named "America", and 1538 this name was used for the entire double continent by Mercator.

An Italian - Columbus was born in Genova - discovered the "New World", an Italian invented this name for the Western Hemispehere, the whole continet is named for an Italian, and it was an Italian again who brought back this new knowledge of the existence of America to China, and paid back our debt to this country. The wonders and the high level of civilisation of China which Marco Polo described so amazingly gave Columbus the inspiration to try to find his way to the Great Khan. The Italian Jesuit Matteo Ricci landed in 1582 at Canton. His arrival is mentioned in the Ming Annales (1573-1620 A.D.). Following Berthold Laufer it reads as follows:

" .. [illegible] is a country, situated in the great Western Ocean. A man of this country arrived at the capital and displayed a complete map of 10,000 countries (= the world), explaining that there are in the world 5 great continents. The first of these is called "Asia" with more than a 100 centries, of which China is the first. The second is "Ou-lo-pa" (=Europe; the Chinese cannot pronounce "r"), the third is "Li-wei-ya" (= Lybia, the old name for Africa. The latter name originates from the North-African folk the "Afri", or "Africans", known to the Romans. It was used by the Portuguese during their journeys of discovery along the cost of that continent) The fourth is "A-mo-li-kia" (=America), vast in extent, and divided intoa northern and a southern continent, which, however are connected with each other!

These are the results of the work of a small, ugly looking, white caterpillar. It uses its thread to hide itself from the world. The same silk thread opened to man the connection between occident and the Far East with their different types of culture, and at last the way to a new continet, the way to the "New World"!

chiefly through the leaves,is cut off.The valuable substances are with - drawn and stored into the woody stems.The chlorophyll disintegrates and t the red and yellow components of this important pigment cause the splendor of colors in our deciduous forests.In the pith-rays of many trees during the winter starch is stored* .This process is especially intersting and also economically important in Sugar Maple.In early spring this starch is very quickly turned into sugar and the sweet sap rises up in the tree; it may be harvested and concentrated by heat:This is Maple Sugar.

In winter the trees and shrubs are not dead.In the buds life continues. The leaves and often also the flowers for the following year are already present.When in late August or September we look at alder and hazel shrubs, we are already able to observe the small catkins and we may also observe even in fall the flowerbuds of the Dogwood.Leaves and often flowers/too are started in summer,during fruiting time,and about September they are nearly completed.Only by this is it possible that we are able to enjoy a fresh green in the spring.The young plant parts are very delicate.They must be protected from winter's inclemency.This is done in the buds.Most simply formed are the so called "naked" buds,as they are seen in some snow-ball species.The young leaves are folded together and covered by a pilose tomentum.Sometimes this "naked" buds enclose an inflorescence.This hirsuteness is again found in many plants of steppes and deserts.The air in between the hairs causes insulation.The buds are described "naked" in contrast to buds on which there are present particular protective organs,the bud-scales. these form a covering for the young leaves and flowers.They are transformed leaves in connection with a change of function;They have not to assimilate. The external bud scales frequently are skinny and lignified and not able to grow in spring,whilst in the inner ones a stretching growth is still possible.In the buds of the Ash-Maple and especially in the American Horse-Chestnut-Shrub Aesculus parviflora we can observe transitions between leaves

*Proof with JJK (iodine solution in potassium-iodid) on a fresh piece of wood!

So we can spin our thread from things of the daily use to the most amazing chaptens of history of culture. When we take our breakfast, the little spoon with the now rationed sugar, these sweet cristals could tell us, how [illegible] in making of solid sugar by refining of the row material, science and technique worked together in Mesopotamia, 1000 years ago, the first case in history. Our cup of coffe would tell us from the far way which coffee went from its native land, the province Kaffa in southern Abyssinia, where it is called "bun", to Arabia, to the Dutch Indies, especially Java and from there to our allies Brazil, today the main Coffee-land. It could tell us that Goethe gave the suggestion to Chemists to find out the Caffein. If we put our little tea bag in hot water, tee could to tell us [illegible] its story, how the Chinese made it. It is always the great problem why Marco Polo did not mention tea. The first exact description is probably by Suleyman. He writes:

And at least our paper on which we write every day, could give a long report of its birth in China 105 A.D. and its journey to us, this simple paper the patience of which we praise and which accompanies us from birth to death. This paper which transmets our thoughts, this paper which may give us so much joice and which can do to us so much harm! And in the same manner as of our language of paper is valid the Arabian proverb:

Knifewound heals, tongue wound heals not!

The wound of a knife heals.
but such a wound ... by the tongue

Sub. Pirus Aucuparia L., the well known bird berry tree or "Ebereschi", Sitka' bunker very much in North-Asia and Europe until the timber line. it is in Iceland the most spectacularly tree like plants but on the other side it occurs still in the mountains of Madeira. Similar species are still growing in the Himalaya East Asia and North-America.

pag. 25 Pirus
Sub-spec. IV. Sorbus L.
fruit leaves 2 to 5. but seldom fertile more than 3.

The Distribution of Fruits and Seeds.

The distribution of fruits and seeds is one of the most amazing chapters of botany. It has its parallel only in pollination, the process which proceedes the development of fruits and seeds. As a rule - without pollination the growth of the latter is impossible.

As regards the traveling of fruits and seeds, they are very similar to each other, but let us not forget the fact that a fruit originates from a modified leaf, a fruit leaf, while a seed from an ovule! Fruits an seeds may also look somewhat alike, as, for instance, the fruits of Heaven Tree (Ailanthus) and the seeds of the Indian Bean (Catalpa), both very abundant around Philadelphia.

I wish to describe how both, fruits and seeds are distributed by the plants. We shall speak only of flowering plants. The others, like ferns, clubmosses, horsetails, or even mosses, mushrooms and algae have no fruits. They produce oncelled forms, called "spores", a Greek word which means "sowing", and which is used now in this sense.

In the distribution of fruits and seeds there are two possibilities: The first one is that the mother plant itself possesses means to distribute them. In this case we speak of "self-distribution". Second, the plant uses foreign menas, such as wind, water, or animals, for this purpose. Then we call this "foreign-distribution".*

Let us first consider "self-distribution". The simplest way is that the fruits and seeds have a certain weight and simply drop off the tree. The great fruits of the Ossage Orange (Maclura) or the seeds of the Horse-Chestnut are well known examples. A very peculiar instance of this simple fall movement is in the mangrove plants as we have them in Florida. The mangrove is one of the most interesting plant societies. It is a tropical swamp forest, growing in salt water regions (including the mouth of rivers) on the ocean shores. It is a swampforest in the tide regions where the breakers are not too strong. This forest is composed of a certain group of shrubs and trees (including palms), belonging to different plant families. The mangrove occurs as well in the tropics of the Old as of the New World.** The conditions of the soil makes it

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*The scientific words are "autochory", resp. "allochory".

**The latter is called "Western" mangrove; growing on the American shores and West-Africa the "Eastern" mangrove, being much richer in species, occurs in Asia, Australia and East-Africa.

necessary that the root system and the propagation possess certain adaptations.The soil mostly is a very tough,grayish,bad smelling clay,very poor in oxygen.So it is helpful for the plant if the germination of the seed already takes place in the fruit and is transfered to the mother plant.This is termed "vivipary" and is demonstrated in this country by our native Rhizophora Mangle. (Rhizophora means "bearer of roots;the tap roots of the young germplants on the shrubs).The tap roots of the germplants reach a length of about 10 cm and the point of gravity lies very close to the root tip.In this way the young germplant falls like an airplane bomb in the soil.Ill. 1.show such germplants;they hang like bombs on the twigs of the shrubs. On the ground the young plants produce very quick side-roots and thus they are anchored and protected against the ocean waves.

Other means of "self-distribution" are growth movements and one of the most fascinating examples is the peanut (Arachis hypogaea).The plant is native in Brazil, but it is cultivated today in all warmer countries of the world.It belongs to the legumes.The peanut has little orange flowers and the pedunclesof these flowers grow toward the light as every flower stalk does.But after fertilisation they turn away from the light and grow into the ground.At the beginning of this process the young fruits are very small and so it is realtively easy for them to penetrate into the soil.When they are in a certain depth they begin to grow and reach their normal size. It is supposed that the fruitwall is able to take upp food from the soil,because fruits which have not reached the soil remain small and undeveloped.If hairs which find like root hairs,we we on the fruit wall particpate on this process dont know.

A certain progress is observed when the mother plant casts away the fruits and seeds.This happens in two ways.The first one is that the fruits contain tissues with a very high cell pressure,the other possibility is that in the fruits occurs a high expansion when they dry out.What concerns the first way,we have in our native flora the " touch me not's",the fruits of Impatiens species.If we touch the ripe fruits slightly they explode and the seeds are cast away.The fruits of a few members of the Cucumber family: Cyclanthera explodens,native of South-America,and Ecballium Elaterium,the Squirting Cucumber,at home in the Mediterranean,work much better (Ill.2).The seeds of the latter are thrown away at least 10 m.The inside of the fruit

A certain progress is observed when the mother plant slings away the fruits and seeds. This may happen in a double way. The first one is that the fruits contain tissues with a very high cell pressure, the other possibility is that in the fruits occurs a high expansion when they dry out. Examples for both! In our native flora we have the "touch-me-not's", the fruits of Impatiens species. If we touch a little bit the ripe fruits they explode and the seeds are slinged away. Much better work the fruits of a few members of the Cucumber family: Cyclanthera explodens, native of South-America, and Ecballium Elaterium, the Squirting Cucumber, at home in the Mediterranean, work much better. The seeds of the last one are thrown at least 10 m. In Ecballium the principle is the same as in the Champagne bottle. The inside of the fruit of Ecballium is very juicy and under a high pressure which may reach 25 atm. The peduncle closes it like the plug of the Champagne bottle. The fruit separates itself when it is slightly touched; it explodes and the juicy content and the seeds fly away. The other principle, the expansion power of dried out and thereby dead tissue does not work less effective than the first described one. The best example is Hura crepitans, the Sandbox Tree of the American tropics, a member of the Spurge family (Euphorbiaceae). The fruits split into partial fruits, containing hard, coinlike seeds. The explosion power is tremendous. The fruits may explode even in an herbarium, many years after they are taken from the plant. A friend of mine told me he had an entire fruit of Hura crepitans in Europe on his desk, tied together by strings. Suddenly the fruit exploded, the strings were broken and the parts of the fruit and the seeds were distributed in the whole room! In most cases the fruits are not so dangerous and their seeds don't jump so far. In our native Geranium species they jump only several feet. The same happens in the Knotweed Polygonum virginianum, the "Jump-Seed", a postfloral function of the style. The ripe fruits have an elastic angled pistil; when this is touched, the fruits jump several feet away. Those plants are always interesting to watch!

The contrast to "autochory" is "allochory", the foreign distribution of fruits and seeds of which we will speak now. The latter is much more effective than the former self-distribution. This way of seed distribution is called "allochory", or foreign-distribution because the plants use foreign means and not their own for this purpose. Such foreign means are the wind, water and animals (naturally including man) and we

awns then this is very useful for man, but the plant loses a means for distribution. If the rhachis of the spikes breaks into pieces the coarse awns may remain sticking in the fleece of animals, and if they include the grain it may be carried away by this. This is the case, for instance, in the wheat species spelt, whilst where as in our ordinary wheat the naked grain drops down.

In many cases the relations between man and plant go back to a very early time and therefore the earliest wanderings with man. The cereal, first cultivated in the Old World, was millet, still to day very important in China and Japan. This cereal was later replaced by cereals with larger fruits: wheat and barley and in the Far East by rice, at home in East India. Wheat, resp. Emmer, and Barley were the most important cereals already in the earliest antiquity in the Near East [illegible] and. We don't know since which time! The same is to say of the date palm, indigenous in Mesopotamia. And in our continent happens the same probleme. Long before the arrival of Columbus maize, our corn, [illegible] and [illegible] potato and perhaps other food plants wandered with the Indian tribes. One of the largest wanderings [illegible] ever made a plant [illegible] the Cocoa Nut. This plant has fruits - stone fruits like the cherry! - which are adapted very well to distribution by ocean water, but once for all, man has caused that the Cocoa Palm (native on the shores of tropical Asia) grows on every shore in the tropics of the entire world. Especially the seafarings of the Polynesians may be responsible a great deal for this fact* but, endeed, we cannot say when the wandering started first. The situation is quite different in plants which came relatively late to use, or after the discovery of their homeland in cases where we can date this event, as it is for instance with the New World. Here we can state more exact facts. I want to talk first of journeys which made New World plants to the Old World and then of Old World plants which came to the Western Hemisphere. I will speak only of those plants which became acclimatized in so complete that they seem to be at home in the country of their migration. The history of the potato was already mentioned. Maize, is the single cereal which gave the New World to mankind, and before 1492, before Columbus riched the New World, there is no Indian corn either in Europe nor in Asia.

* For the tropics with the favorable conditions of growth today Old- and New World [illegible]

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*War Background Studies # 6., January 1943 "Polynesians, Explorer of the Pacific"

~~[illegible]~~ the [illegible]
Sweet potato ~~[illegible]~~ Ipomea. Batatas and the [illegible] [illegible] [illegible] are so similar to each other, that they have the same [illegible] name. Really is the very [illegible] [illegible] [illegible]

The Distribution of Fruits and Seeds.

The distribution of fruits and seeds is one of the most amazing chapters of botany. It has its parallel only in pollination, the process which proceedes the development of fruits and seeds. As a rule - without pollination the growth of the latter is impossible.

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In the distribution of fruits and seeds there are two possibilities: The first one is that the mother plant itself possesses means to distribute them. In this case we speak of "self-distribution". Second, the plant uses foreign means, such as wind, water, or animals, for this purpose. Then we call this "foreign-distribution".*

Let us first consider "self-distribution". The simplest way is that the fruits and seeds have a certain weight and simply drop off the tree. The great fruits of the Osage Orange (Maclura) or the seeds of the Horse-Chestnut are well known examples. A very peculiar instance of this simple fall movement is in the mangrove plants as we have them in Florida. The mangrove is one of the most interesting plant societies. It is a tropical swamp forest, growing in salt water regions (including the mouth of rivers) on the ocean shores. It is a swampforest in the tide regions where the breakers are not too strong. This forest is composed of a certain group of shrubs and trees (including palms), belonging to different plant families. The mangrove occurs as well in the tropics of the Old as of the New World.** The conditions of the soil makes it

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The Chinese used as a writing ground the stem of bamboo or small wooden planks, this is the cause that the Chinese write vertically. Besides these things cheap silkcloth also was used. But the latter was too expensive for the daily use.

On 105 A.D. the Chinese state-officer Tsai Lun used for the first time plant material in the place of silk which is, of course, of animal origin. Tsai Lund took rags of remi, perhaps also of hemp and linen, and it is mentioned as "fishing nets" and made paper in a wey which is not very different as we do it today. The art of paper making spread out in China, but was kept secret towards foreign countries. In Central Asia with its dry climate was found by Sven Hedin and especially by Sir Aurel Stein, who died in October 1943, a great number of documents of the time of 200 until 800 A.D. written upon paper. The former excavated in Lao-Lan on the Lobnor, in the Gobi desert, a town which was mentioned by Marco Polo, and the latter found a large amount of written material in a Buddhist cloister in Tunhuang, in East Turkestan. We are able to read the scipture, and we have a picture of the stand of culture in that area of that time. We know that there were religious relations between Central Asia and China and especially interesting are the informations which we got about the Manichaens, the followers of the Persian, Mani, whose religion during the middle ages was distributed very far, and which disappeared completely. The Chinese already could dye their paper and poison it agains the damage by insects. 751 A.D. after a war with Timur, Chinese paper maker came to Samarkand, the knowledge of papermaking came out of the Chinese circle of culture, and entered the Islamitic region of culture. The art of paper making spread out there rather quick. In Bagdad where the Chemical Science was on a high stand (for instance the refinery of sugar was invented there) the art of paper making was much improved. The Arabs at about 900 until 1050 A.D. could make paper for any use and they also used the sap of the Coloquinte against insects. From Bagdad paper spread to Kairo and from their and also from Marocco it came at the end of the 14th century to Europe. - Back to China. Another thing started there originating of paper: Paper money - and unfortunately inflation. The latter was at the end of the 13th century, and it is described very exactly by Marco Polo. The origin of paper money goes back to a very necessity. The Chinese used copper coins. These were rather heavy and dis-

in the case of a business trip/ (to carry) agreeable/ So, the people came to the idea of paying a certain amount of money to the ~~state~~ government and to take on the trip the paper receipt. This was about 600 to 800 A.D. The next step was to use paper receipts of a certain sum of money; this was the first paper money. Later on all such receipts were used without the backing of real money, was issued. In this way the inflation started with all the results we know in our time. From the invention of paper started also the invention of the playing card. This came over India to Europe and there developed the "visiting card". The play card was used first to invite someone to a game and later one it was used to announce one self as a visitor. This is our "side road digression" concerning paper.

The discovery of America and our silk. Yes, they cling together. Two books influenced Columbus so much that he developed the idea of "Enterprise of the Indies" and he developed the initiative (and courage) for sailing to the West in order to find the residence of the Great Khan in China. Those two books were/ The book of Ptolemy of Alexandria and the travel report of Marco Polo. Columbus had no clear picture of East India and China. I already spoke of the fact that the knowledge of Marinus of Tyrus was taken over by Ptolemy. Also the great error of exaggerating the size of the Eurasian continent made by the Syrian Geographer was accepted. In this way Columbus supposed the Atlantic Ocean far smaller than it is (indeed), and risked crossing it. In this way the discovery of America goes back to the silk trade in the antiquity because Marinus of Tyrus got his knowledge by the way of the silk trade! Columbus sailed to the West in 1492. When he returned in 1493 he believed he had found a new way to the Indies and China. It was an Italian historian, living in Spain, Peter Martyr of Anghiera, who wrote in September 1493 to a Spanish Bishop that he did not believe that Columbus was in the Indies or in China. He thought that Columbus had discovered a "New World": The origin of that name for the Western Hemisphere. This is

These are the last results of the work of a small, ugly caterpilar. He uses his thread to hide himself from the world. The same silk thread opened to/ man the connection between two different types of culture and at last the way to a new continent, the way to the New World!

time and therefore the wanderings with man. The cereal, cultivated first in the Old World, was millet. This cereal was later replaced by wheat and barley and by rice, at home in East India, in the Far East. The Greeks and the Romains have not known our rye and our oat. Wheat and barley were the most important cereals in the Near East. In the same way we are not able to say when the Indian corn (Zea Mays) was wandering with the Indians. And what we said from the cerelas is also the case of the Coco Nut. This plant has fruits which are adapted very well to the distribution by ocean water, but once for all, man is responsible that the Coco Palm grows on every sea shore in the tropics of the entire world. Here also we cannot say when the wandering started. This is quite different in plants which were used in a relatively late time, or after the discovering of their homeland, in cases when we can date this event, as it is with the New World. Here we can say more exact facts. So came Indian corn (Mais), to day very common among the natives of Africa, to the Black Continent, not before Columbus discovered the New World. Like this potato, this cereal is native in our continent. Already 1493 the great discoverer took our corn to Europe. It was firs garment flower in gardens in Spain. 1525 is its first cultivation in Andalusia in Spain as a cereal. and by the Venetians it came to the Orient and from there starts its distribution entire in the Old World by the trade relations of the Europeans. At the begin of the 17th century our Corn came to China. Rice which is the main food for 2/3 to 3/4 of mankind, Native in India, is spread out very early to East-China and Japan and to the Great Arabs Mesopotamia (a short time before Alexander arrived in India). By the it came to Europe, at first to Spain and with the wars of Charles V. to Italy, 1647 rice came to Virginia and 1694 to South Carolina. Before 1492 there is no rice in the New World. The same is with coffee. Brasil is today the most important coffee producent in the world and our country buys coffee in great quantities from our ally in South America. But coffee is native in Abyssinia. The plant is called there "bun" and from this word originates our "coffee-bean". From Abyssinia coffee came to South Arabia at the beginning of the 15th century 1671 the plant is in Java and probably it arrives in Brasil. The most impor

tant rubber plant, Hevea brasiliensis, native in Brazil, came 1876 to Malaya, the Dutch Indies and Ceylon, and, unfortunately, from these regions today comes nearly our entire rubber we need for our tires. From the wandering of the Banana was already spoken in the article "The Fruit of the Wise Man" in the April # of this magazine. This are wanderings which we can date.

Very interesting also are the "voluntary" travels of plants, the travels or the "weeds". Naturally we can speak here only from a generally standpoint. At first, it is to say, the "weeds" are fitted better for the "struggle for existence" than the cultivated plants. They have to be it because they have to strike for the place where they live! The cultivated plants have it much easier. Man has taken away from them their "stuggle for existence"! He choses the place where they may live, he takes care for ther nurrishment etc. He raises them in great numbers of individuals and in closed groups. Cornfields, wheat fields, rye fields, are only the work of man. In contrast to this, the weeds grow much more scattered. Naturally we have cases in which they live together in great quantities. I will mention here our ragweeds (Ambrosia artimisifolia and trifida, native in Asia), which are responsible in such a great measure for hayfeever. How are the weeds fitted for the struggle for existnece? At first it is to say, the weeds are very relating soil and climate and then propagation and distribution of fruits and seeds show very interesting adaptions. These, enables them to the great journeys they have made; the voluntay travels, as we have called them.

We distinguis between sexual propagation, propagation by seeds which are a result of pollination and fertilisation of an egg-cell, and asexual one in which other parts of the plant, shoots, roots are used. Both ways find their use in the spreading of weeds. We shall speak first of the sexual propagation. Many weeds have a tremendous production of seeds. Thus it is reported that in Ithaca in the State New York, in 1924 one single plant of Fleabane (Erigeron canadensis) has produced 243,375 seeds, (Amaranthus retroflexus) 196,405 (both plants are native in our country), the Nightshade (Solanum nigrum) which came in the 17th century to our continent 178,000, Purslane (Portulaca oleracea), at home in the moderate climate of Asia, 193,213. But the most interesting plant is Hedge Mustard (Sisymbrium altissimum)

awns then this is very useful for man but the plant loses a means for distribution. If the rhachis of the spikes breaks into pieces the coarse awns remain sticking in the fleece of animals, and if they include the grain it may be carried away by this. This is the case, for instance, in the wheat species spelt, whilst in our ordinary wheat the naked grain drops down.

In many cases the relations between man and plant go back to very early time, and therefore the earliest wanderings of it with man. The cereal, first cultivated in the Old World was millet, still to day very important in China and Japan. This cereal was replaced by such ones with larger fruits: wheat and barley and in the Far East by rice, at home in East-India. Wheat, resp. Emmer, and barley were the most important cereals already in the earliest antiquity in the Near East, the oldest center of civilisation, and we don't know since which time they were in cultivation. The same is to say of the date palm, the most important native tree in Mesopotamia. Also in our continent happens the same problems. Long before the arrival of Columbus, maize, our corn, and potato, and perhaps other food plants wandered with the Indian tribes. Maize was cultivated by them already in varieties, adapted to the different climates and to the different length of the summer! One of the largest wanderings which ever made a plant are the wanderings of the Cocoa nut. This plant has fruits - stone fruits like the cherry! - which are adapted very well to distribution by oceanwater, but once for all, man has caused that the Cocoa nut, native on the shores of tropical Asia, grows on every coast in the tropics of the entire world. Especially the seafarings of the Polynesians may be responsible a great deal for this fact*. But, indeed, we cannot say when these wanderings started first. In the tropics with the favorable conditions of growth, today, and perhaps since some centuries, Old- and New World plants are so mixed that it is often difficult, if not impossible, to know where they have their origin! Sometimes we find the same varnicular name for 2 different plants if they are very similar to each other as it is the case with the South American Sweet Potato Ipomea batatas, a dicot, very close related to the morning glory, and the

*War Background Studies # 6.: Polynesians Explorers of the Pacific, by A.E. Weckler, jr. January 13th 1943.

s tuber, Dioscorea batatas, a monocot, belonging to the Dioscoraceae. The appearance of the Sweet Potato among the Maori, the Polynesian Natives of New Zealand, and the fact that the varnicular name for this plant is very similar to the name of the plant there used in Peru, originally the homeland of the Sweet Potato, opens the question if the Polynesians during their seafarings across the Pacific Ocean had reached the South American Coast. The other possibility would be that the Sweet Potato came by the Spaniards who possessed on that time the Philippines (named after King Philipp II. of Spain) to the Polynesians. This problem is mentioned in the already cited booclet "Polynesians, Explorer of the Pacific. In other cases we are able to state much moreexact facts, especially when plants realtively late came to use, or after the discovery of their homeland in cases where we can date this event. I want to talk first of journeys which made New World plants to the Old World and then of Old World plants which came to the Western Hemisphere. I will speak only of those plants which became acclimatisized so completely that they seem to be at home in the country of their migration. The history of the potato ~~was already mentioned.~~ Maize is the single cereal which gave the New World to mankind, and before 1492, before Columbus reached the Western Hemisphere, there is no Indian corn either in Europe nor in Asia. Already in 1493 the great discoverer took our corn to Europe. This year it could celebrete its 500th "birthday" in Europe! It was first as a decorative plant in Spanish used gardens. As a cereal it was cultivated first in 1525 in Andalusia in Spain. The Venetians brought it to the Orient and from here it may have travelled farther to the East. with the trade relations of the merchants of that time. But Maize came to the Far East also by another way. The Portuguese possessed colonies in West-Africa (Angola since 1450) and in South-America. Brazil was a Portuguese colony; this is the reason that the Portuguese there Latin language is used still today whilst the average America speaks Spanish. The Portuguese called our corn "milhao" which means "millet" and with the slave trade - they imas worker ported black slaves from Africa to Brazil - it came to Angola, to West-Africa. It was called there "blé portugais". Our corn is now cultivated among the natives and is now acclimatisized so completely that everybody would think maize would be an indigenous African cereal though the native name "mielie" reminds to the Portuguise "milhao". But our maize travelled farther: it come with the Portuguise to China. Mendoza mentions its cultivation there already 1585 and even 1597 we have the first picture of it, only about 101 years after the discovery of the New World.

To page 7:

... How many people know that this grass came from the East Indies,from Asia.Among the weeds are many plants which are to be found in the whole world;they cosmopites. The weeds are really an "international society"!.The conditions of growth are in Philadelpgia in summer so favorable that it is possible to raise tropical plants outdoors.The tropical sensitive plant Mimosa pudica grew last summer in our "Kilmer Botanical Garden.The traveling of plants,these plants which we think are rooted fast in the soil,is fascinating! They travel with tMM ,or by the will of man when we think of the "cultivated",or"economic" plants,they travel against the will of man when we think of "weeds"!Seen from the standpoint of the plant I would like to speak of "involuntary" and "voluntary" journeys.When we consider the weeds,how we try to exterminate them and how stubbornly the come back again and again,the reader may understand what I mean by these words.It is,indeed,a traveling "with intention" on the part of the plant!

To page 8, ,,, These plants are - as mentioned, in the Herbarium of the Philadelphia College of Pharmacy and Science.Martindale finishes his article as follows:

" A great many species that are already described in Gray's Manual as introduced plants occured abundatly both in this former years,evidently recent importations, but did not deem it essentual to include them in this article.Many strange looking plants have appeared,that never have flowered,hence coould not be determined,and some bienneals have appeared this year that may flower nest,if the winter be not severe. It would be interesting to know if ballast deposites at other places produces the same kind of plants."

The following lines seem to concern the plant which shows photo # 2..Martindale writes also,dated of Sept.12th 1876:

"Since the above was written I collected near the Wissahickon Station,,on the Philadelphia Reading Railroad Station,about 5 miles from Philadelphia, <u>Leonurus glaucescens Bäuge.</u> This plant is from Northern Asia,and how it could get into the above locality is somewhat of mystery,as no ballast material has been transported to that neighborhood,and it is not a garden plant in this country,at least; it is possible however,that seeds may have been introduced among the exhibits to the

Centennial Exposition, by way of Japan. It is very abundant this year, in the locality above mentioned, and seeds have fully ripened, but it remains to be seen whether it will reproduce itself another year or not."

... Science. It is no lifeless gift. We use and shall use the specimens for the education of our students. The Martindale Collection is a most helpful scientific instrument to study botany and especially taxonomy. Let us hope....

In "A Preliminary Catalogue of the Flora of New Jersey", compiled by N.L. Britton, Ph.D., Office of the Survey 1881, (Rutgers College, New Brunswick)

Apendix II., pag. 128- 134, is ~~to be read~~:

"List of Plants, mostly of European origin, found on ballast deposits at Camden and in the vicinity of New York. Where not otherwise stated the plants from Camden were collected by Mr. C.F. Parker and those from Communipaw and Hoboken by Mr. Addison Brown. These species are not mentioned in Gray's Manual of Botany."

In this list are 18 specimens of which Martindale is mentioned as collector.

How the times change! Martindale collected weeds from foreign countries during the Civil War, during a period where fighting going on was in this country. In the present war, where the fighting is - thank God - so far away, Botany is not considered as "war important" and the youth, the coming generation, is not trained in our lovely science, as Linnaeus called Botany.!

The Martindale Herbarium is now half a century in the possession of the Philadelphia College of Pharmacy and Science. Let us hope that in further 50 years all our wishes ~~which we have~~ for the housing of this wonderful collection are fulfilled. Let us hope that there is peace on earth, a "lasting peace"!

more of 200 000 specimens. The first century of the P.C. of Pharmacy —

(1922)

The M. Her also contains also
specimens of the lower orders of plants.
but as yet we no list of these
The M.H. displays many interesting features
some of which will soon be described

a great many species that are already described in Gray's Manual as introduced plants occurred abundantly both in this & former years, evidently recent importations, but did not seem it essential to include them in this article. Many strange looking plants had appeared, that never have flowered hence could not be determined, and some Grasses have appeared this year that may flower next, if the winter be not too severe. It would be interesting to know if ballast deposited at other places possesses the same kind of plants.

Since the above was written I collected near the W. — Station, on the P. & Reading R.R., about 5 miles from Ph. Lepidium glancescens Bang. This pl. is from Northern Asia, and how it could get into the above locality is somewhat of mystery, as no ballast material has been transported to that neighborhood, and it is not a garden pl in this county, at least it is possible however that the seeds may have been introduced among the exhibits to the Centennial Exposition by way of Japan. It is very abundant this year, in the locality above mentioned, the seeds have fully ripened, but it remains to be seen whether it will reproduce itself another year or not.

Maize may have come on both ways to the Far East;it is possible that it also came from the Orient to China.I already mentioned the importance of the Philippines for the journeys of American plants to Asia.On March 16th 1521 Magellaes reached the Philippines*.Thus these islands became a colony of the Spaniards who where also in the New World.With them Sweet Potato,Peanut and Manihot utilissima,the Quaesava plant,may have travelled to the Old World;the problem with the Sweet Potato I have already mentioned.Certain is that tobacco came on this way to China.In the travels of tabacco to the Old World we possess more exact dates.This plant was,following to Laufer,1558 in Portugal,1571 in Spain,1561 in Italy and 1565 alredy in England.between 1573 and 1620 tobacco was in China under the name tam- or tan - ba - ku

List of trees,shrubs I named:

Pinus silvestris,

Picea excelsa,

Abies pectinata,

Juniperus communis,

Calluna vulgaris, (V_3)

~~Fagus~~ silvatica,

Sorbus aucuparia,

Prunus Padus,

~~Quercus~~ Robur,

Tilia platyphyllos, (V_1)

~~Juglans~~ regia.

~~Salix~~ alba,

Populus alba,

Populus nigra,

Populus tremula,

Ulmus montana,

Fraxinus excelsior, (5_3)

Acer Pseudoplatanus,

" platanoides, (5_1)

" campestre,

" monspessulanum,

Corylus avellana,

Salix purpurea,

Myrica Gale,

Rhamnus Frangula, (5_1)

" cathartica,

Evonymus europaeus,

Berberis vulgaris.

Betula verrucosa,

Betula pubescens

~~Carpinus~~ Betulus

Alnus incana

" glutinosa

" viridis

Sambucus nigra

" racemosa

Ebulus

Erica 5_3

frequently - especially during the night - endure several degrees below zero without their delicate petals suffering harm.The danger in winter is the drying out.When the soil is frozen solid,absorption of water becomes impossible for plants,and the most humid soil also becomes physiologically dry.Thus the danger of drying up for our plants exists exactly in the same way as for desert plants in hot countries.This is the similarity between our winter and the situation in deserts,I mentioned.Many of the subsequently described appearances of adaptility we also encounter in plants which live in regions where absorption of water is at times aggravated,as in salt-steppes,deserts or in high mountains where desert like conditions frequently dominate.(Lack in water,severe insolation, night frost).

How does the plant world pass the winter?First we shall look at herbaceous and then woody plants.A number of the former plants terminates its life at the onset of autumn,and indeed,many dissappear long before this time approaches.In our deciduous forests a great part of the soil-flora discontinues its vital action when the green cover of foliage has been formed or the grass becomes high.I will mention here the "Jack in the Pulpit (Arisema triphylla),Spring Beauty (Olaytonia Virginica), ~~Anemone Hepatica~~ or Dutchmans Breeches (Dicentra cucullaria) and others. A great number of plants pass the winter as fruits and seeds.A plant-seed is a "plant-child" ,therefore quite different from a "seed" in the animal kingdom,where this word signifies a male sex cell,a male gamete. A plant seed contains a more or less developed germ plant with leaf- and root primordials,protected by a seed coat or testa.Nutrients are added besides,so that the young plant may grow before it is able to nourish itself.The germination of seeds is caused by absorption of water,for most seeds are poor in water.In the ripening of fruits and seeds as a rule,water is withdrawn from the embryo in the seed.In many instances the seed coat has not only to protect the plant children,it also has to prevent a

a desert is like a flower carpet.Necessarily the lifetime of those plants is extremely short and they are similar to those hapaxantic plants with several generations is one single year,mentioned above.

However,many herbaceous plants pass the winter with leaves also.When we walk in wintertime across a meadow we may see such ones.They are mostly quite modest little plants.In Europe there are the daisies and others which flower during the whole winter.There are even plants which do not know any winter rest period at all - again one is reminded of the tropics and one is tempted to speak of " wintergreen".

In general however,the tendency exists to keep as close to the ground as possible and even to retreat into it in order to offer drying out winds the smallest possible area of attack.The "winter-rosette" is the first stage in this process;we may see it in every meadow and also vacant lots.A number of plants forms a tuft of leaves,pressed quite flat to the ground.We may see this in the Dandelion or in the Plantain.A lot of herbaceous plants - they are named "biennials" - form in the first year of their life the winterrosette and in the following year they produrce an inflorescence and die after fruit ripening.The umbelliferous plants belong to them.All these plants have a long tap root and a short shoot above,with very small internodes.This short shoot is changing below into the root;an exact separation between shoot and root is not possible. By shortening of the uppermost parts of the tap root it is contrived that the growth point,the "heart" of the plants never comes above the surface of the ground.If such a plant is dug out we see the transvers rugoses immediately below the leaf-tuft.

*(from the page before) Science had discarded the expression "annual" because there exist several plants which also flower only once,bear fruit and die as a whole,but this process lasts many years.We know this from some palm trees in the tropics;our American Agave (A. americana) flowers after about 20 (not 100) years of growth and then it produces a very tall inflorescence.After blooming and bearing fruit is perishes,however,root-shoots remain and continue the life of the mother plant.

"Coffea arabica L.,Coffee.The name is undoubtly derived from the South-Abyssinian landscape Kaffa,the original home of the coffee.(The Arabian word "cahwe" generally signifies "beverage").At the beginning of the 15th century the plant was introduced from Abyssinia,where it is called "bun"(therefore "coffee-bean") to Southern Arabia where today the finest kinds are cultivated (main commercial centre Moldcahi).1671 the coffee came to Java.In the 18th century through the Portuguise it reached the New World (probably 1727 it came to Brasil,today the most important coffee country).To Europe coffee was brought in the 17th century by the Venetians.The Turkish wars also have contributed to its distribution in Europe.Originally the beverage was prepared bey extraction of the unroasted seeds with hot water or by cooking with this.Stimulatingly effective is the caffein (the research of which was caused by Goethe);like in cocoa,the aroma is formed only when roasted! - "Thea sinensis L.,Tea,originating in Assam (Indochina),is not mentioned in Marco Polo's travel report (1295).The first exact description is probably found in the travel report of the Arabian treder Sulayman,851 verified by the Mesopotamian Geographer Abu-Zaid of Ziraf.It reads as follows: "Among the things which China produces in abundance the king has reserved to himself the monopoly on salt and on an herb,dried in a certain manner,which,after drawing in hot water,the Chinese drink.This dried herb is sold in all cities for immense sums.It is called "Sakh";this plant has more leaves than clover,it smells somewhat stronger than this,however it has a bitter taste.In order to prepare tea, water is at first boiled and is then poured over this herb.This pouring serves as an antidote against every indisposition."In the 17th century ter came to Europe."

In the Botanical museum it is to avoid to show too many things,not concerned with Botany,as for instance, works of natives etc.,as I saw in Berlin,because by this,the general view suffers.And a botanical museum must first of all show Botany The botanical museum's exhibition in the described manner provides the possibility to study Botany on the original plants,independent of weather and climate and the present state of development.The Botanical Museum may show the whole plant kingdom in more instructive manner then any book it can do.

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Department of Government November 4, 1942
COURSE: Development of Political and Economic Problems

Seventh Lecture - Russia

Highlights of the Lecture on Russia

Reading about Russia: The Lenin period can now be judged fairly well; it is the history of one of the greatest revolutionary movements. The Stalin period, the present time, is difficult to understand on account of lack of unbiased information. Most important is the study of Holy Russia, the Russia of the people of the black soil, of its great Christian mystics and Spiritual leaders, Tolstoy, Dostoevsky, Soloviev, Berdyaev.

"Old Man River" rhythm of the huge rivers flowing slowly through vast open plains, the Mississippi, the Rio de La Plata, the Ganges, - and the Volga. The Russian people, a story of Christian mysticism and of black soil, of hate and of love, of craving for the kingdom of God, and for self-destruction. The Russian woman an expression of eternal Russia, - and some data about the fruitless efforts of the Bolshevik regime to destroy Christianity with the people, with children, and with women.

Voluntary death on burning wood piles of thousands of religious fanatics on the 17th Century. Tens of thousands of boys and girls of the well-to-do classes went some seventy years ago to the villages to help the poor and to find their god, through humiliation. Tolstoy, Dostoevsky - and Stalin's purge in recent years, the liquidation of 60-70% of the leaders in every field of Soviet activity.

Personal experiences with former collaborators of Lenin: Chicherin, Krassin, Krestinski, Scheinmann. The Religion of Atheism - Re-introduction of the profit motive, but no exploitations of the toilers. State capitalism with great state trusts. The genius of Vladimir Ilyich Ulyanov, called Lenin. Comparison with Hitler. The Gospel of Karl Marx and Friedrich Engels, Lenin and Stalin as their prophets.

Social development in Europe moves from West to East, from France via Germany to Russia. Foreign influences on Russia. The lost wars of 1854-1856 (Crimea), 1904-05 (Japan), and 1914-1917 (First World War) as driving dynamic forces for change, for evolution and for revolution. Two days of history - 14th of July 1789, Fall of the Bastille in France; 7th of November 1917, The Dictatorship of the Proletariat (industrial wage earners). A challenge of a single class, the working class, against all governments and all social classes all over the world. The Russian Revolution only a stepping stone to world conquest.

The great world revolutions which do not recognize national borders: Christianity, Mohammedanism, Reformation, French Revolution, Russian Revolution, National Socialism, - Japan's East Asia Order, America's Age of the Common Man.

The efforts of the Russian Reactionaries, army, church, nobility, and capitalists, to crush the Bolshevik Revolution. The White Generals: Nothing learned and nothing forgotten. Foreign intervention and its failure, the unwillingness of the British soldier to continue the war on Russian soil after 1919.

The breakdown of Russian industry and Russian communications and the crop failure of 1921. Famine and 9,500,000 starving Russian children. The prospects for similar events all over Eurasia at present and after the war. The new Rise of Russia. Holy Russia and the future.

Department of Government December 2, 1942
COURSE: Development of Political and Economic Problems

Eleventh Lecture - Latin America

READING MATERIAL

Indispensable Reading

Inman, S. Guy - Latin America, Its Place in World Life (1937) pp. 15-47, 55-61, 89-101, 168-172, 196-206, 261-279, 305-315, 429-432.

Dr. S. G. Inman has had an unusual personal experience all over Latin America. He represents the North American good-neighbor spirit toward the southern neighbors at its best.

Zweig, Stefan - Brazil, Land of the Future (1941) pp. 1-13, 28-42, 100-106, 111-120, 140-154, 253-268.
Recommended by Luthero Vargas as characteristic for Brazil.

Guiraldes, Ricardo- Don Segundo Sombra
Introduction VII-XI, pp. 48-98, 154-188.
Recommended by Argentine friends as very characteristic for the traditional life on the great cattle ranches.

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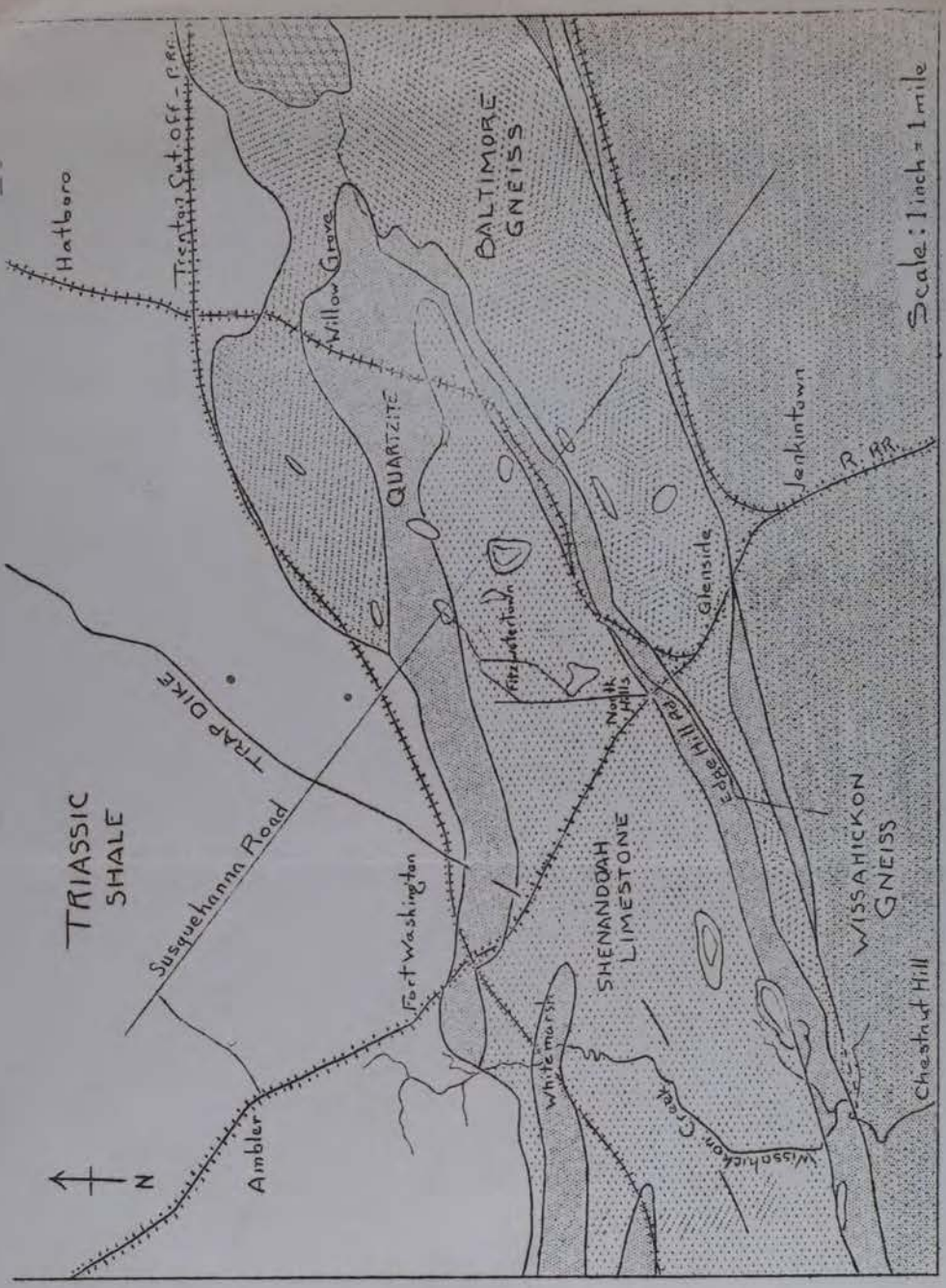
Suggested Additional Reading

Schurz, William Lytle - Latin America
Beals, Carleton - Pan America (1940)

TOPIC FOR SUMMARY

What strikes you as characteristic differences between the Latin American and the North American; what can we learn from our good neighbors in Argentina and Brazil, and what should the U. S. A. do to foster good neighbor policy still further.

(Continued from other page)
their goods, but no supply for their demands - in the later depressions no market for their goods, therefore they found themselves without means to buy foreign finished goods. The U.S.A. bought from Latin America in the boom year 1929 1.1 Billion worth of goods; in the depression year 1933 only 232 million. This became an economic catastrophe for South America. The detrimental Hawley-Smooth tariff. Latin America's "industrial revolution" really starts with 1914: in Brazil 1920 only 13,305 industrial enterprises, in 1935 already 30,000.
The U.S.A. control the Caribbean countries with half of their international trade. The Latin west coast sells only 20% of its goods to U.S.A. Brazil exports 35% to U.S.A., however produces such an abundance of coffee and its cotton is competitive to U.S.A. so that it has to foster all possible Eurasian consumers. Argentina sold in 1938 only 8.5% to U.S.A. For Argentina and especially its ruling cattle ranchers meat exports are decisive. In 1938 Great Britain bought 500,000 tons meat, Germany 50,000 tons, U.S.A. none. The unjustified discrimination against Argentine meat as detrimental to an understanding with Argentina and to the whole good neighbor policy as the Seclusion Act against 146 Japanese immigrants per annum is detrimental to an understanding with Japan and the whole yellow race.



OUR ANCIENT LAND — An "Expedition for Everyone" Arranged by THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

Periods represented	Age	Chief rocks	Type
TRIASSIC	(185 million years ago)	Stockton red shale	Sedimentary
		Igneous trap dikes are of this age	
ORDOVICIAN	(465 " " ")	Shenandoah limestone	Sedimentary
		Deposition began in the Cambrian	
CAMBRIAN	(555 " " "	Chickies quartzite	Metamorphosed sediments
PRECAMBRIAN	(up to 1,800 million)	Baltimore & Wissahickon gneiss	Igneous

Map based on Philadelphia Folio (Germantown Quadrangle) - Geological Atlas of New Jersey.

An das Bayerische Landesentschädigungsamt ...

Hiermit stelle ich - unter Verwendung des beiliegenden Formulars - den Antrag auf Entschädigung. Ich möchte hier ausdrücklich bemerken, dass dieser Schritt keine Unfreundlichkeit gegenüber dem Botanischen Staatsanstalten bedeutet. Ich stehe heute wieder mit Herren, von denen ich weiss, dass sie keine Nazi waren, in freundschaftlichstem Gedankenaustausch!

Der Hauptgrund, den Antrag zu stellen ist, der Witwe meines von den Nazi ermordeten Vetters, der meine Mutter und mich unterstützte, den anfallenden Betrag zu überweisen.

Ich lebte mit meinen Eltern zusammen. Mein Vater, Adolph Haas starb 1928 nach langer Krankheit, meine Mutter starb in Theresienstadt am 5. Oktober 1942; der Sterbeschein befindet sich in Prag. Wie alle unsere christlichen Freunde haben wir in der Inflation unser Vermögen verloren. Die kleine Farbenfabrik meines Vaters musste 1929 aufgegeben werden. Im Mai 1929 bestand ich die Begabten-Prüfung am Kultusministerium und konnte so, meiner Veranlagung entsprechend, Botanik studieren. Während meiner Studienzeit betreute ich als Volontär-Assistent die botanische Schausammlung. Nach meiner Promovierung - 21.12.32 - setzte ich diese Tätigkeit fort unter den gegebenen Umständen zögerte der damalige Direktor Dr. F.v.W. für mich um die Mittel meiner Bezahlung nachzusuchen. In der Hoffnung auf eine spätere Regelung setzte ich meine Arbeiten freiwillig fort.

Am 23. Mai 1933 wurde ich entlassen, konnte aber im Herbst 1933 - obwohl ich Jude bin - weiterarbeiten, freilich weiterhin ohne Vergütung! Ich war damals "Wissenschaftliche Hilfskraft an der botanischen Schausammlung". Späterhin setzte ich diese Arbeit als "Wohlfahrts-Erwerbsloser" fort. Wie die Verhältnisse waren, mögen Sie aus dem beiligenden Briefwechsel (die beiligenden Photographien der Briefe) ersehen.

Wir wohnten seit Oktober 1895 in der Buttermelcherstrasse 15/2r. Da ein Mitglied der NSDAP die Wohnung wollte (Es ist der Zahntechniker Lerch, der die Wohnung noch inne hat), mussten wir knall und Fall unsere Wohnung verlassen und in einer sog. Judischen Wohnung Triftstasse 9/2 ein gemeinsames (!) Zimmer nehmen. Dabei mussten wir unsere Möbel verschleudern. Ich war dann bis zum 29. Juli noch mit meiner Mutter in der Triftstrasse. Ich bin damals nach Amerika ausgewandert. Meine Mutter blieb bis 1941 in diesem Zimmer; am ..... wurde sie von den Nazi nach Theresienstadt verschleppt, wo sie nach der erhaltenen Urkunde am... gestorben ist. Bei der allgemeinen Aktion am 10. November 1938 wurde ich nach dem Konzentrationslage Dachau verbracht, wo ich bis zum 22. Dezember 1938 gefangen gehalten wurde.

Da ich durch die Nazi in meinem Fortkommen behindert wurde und dadurch gezwungen wurde, von meinen Verwandten Hilfe anzunehmen, da ich 6 Wochen meiner Freiheit beraubt wurde, stelle ich hiermit den Antrag auf Entschädigung

that at K. P. was made known about the same time by the names gentlemen since then the plants of those places, and in 1866 those of P. F. have been carefully watched & collected by a number of botanists. Among these I may especially mention Dr. M. & Messrs Smith, Diffenbach, Parker, & Prof. T. C. Porter determined the plants.

A small number of the plants of 1864 did not reappear in 1865, & some of those of 1865 were not found in 1866

Proceedings of the A...
Vol. XIX 1867 pg 15.
Aubrey H. Smith "On colonies of Plants observed near Ph."

During the years 1864, 65, & 66, a large number of introduced plants, chiefly southern, were found growing on the waste grounds below the Phila Navy Yard, and at Knight's Point and Petty's Island, on the opposite shore of the D.

[The B.C. on the N.J. side of the river at K.P. is a large enclosed ship timber

pg. 16. Petty's I. is a tract of alluvian on the N.J. s

The Ballast Grounds locality was discovered by Messrs Diffenbaugh and Parker in the latter part of the season of 1864

of the D, opposite the mouth of Cooper's Creek.

Aubrey H. Smith. Proceedings of
N. Y. A. S. C. II. 1867

The arrival at the various seaports
towns on the coast of ships with
ballast from different parts of the world
has probably done the greatest work in
this introduction & distribution, and it is one
which will continue to obtain. As our country
can furnish material to satisfy the
wants of the naturalist the port of Philadelphia
has been on a gradual increase
for several years, and, as a natural
consequence, many plants have been
collected which probably have not been
found elsewhere in the U.S.

XIX 1867

An Address Delivered at the V.E. Day Assembly of the Students, Seminar Registrants and Staff of the Philadelphia College of Pharmacy and Science, May 8, 1945.

The war in Europe is officially ended. It should never have begun. Certainly, it has engendered material invention and progress; certainly, it has improved the current economy; certainly it will more equitably map the world and remold its thoughts. But just as certainly has it mortgaged the future of children yet unborn, and given us, the survivors, a charge more solemn, a trust more sacred, than ever before given to civilization.

It has killed millions of young people, young people who had dreams of lilac scented mornings, and visions of loving and living in the gentle avenues of peace and prosperity. No tribute of honor and praise, no gilded monument can ever awaken them to their belonging lives. They are dead, cold dead, young people of many nations who gave their all toward the security of those who now mourn them. Others, wounded in the senseless fray, return to us, and elsewhere, maimed in mind, in body, in spirit, never again to know their wonted strength and capacities. They will be with us to remind us of the hideousness, the barbarity--the wickedness and the total futility of war.

Mind you! Not for a second do I say that their sacrifices have been vacuous and vain. Oh no! When once the meteoric madman of Germany and the megalomaniac Mussolini had achieved to their pinnacles of synthetic power and siren-struck their foolish and fanatic followers, there was no alternative but war--war to the end--to the partial end to which we have now victoriously come.

But if the strength of decent men had met the issues long before these swollen-headed criminals and beasts of Axishood, if Hitler had been hung and swung in willing winds, and Mussolini strung by his cyanotic ankles, in proper season, the boys you know, who now lie quietly in serried rows and in foreign green acres of God, would today be vibrantly, throbbingly alive, enjoying the blessings of life expressed in their own belonging way. And the wounded, and maimed now streaming into their homelands, would be clear in mind, unhurt and unseared in

heart and soul--to say nothing of the long hurt in the hearts of fathers and mothers, children and others for whom there are no returning heroes.

But the peace in Europe is only a semi global peace. The false philosophies and ideologies, the racial perversity, the military power of Japan still hold their terrors for today and for tomorrow. Just as certainly as the Nazi python was ultimately choked to its slimy death by the strangling power of Democracy, so too, must the beastly rapacity of Nippon be liquidated and made futile for all time.

From this victory we must dedicate ourselves, in every sense of the word, toward our final objective. Those on the homeland must still talk, work, feel and fight in terms of an unfinished task. Our naval and military forces have already indicated that their fight is only half over and are even now on the way to finish it.

Yes, there are more sacrifices to pay,--but they are the sacrifices which will keep glorious and intact our avowed purpose to clear the world of the senseless idiocy, the brutal indecency of war--man's inhumanity to man.

Americans--all of us--and our Allies, look forward to the day when we shall gladly live as we want to live, humbly, decently and enjoyably in a land of peace and plenty, time without end.

In his message, this morning, President Truman reverently asked that this Sunday, May 13th, be given over as a day of Thanksgiving to the Divine Providence which brought success to the forces of right and justice. May I, accordingly, ask that all who are attending this service, with solemn thought and full heart, attend upon their church this Sunday and so offer, not only a prayer of Thankfulness for victory, but gain from the occasion, inspiration and guidance wherewith to pursue the enemy of decency until the world victory is won and a friendly, cooperative world amity is at last reached.

May I, in conclusion, cut of the sublimates of the last war, bring this gem in poetry, slightly changed to meet the current situation and as a challenge to your thinking and mine:

"In far off fields the flowers blow
Between the crosses, row on row,
That mark our place, and in the sky
The larks still bravely singing fly,
Scarce heard amidst the guns below.
We are the dead. Short days ago
We lived, felt dawn, saw sunset glow,
Loved and were loved; and now we lie
In far off fields.

Take up our quarrel with the foe,
To you from failing hands we throw
The Torch--be yours to hold it high;
If you break faith with us who die,
We shall not sleep, though flowers grow
In far off fields."
(John David McCrae)

Verglichen mit den U.S. liegt unser Gebiet sehr weit nördlich.München hat dieselbe Breitenlage wie Quebec in Canada.Ausserdem liegt es auch verhältnismässig hoch.München,das selbst in einem Tale sich befindet hat eine Höhenlage von 520 m N.N.,während die durchschnittliche Höhe des Landes südlich der Bayerischen Hauptstadt 600 m NN beträgt.Un doch ist das Klima ganz verschieden von dem z.B. in Philadelphia.Während des grössten Teiles des Jahres weht Westwind.Dieser kommt vom Atlantischen Ozean und bringt dem Lande Niederschläge.Diese fallen im Sommer als Regen,im Winter als Schnee.Die Niederschlagsmenge ist sehr hoch;Südbayern ist ein sehr regenreiches Land;insbesodere im Sommer fällt viel Regen.Die Alpen setzen den winden West- Widerstand entgegen,die Feuchtigkeit,die sie mitführen manchmal tagelang,ohne Unterbrechung condensiert sich als Regen.Ich weiss genug Sommer,die total verregnet waren.Dies ist besonders der Fall,wenn sich eine sog. Monsun-Wetterlage einstellt,wie das sehr häufig vorkommt.Die Wetterlage Mitteleuropa's wird durch 3 Faktoren bestimmt.Durch ein Gebiet mit niedrigen Luftdruck von Island bis Grönland reichend,das sog, "Island-Tief",durch ein Gebiet mit hohem Luftdruck,dessen Kern über den Azoren liegt und das oft bis England reicht,das sog,"Azoren-Hoch".Der 3. Faktor wird durch die Luftmassen über Sibirien gebildet.Wenn sich im Sommer das Land stark erwärmt,dann sind diese leicht,es besteht ein niedriger Luftdruck,ein "Tief",während im Winter dort grimmige Kälte herrscht.Kalte Luft ist schwer;wir haben hier hohen Luftdruck,ein "Hoch".Ganz Mitteleuropa und auch unser Südbayern liegt im Kampfgebiet dieser 3 Wetter-Faktoren.Sie mögen daher verstehen,wie wichtig für die alliierten Mächte der Besitz vom Island und Grönland ist und und warum die Deutschen versuchten so lange Wetter-Information von Grönland zu bekommen,bis es gelang im Herbst 1943 ihren Geheimsender unschädlich zu machen.Im November und Dezember ist der Himmel meist mit einer zusammenhängenden Wolkenschicht bedeckt.Man sieht of wochenlang keinen blauen Himmel.Das mag mit ein Grund gewesen sein die sog. "Second Front" zu verschieben,denn zu dieser Zeit hat die Luftwaffe nur begrenzten Wert.

Wenn "Monsun-Wetterlage" besteht,dann ist über England Hochdruck (meist in Verbindung mit dem "Azoren-Hoch") und über Mittel-Europa Tiefdruck.Die Westwinde bringen nun Regen, über weite Gebiete.Man bezeichnet sie daher als "Landregen".Besonders feucht ist der Alpenrand.Oberammergau,Garmisch-Partenkrichen haben im Juni so viel Regen,dass oft die Heu-Ernte gefährdet ist.Bekannt durch seinen vielen Regen ist Salzburg.Da war einmal

einem
einmal ein Engländer im verregneten Sommer in Salzburg. Nach 2 Jahren kam er wieder nach Salzburg und da hat es wieder geregnet. Da hat er gesagt: "Salzburg ist eine sehr feuchte Stadt; es regnet noch immer!"

Schnee kommt meistens gegen Weihnachten oder Neujahr und dann ist das Land oft M 2 Monate lange mit einer dicken Schneeschicht bedeckt. Es ist dei Zeit des Wintersports! Ostwind bringt trockenes, heiteres Wetter, im Winter Kälte, denn der Wind kommt ja aus dem Innern Russlands. Eine sehr interessante Erscheinung ist ein warmer Südwind, der plötzlich auftritt. Dieser Wind wird "Föhn" geheissen. Er hat folgende Entstehungs-Ursachen. Wenn über Mittel-Europa Tiefdruck herrscht und über dem Mittellandischen Meer Hochdruck, beim Hochsteigen
dann wird von dem ersteren Luft aus dem Süden her angesaugt. Diese erwärmt sich an den Südhängen der Alpen. Wenn sie nun auf der Nordseite der Berge herunter sinkt, wird sie komprimiert und erwärmt sich von neuem. Dieser Wind ist so warm, dass er in ganz kurzer Zeit den Winterschnee zum Schmelzen bringen kann. Nervöse Leute empfinden ihn sehr unangenehm, da er mit grossen Luftdruckschwankungen verbunden ist. Kühle Temperaturen herrschen meistens bis Mai, bis der Schnee von den Bergen weggeschmolzen ist. Mitte Mai sind meist sehr gefährliche Kälte-Rückfälle. Es sind dies die Tage, die den Heiligen Bonifatius, Servatius und Pankratius geweiht sind - Bayern ist ein katholisches Land und jeder Tag trägt als "Namenstag" den Namen eines Heiligen - und die deshalb die 3 Eisheiligen genannt werden; sie sind am 12., 13., und 14. Mai. Am 15. ist dann die "kalte Sophie". An diesen Tagen sind Spätfröste nicht selten. Schwächere Kälte-Rückfälle kommen dann noch anfangs Juni. Durch die Nähe der Alpen sind auch im Sommer rasche Temperatur Wechsel nicht selten und Gewitter, die mit diesen verbunden sind, bringen dann zuweilen schwere Hagel-Schläge. Es ist daher das Bestreben der Regierung, die Bauern zu einer Hagel versicherung zu veranlassen. Ich will nun die Demonstration der Bilder nicht länger hinaus ziehen und alles weitere in Gegenwart der Bilder erklären.

1. Phenotype : Relative grass of enzyme
Genome . Chemical process . gen

(Rhodes born 1943) The white stripes on the green leaves is caused by a cytopl. har.

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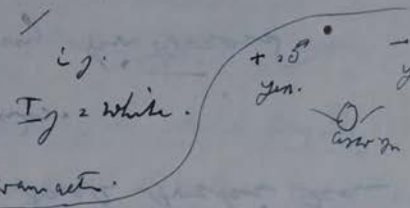
I_g i_g

$I_g I_g$ = white.



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Adaptation . Learning . Enzyme syst.
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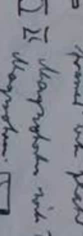
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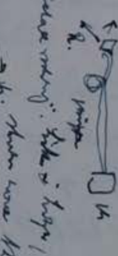

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(U.S. [illegible] = Vaccin of Kills) from [illegible] yolk sacks. Egg pro-
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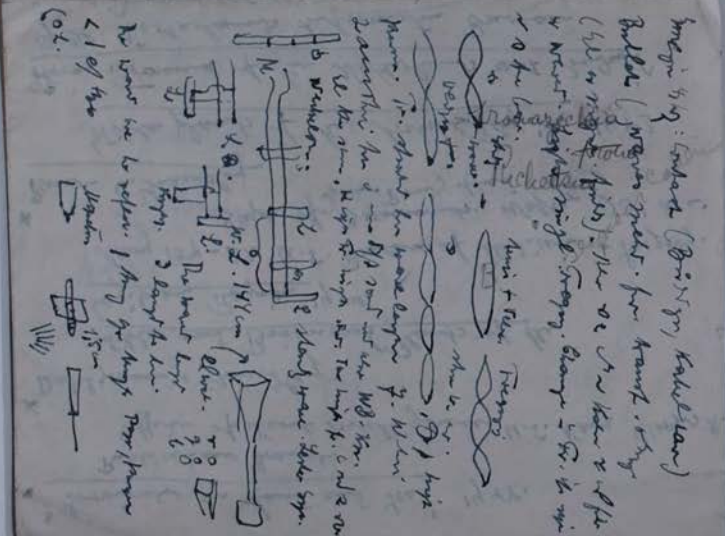

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M. 25.

ASCANIO ARCANIO
"MANSION EGIPCIA"
LOS CAOBOS
CARACAS
VENEZUELA

3) Julius Caesar – [illegible], [illegible] [illegible] as the [illegible], 444 BC [illegible] [illegible] [illegible] [illegible] the [illegible] [illegible] [illegible] [illegible], but he was always [illegible] the [illegible] of [illegible] [illegible] [illegible] both [illegible] [illegible], [illegible] of variety of [illegible]

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5. Restoration of scientific [illegible], & Univer[illegible] [illegible]. [illegible] – Scientific [illegible] [illegible] [illegible] [illegible] meeting this year in [illegible] + [illegible]. [illegible] of the intelligence. [illegible] [illegible] [illegible] [illegible] [illegible] of means. [illegible] [illegible] for the [illegible], UNSCO. To [illegible] all [illegible] UNESCO [illegible] [illegible] of the [illegible] [illegible]. We have [illegible] [illegible] the [illegible]

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~~[illegible]~~ living

Sitze in Strassenbahnen und im "Subway" verwendet. Von Palmblättern stammt auch das "Crin d'Afrique", ein wegen seiner Elastizität geschätztes Polstermaterial. Es besteht aus den aufgespaltenen Blättern der Zwergpalme Chamaerops humilis, der einzigen Palme, die in Europa, im südlichen Spanien heimisch ist, aber auch in Nordafrika wächst. Die abgezogene Oberhaut der Blätter der afrikanischen Raphiapalme, wird als "Raphiabast" in der Gärtnerei zum Aufbinden gebraucht.

Wir haben gesehen, dass Samenhaare, und Gefässbündelfasern von Stengeln und Blättern wichtige Faserstoffe liefern. Solche stammen auch vom Fruchtfleisch der Kokosnuss. In den Handel kommt es unter dem Namen "Coir". Die Kokosnüsse sind Schwimmfrüchte, die in weitestgehendem Masse an die Verbreitung durch das Meerwasser angepasst sind, die aber im wesentlichen doch durch den Menschen an alle Küsten der Tropen gebracht worden sind. Was man auf den Jahrmärkten zu sehen bekommt, sind nur die Steinkerne. Die ganzen Früchte sind viel grösser. Die Kokosnüsse sind wie unser Steinobst Steinfrüchte. Die Frucht besteht aus 3 Schichten: Zuerst kommt eine dünne, unbenetzbare Aussenhaut, dann folgt eine breite Mittelschicht aus langen Fasern, zwischen denen sich bei der reifen Frucht Luft befindet, die die Früchte leicht und schwimmfähig macht; die Innenschicht wird von der sehr harten, etwa 1 cm dicken Steinschale gebildet. Jetzt erst kommt von einer dünnen Haut eingehüllt, der Same mit seinem fettreichen Nährgewebe, das, von der ausgereiften Frucht stammend, als "Copra" getrocknet in den Handel kommt und aus dem man, nachdem es geraspelt worden ist, durch Ausziehen mit chemisch reinem Benzin auf kaltem Wege das feste Palmfett (Palmin) gewinnt. Ein Hohlraum im Innern enthält die durststillende Kokosmilch. Diese ist freilich nur vorhanden, wenn die Früchte unreif sind, denn die für Speisezwecke und auch für die Fasergewinnung geernteten Kokosnüsse sind unreif; der Keimling ist noch ganz unentwickelt. Man kann Fett und Fasern nicht gleichzeitig erhalten. Die Kokosfasern müssen auch einen Röstprozess durchmachen; sie sind braun; man kann sie aber auch färben. Man stellt aus ihnen Matten und Läufer her. Zum Schlusse sei noch über die Kokospalme einiges Interessante mitgeteilt. Auch die Palme selbst ist dem Meere angepasst. Sie wächst mit Vorliebe an den Küsten und der Stamm ist meist gebogen, sodass die Früchte leicht ins Wasser fallen können. Die Blattfiedern sind meist senkrecht gestellt, sodass eine Fiederreihe unten, die andere oben ist; das kommt durch Drehung der Blattrhachis zustande. Noch heute bestehen über die Heimat der Kokosnuss einige Zweifel. Die meisten Vertreter der Gattung Cocos sind in der Neuen Welt zuhause. Man nimmt aber doch mehr und mehr an, dass die Heimat von Cocos nucifera, von der unsere Cocosnüsse stammen, in der Alten Welt zu suchen ist. Ein Fingerzeig mag vielleicht der sog. "Cocosräuber" Birgus latro sein. Im ostindischen Archipel lebt dieser recht grosse Krebs, der eigentlich zu den "Einsiedlerkrebsen", die im Meere leere Schneckenhäuser bewohnen, gehört. Er hat sich dem Leben auf dem Lande angepasst. Das Tier klettert auf die Kokospalmen hinauf,

die dieser Militär im Auftrage seines kaiserlichen Herrn Wu - ti unternahm um Bundesgenossen gegen die Hunnen zu gewinnen, ~~[illegible]~~. Die andern Faserstoffe haben niemals die Bedeutung des Flachses erlangt.

Während die Baumwolle weiss ist, müssen die Gefässbündelfasern gebleicht werden; erst dann kann man sie färben.

Die bisher besprochenen Gefässbündelfasern stammten von Sprossen und Stengeln; aber auch von Blättern können Pflanzenfasern herrühren. Es sind das die fleischigen Blätter, in denen verschiedene tropische Pflanzen das Wasser speichern, Blattsucculente, wie z.B. Agaven, Aloen ect. Die Sisal-Agave wird in den Tropen plantagenmässig angepflanzt und auch eine verwandte Pflanze von der in den Wohnungen in New York gerne gezogenen Sanseveria zeylanica wird zur Fasergewinnung herangezogen. Es gibt aber auch eine Bananen-Art, Musa textilis, die auf den Philippinen wächst. Der Scheinstamm, der nur aus den Blattscheiden, den verbreiterten Blattstielen, besteht, liefert nach dem "Rösten" ebenfalls Fasern, den sog. "Manila-Hanf". Die ~~aus den Blättern gezogenen~~ Fasern sind zum Verspinnen zu steif. Sie werden vielfach als "Fiber" bezeichnet. Man macht aus ihnen Handbürstchen oder auch Seile, besonders aus dem "Manilahanf", den dieser hat die Eigenschaft, auch, wenn er nass wird, zu schwimmen. Er wird deshalb in der Marine verwendet.

Die "Gefässbündelfasern" wurden gewonnen, durch einen Fäulnisprozess, bei dem die widerstandsfähigeren Teile übrig geblieben sind. In gewissem Sinne macht die Natur dasselbe an den Stämmen von afrikanischen und asiatischen Palmen bei der Entstehung der Piassave. Darunter versteht man die bei der Vermoderung der Blattscheiden der Palmblätter am Stamm zurückbleibenden, stark verkieselten und daher widerstandsfähigen Gefässbündel-Fasern. Nicht von allen Palmen kann Piassave gewonnen werden. Es gibt solche, bei denen die Blätter restlos abfallen. Auch müssen die Fasern die nötige Festigkeit besitzen. Die Piasave-Fasern sind braun bis schwarz, sehr dick und steif; man macht aus ihnen die bekannten Waschbürsten und Besen. Von den Palmen stammen noch andere wertvolle Dinge. Zum Flechten verwendet man Streifen von Palmblättern, aber auch Streifen vom Stamme der ostindischen Kletter- oder Rotang-Palme (Calamus), die, weil von den Spaniern nach Europa gebracht, auch "Spanisches Rohr" geheissen wird. (Aus dem gleichen Grunde heisst der rote scharfe Pfeffer, der von der Solanacee Capsicum anuum die in Amerika zuhause ist, "spanischer Pfeffer"). Mit einem "Rohr" hat diese Pflanze gar nichts zu tun; die Stämme sind auch nicht hohl. Diese Pflanze ist überhaupt sehr interessant. Ihr Stamm kann bei einer Dicke von weniger als 5 cm 100 - 150 m lang werden. Die Palme kann nur in die Höhe gelangen, indem sie sich an andere Gewächse anhängt. Sie besitzt riesige Fiederblätter; sie ist also eine Fiederpalme. Eine grosse Zahl der endständigen Fiedern ist zu stark verkieselten, sehr scharfen Widerhaken, zu Blattdornen, umgebildet, mit deren Hilfe die Palme als "Spreizklimmer", ähnlich wie die Brombeere oder die Rose mit ihren Stacheln emporklettert. In den Tropen entstehen dadurch undurchdringliche Dickichte, die nur von Dickhäutern, vom Elefanten oder Rhinozeros durchbrochen werden können. Die Streifen des "Spanischen Rohrs" werden besonders gerne für

3 Agave sisalana Perrine, Amaryllidaceae, Mexico.

1 Achillea Millefolium L., Compositae, Eu., As., Am., Common Yarrow.

2 Aconitum Napellus L., Ranunculaceae, moderate Zones.

4 Agropyrum repens Beauv., Gramineae, Cosmopolite, Quick-Grass.

Avena sativa L., Gramineae, Cult. Plant., Oat.

5 Althaea rosea Cav., Malvaceae, Orient, Hollyhocke.

" officinalis L., " , Eu. Orient, Common Marsh-Mallow.

"

7 Apocynum cannabinum L., Apocynaceae, U.S., Can., Indian Hemp.

11 Asclepias tuberosa L., Asclepiadaceae, " " , Butterfly-Weed.

12 Atropa Belladonna L., Solanaceae, Eu., Orient.

9c Artemisia Absinthum L., Compositae, Eu., Wormwood.

9 Arisaema triphyllum Schott, U.S., Can, Jack-in-the-Pulpet. (Araceae)

6 Anethum graveolens L., Umbelliferae, Eu. As., Dill.

19 Artemisia Dracunculus, L., Compositae, Eu, As., Tarragon.

Baptisia australis R.Br.. Leguminosae, U.S., Can., False Blue Indigo

Baptisia tinctorea R.Br. Leguminosae " , Wild Indigo

9 Arctium Lappa L. Compositae, Eu, , Great Burdock

species of bananas which has retained the two ranked position of the leaves, it is this the so called "tree of the travellers" Ravenhalia Madagascarensis. (In the leaf axils rain water collects, which travellers are said to drink) with large banana leaves spread out flabelliformly (Ill. Nr. 6.) In other bananas in the development of the pseudo-stem a turn to the right takes place. In this manner the spiral arrangement of the leaves is formed. The large banana leaves are used by the natives for covering of their huts. These too are interesting. With their gigantic measures they offer a wide surface for attack by the winds. In "monocotyledons" the leaf-veins, the so called leaf nerves as a rule run parallel. We have a "parallel leaf venation". Thus it is for instance in grasses. In banana leaves also we have a parallel venation. All the veins are at first combined in the very strong midrib which has to bear the entire weight of the leaf, and then proceed fountain like towards the border of the leaf. By this it is attained that indeed by the wind the leaf may be split but may not be broken. In plants which grow in the open this may be observed. A split leaf is able to assimilate in the same manner then another one which is not injured. In greenhouses the leaves are seldom damaged. Theophrastus compared the leaf very instructively with the feather of a bird.

Although the stem is soft, it consists of very fibrous, tough tissue. True the plant must be able to withstand strong pressure of wind and thus the pseudo-stem of species of bananas, which does not produce edible fruits attains great technical significance. On the Philippine Islands and in Indian Archipelagus Musa textilis (Ill. Nr. 7. is cultivated. It does not become very heigh and has a comparatively thin stem. It is cut off and, subject to a process of putrefaction, called - retting proceds - by which the resistable fibers remain. They yield the so called "Manila hemp", from which ships hawsers are made, which have the property to swim, even when the are wet. and not to sink.

Thus far we have always spoken about the aerial parts of the plant. these are produced by a roundish, darkbrown tuber subterranean tuber with a diameter of 50 - 60 cm. Banana plants are thus perennal tuber plants, unlike potatoes, in which the old tuber is annually used up and new ones are formed, but like Araceae, where the tuber remains vital permanently. The banana tuber has numerous growing points, called "eyes" from which the arial shoots remets. With these "eyes" the banana - similarly to the potatoe - must be increased asexually, asexually, because not by seeds, which are formed by a sexual process, by fertilisation. We shall again come back to this. From the "eyes" at first a small leaf-sprout grows (It may be noticed in the different illustrations). This becomes bigger and bigger and finally we see the pseudo-stem consisting of leaves. Such sprouts are ever present in certain numbers, In Musa textilis and in a few "wild" Bananas they are mostly developed simultaneously in greater numbers, while in "edible" Bananas, as well as in Musa Ensete, this large banana, originating from Africa, and frequently used in open gardens (the fruits of it are small and

Observations on the room-pine.

The room-pine, Norfolk-Island-pine, Auracaria excelsa R.Br., which is frequently kept in rooms, virginates at Norfolk-Islands on the southern hemisphere. With us it is mostly raised as a pot-plant, however in its homeland it grows up into a stately tree.

On this plant the following observations may be made: Auracaria has a very clear structure. The stem, which is straight as an arrow, sendt out tierlike 5 - 6 lateral-branches, radially in all direction, which again have branches, arranged in two rows. This ramification is always constant, it is fixed. On our own indigenous firs or spruces this is different. As with Auracaria here too there is a difference in ramification of the principal- and the lateral-shoots. In these trees also the lateral branches, ramified in two rows spread away from the stem in all directions! In the stem science speaks of radial arrangement of branches, the ramification of an individual branch it calls bilateral. So much about the structure of coniferes.

It is now familiar, that, when on a spruce or fir the top breaks off, which occurs quite frequently, then the leader-shoot, which greatly advances in growth, is not yet lignified and therefore is still soft (frequently crows rest on the young leader-shoots), one or more of the uppermost branches becomes erected and form a new top. Such a branch thereby passes over from the bilateral to the radially branching. It then grows vertically and not horizontally any longer. Frequently thereby it looks like a rivalry between several branches. Therein one branch may come out from the combat or however, when this remains undecided, the tree obtains several tops. Thus " forked - spruces " are formed. This however is different entirely with Auracaria excelsa. When here the top is removed, the the uppermost branches are in no manner influenced in the direktion of their growth. Illustration Nr. 1. showes such an instance. The tree has become too high; it strikes against the glassroof and therefore had to be topped. On the node below the cut several new

Die tierfangende Pflanze Cephalotus follicularis (April 1938.)

Im Dezember 1936 bekam der Botanische Garten in München-Nymphenburg aus Australien einen Torfballen, der eine seltsame Pflanze enthielt: Cephalotus follicularis Labill.

Dieses zu den tierfangenden Pflanzen, den "Insectivoren" gehörige Gewächs kommt als sog. endemische Pflanze einzig und allein in SW Australien vor, d.h. seine Heimat, wo sie die Moore bewohnt, ist auf ein ganz kleines Gebiet beschränkt und von dort sind die Pflanzen eingeführt worden. Cephalotus ist sehr selten und es wird wohl in Europa keinen Botanischen Garten geben, der so schöne Exemplare davon besitzt wie der Münchener. Die Pflanzen kamen in stark etioliertem (vergeiltem) Zustande in München an, was bei der weiten Reise von Australien her recht gut verständlich ist. Wie aber die 3 im Mai, Juni und Oktober 1937 aufgenommenen Bilder zeigen, haben sie die Verfrachtung gut überstanden. und sich seitdem sehr schön entwickelt. Die Aufnahmen sollen einen Begriff geben, wie die Pflanzen aussehen, denn die meisten Abbildungen sind unrichtig. (Kerner v. Marilaun, Wettstein, Engler Prantl.)

In den Moospolstern stecken viele Pflanzen. Diese besitzen zweierlei Blätter: flache, spitzeiförmige, und Kannenblätter. Jene haben sich zuerst entwickelt und im Oktober sind sie von den Kannenblättern ganz verdeckt worden. (Abb.) Diese liegen als Rosette auf dem Boden ausgestreckt. (ihre Stiele stecken meist im Moos oder werden durch andere Blätter verdeckt) Im Aussehen erinnern sie stark an die Blätter der Kannenpflanzen Nepenthes besonders an Nepenthes ampullaria, eine im Ostindischen Archipel vorkommende Pflanze, dere Kannen gleichfalls als Fallgruben auf dem Boden liegen.

Diese Aehnlichkeit ist aber nur rein äusserlich, denn Cephalotus ist mit Nepenthes in keiner Weise verwandt und gehört als einzige Art zur Familie der Cephalotaceae. Wenn auch in den Kannen viele tote Insekten, besonders Ameisen, in einer ausgeschiedenen Flüssigkeit ertrunken gefunden werden, so hat man hier, im Gegensatz zu Nepenthes, ausser einem fäulniswidrigen Stoff, k

Nitrophoska was the fertilizer of the F.G. Farm

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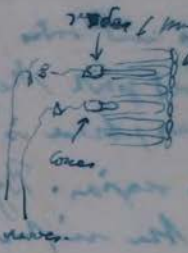
Kohlensaure Düngung + Superphosphat

Thomas Schlacke / Kalk + K2O

Dry- and Wet-vision. Selig Hecht - Columbia Dept of Biophysics, 7. 3. 45.

The eye is a wonderful instrument. The light on a bright summerday is about 4000 photo-candles (pc). 200 of these energies our eye. The latter is able to reach from: The last value is the first in deep night in a forest, then we can still observe a white sheet. It corresponds with the sensitivity of 1 candle 14 miles away from the observer. Already Max Schultze 1866 describes on the last 15 pages his observations on the eye and his [illegible] was unknown even to Helmholtz a contemporary of him. Our eye is a double apparatus, one works during day light, the other in the night when the light is limited. The border between 0,02 and 0,002 pc. Under 0,002 works the latter appe. Our eye is a photographical factory, not only a camera, because it informes our brain each moment with a new 'product'. The retina, the

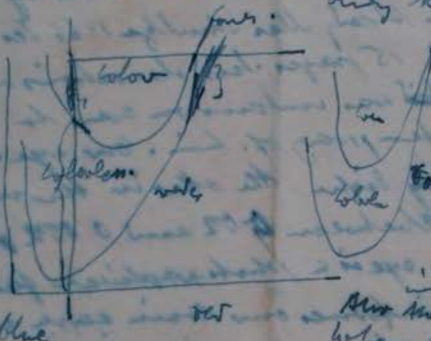
200 Day app.
20
2 cones
0,2
0,02
0,002 night app.
0,0002 rodes.
0,00002
0,000002 pc.



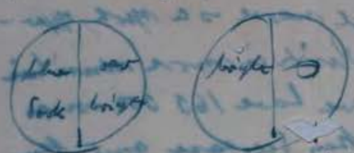
lens.

an essencial part of the brain contains besides the nerve fibres also a type, the vision purple, and once for all two kinds of sensitive cells: The cones and the rodes. The retina needs twice so much oxygene than all other tissues of the body. On a side of the entrance of the optical nerve is a spot, opposite the lens (rays) which is most sensitive (fovea centralis), here we have 163 000 cones per qumm. Round 20° they decrease and the rods increase. This is round a diameter of 1 mm. With the cone apparatus we are able to see strongly, with the rods intensively, this means we can recognize the objects but we don't see them sharp, on the other hand the rods have a twice

There are other interesting facts to state. The daylight apparatus adapts himself much quicker than the night appar. We see in daylight quicker than in the night. There are animals which have only one apparatus. Owls and bats have only the night - chickens only the day appr. whilst fish have both.



Also in the dark light we see somewhat colors, but whilst in daylight the brightest part of the spectrum is in yellow-red, in the night spectrum it is different. Also the vitamin A has a great importance. When we compare the sensitivity of cones and rods in day- and night light, so we see that in the red part they come close together, but in the blue-green part, there is a great diff. Here is a great spot of colorless region. By this fact the brightest part of the spect. which in the night is in the blue-green. This moving from red-yellow to bluegreen is called the Purkinje's effect, named for Purkinje a Russian scientist who observed first that the flowers looked differ bright in the night than in the day.



Hecht showed us a disc with blue and red colors when dimmed out, the blue parts appears bright whilst red is not more to be seen. In this way it is to state that blue light is not fitted for the blackout of cities against air raids.

we don't know. Nor is the radioactivity in the center or at the course of the earth. Today we suppose for instance that the heat center of the volcanoes is relatively not deep. Have we in the earth centers of earthquakes, especially around the Pacific Ocean. The thickness of the crust must be differ. in North America about 30 miles whilst in Japan or New Zealand only 10 miles. The waves travel in the ground of the oceans much quicklier than in the continents. This is also a hint that they must have a differ composition. The core of the Earth must be very heavy, following the composition of the meteors perhaps of Fe. Ni. But we don't know in which condition these elements are.

Dr. Theodor Philipp H a a s .

Philadelphia College of Pharmacy and Science.
Philadelphia 4., March 1, 1945.

Dr. Ernest Guenther,
Vice-president and Chief Chemist,
Fritzsche Brothers, Inc.,

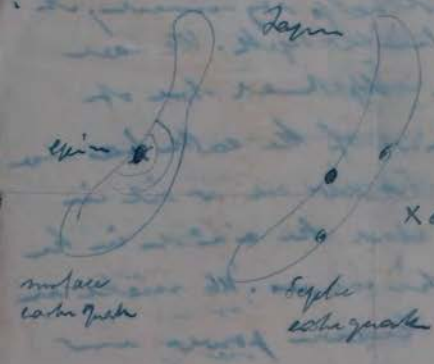
Nordenmark, the interior of the earth. 3.6.45.

What do we know about what happens underneath of us and how can we get information?

The deepest point which we have already reached is a oil well of about 3 miles, about 5 km. We must not forget that the radius of the earth is about 6370 km. Geology does not help very much, it can inform us only about a relatively thin depth. We have to take our information of geophysics, a different sort of different sciences. The problem of the interior of the earth has also economic importance when we want to discover ore or oil in the ground. Seismology gives us an answer about the conditions in the upper shales of the earth, by using elastic waves. We make an explosion by the use of dynamite of a known power and place wave detectors in certain distances. These detectors are connected with amplifiers which multiply the registered shock and the latter is then recorded by a mirror galvanometer on a photographic strip. We may get information in this way until about 4 : 5 km.

We have reflections of waves, also appearances of other waves and so we see that even the uppermost shales of the earth must be composed of different layers built by different material, sand, limestone etc. in which the waves run with different speed.

The main information of the interior of the earth we get by the earthquakes of which we have about 1 million each year. The earthquakes are registered by seismographs which are mainly based on the pendula principle. (Heavy mass which does not move with movements of the earth.) These seismographs register earthquake waves mostly in S-W and in E-W direction.



In 5 different stations and from these registrations we can make conclusions about the interior of the earth because these waves are sometimes reflected. The depth of an earthquake, the so-called 'epicenter' is of importance. The greater however the appearance of such 5th. earthquakes in Zagreb in recent years. We found in this way until yet

weakened unit 430 mil. a 700 km. solid if glass or crystal is not serious.

Outer layer

intermediary layer.

After the outer layer we have the intermediary layer which goes until about 2850 km. We know the speed with which the waves, caused by the earthquakes, travel. We know that their speed increases until 28 00 km with a maximal speed of 11 km/1 (existence as far as the round is about). This speed stops suddenly at 2800 km. and we don't know why. Here is a small layer of unknown structure. Below it is the core, the center of which we also don't know something. It is unclear if it is solid or warm. We don't know. The pressure dominating there is about 4 Mio. atmos. Also and we don't know the physical condition

2. grafting and wound healing

The stimulation of the callus formation by the use of g.s. is used in order to increase the growing together of cutting + rootstock. The cutting surfaces of both parts have to be as much fresh and to come in contact with each other clean in order to grow together. Often it is better to treat ~~either~~ both with the g.s. solution only after cutting or ~~grafting~~ grafting. Also Dahlia is very helpful. It may be probable that by the use of g.s. the callus takes up also quicker, for fruit trees may have to be inspected

But it is to consider that the particular g.s. ~~increase~~ stimulates the formation of the root primordias but not the growth of the root. Therefore the grafts are exposed to the influence of the g.s. not for a longer duration. This should only start the development of root, afterwards the latter continue to grow normally.

The treatment of grafting with g.s. penetrates more the grafting-business. With it the ~~possible~~ the vegetative propagation of plant species is possible, replacing the ~~expensive~~ propagation by seeds or the expensive grafting. More root cuttings are to use. For the Weinbau (wine growing) + in Forestry this method has great possibilities. The rooting of Rebstecken with Heteroauxin and Belosten is proved. / grape-vine

Winery

butyric acid

die Blätter sind stark verkümmert. Neben der Transpiration hat ja eine solche Pflanze nur mehr für die Fortpflanzung zu sorgen. So ist es bei den zuweilen nach Amerika eingeschleppten Orobanche-Arten. Das deutsche Wort hierfür ist "Sommerwurz" (= Broomrape). In der Umgegend von Philadelphia (auch in anderen Gegenden der östlichen Staaten) wächst auf den Wurzeln der amerikanischen Buche (Fagus grandifolia) Epifagus americana, Beechdrops, in grosser Zahl. In Europa findet man auf den Wurzeln von Ulmen (Ulmus montana) die Schuppenwurz (Coral Wort), Lathraea squamara, deren schmutzig purpurfarbenen Blütenstände im zeitigen Frühjahre über den Erdboden erscheinen. Sonst lebt die Pflanze unterirdisch; sie besitzt schuppenförmige, milchigweisse, fleischige Blätter. In den Tropen gehören die Balanophoraceen mit ihren keulenförmigen Blütenständen hierher. - Bei den Wurzel- Endo-Holoparasiten ist der Vegetationskörper zu Zell-Reihen, die zwischen dem Gewebe des Wirtskörpers dahinziehen, reduziert. Wie bereits erwähnt, gehören dazu die tropischen Rafflesia-Arten. Nur die Blüten kommen auf der Oberfläche der Wirtspflanze zum Vorschein.

Die "Seide" (= Dodder) - je nach der Wirtspflanze, spricht man von "Flachs-Seide" oder "Klee-Seide", [illegible] - gehört zu den "Spross - Ecto -Holoparasiten". Der blass gelbliche Spross, mit seinen weissen Blüten, windet sich von Wirtspflanze zu Wirtspflanze, indem das Ende windende Bewegungen ausführt. Wie alle Windengewächse, windet auch die "Seide" entgegengesetzt dem Uhrzeiger-Sinn. Der Parasit sendet in die Leitungsbahnen des Wirtes Saugorgane, die sog. "Haustorien", die der Wirtspflanze Mineralsalze und Assimilate entnehmen. Der exmatrikale Spross-Parasit sitzt mit haftscheibenartigen Gebilden auf dem Spross der Wirtspflanze und die Gefässbündel in diesen verschmelzen mit den Gefässbündeln der Wirtspflanze. Zu den immatrikalen Spross-Ganz-Schmarotzern gehört die tropische Rafflesiacee Pilostyles, die auf Leguminosen schmarotzt. Auch diese Planze besteht nur aus Zellreihen im Wirtsgewebe und auch von ihr werden nur die kleinen Blüten am Stamm des Wirtes sichtbar.

Viele Parasiten sind an bestimmte Wirtspflanzen gebunden. Selbst unter den Endo-Hemiparasiten, wie die europäische Mistel, gibt es bezüglich der Wirtswahl bestimmte Rassen. So kann eine Tannen-Mistel niemals auf einem Laubbaum leben und eine Linden-Mistel geht niemals auf eine Tanne, aber auch nicht auf eine Eiche.

tig sind, bilden die "Schwämme" wichtige - Genussmittel, wie z.B. in Europa der Steinpilz (Boletus edulis).* Ausser diesen im Boden lebenden Pilzen, gibt es auch solche, die auf den oberirdischen Organen des Wirtes, auf Blättern und Sprossen, ihren Sitz haben. Hierher gehören die Rost- und Brand-Pilze, hochspezialisierte, stark reduzierte Formen, die keine Fruchtkörper mehr hervorbringen.

Es ist hier nicht möglich, auf die interessanten Verhältnisse betreffs Wirts-Wahl und Wirtswechsel einzugehen. Viele dieser Pilze sind auf ganz bestimmte Wirtspflanzen angewiesen. Auch das Problem der Pflanzenkrankheiten, verursacht durch diese Pilze, kann hier nicht besprochen werden. Es sei nur fest gestellt, dass bereits unter den "blütenlosen" Pflanzen solche sind, die die unterirdischen Organe, - Wurzeln, Knollen, Zwiebeln, - und solche, die die oberirdischen Organe - Sprosse und Blätter - befallen.

Das ist auch bei den Blütenpflanzen der Fall. Wir unterscheiden auch hier zwischen Wurzel- und Sprosse-Parasiten. Solche kommen sowohl in den Tropen, als auch in unseren Breiten vor. Einige Familien scheinen besonders für den Parasitismus bevorzugt zu sein. Unter den Scrophulariaceen sind viele Parsiten, die ihnen nahestehenden Orobanchaceen sind ausschliesslich Schmarotzer-Pflanzen. Das Gleiche gilt von den Balanophoraceen, Rafflesiaceen und den Loranthaceen, zu denen z.B. die Mistel (= Misteltoe) gehört. Während aber die Vertreter der erstgenannten Familien Wurzelparasiten** sind, treten die Loranthaceen nur als Sprosse-Parsiten auf. Nur von den Rafflesiaceen kennt man auch einige wenige Sprosse-Parasiten. Die "Seide" (= Dodder), Cuscuta, die man sehr häufig in der Umgegend von Philadelphia sieht, und die auf verschiedenen grünen Pflanzen schmarotzt, gehört zu den Winden-Gewächsen, den Convolvulaceen, zu einer Familie von der wir die schöne "Morning Glory", aber auch die Süss-Kartoffel (Sweet-Potato) kennen!***

*Ich sagte "Genussmittel", weil die Pilze selbst von den Verdauungssäften unseres Magen-Darm-Kanals nicht angegriffen werden. Sie sind unverdaulich und haben keinen Nährwert. Sie können nur - wie die Gewürze - die Verdauung anregen.

**Es ist oft sehr schwer, bei Wurzel-Schmarotzern zwischen Parasiten und Saprophyten - beides heterotrophe Pflanzen - zu unterscheiden. So ist die "Indian Pipe" Monotropa (deutsch "Fichten-Spargel) ein Saprophyt. Sie lebt auf dem Pilz-Myzelium, das auch die Wurzel des Baumens unter dem die Pflanze lebt, einhüllt. (Mykorhiza)

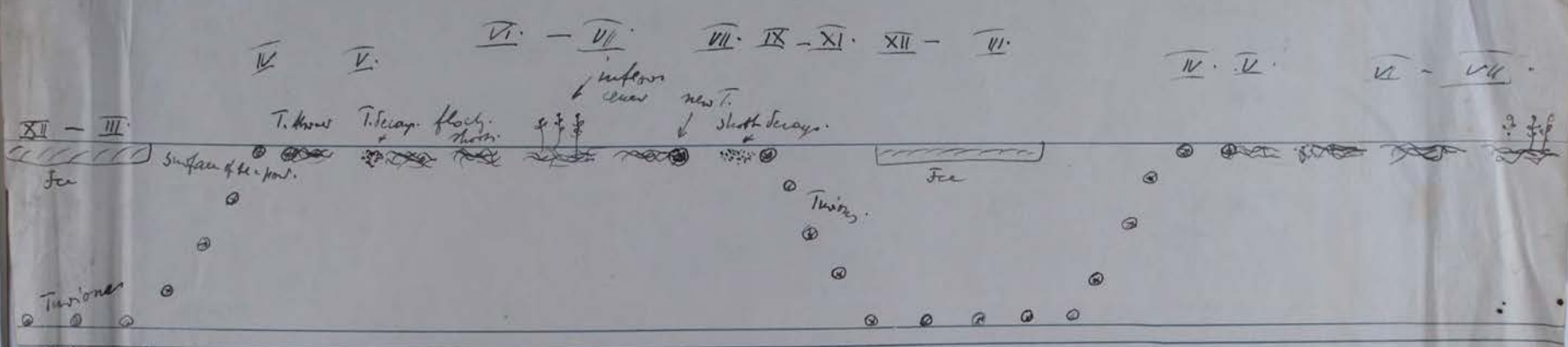
*** Die gewöhnliche Kartoffel - Irish Potato - ist ein Nachtschatten Gewächs. eine Solanacee

Following ~~the~~ (Engler's) Syllabus der Pflanzenfamilien, 11th ed. by L. Diels 1936, we find in the Encyclopedia Americana ~~1947~~ 1941 edition a quite different sequence. The Gymnosperms are separated from the Angiosperms and placed before the latter. Among the Gymnosperms are left as recent orders ~~groups~~ the Cycadales (cycads), the Ginkgoales (Ginkgos), the Coniferales (Pines) and the Gnetales. Ephedra Welwitschia, Gnetum. That in the Engler system the Monocots occur before the Dicots cannot satisfy us, but ~~this~~ this system is worked through so consistently that we have to take it as it is, without any regard that we are today convinced that the Monocots derive from the Dicots and are to be placed after the latter and not before them.

[illegible] 712 - 14 Spruce St. Philadelphia

	Equator	Bolivia	Peru	Chile	Argentina	Brazil	Paraguay	Uruguay
Plantago major			×	×	common & major			
Artemisia Absinthium					×			
Ambrosia artemisiifolia					×			
Iva ciliata								
Salsola Kali								
* Agrostis alba (Redtop)	×	×	×	×	×	×		×
Agropyron repens	×	×	×	×	×			×
Dactylis glomerata orchard grass	×	×	×	×	×			×
Phleum pratense Timothy	×	×	×	×	×			×
Poa pratensis June grass	×	×	×	×	×	×		×

Life cycle of Utricularia vulgaris (Europe)



Life cycle of Utricularia inflata: