shellac and clear varnish an appearance is obtained that is both pleasing and in harmony with other laboratory furniture.

The specimen pack is prepared for drying, as in other cases where heated air is utilized, by separating the specimens from each other with corrugated strawboard, the corrugations running, of course, the short way of the pack, so as to be vertical when the pack is set in the drier. After being strapped tightly between press-boards or lattices, the pack is set on edge in the drier, the sliding shelves adjusted to its sides and the electric current turned on. The rate of drying can be controlled by the size of lamp used.

In our hands, this drier has proved very satisfactory indeed. It is, first of all, a complete and independent unit. As it occupies but little space, it can be conveniently installed in a crowded laboratory. Requiring only to be connected with an electric current, it is always ready for use, and large or small sets of specimens can be handled in it with equal facility. A full pack of wet aquatic plants can be dried in from eight to ten hours by using two 100-watt lamps. There is, moreover, no danger of fire, and the specimens are not subjected to scorching or overheating.

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SPECIAL ARTICLES

DIRECT TRANSMISSION OF HUMAN TRACHOMA TO THE MONKEY

IN previous notes we drew attention to the successful transmission of experimental trachoma from monkey to monkey by (*a*) simple caging together of infected and uninfected *Macacus rhesus*,[1] (*b*) by repeated swabbing of the normal conjunctivae with the secretions from the experimental lesions in *Macacus rhesus*[2] and (*c*) by the repeated instillation of cultures of *Bact. granulosis* into the conjunctival sac of normal rhesus with subsequent massage of the eyelid.[2] The last method is, of course, not an example of monkey to monkey transmission except in respect to the principle of eye to eye conveyance.

In this note we are reporting two instances of direct transmission of trachoma by means of secretions from human cases to normal *Macacus rhesus*, which showed, previously to the swabbings, smooth conjunctivae. For the materials and effective cooperation we are indebted to Dr. Martin Cohen, of New York.

The cases consisted of two white persons residing in New York. Case A had suffered from trachoma for ten years. The lesions were characteristic, consisting of granulations, extensive scar formation and pannus. Case B had suffered from the active disease for two years. The lesions consisted also of granulations, scars and pannus.

The secretions from each case were taken on cotton swabs and transferred directly, by gentle rubbing, to the smooth conjunctivae of each of three monkeys. Nine swabbings were made from man to monkey in Case A and seven in Case B.

Thirteen days after the last swabbing from Case A, one monkey showed granular lesions of experimental trachoma, and thirteen days after the last transfer from Case B the three respective monkeys presented typical granulomatous changes.

Conjunctival tissue was removed from Case A for curative purposes by Dr. Cohen and employed for direct subconjunctival injections in three further normal *Macacus rhesus* presenting smooth conjunctivae. Within four to ten days, all three developed granular lesions of experimental trachoma. The excised tissue was also employed for bacteriological study. Cultures of *Bact. granulosis* were isolated, and these when injected subconjunctivally into three normal monkeys induced in all experimental trachomatous changes in nine to eleven days.

Finally, granulomatous tissue removed from the monkey infected by swabbing from Case A yielded cultures of *Bact. granulosis*.

The direct transmission of trachoma to monkeys has already been effected by several investigators,[3] but the present experiments are the first in which both transmission and the isolation of *Bact. granulosis* have been successful with the same trachomatous material.

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[1] J. R. Tyler, SCIENCE, 70: 612, 1929.

[2] P. K. Olitsky and J. R. Tyler, SCIENCE, 71: 263, 1930.

[3] For literature see: H. Noguchi, *Jour. Exper. Med.*, Supplement No. 2, 1928, xlviii; and V. Morax and P. J. Petit, "Le Trachome," Paris, 1929.

ASSOCIATION AND CONSTITUTION

THE study of the properties of compounds has unfortunately not yet made it possible to predict the properties of associated compounds with any degree of success. It now appears that the association as measured by the fluidity method varies regularly in a given homologous series, so that the association itself may be calculated, thus permitting the calculation of other properties dependent upon the association. It is found that groups causing association, such as carboxyl, hydroxyl, sulphydrate, etc., are most active at the end of a paraffin chain and are less active as the paraffin chain is shortened or as the active groups are moved toward the center of the paraffin chain. These effects may be incorporated in a formula.[1]

The following tables will show the association as calculated by formula for certain compounds and also the temperatures required to give these compounds a fluidity of 100 rhes, the fluidity of water at 20° C. In the case of the mercaptans, the fluidity has, for convenience, been taken as 200 rhes.

THE OBSERVED AND CALCULATED ABSOLUTE TEMPERATURES REQUIRED TO GIVE A FLUIDITY OF 100 RHES TO VARIOUS ACIDS, WITH THE PREDICTED ASSOCIATIONS

Substance	Predicted association at $\varphi = 100$ Rhes	Predicted absolute temperature to produce $\varphi = 100$ Rhes	Observed absolute temperature to produce $\varphi = 100$ Rhes	Percentage difference
Formic acid	2.225	325.5	324.7*	0.2
Acetic acid	1.841	304.9	305.7*	0.3
Propionic acid	1.816	298.8	300.0*	0.4
Butyric acid	1.572	321.0	320.2*	0.2
Valeric acid	1.527	341.3	342.0*	0.2
Caproic acid	1.482	359.8	361.3*	0.4
Heptylic acid	1.438	376.9	377.5	0.2
Caprilic acid	1.393	392.0	381.7*	2.7
Lauric acid	1.215	435.7	435.7	0.0

* Fluidity not measured by the authors.

THE OBSERVED AND CALCULATED ABSOLUTE TEMPERATURES REQUIRED TO GIVE A FLUIDITY OF 100 RHES TO VARIOUS ALCOHOLS TOGETHER WITH THE PREDICTED ASSOCIATIONS

Substance	Predicted association at $\varphi = 100$ Rhes	Predicted absolute temperature to produce $\varphi = 100$ Rhes	Observed absolute temperature to produce $\varphi = 100$ Rhes	Percentage difference
Methyl alcohol	2.097	272.0	263.2*	3.2
Ethyl alcohol	2.001	298.1	302.9*	1.6
Propyl alcohol	1.906	320.8	329.2*	2.6
Isopropyl alcohol	1.839	309.5	324.3*	4.8
Butyl alcohol	1.811	339.7	339.7*	0.0
Isobutyl alcohol	1.778	333.6	342.2*	2.6
Trimethyl carbinol	1.711	321.0	334.3*	4.1
Amyl alcohol	1.649	341.2	349.2*	2.3
Amyl (inactive) alcohol	1.682	348.0	349.2*	0.3
Dimethyl-ethyl carbinol	1.582	327.3	336.0*	2.7
Allyl alcohol	1.906	320.8	311.2*	2.7
n-Heptyl alcohol	1.525	374.4	362.3	3.2
n-Octyl alcohol	1.430	378.7	376.7	0.5

* Fluidity not measured by the authors.

THE OBSERVED AND PREDICTED ABSOLUTE TEMPERATURES REQUIRED TO GIVE A FLUIDITY OF 200 RHES TO VARIOUS MERCAPTANS TOGETHER WITH THE PREDICTED ASSOCIATIONS

Substance	Predicted association at $\varphi = 200$ Rhes	Predicted absolute temperature to produce $\varphi = 200$ Rhes	Observed absolute temperature to produce $\varphi = 200$ Rhes	Percentage difference
n-Ethyl mercaptan	1.118	250.0	247.5	1.0
n-Propyl mercaptan	1.107	272.0	273.5	0.6
n-Butyl mercaptan	1.095	293.2	293.1	0.0
n-Pentyl mercaptan	1.084	314.3	315.7	0.4
n-Hexyl mercaptan	1.072	334.5	335.8	0.3
n-Heptyl mercaptan	1.061	354.5	355.8	0.4
n-Octyl mercaptan	1.049	373.7	373.7	0.0
n-Nonyl mercaptan	1.038	392.7	389.7	0.8
Propane thiol-2	1.082	265.8	269.0	1.2
Pentane thiol-2	1.055	305.8	301.1	1.5
Hexane thiol-2	1.041	324.8	321.9	0.9
Heptane thiol-2	1.027	343.1	342.3	0.2
Octane thiol-2	1.013	360.8	360.5	0.8
Nonane thiol-2	1.000	378.3	378.3	0.0

If one excludes caprilic acid, the average deviation between the observed and calculated values for the acids is only 0.2 per cent., which is less than one tenth of the deviation shown by caprilic acid, so that we propose to prepare further samples of this substance in order to learn whether this difference is real or not. The average deviation with the thirteen alcohols is somewhat higher, averaging 2.3 per cent. If we include twenty-two different isomeric octyl alcohols, the deviation is 1.2 per cent. The average deviation for fourteen mercaptans is 0.6 per cent. Therefore the average deviation for fifty-seven calculated substances is 0.9 per cent.

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[1] See Eugene C. Bingham and Logan B. Darrall, *J. of Rheology*, 1: 174, 1930.