The spindles become a different shade of purple, the nucleoli red, and the cytoplasm orange-yellow. Anatomical structures are stained the same as with Flemming's triple stain.

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MICRO MOUNTS, REVERSE AND CONVERSE

IN examining the reverse side of microscope mounts, at least two procedures have been resorted to. One is to make mounts thin enough on the reverse side to enable clear vision with a high-power objective. Two such types of mounts have been described in a former issue of SCIENCE.[1] I have used a similar method, mounting my specimens between two cover glasses, one 25 mm square, the other circles 12 to 20 mm in diameter. Use of the smaller covers leaves an area on the large cover for recording the collection number. These mounts were examined on a special holder consisting of the usual micro slide to the face of which were soldered three strips enclosing a 25 mm square. These square mounts were filed in shallow trays as used in England.

The chief objection to this method is that it does not provide for the examination of the reverse side of micro slides received for study from *other* persons and institutions scattered over the United States and abroad. For such examination the second method, already described in SCIENCE,[2] is necessary, and having adopted this method, the first is quite unnecessary.

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SPECIAL ARTICLES

SPONTANEOUS ENCEPHALOMYELITIS OF MICE—A NEW VIRUS DISEASE

DURING the past two years, on numerous occasions, individual mice with flaccid paralysis of the hind legs have been observed among our normal stock. By intracerebral injection of normal mice with a suspension of brain or spinal cord from six affected mice, five strains of the inciting agent have been obtained and propagated in series by passage through mice.

The course of the disease in mice, after intracerebral injection, depends on several factors, of which the strain of the virus and the age of the mice are the most important. The course of the disease, using the strain of virus most extensively studied, is briefly as follows: After an incubation period varying from seven to more than thirty days, a flaccid paralysis of one of the limbs appears. This paralysis usually spreads rapidly until all four limbs are affected. In general it may be stated that the younger the mice, the higher the mortality. Very young mice, less than four weeks of age, usually die without showing signs of paralysis. With increasing age the paralysis rate as well as the mortality rate decreases. Adult mice often show no signs after an intracerebral injection of the virus. A number of these mice, although showing no signs of paralysis, have become infected, a fact which is demonstrated by the results of intracerebral injection of normal mice with a suspension of the spinal cord from these mice, as well as by histopathological studies.

Intranasal instillation of virus is the only other method of producing the infection. This method, however, produces paralysis in only a small percentage of mice. Following intranasal instillation there is often developed a relative immunity to a subsequent intracerebral injection of virus.

The paralysis in surviving mice recedes gradually, but a permanent residual paralysis, usually of the hind legs, is almost invariable. Such mice, however, are virus "carriers," as virus can be recovered from the spinal cord for at least 150 days after injection.

Paralytic mice are immune to a subsequent intracerebral injection of virus. There is some evidence of neutralizing substances being present in the blood. A considerable proportion of mice which have remained well after an intracerebral injection of virus are immune to a second injection.

The virus resists the action of 50 per cent. glycerine at from 2° to 4° C. for at least 150 days. It passes all grades of Berkefeld filters with ease.

The virus of spontaneous mouse encephalomyelitis is not pathogenic for rhesus monkeys. No evidence of any immunological relationship with the virus of human poliomyelitis has been obtained.

The anatomic basis for the symptoms is an acute necrosis of the ganglion cells of the anterior horn of the spinal cord. Isolated ganglion cells of the cerebrum also undergo necrosis. Following the acute necrosis of the ganglion cells, there is a marked neuronophagia. A perivascular infiltration is observed in the cerebrum and spinal cord. Lesions have been observed only in the nervous system, which is the only region where virus has been demonstrated.

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RESPIRATORY TYPES AND PHOTOPERIODISM[1]

WORK was initiated in 1930 upon the use potted apple trees make of carbon dioxide from unmodified

[1] SCIENCE, 78: 2021, 267, September 22, 1933.

[2] SCIENCE, 78: 2015, 128, August 11, 1933.

[1] Published with the approval of the director of the Agricultural Experiment Station.

air. It has been reported[2] that the internal condition of the plants, due to differences in nitrogen nutrient, variety, stocks, photoperiod, shading and girdling, affected the amount of this gas used per unit leaf area in unit time.

The method employed of recording the amount of carbon dioxide in air that has been passed through a closed chamber containing plants does not measure, obviously, the amount of carbon dioxide which the plants use. For example, girdled trees have an increased respiration rate and appear to give off more carbon dioxide during the night than is taken out of the air during the day. The amount of carbon dioxide removed from the air during the day when respiration is also going on is an apparent low amount and not an actual amount. The carbon dioxide measurements do, however, show the period of its utilization during the day as well as represent the intensity of respiration during the night.

As plants do not extract carbon dioxide from the air at uniform rates during periods of illumination nor discharge it uniformly in periods of darkness, a record of the trend of carbon dioxide exchange can be secured only by determinations at different times throughout the 24 hours of the day or, it seems in some cases, only by observations during consecutive days. Three-hour readings were used in the present studies.

Observations upon 12 species other than Malus (6 varieties) particularly selected to represent short-day, long-day and indeterminate types[3] have led to the conclusion that plants have characteristic rhythms or daily cycles of carbon dioxide utilization. It is suggested that this plant character is associated with, if not responsible for, the phenomenon of photoperiodism. The species examined to date have shown a relatively irregular respiration curve for plants in a reproductive growth condition and a more regular curve when in a purely vegetative condition. Thus, short-day plants as Poinsettia gave the more irregular curve when grown in a short-day environment and long-day plants as spinach had the more irregular curve in a long-day environment. Each type of plant had more regular respiration curves in the environment which produced a vegetative growth response. (That is, if curves showing carbon dioxide exchange may be referred to as respiration curves.)

This correlation of respiration type to reproductive condition appears to bear a significant relation to Wilton's[4] deduction that plants of different photoperiodic classes have similar anatomical characteristics, particularly in tissues of secondary origin, at the time of flower formation, although they require a different light environment in order to become fruitful.

It should be clearly noted that the present carbon dioxide studies show that the altered respiration values precede flowering and appear as a causal condition rather than an effect.

It appears that the respiration rhythm of a plant may account for the unequal responses which some plants exhibit to added illumination applied at different periods of the day.

In some plants a respiration type which has been established by a cultural treatment tends to persist for a considerable time after the environment has been altered. Tests are being made to determine if the "vernalization" effects described by Lyssenko[5] or such phenomena as the inducing of seeding of celery by chilling in the seedling stage[6] result from an altered and then persistent, respiration type.

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[2] Meeting of the American Society of Plant Physiologists, Boston, December 28, 1933.

[3] W. W. Garner, *Plant Phys.*, 8: 347–356.

[4] Ocra C. Wilton, "The Relation of Anatomical Structure to Growth and Fruiting Condition in Plants," Doctor's thesis, University of Wisconsin, 1934.

LINEAR AND DENDRITIC SINK-HOLE PATTERNS IN SOUTHEASTERN NEW MEXICO

SINK-HOLES arranged in straight lines have lately been discovered in the High Plains in the southeastern part of New Mexico. These manifestations of the dissolving action of ground-water range in size from features which are very small to others more than 1,800 feet in diameter. They are connected in places by straight "trenches" of varying depth, which are possibly also the result of solution. The basins possess different degrees of roundness, the larger ones being the more elongate. These straight alinements, extending for 10 or 15 miles, are usually arranged in a parallel series which may be seen at various places throughout a considerable region. In Lea County, in an area as large as a 15-minute quadrangle, the mode of these linear trends is north 64° west. The mean deviation from this value is only a few degrees.

There are two zones of soluble rock and an intervening insoluble layer more than 1,000 feet thick. The upper zone is a thin superficial deposit of interbedded sand and limestone known as "caliche," which is usually 200 feet or less in thickness. In places it is covered by dunes. The lower "bed-rock" zone is a complex mass, consisting of limestone and various

[5] R. O. Whyte and P. S. Hudson, "Vernalization, or Lyssenko's Method for the Pre-treatment of Seed," *Bul.* 9, Imperial Bureaux, Plant Genetics, Great Britain, 1933.

[6] H. C. Thompson, *N. Y. (Cornell) Agr. Exp. Sta. Bul.* 480, 1929.