ting paper somewhat smaller than the window over the target of the counter. This piece of blotting paper was then placed on the window over the target. The number of counts were noted for a certain length of time and the counts per minute calculated, and from this was subtracted the background count to give the number of counts due to the plant material. This count per minute was multiplied by the proper factor to obtain the count for all the ash, per minute. The total active phosphorus in the tops or roots was determined only in experiment 37, but as determined the activity in the different parts is strictly comparable and the figures in the table denote the number of counts that would have been observed per minute if all the ash of the particular part of the plant had been placed above the target of the counter.

Table 1 gives the number of beta particles originating in the irradiated phosphorus of the ash that would have hit the target of the Geiger counter per minute if all the ash had been placed above the target.

Table 1 shows clearly that if the top was supplied with water through the cut end of the xylem rather than through the phloem, when the xylem was removed, there was much less phosphorus in the top than when all the water had to pass through the phloem and there was a transpiration stream connecting the top with the root.

The actual amount of active phosphorus in the tops of the plants in experiment 37 was 0.0024 g for the control, 0.0012 g for the plant carrying on conduction only through the xylem, 0.0002 g for the plant with phloem as the conduction element and only 0.000014 g when the conduction of the mineral took place through the phloem, but most of the water was supplied to the leaves through the cut end of the xylem.

TABLE 1

Plant and experiment number	Hours in solution	Control		Conduction through xylem		Conduction through phloem	
		top	roots	top	roots	top	roots
Bryophyllum							
16	41	310	1020	350	1030	15 (2)	1100
20	48	360	1920	550	990	27 (1, 3)	350
21	48	365	860	447	770	30 (1, 3)	593
22	46	87	548	103	254	20 (1, 3)	684
36	69	6100	6300	4200	4450	375 (3)	5900
37	42	10200	10850	5880	6950	60 (1, 3)	6950
						820 (3)	15400
48	47	.....	.....	1100	2460	500 (1)	2040
Willow							
52	22	195	720	300	810	40 (2, 4)	300
						20 (1, 3)	585
53	48	3060	765	135	345	45 (2)	825
						0 (1, 2)	540
54	7	40	580	112	920	0 (2)	720

Note: (1) Lower end of xylem in a tube of water; (2) leaves wilted badly long before the end of the experiment; (3) partly wilted at end of experiment; (4) plant was in solution only 5 hours.

From these experiments it would seem that not as much minerals are conducted through the phloem as Gustafson and Darken had supposed. Nevertheless, there is undoubtedly some upward conduction of minerals in the phloem under normal conditions.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ACETO-CARMINE METHOD FOR BIRD AND MAMMALIAN CHROMOSOMES

EXCELLENT aceto-carmine preparations, either temporary or permanent, can be made of bird and mammalian chromosomes (and no doubt of other animals) by the simple procedure described below. The method is applicable to any tissue which can be readily subdivided by teasing with needles prior to fixation.

The tissue—usually young embryos, embryonic ovary or adult testis—is removed with the greatest possible speed and with the usual precautions to insure that the cells are living and normal, and quickly dissociated by teasing with needles for four or five seconds and then plunged in one of Carnoy's fixatives, where it can be further teased apart. Both the 3:1 and 6:3:1 solutions give excellent results with bird embryo somatic cells and ovaries, and with adult rat testes. (3 parts absolute alcohol and 1 part of glacial acetic acid, or 6 parts of absolute alcohol, 3 parts of chloroform and 1 part of glacial acetic acid.)

The tissue is fixed for 20 minutes to several hours and then placed directly into aceto-carmine, where it should stain for half an hour, more or less, depending on the tissue. *Small* bits of tissue are next removed with a pipette, along with aceto-carmine, and placed on a clean slide and covered with a coverglass. The preparation is now treated just as you would a salivary gland. The excess aceto-carmine is blotted off with filter paper and the soft tissue mashed out with considerable pressure from the finger tips. If necessary, complete spreading of the cells may be accomplished by rubbing a blunt needle over the coverglass. During this whole process the coverglass must not be allowed to slip about. For temporary mounts, the coverglass is sealed with vaseline or some other like agent and studied at once. For permanent slides the coverglass is left unsealed and the slide is placed at once into a jar saturated for alcohol vapor. (This is Bridges's alcohol-euparal method.) After standing in alcohol fumes for a few hours, the slides are placed in 95 per cent. alcohol, where they should remain for several hours or longer. If the coverglass doesn't loosen and come off it should be pried off with a spade-shaped needle in a Petri dish filled with 95 per cent. alcohol. When this is done part of the cells adhere to

the slide, others to the coverglass and some are lost, especially when too much tissue was used in the first place. The slide is next removed from the Petri dish, the excess alcohol quickly drained or wiped off, and the adhering tissue is covered at once with a liberal amount of euparal or its equivalent. Next the excess alcohol is drained from the coverglass and the latter is placed back on the slide, face down and in its original position. Excess euparal is blotted off and after shifting the coverglass to as near its original position as possible, the preparation is ready for study.

The advantage of the method is its simplicity and speed and the excellent preservation and staining of the chromosomes. Meiotic chromosomes are especially well shown in the rat. The alcoholic-acetic fixation leaves the tissue so soft its cells can be separated by mashing after staining with aceto-carmine. The other preliminary fixatives tried so far (Flemming, Nawaschin, etc.) leave the tissues too hard or tough to be mashed out.

In studying any aceto-carmine preparation it is desirable to use green filters, Wratten filters Nos. 61 and 62 being especially recommended with artificial light. In a pinch, a piece of green eye-shade will do.

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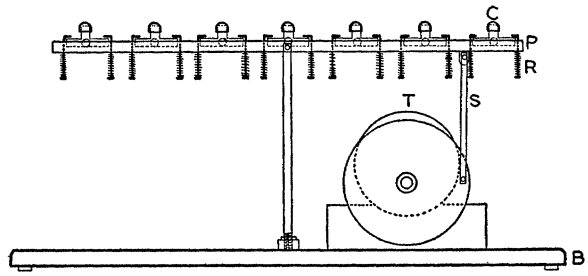
A SIMPLE ROCKING DEVICE FOR CARREL FLASKS[1]

IN experiments on the artificial parthenogenesis and development of rabbit eggs *in vitro,* we have usually placed the eggs in rabbit serum in a Carrel flask and left them stationary in an incubator at 37.5° C. When the eggs are removed from the Fallopian tubes within 15 hours after the final ovulating injection of pituitary has been given, each one is found covered by several layers of granulosa cells adhering closely to the protein layer immediately surrounding the egg, and the eggs as a whole are embedded in a much larger mass of loose material of similar nature. While standing in the incubator, these cells tend to fall away from the eggs, disintegrate and spread over the bottom of the flask. While this in itself may not be deleterious, it appears to be instrumental in causing the eggs as well to adhere to the glass substratum. To avoid this, we have found the shaker, of which a side elevation is sketched in the accompanying figure, to be of definite value. Not only does it in general prevent the sticking and disintegration of this material, referred to above, but it assists the adequate and uniform oxygenation of the culture, and helps prevent local accumulation of carbon dioxide. On the whole, the condition of the eggs is definitely an improvement over that when they are left stationary. It may be of use also in oxygenating tissue cultures with large quantities of fluid, which adhere firmly after an initial growth period.

The construction is simple. On a baseboard (B), 42 × 20 cm a Telechron motor (T), giving four revolutions per minute, is mounted and attached by a 10 cm shaft (S) on the eccentric to the platform P, 8.5 × 25.5 cm, and 15 cm above the base. Seven Carrel flasks (C)



are shown held in place in depressions on the platform, by brass rods (R) bent at right angles, and fitted with springs under the platform. Each rod is covered with a short length of rubber tubing where it fits snugly against the top of the flask. The entire assemblage is kept inside the incubator during an experiment, which may last 24 to 30 hours. During this time it is regularly tilted back and forth about 30° from either side of the horizontal. The size of platform and number of flasks may of course be extended.

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