salivation to the generalization sentences as percent of the conditioned salivation to the conditioned sentences (the latter ranging from 189 to 531 mg per min). For lack of space, the entries in the first column of the table are abbreviated, while the first entry in the second column under *Logical formula* means that each of the three generalization sentences in the first row of the first column was formed from its respective conditioned sentence by reversing the "subject" (S′), keeping the "copula" (C) unchanged, and reversing the "predicate" (P′) of the conditioned sentence, thus affirming (○) its proposition; and the fourth entry in the second column means that each of the three generalization sentences in the fourth row of the first column was formed from its respective conditioned sentence by reversing the "subject" (S′) but keeping unchanged the "predicate" (P) and the "copula" (C) of the conditioned sentence, thus negating (●) its proposition. As seen from the table, the amount of CR generalization was a function of both (a) the general logical equivalence of the propositions in the generalization sentences to those in the conditioned sentences, and (b) the particular verbal similarity of the two types of sentences. The generalization factor of *propositional equivalence* is seen in the greater CR generalization to the sentences in the first three rows, affirming the propositions of their respective conditioned sentences, than to the sentences in rows four, five, and six, negating these propositions, even though the sentences in the latter rows were sententially twice as similar to the conditioned sentences. On the other hand, the significance of the factor of *sentential similarity* is manifest in the differences between CR generalizations to sentences that were propositionally equivalent yet sententially different, such as each of the sentences in the first three rows and each of the sentences in rows four, five, and six—and it further follows from the fact that the generalization to the sentences in the first rows that were propositionally equivalent yet sententially different from their respective conditioned sentences was not complete, but ranged from 41 to 63 percent. The table also appears to show that sentential similarity is itself a complex function, and is more than mere verbal similarity. Thus, comparing rows two and three, and four and six, we learn that reversing the "predicate" produced a greater loss in CR generalization than reversing the "subject," which fact points to both a grammatical factor of *syntax* and a logical factor of the relative contributions of "*concepts*" and "*individuals*" to total propositions. Finally, the table gives some indication that changing "desirable" to "undesirable" resulted in less of a loss of CR generalization than changing "degrading" to "uplifting" and "elected" to "defeated." This apparently means that even pure verbal similarity between sentences must, in its turn, take account of not only the number of identical words between the sentences, but also the intersentential relatedness of nonidentical and even of contradictory words. In a previous study (*2*), the writer found that CR generalizations to single words proceeded both along semantic and along phonetic and graphic relatednesses—though more along the former than the latter—and that finding has since been corroborated by two other investigations in conditioning the galvanic skin response (*3*). It would seem worth while to try out, similarly, the more complex findings of the present study with other responses and techniques. And these techniques need not necessarily be those of conditioning.

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The Purification of Phenol for Paper Partition Chromatography

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Since the original work of Consden, *et al.* (*1*) on paper partition chromatography, many workers have sought diligently for a better solvent system than the phenol-water which they used. So far nothing better has been reported even though the phenol-water system is frequently limited in usefulness by the development of extraneous colors, which are particularly harmful when the chromatogram is run in ammonia atmosphere, as it usually is.

In this laboratory, the method has been used for some time to identify amino acids in bacterial culture filtrates. The extraneous colors which were almost always present on the developed chromatogram introduced so much uncertainty that final results could not be presented with any confidence. A project was therefore undertaken to determine the cause of these colors and the possibility of eliminating them. This was finally accomplished and it is thought that the results may be of interest to others.

The colors are probably caused by the catalytic action of heavy metals on phenol. Consden, *et al.* (*1*) believed them to be caused by copper in the paper but it has been determined here that the principal source is from impure phenol and from the distilled water used to dilute it. Present practice is to distill all phenol before use. If in the form of crystals, it is liquefied with 12% water first. It is put into the distilling flask and 0.1% aluminum turnings and 0.05% $NaHCO_3$ are added. Distillation is carried on at atmospheric pressure until the azeotrope is off and then under about 25 mm from a water pump until approximately 20 ml of the almost black residue is left. A 14 mm × 70 cm Pyrex air-cooled tube is used as a condenser.

Before use the water content is adjusted to 25% using triple distilled water which is tested for heavy metals. The water content of the mixture is determined as follows: into a 15-ml centrifuge cone put 10 ml of the phenol-water solution and 500 mg of NaCl; stopper and shake the tube; allow to stand 20 minutes to form the phase boundary. This should be at 1.4 ml when the water content is 25%. The water content may vary from 24 to 28% without a detectable difference in Rf values. It should not, however, be at saturation since if a water

layer forms in the chromatographic chamber incorrect results will be obtained.

With phenol prepared in this way extraneous colors are completely eliminated. The amino acid bands are sharply defined and full advantage of the color range is obtained. It should be mentioned that the sample should also be free from heavy metals, particularly Cu, Zn, Fe and Mn. All chromatograms run in this laboratory are run against gravity as described by Horne and Pollard (*3*). An ammonia atmosphere is always used with phenol. With these procedures Rf values confirm very exactly those obtained by Dent (*2*).

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A Method of Automatic Dehydration for Histological Technique[1]

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Heretofore the mechanics commonly involved in the process of dehydration have consisted of manually or mechanically transferring tissues through a series of dehydrating chambers containing the dehydrating agents, or of leaving the tissues in a single chamber and periodically changing the surrounding dehydrating fluids.

A new method is now introduced whereby the tissues are continuously and automatically bathed in a continuous flow of anhydrous dehydrating agent. This is accomplished by the use of an extraction apparatus equipped with a Soxhlet Extractor having an overflow drainage rather than the usual siphon type drainage (see Fig. 1). The tissues are placed in the modified Soxhlet Extractor, which is then filled with dehydrating fluid. A funnel placed in the extractor is used to carry the condensate to the bottom of the chamber to insure a continuous change in fluid throughout the depth of the extractor. The flask is filled approximately three-fourths full of dehydrating agent, and 80–100 g of calcium carbide (depending upon the moisture content of the dehydrating agent and tissues) is also added to insure a completely anhydrous condensate. A thermostatically controlled hot plate with a variable temperature control is used as the source of heat. Thus, as the dehydrant is refluxed, the condensate (anhydrous dehydrating agent) enters the bottom of the extracting chamber, circulates through the tissues, and finally spills out through the overflow drainage back down into the flask. The apparatus should be operated under a hood, or else a rubber hose should be attached to the top of the condenser to carry off the fumes.

[1] This work was supported in part by a National Institutes of Health grant.

This method offers several definite advantages. Dehydration is more complete. A flow of circulating fresh anhydrous dehydrant completely surrounds the tissues at all times. This is an important consideration, since incomplete dehydration is a frequent cause of shrinkage and hardening of tissues within paraffin blocks after they have been cut off and put away. If a gradually increasing concentration of the dehydrant is desired, one need only fill the extraction chamber with the desired

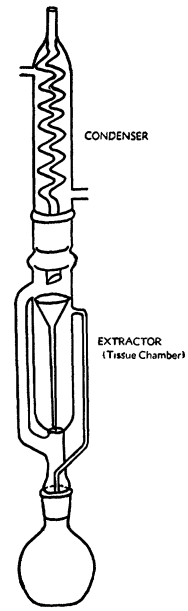

Fig. 1.

starting concentration of dehydrant at the beginning of the procedure. This dehydrant then will be very gradually replaced by completely anhydrous dehydrating agent, giving the effect of transferring the tissues through a finely graded series of reagents.

It is automatic. A manual transfer of the tissues is not necessary, nor is a manual change of dehydrating fluid. The tissues may be placed in the apparatus towards evening and left unattended until the following morning, when they will be dehydrated and ready for further processing.

It is inexpensive. Only small amounts of dehydrating agent are necessary, since the dehydrant is being continually refreshed as the process proceeds. The apparatus itself is of simple design, and any glass blower can make it at a nominal cost simply by altering a regular Soxhlet Extractor as indicated.

Although most of the commonly used dehydrating agents are adaptable to this procedure, it is preferable to use those having relatively low boiling points, so that the tissues may be safeguarded against any heat damage. We have had good success with acetone with the above method and at present are testing various other reagents, particularly those which can be used both for the dehydration and the clearing process, thus extending the automaticity of the procedure.