OPTICAL PROPERTIES OF LINSEED OIL

It is commonly known that modern pictures painted in oil were found to undergo a considerable lowering of tone after a few years. This went on over the whole surface, but it varied with different painters who followed their own particular methods. This state of affairs in relation to modern pictures was in strong contrast with pictures painted in the fifteenth century by Van Eyck and others, which to the present day retained their brilliancy of tone. Prior to the introduction of painting in oils the mediæval painters painted in tempera, but the paintings of the first painters in oils had produced works which retained their brilliance even to this day, as compared with the loss of tone in so many modern oil paintings.

Professor A. P. Laurie was one of a committee of artists and chemists appointed by the Royal Academy to investigate this and other problems affecting artists. Professor Laurie recently discussed some of the points under investigation at a meeting of the Oil and Colour Chemists Association in London. His paper entitled "The Optical Properties of Linseed Oil and the Technique of Van Eyck and his Followers" was ably reported by *Chemical Age*, London, and constitutes most interesting reading for the paint manufacturer and chemist.

This journal quotes Professor Laurie as stating that there is nothing in the historical information available concerning the art of the eleventh and twelfth centuries to suggest that there were any special methods of preparing the oil or pigment. The real fact was that Van Eyck and other painters of those days were first-class artists, and the suggestion that there was a tradition, which had grown up during 200 or 300 years from the eleventh or twelfth century onwards, was due more to picturesque writing than to actual fact. Therefore, the committee came to the conclusion that there was no mystery or secret about the methods adopted by the early painters and that the whole matter required looking into afresh.

Some Experiments

Professor Laurie said that he had tried a few simple experiments in order to get more information on the yellowing of oils used in the painting of pictures. He took artists' flake white and ground it in various oils, including artists' linseed oil which had been bleached in the sun, poppy oil supplied by a good firm, stand oil, copal varnish, etc., and from these experiments certain facts came out. The oil that altered least was the poppy oil; next to that was Dutch stand oil; next came walnut oil; and the one that yellowed most was linseed oil. Copal varnish yellowed more than any of the others, whilst turpentine yellowed worst of all.

It was rather an interesting fact that a great many artists held the view that when they used turpentine as a thinner the tendency was for the oil to yellow more than any other. Artists varnished their pictures with mastic,

and he took some of his white lead in oil grindings and put one sample on glass and another on an artist's canvas varnished with mastic. In yet another case he coated the back of the canvas as well as the front with mastic and found that the sample on glass was protected absolutely from the effect of moisture, the sample of canvas coated one side with mastic was fairly well protected, whilst the canvas coated on both sides with mastic was protected very much better. The canvas with mastic on both sides showed a little yellowing, the glass showed a little more, whilst the canvas with mastic on one side only showed the most yellowing of the three.

The important practical bearing of that from the artist's point of view was that when he varnished the front of his picture he did not protect it from moisture at the back, but it was due to the action of moisture or oxygen on certain ketones that yellowing took place and the more the picture was protected back and front the less it would yellow. Copal varnish yellowed considerably; stand oil in which dammar was dissolved, or linseed oil in which mastic was mixed, changed very little in tint and remained remarkably white. Therefore, he put the order as follows:— Poppy oil, stand oil in which dammar had been dissolved; linseed oil mixed with mastic; walnut oil; stand oil; finally linseed oil. These simple elementary experiments gave some practical information to the artist.

It was well known that when an artist painted out a portion of an oil painting, in the course of time the painted out part showed through. There were two explanations of this. One was the permeability of the oil in the pigment, and the other that saponification might be going on slowly between the white lead and the zinc oxide which produced this effect. There was, however, another possibility and that was whether the linseed oil film altered in refractive index. If that were so, it would account for a good deal of the lowering of the tone of oil paintings. Experiments were described which gave a rough classification of the pigments artists used in order of opacity, which might also be regarded as the order of refractive index. If a linseed oil increased in refractive index, as he claimed these experiments showed, then the pigment would be deeper in tone and the whole surface of the picture would be lower in tone. Thus the increase in the refractive index of linseed oil was an important matter in the lowering of the tone in oil paintings after a period of time, and he could not help thinking that in the increase of refractive index of linseed oil there would be found a solution of more than one trouble experienced by the painter in oils.

Discussion

The President, in thanking Professor Laurie for his lecture, said it had taken them back to the fundamental principles underlying some of the oil and color chemists' business. The present day oil and color chemist was rather more inclined to consider the problems connected with the manu-

facture of his materials than the scientific effects underlying the methods of application. It was only by realizing and studying these scientific effects that it was possible to manufacture what was required. He could personally substantiate the statement that oils mixed with turpentine showed a greater degree of yellowing than oils not so mixed.

Noel Heaton said that although Professor Laurie had stated that there was no mystery about the methods of the Van Eyck school, it was still a subject of tremendous controversy as to how those paintings retained their tone. The early painters were consummate craftsmen, and if work of this character was to be produced it needed the application of scientific technology of the highest degree. Whilst boiled linseed oil was known in the time of Van Eyck the painters of those days started their pictures with a foundation and built the whole thing up in a painstaking manner, which very few present day artists would take the trouble to do. That was the rock bottom secret of the whole matter. The modern artist simply squeezed his color out of a tube on to a brush and what happened to it afterwards he did not quite know.

Cruickshank Smith said it was interesting to hear that poppy oil compared so favorably with the others because in some experiments of his own certain types of stand oil were quite equal to poppy oil in their resistance to change of tint.

TAKES OVER HOUSTON LABORATORIES

F. R. Robertson has taken over the Houston Laboratories, Houston, Texas, following the death of its president and founder, P. S. Tilson. The work of the laboratory will be continued as formerly, under the direction of Mr. Robertson.