SPECIAL ARTICLES

THERMAL EXPANSION OF WOOD

UP to the present time very little work has been done on the thermal expansion of wood. Villari[1] made measurements on several varieties in 1868, and Glatzel[2] worked on the longitudinal expansion in 1877. Glatzel dried his specimens in a vacuum at room temperature. His results show a continuous change in coefficients of expansion for consecutive heating and cooling. There was also as high as 35 per cent. difference between the coefficients determined from the heating and cooling changes, the cooling giving the greater coefficient. This would seem to indicate that the specimen was not completely dried and was losing moisture. Villari worked on wood which had been prepared by soaking in oil at 120° to 140° for 48 hours. This is a rather unusual treatment for wood, and it seemed of interest to find what its coefficient of expansion would be under other conditions.

OVEN-DRIED WOOD

In the present investigation the expansion was first determined for oven-dried specimens. The change in length was measured by means of two micrometer microscopes rigidly mounted and placed in front of a Freas electric oven with automatic temperature control. Coefficients were determined for both expansion and contraction and the constancy of the two coefficients was used as a check on the constancy of the moisture content. It is very important that the moisture content remain constant as a small change in this will mask the expansion due to change in temperature, especially when working with cross-section expansions.

Changes in temperature were determined by means of a standardized mercury thermometer placed directly over and almost in contact with the specimen under investigation. Any changes in the temperature of the mounting of the microscopes was observed and a correction made for this change.

The inner glass door of the oven was kept closed during a test and all the observations were taken through the door so that there would be no change in the thermal conditions.

WORK ON WOOD CONTAINING MOISTURE

Determinations were also taken on wood at room-dry conditions. It was found impossible to maintain the moisture content constant for room-dry specimens and so it was decided to determine the coefficient as the specimen was drying and then correct for the drying loss.

The rate of drying increases with the temperature while the rate of increase in temperature for a given run of the experiment decreases as the temperature nears the maximum. From a consideration of the first of these facts, it would appear that the average rate of drying would give too large a correction for the drying loss; but from the second fact it is seen that the specimen was above the average temperature for more than half the time which would tend to increase the loss and to a partial degree compensate for the other. Thus in making the correction the average rate of drying was used and it was considered that by so doing the error introduced was smaller than the other experimental errors of the determination.

WORK ON OIL-SOAKED WOOD

White pine was also tested under conditions similar to those under which Villari tested his specimens. For this purpose the specimens were placed in hot neatsfoot oil at about 120° C. for 48 hours and then taken out and tested in the same manner that the dry specimens had been tested. It was found that under these conditions the results agreed to within from 1 to 8 per cent. with those of Villari.

Results for temperature range 20° to 50° C.

Wood	Condition	Coef. of expan. per ° C. x 10^4 Right angles to grain	Parallel to grain
White pine (Pinus Strobus)	dry	.636	.0365
	4% moisture	.727	
	5% moisture		.0400
	oil-soaked	.346	.0511
Basswood (Tilia Americana)	dry	.444	.0546
Tulip poplar (Liriodendron Tulipifera)	dry	.429	.0595
Hard maple (Acer Saccharum)	dry	.602	.0422
White ash (Fraxinus Americana)	dry	.458	.1100

The varieties of wood tested have been verified by Dr. Brown, of the New York State College of Forestry.

The results here given are of a preliminary nature and it is expected to extend the work to cover more

[1] E. Villari, *Annalen der Physik*, 133, p. 400, 1868.

[2] P. Glatzel, *Annalen der Physik*, 160, p. 497, 1877.

varieties of wood and wood under various conditions.

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THE EFFECT OF MINERAL SUPPLEMENTS ON GROWTH AND REPRODUCTION

THE effect of adding various mineral supplements to a basal ration of 2 parts of yellow corn and 1 part of peanut meal was tested on albino rats. The basal ration is often used for the feeding of swine in the south.

The plan of feeding was as follows:

Lot 1—Basal ration alone		
Lot 2—Basal ration	99	per cent.
NaCl	1	per cent.
Lot 3—Basal ration	97.5	per cent.
NaCl	1.0	per cent.
$CaCO_3$	1.5	per cent.
Lot 4—Basal ration	97.5	per cent.
NaCl	1.0	per cent.
Steamed bone meal	1.5	per cent.
Lot 5—Basal ration	97.5	per cent.
NaCl	1.0	per cent.
Acid phosphate	1.5	per cent.

EFFECT ON GROWTH

Lot 1 made very little growth. Lot 2 made gradual gains for a period of two to three months. This was followed by a decline in the weights of the males and approximate maintenance in the weights of the females.

The rate of growth in Lots 3, 4 and 5 was normal and was practically the same in all three lots during the first weeks of the experiment. The rats that received steamed bone meal, however, sustained their growth longer and reached a greater final weight on the average than those that received the $CaCO_3$ or the acid phosphate. The curves for the latter two lots were very similar.

EFFECT ON REPRODUCTION

The differences in reproduction were more striking than the differences in growth.

None of the females in Lots 1 and 2 showed signs of pregnancy.

In Lot 3 rearing of young was successful in the first litters of the second generation. Later litters did not grow so rapidly. The third generation was a failure.

Young were successfully raised in the fourth generation in Lot 4. The results in the third and fourth generations were not normal but were decidedly superior to those in any of the other groups.

Reproduction in Lot 5 was most disappointing in view of the fact that this group made about as good growth in the first generation as Lot 3. The females in Lot 5 littered fairly regularly, but the young were small, low in vitality and usually died within a few hours after birth.

Growth curves and analyses showing the ash content of the bodies of rats from each lot will be published later.

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE FALL MEETING OF THE EXECUTIVE COMMITTEE

THE regular fall meeting of the executive committee of the council of the American Association was held at the Cosmos Club in Washington, on Sunday, October 12, with the following members present: Cattell, Humphreys, Livingston, Osborn, Ward. The following members were absent: Fairchild, Flexner, MacDougal, Miller, W. A. Noyes. In the absence of the chairman, the president of the association was elected chairman for the meeting. Three sessions were held, one in the forenoon, one in the afternoon and the third in the evening. A vote by mail has been taken among the absentee members on the items of business transacted at the meeting, this having been needed on account of the presence of only five members, six being required for a majority of the committee. The following items of business were transacted and have received the approval of more than a majority.

1. The election of Dr. F. G. Cottrell as chairman of Section C (Chemistry) was approved.

2. The permanent secretary's annual report on the affairs of the association was accepted. It will appear in SCIENCE in the near future.

3. The permanent secretary's annual financial report was accepted and ordered audited and then presented to the council.

4. The annual report of the assistant treasurer was accepted and ordered audited and then presented to the council.

5. It was voted that any funds appropriated for grants which shall not have been disbursed at the end of the fiscal year for which they were appropriated shall revert to the treasury as appropriable funds on October 1. It is, however, understood that this rule does not prejudice the possible transfer of any unused grant or any unused portion of a grant to the next fiscal year, providing this transfer be recommended by the Committee on Grants.