Comparative evaporation with the volatile oil of *P. palustris*, at room temperature, in shallow watch glasses, 0.2 gram of each used.

Time.	*P. palustris.* Per cent.	*P. serotina.* Per cent.
Loss after ½ hour	35.7	20.30
Loss after 1 hour	62.5	37.30
Loss after 1½ hours	91.7	53.40
Loss after 2 hours	96.0	68.47
Loss after 5 hours	97.8	98.8

On fractionation the following results were obtained:

Temperatures.	Per cent. distillate.	Index of refraction, 20°.	Rotation in 100 mm. tube 20°.
172–175°	27.4	1.4716	—87°53′
175–180°	57.0	1.4724	—92°21′
180–185°	8.4	1.4744	—92°14′
185– +	7.2	1.5045	....

Repeated fractionation at atmospheric pressure showed some polymerization. From a fraction, 175–176°, a large yield of limonene tetrabromide was obtained. Melting-point 103°–104°. The solution of the tetrabromide in chloroform was levo-rotatory, —70.0°.

A study of the oxygen absorbing power of this volatile oil in comparison with that of the ordinary spirits of turpentine obtained from *P. palustris* showed a much larger absorption by the oil of *P. serotina* during the early days of the experiment, but the total absorption after three months' exposure to northern light was practically the same in each.

UNIVERSITY OF NORTH CAROLINA,
CHAPEL HILL, N. C., February 4, 1908.

ON THE OXIDATION OF OLIVE OIL.

BY AUGUSTUS H. GILL.

Received February 14, 1908.

Some years ago it became a question of the determination of the kind of "wool oil" that had been employed in the manufacture of certain "tops." Tops may be defined as wool roving or wool which has been partially spun. In their manufacture the wool is scoured and oiled, usually with an olive oil emulsified with either ammonia or sal soda, then it is carded and spun. As the tops are stored "in the grease," as the expression is, two months may elapse before they are used, so that the oil spread over these fibers has ample opportunity for oxidation.

The oils extracted from the tops had the characteristics shown in the table below:

Top. No.	1.	2.		3.	4.	
Date left mill	Aug.	Nov.		Nov.	Nov.	
Date tested	Jan.	Dec.	Jan.	Jan.	Dec.	Jan.
Iodine No.	39	53.6	42.1	45.5	54.0	40.5
Saponif. No.	213	225	221.5	207.5	216.0	221.5

The January samples were different from those tested in December, although from the same lot.

Ballantyne[1] gives the following iodine figures for olive oil which had been "kept in direct sunlight, uncorked and agitated every morning."

Original oil.	1 month.	2 mos.	3 mos.	5 mos.	6 mos.
83.2	82.5	82.3	81.6	79.1	78.2

Sherman and Falk[2] give the following figures:

	Fresh.	Exposed.
Olive oil	83.8	77.4
Lard oil	73.3	66.7
"	69.3	54.6
"	73.3	56.2

From the results obtained from the oils extracted from the tops it would seem that the oil could not have been by any possibility olive oil.

As an aid in settling this question, olive oil was exposed to atmospheric agencies under varying conditions, as follows:

I. Olive oil A was emulsified with ammonia and soda in the usual way, the emulsion sprinkled upon absorbent cotton and allowed to lie in the laboratory for seven weeks, covered with paper to keep off dust. The time (seven weeks) was approximately equal to that which the oil had been upon the top when received. The oil was then extracted from the cotton (sample B).

II. Another portion of olive oil A was emulsified as in I and extracted from the emulsion by ether (sample C). This was to see what effect, if any, the emulsification process had.

III. A portion of olive oil A was oxidized by drawing a current of air through it eight hours per day for seven weeks (sample D).

IV. A fourth portion of the original olive oil was allowed to stand for this same length of time in an open beaker in the laboratory (sample E).

V. Another portion of the original oil was emulsified and sprinkled upon the tops themselves, which had been extracted with naphtha and allowed to remain for five weeks as in Experiment I. The oil was then extracted (sample F).

VI. Lastly a sixth portion was heated for two hours in an open dish to 120° to see the effect of heat (sample G).

TABLE OF THE OXIDATION OF OLIVE OIL UNDER VARIOUS CONDITIONS AS SHOWN BY THE IODINE NUMBER.

A. Original oil.	B. Emulsified oil from cotton.	C. Emulsified oil by itself.	D. Blown oil.	E. Open beaker oil.	F. "Top" oil.	G. Heated oil to 120°.	H. Original oil after standing 7 weeks, closed.
83.2	62.0	84.0	84.0	83.9	78.2	82.0	83.5

[1] *J. Soc. Chem. Ind.*, **10**, 29.

[2] THIS JOURNAL, **27**, 606.

The iodine number of the oil supposed to have been used on the tops at the mill was 84.3; assuming that the change was the same as in the laboratory, that upon the tops should not have been below 63 or certainly should not have reached 53–54, as both my determinations and that of the mills chemist showed.

The work corroborates that of Ballantyne and shows that except when spread out in a finely divided condition as upon cotton, olive oil changes but little on exposure to the air or heat.

The high saponification numbers, 207–221, indicate that the oil has undergone oxidation and also the entire absence of any unsaponifiable or mineral oil. It would seem from these results that the oil used upon the tops was most likely lard oil; had it not been for the possibility of cholesterol in the wool this could have been shown by a test for cholesterol in the extracted oil.

In conclusion, the writer wishes to express his indebtedness to Mr. H. S. Bailey, by whom the analytical work was performed.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, MASS.

THE EFFECT OF TEMPERATURE ON THE RESPIRATION OF APPLES.

BY FRED W. MORSE.

Received February 17, 1908.

While engaged in an investigation of the effects of different methods of storage on the chemical composition of apples, it was found impracticable with the methods of analysis in common use to determine the variations produced by comparatively small changes in temperature, or in other words, whether 32° F or 45° F affected the composition of the fruit in a different ratio.

This difficulty was due to the fact of the destruction of some of the apple constituents by respiration, which could be easily deduced from the exhalation of carbon dioxide and water, and the practically constant proportions of water and dry matter which existed in spite of a steady loss of water, and decrease in weight.

It seemed possible that the rate of chemical change might be measured by determining the rate of exhalation of carbon dioxide. Some simple experiments with fruit under bell jars, over mercury, and over water, soon showed that temperature had a very marked effect on the exhalation of the respiratory products.

A respiration apparatus was planned and constructed as follows: The chamber in which the fruit was to be placed was a cylindrical vessel of copper supported by a tripod in an upright position. The bottom of the cylinder was formed like a funnel ending in an outlet tube of brass