CHEMISTRY IN PERMANENT WAVING—PAST, PRESENT, AND FUTURE*

By MARCEL J. SUTER

President, Eugene Ltd., Brooklyn, N. Y.

A DISCUSSION of chemistry in permanent waving can be either very technical, or it can be general in character. This discussion will be rather general. The technical aspects will be stressed more fully by Dr. Eugene F. Traub and by Mr. Raymond Reed, who follow me shortly.

Why do we have permanent waving? We have permanent waving because it is the misfortune of women to be born with straight hair in most instances. There are no accurate statistics which state what percentage have straight hair and what percentage have curly hair. As a result of surveys, which we made some years back, we came to the conclusion that fully 80% of all women are born with straight hair. Since time immortal, it has also been women's fondest hope and dream to have curly hair, since invariably it is more becoming to them.

How did they obtain curls in their hair in the old days? As far back as the early Egyptian civilization women would roll their hair up on wooden sticks and cover same with mud from the banks of the Nile. They would then sit in the hot sun until the mud was dry. This produced some sort of curl, which disappeared, however, when the hair was washed.

It seems rather strange that from that time until modern civilization—to be exact, around 1910—hair was always curled by means of a curling iron or by boiling it in water. This, however, never resulted in a lasting wave. When the hair was shampooed after a treatment, it again became straight.

I spoke a minute ago, about boiling a curl into hair with ordinary water. Since, of course, you cannot take a woman's head and boil it in water, wig-makers would make chignons and other hair pieces by boiling hair on wooden curlers for five to six hours. They would then fasten all these curls together and make wigs which women of the 18th and 19th centuries wore on different occasions.

It is noteworthy that until 1910 no research was attempted to see why some hair was straight and some curly, and why boiling in

* Presented at the May 13, 1947, Meeting, New York City.

water would produce a curl. We should also note that until comparatively recently, very little research had been done on the nature of what we call the permanent waving of hair. This will become more apparent as we cover the recent years of development in this field.

Modern, so-called permanent waving started right after the turn of the century in London, England. Three persons, who today are accepted as pioneers in permanent waving, to wit: Charles Nessler, E. Frederics, and Eugene Suter, each working independently, found that the addition of chemicals, such as borax, to water, under the influence of heat, would curl hair and would survive several shampooings and washings of the hair.

The method of producing heat, however, was very crude and necessitated long hours to produce a curl in a whole head of hair. After many hit-and-miss experiments, special electrical heaters were developed, and then complete machines which contained sufficient heaters to heat all the wound strands of hair at the same time.

In those days, hair was wound by what is called the spiral system of winding—that is, starting from the roots to the ends. The borax pads were very clumsy, and after baking the hair they had to be chiseled off to break the hard borax crust. Naturally, in those days they tried to keep the hair in as good condition as possible, but you can see that after actual baking, at high temperature, the hair was left in a rather sad state. At that time, however, that was unimportant—the principal objective was to produce a curl which would last a long time.

Progress in permanent waving remained pretty well static in Europe and England until World War I. At that time Nessler and Frederics came to this country, and in 1922 Suter came over to the United States to start his own company. Then, for the first time, the problem of rewaving hair presented itself, and you might be interested to hear how this was originally handled. Two-sectional heaters were constructed which would heat only the lower part of the heater—that is, the section closest to the scalp—and would heat only slightly, if at all, that portion which was farthest from the scalp.

Around 1924 ammonium hydroxide first came into use in connection with borax, and this materially shortened the heating time necessary to produce curl. It is interesting to note that the introduction of ammonium hydroxide and the subsequent introduction of other chemicals, such as amines, ammonium derivatives, borates, carbonates, phosphates and sulfites, were not developed by careful and laborious work in research laboratories.

The principal manufacturers knew that certain chemicals would wave hair so they mixed up batches of solutions and would then try out each on innumerable heads of hair until they hit upon a solution which

would achieve the best results on most types of hair. The strength of the solutions would vary according to the textures of hair to be waved, and whereas Nessler segregated hair into ten main categories today it is the general practice to subdivide hair into coarse, medium, and fine, and bleached and dyed. Since it would be impractical for a beautician to have too many solutions for the purpose of waving hair, most manufacturers today confine their solutions to three strengths at the most, and the operator who gives the wave normally test curls the hair with these three solutions if she is not sure of the texture and type.

Again going back to the history of this subject—in 1928, Mayer of Germany, developed what is now called the croquignole system of permanent waving; that is, winding the hair from the points to the roots on croquignole curlers. Croquignole curlers differ from spiral curlers in that they are thin in the center and gradually thicken toward the ends. This system was introduced in the United States soon thereafter, and like anything new which has merit—and particularly because it gave extreme ease of operation and application on the part of beauty shop owners and operators—it spread rapidly through the country. In fact, within seven years it replaced spiral waving up to 98%. Schools, today, do not teach the spiral system of waving. They concentrate mainly on the point-to-root system which is the basis of machine type waves, machineless type waves, and the new cold waves.

We should note that with the beginning of the machineless wave—and by this I mean the application of chemically produced heat—permanent waving companies were beginning to set up research departments on a small scale, since it required chemical ingenuity and skill to produce proper mixtures for the correct heat in chemical heating pads. Heretofore, engineers were required to make up permanent waving machines, with their intricate heaters and timing mechanisms, but any Tom, Dick, or Harry could mix up a batch of solution in his bathtub for the purpose of waving hair, and many of the large manufacturers never employed a chemist to mix their solutions and never had any controls on their final results.

For instance, such things as permanent waving solutions—particularly the ones containing sulfites, which lost their strength very rapidly due to oxidation—were never attributed to the cause of failures of waves once the solutions reached the beauty shops. Since some of these firms did not employ chemists, who could protect by means of chemicals the loss of strength due to oxidation, they blamed failures upon the incompetence of the operator using their solutions. While it is true that the operators and their skill determine the success of the permanent wave, if the solutions are not up to par even the best operator and artist cannot give a successful wave. It is also true that the best

brains in the chemical field today, by making the best possible permanent waving solutions, cannot hope to obtain results in the beauty shops unless the operators are competent and give a proper wave according to instructions. Many manufacturers are blamed for failures which are the fault of the operators.

Machineless waving, as waving is known when chemical pads are used for heating, has gained greatly in favor and is today one of the three leading methods of waving hair. As was the case when croquignole first came to the market, stronger solutions had to be found which would wave the hair under the reduced heats prevailing in chemical pads, as against the higher heats generated by a machine.

Leaders of the industry fully realized that solutions could be made just so strong and no more, because the hair itself would be attacked and rather than obtaining a permanent wave the hair would be destroyed. However, some of the smaller and irresponsible manufacturers, who sold their solution on the basis that it would give a strong curl, regardless of the effect upon the hair, flooded the market with strong solutions, claiming that they were actually better for the hair because they contained certain oils.

Today most permanent wave solutions contain various kinds of soluble oils for the purpose of protecting the hair from the harsh chemicals prevalent in most solutions; and it is noteworthy that somewhat of a race developed when one manufacturer would put in more oil, then find he needed more sulfite and other chemicals, only to find he needed more oil and then again more sulfite.

Actually, some of the thick, cream solutions today are materially stronger than is required for normal waving operations, and whereas we have seen that some of these thick, cream solutions seems to give a decent appearance, in three or four weeks' time the hair will look like straw.

During the recent war, the cold waving system of permanent waving was developed. The original complex machinery which was used had passed hydrogen sulfite through curling rods. However, this type of waving received a setback when a beauty shop customer died from blood poisoning, which was generally attributed to the use of hydrogen sulfite. This setback, however, did not halt progress and new cold waving solutions were introduced on the market containing ammonium thioglycolate. The introduction of cold waving necessitated a completely new approach to permanent waving The beauty shop operator had to unlearn nearly everything she had learned in the last 20 years. The hair could not be stretched, and had to be carefully rinsed out with neutralizing solution to stop the action of the ammonium thioglycolate. Cold waving became very popular during the war, but it is now on a decline due to certain factors that are not connected with the technical aspects, or the results of

cold waving. I shall discuss these a little more later on, but will not go any further into cold waving now since Mr. Reed, who follows, will be speaking primarily about the cold waving system and knows much more about it than I.

What is the future of permanent waving so far as the beauty shop industry is concerned? There are two main avenues which must be explored at great length:

Number 1: More research work should be done in connection with the formulation of solutions for the waving of hair. All too often, solutions are marketed in the field without having had sufficient research work behind them. By that I do not mean that there was not enough chemical research and formulation—but not enough actual experience research. My colleagues and I have found that sometimes we can theoretically produce what we think is the finest solution for permanent waving, and the finest method of permanent waving, and our surprise is great when we use the solution or system on an actual head of hair and it does not work out.

For example, according to theory and textbooks and everything we have known before, the addition of alcohol to a waving solution should give a wave at reduced temperatures if the heat waving method is used; but that does not always work out.

In my opinion, all research laboratories should have an expert on permanent waving, and by that I do not mean a hair stylist who can set hair very prettily, but a man who is not afraid to speak his own mind and say "No" to something that took two years to develop in the laboratories, Because, what may appear on the surface to be a good wave, and a long-lasting wave, even though it has been watched for six to nine months, may not work out in Phoenix, Arizona, or in Florida or in Texas. Water conditions, types of soaps used to wash the hair, types of rinses and bleaches—everything has a bearing on results. In fact, I do not think any of you people can have any idea of what stuff some women will put on their hair during the day or night, which will affect the waving of the hair.

In our own laboratories, we have a collection of everything that is put on the market. We try to use everything on every conceivable type of hair—and if a permanent waving solution will wave hair that has been washed with bar soap, detergents, olive soaps, etc., and which has been subjected also to dandruff remover preparations, Listerine, and other items, and then exposed to air, wind, and hot, dry sun, we can be reasonably sure that it will wave hair any place in the United States.

In my opinion, too little time is spent on this particular phase. Permanent waving manufacturers have no control over what a woman will use before and in between her permanent waves. She is constantly bombarded by fantastic claims accredited to shampoos and all other preparations used on the scalp, and

unless we use all of them on the hair we wish to wave, we cannot be certain what our solutions will do when they meet the actual test in the field.

The second problem which we have to face in the future is that of experimentation in electronic radiation and electronic heating as it can affect the waving of hair. There we have to be extremely careful because when we work with high-frequency radiation, we are dealing with the brain. Waves have been given by means of electronic radiation, whether it be high frequency or otherwise, when the hair was on a wooden block. But I, personally, would be rather wary of using the same methods on a human being. What will the high frequency do to the brain matter? That is something that will have to be discovered.

Also, what would happen if there were a short in the high frequency machine? Shorts in high frequency machines have been known to kill instantly anyone in contact with them.

I want to end this little discussion with a warning—I am now speaking principally and primarily about permanent waving as it is done in the beauty shop field. A lot of permanent waves today are being sold in packages in the drug stores, and it is seriously affecting the business done by beauty shops. We must be careful not to introduce any items in the beauty shop field unless we are absolutely sure of them. Too many hairdressers have had to pay by being the guinea pigs of manufacturers' experimentations. They do not like it, and in the process of this experimentation a lot of ill will is created and women are driven away from beauty shops.

Whereas no actual figures are available, it is fairly certain today that no more women get permanent waves, percentage-wise, than they did ten years ago. They have just been stung too many times and have had their hair ruined too many times. Whether it be the fault of the products or the operators—they do not care.

We have a man-size job ahead of us in development work. A few large companies who, for the past 10 or 15 years, have conscientiously followed careful and progressive experimentation, will suffer if they do not see to it that certain standards are developed by all the manufacturers concerned, and it might not be a bad idea if the manufacturers in the permanent waving field were to establish a scholarship or set up a course in research work at one of our universities, similar to the research work that has been done for many years by Dr. Speakman at Leeds University in England. So far as I know, Leeds is the only university in the world that has done some far-reaching work in the whys and wherefores of permanent waving.

I hope that this little talk has given you some idea about the problems of permanent waving. Should you have any questions, I will be glad to answer them.