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## A Psychosomatic Study of Contagious Dermatitis

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### Introduction

The dermatitis caused by contact with such poisonous trees as the lacquer tree and the wax tree is very similar in symptomology to acute eczema. The question of whether a person's special susceptibility to these trees should be considered due to a special congenital or acquired characteristic of skin tissue, i.e., due to tissue hypersensitivity or due to allergy has been the subject of much dispute for a long time. Since Hebra reported the similarity of artificial dermatitis induced by rubbing the skin with croton oil to the pathology of eczema, most eczema, is now considered to belong to the category of contagious dermatitis and to be mostly due to an allergic mechanism (Jadassohn, Bloch, Darier, 1930).

Studies of dermatitis caused by the lacquer tree and the wax tree have been performed by Schwalbe, Haupt, Stevens, Warren, Korschelt, Tschirch, Jadassohn, Maisch, Pollitzer, Pfaff, Bertrand, Scheube, and Stephan, and in our country by Hiraga, Yoshida, Toyama, Kayaba, Mashima, Usuba, Dohi, Negishi, Hayashi, Watanabe, Kobayashi, Ito, Masuda, Okawa, and others since about eighty years ago. The poisonous substance of the lacquer tree and the wax tree and the actual cause of the outbreak of the condition have been the subject of much discussion. The syndrome of contagious dermatitis and the histological findings have been studied in detail including both animal and human experiments.

The reason for individual differences in the development of this condition in human beings, however, has not been completely clarified. In addition, some authors such as Yoshida, Scheube, and Mense, have pointed out that some people sensitive to the lacquer tree could develop dermatitis of this type by merely passing under this tree, without touching it at all. This phenomenon has been considered to be probably due to the fact that the cilia or pollen may be spread by the wind and a minute amount of poisonous Urshiol contained therein may touch the person's skin. The phenomenon that some persons develop dermatitis by only passing in front of a lacquer-ware factory where lacquer is used, is attributed by some to the possibility of contact with Urshiol-carrying dust from the factory.

An example is a 22 year old male who was very much afraid of contagion when his older brother developed dermatitis due to raw lacquer. Three days after his brother teased him by saying, "I'll make you suffer from dermatitis," and touched his head, he developed erythema, edema, and small nodules appeared on his right scapular area, left upper arm and right ear lobe, and little vesicles appeared on the fourth day. Frank (1898) reported also three similar cases. Schwarbe suggested that this may be due to the transmission of a minute amount of Urshiol by contact with another person or object.

We are inclined to be skeptical of such facile explanations of lacquer hypersensitivity. In the above mentioned studies, they attempted to attribute such a phenomenon to contact

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with a minute amount of a poisonous substance and ignore the extreme anxiety which is frequently strengthened by the patient's previous suffering from this condition. It is very difficult to find reports in which such a phenomenon has been studied from the psychosomatic standpoint. We have carried out a special study on the mechanism of the development of contagious dermatitis from this point of view. The subjects were fifteen to eighteen year old males. In general, youths of this age are considered to be unstable physically and mentally.

### I. Subjects and Experimental Procedure

Fifty seven high school boys from fifteen to eighteen years of age were asked to answer a questionnaire concerning their past history of hypersensitivity to the lacquer tree and the wax tree and other allergic conditions and their families' histories of allergic diseases. This group was divided into four categories according to their answers as shown in Table 1.

**Table 1.** Reaction to the lacquer tree or the wax tree as reported on the questionnaire 57 male high school students aged from 15 years to 18 years

Category	Strong Reaction	Moderate Reaction	No Experience	No Sensitivity	Total
Number	13	23	5	16	57
Percent	22.8	40.3	8.8	28.1	100

#### Common Poisonous Trees in Japan

1. *Rhus Venicifera* (R.V.)-Lacquer Tree
2. *Rhus Trichocarpa*
3. *Rhus Toxicodendron*
4. *Rhus Succedanea* (R.S.)-Wax Tree
5. *Rhus Sylvestria*

From the above mentioned trees, numbers 1 and 4 were used in this experiment. The chestnut tree was used as the control.

In regard to the poisonous substances of the lacquer tree, their molecular and structural formulae have been determined by the research of Mashima and others to be as follows;

1. Urshiol,  $C_{21}H_{32}O_2$ . This substance is commonly found in the Japanese lacquer tree.
2. Laccol,  $C_{23}H_{36}O_2$ . This substance is commonly found in the French Indo-Chinese lacquer and wax trees.
3. Thitsiol,  $C_{23}H_{36}O_2$ . This substance is commonly found in the Burmese lacquer tree.

#### *Experiment A: Induction of Dermatitis by Contact With the Poisonous Tree.*

Procedure: The thirteen subjects who reported the highest sensitivity to R.V. and R.S. were divided into two groups. One group of five subjects were hypnotized and the leaves of R.V. or R.S. were applied to one arm. The subjects were told they were touching a chestnut tree. Chestnut leaves were applied to the other arm and the subjects were told that they were R.V. or R.S. leaves.

The other group was not hypnotized but merely blindfolded and the above procedure followed.

#### *Experiment B: Induction of Dermatitis by Contact With Extract of R.V. or R.S.*

**Pilot Procedure:** Two subjects were chosen, one from the group with a moderate reaction to R.V. or R.S. and one from the group with no reaction to the poison. In the first part of the pilot experiment, R.S. extract was applied to a spot about 1 cm. in diameter on the flexor surface of both upper arms. They were told that the left spot was water and the right spot was R.S.

In the second part of the pilot experiment, the same procedure was followed using R.V. extract placed on the extensor surface of the forearms.

**Main Procedure:** R.V. extract was applied to a spot approximately 1 cm. in diameter on both flexor surfaces of the forearms of fifteen subjects. The subjects were told the spot on one arm was R.V. extract and the spot on the other arm was water.

*Experiment C: Induction of Dermatitis by Contact With Poisonous Leaves in Bright and Dark Room.*

**Procedure:** In Part 1, the five boys who reported no previous experience with R.V. or R.S. were put in a dark room where their left arm was touched with R.V. leaves. In a bright room, the right arm was touched with R.V. leaves.

In Part 2, the same procedure was followed with the sixteen boys who reported no previous reaction to R.V. or R.S.

The authors picked five doubtful cases and the extract of R.V. was applied to all of them with the suggestion of water. Then, in the subjects whose reaction was negative, the extract of R.V. was again applied and this time they were informed that the fluid was R.V. extract.

*Experiment D: The Experimental Induction of Contagious Dermatitis by The Procedure of Conditioning*

**Materials Used:** A 2% raw extract of the Japanese lacquer tree dissolved in an alcohol or chloroform base and colored with methylene blue was used. A control solution of pure alcohol or chloroform colored with active carbon and methylene blue was also used.

**Subjects:** Two subjects with a moderate reaction and two subjects with no reaction.

*Experiment E: The Experimental Induction of Contagious Dermatitis by Passing Under a Poisonous Tree.*

Two subjects with a marked reaction to both R.V. and R.S. were used to examine the mechanism of the outbreak of contagious dermatitis by passing under a lacquer or wax tree.

## II. Results

*Experiment A: Contact With Poisonous Tree.*

As shown in Tables 2, 3 and 4, the effect of suggestion was found in practically every case and was particularly marked in nine out of thirteen cases. It is probable that the remarkable reactivity of this group was due to the fact that all these subjects reported a previous marked reaction to R.V. and R.S.

Case No. 1; (Case #4 in Table 2) K.H., a 16 year old male. This case belongs to the "marked reaction" category having a family history of allergic conditions and a past personal history of contagious dermatitis due to R.S.. He has a strong fear of the wax tree.

The chestnut tree was applied to the right arm and the suggestion was given that this was a wax tree. The left arm was touched with a wax tree with the suggestion that this was a chestnut tree. (Fig. 1).

The subject expressed great fear and complained of severe itching and burning ten minutes later. At the same time, erythema and papules appeared on the extensor surface

Table 2. Results of Experiment A Part I Production of dermatitis by contact with leaves while under hypnosis

Case No.	Subject	Age in Years	Arm Touched		Eruption Sites	Latent Time	Result	
			L	R			C	RV RS
1	T.E.	16	C	RS	L-upper arm L-elbow scapular area	30'-10h 50h erythema papules	+	-
2	M.I.	15	C	RS	R-forearm L-arm neck	6h-Left erythema papules Right weaker 10h neck	+	+
3	T.H.	17	C	RV	L-arm L-part of chest	20' flushed 11h marked flush 22h papules vesicles	±	-
4	K.H.	16	RS	C	R-forearm back of Right hand	10'-6h erythema papules 22h vesicles	±	-
5	K.S.	17	RS	C	R-upper arm R-part of chest R-part of back	15'-3h erythema papules 28h become marked on back	+	-

R.V.=Rhus Venicitera R.S.=Rhus Succedanea C.=Chestnut

of the right forearm and the back of the right hand. These changes increased six hours later (Fig. 2).

Flushing and small vesicles appeared and spread all over the right forearm twenty-two hours later. Erythema and papules fused with scattered vesicles (Fig. 3).

Case No. 2; (Case #7 in Table 3) F.A., a 15 year old male, who also belonged to the "marked reaction" group with a family history of allergic conditions, a past personal history of contagious dermatitis and much fear of the wax tree.

The right arm was touched with a wax tree and the suggestion was given that it was a chestnut tree. The left arm was touched with a chestnut tree and the suggestion was given that it was a wax tree (Fig. 4).

Erythema and papules appeared on the left forearm after ten to thirty minutes (Fig. 5).

Three hours later, papules on the left forearm markedly increased with a sign of edematous swelling. Twenty-seven hours later, the papules on the left forearm fused into a marked edematous condition (Fig. 6).

In figure 6, the left arm takes the position of supination because the skin pathology was most marked on the ulnar surface.

Table 3. Results of Experiment A Part 2 Production of dermatitis by contact with leaves while in waking state

Case No.	Subject	Age in Years	Arm Touched		Eruption Sites	Latent Time	Result	
			L	R			C	RV RS
1	S.K.	16	RS	C	R-upper arm near elbow	50'-3h erythema papules	+	-
2	N.T.	16	RS	C	R-forearm	50'-3h flushed itching papules	+	-
3	T.M.	17	C	RS	L-elbow (flexor surface)	1h flushed itching (slight)	±	-
4	H.I.	16	C	RS	L-elbow L-upper arm	20'-4h flushed papules	+	-
5	T.Y.	16	C	RS	R-neck R-elbow L-elbow L-forearm	20' L-elbow 1h R-elbow flushed papules	+	+
6	K.E.	15	C	RS	L-forearm (flexor surface)	30'-3h flushed itching (slight)	±	-
7	F.A.	15	C	RS	L-forearm L-elbow	10'-30' erythema papules 3h papules increased 27h papules fuse	±	-
8	T.H.	15	C	RS	L-forearm L-elbow	30'-3h erythema papules	+	-

R.V.=Rhus Venicitera R.S.= Rhus Sucedanea C.=Chestnut

Table 4. Summary of Tables 2 and 3(Experiment A)

Subjects	Reaction					Marked Response to Suggestion
	RV RS +	RV RS -	RV RS -	RV RS -	RV RS -	
	C +	C -	C ±	C +	C #	
Number	2	0	2	6	3	9
Fraction	2/13	0	2/13	6/13	3/13	9/13
Percent	15.4	0	15.4	46.5	23.1	69.6

R.V.=Rhus Venicitera R.S.=Rhus Sucedanea C.=Chestnut

Case No. 3; (Case #3 in Table 2) T.H., a 17 year old male, who also belongs to the "marked reaction" group with a family history of allergic reaction, a past personal history of contagious dermatitis due to the lacquer tree and has a strong fear of this tree.

The right arm was touched with a lacquer tree and the suggestion was given that it was a chestnut tree. The left arm was touched with a chestnut tree and the suggestion was given that it was a lacquer tree (Fig. 7).

Twenty minutes later, several spots of flushing appeared on the left arm.

Fifty minutes later, distinct papules appeared on the left arm and left side of chest (Fig. 8).

Eleven hours later, erythema and papules became marked, and twenty-two hours later erythema, papules, edema, serous exudate, and vesicles appeared on the flexor surface of the left arm.

*Experiment B: Application of Extract.*

Pilot Study, Part 1: As shown in Table 5, after the application of R.S. extract to the flexor surface of both forearms of H.S. (a strong reactor to both R.V. and R.S.) and of T.N. (a non-reactor to R.V. and R.S.) with the previously mentioned suggestions, the following changes were observed.

Case No. 4; (H.S. in Table 5), an 18 year old male.

Figure 9: Immediately after the application of the extract.

Figure 10: Seventy-one hours later, flushing and papules approx.  $2.0 \times 1.5$  cm. appeared.

Figure 11: Eighty hours later, the flushing and swelling spread.

Figure 12; On the sixth day, the inflammation spread all over the right forearm with fusion of flushing, swelling, and papules accompanied by serous exudate and vesicles.

On the seventh day, the condition was improving under the hypnotic suggestion of cure. The condition was almost completely cured on the eleventh day. Judging by the severity of the dermatitis on the sixth day (Figure 12), it would normally take about twenty

Table 5. Results of Experiment B Pilot experiment  
extract applied to the forearm

Exp No.	Subject	Age in Years	Forearm Side Touched	Suggestion Given		Latent Time	Reaction	
				L	R		Water	RV SR
1	H.S.	18	Flexor Side	Water	RS	71h R-side $2.0 \times 1.5$ cm flushed area and papules 118h spread	--	++
2	T.N.	17	Flexor Side	Water	RS	No Reaction	--	--
3	H.S.	18	Extensor Side	Water	RV	49h $1.2 \times 1.3$ cm eruption later spread	--	+
4	T.N.	17	Extensor Side	Water	RV	No Reaction	--	--

R.V.=Rhus Venicitera R.S.=Rhus Succedanea

ty days for a complete cure by the ordinary method of treatment.

No changes were found in T.N., a non-reactor, after the application of the same extract.

Pilot Study, Part 2: R.V. extract was applied to both subjects by the same procedure as mentioned above. As shown in Table 5, H.S. had flushing and papules 1.2×1.3 cm. in size on the extensor surface of the right forearm and this condition gradually spread. On the fourth day, the extent of the inflammation was somewhat reduced by hypnotic suggestion and spontaneously diminished. Again, T.N. showed no reaction.

In regard to the concentration of the extract of these two trees, the extract was made from the same amount of leaves and branches of both tree. The poisonous substance of the wax tree is Laccol (C<sub>23</sub>H<sub>36</sub>O<sub>2</sub>) and that of the lacquer tree is Urshiol (C<sub>21</sub>H<sub>32</sub>O<sub>2</sub>). The toxicity of the poison depends upon the difference in size of the side chain of the structural formula. Thus Urshiol is more toxic.

In this experiment, it was found as it was expected that the flexor surface of the forearm was more sensitive than the extensor surface.

Table 6. Results of Experiment B. Extract applied to the forearm

Case No.	Subject	Age in Years	Suggestion Given L R	Reaction					Results		
				Day 1 8 a.m.	Day 2 8 a.m.~8 p.m.	Day 3 8 a.m.~8 p.m.	Day 4 8 a.m.~8 p.m.	Day 5 8 a.m.	Water	RV	
1	M.S.	16	Water RV	-	-	-	L - R ±	-	-	-	±
2	K.K.	16	Water RV	-	L - R ±	±	±	±	±	-	±
3	H.T.	16	Water RV	-	L ± R ±	+	+	+	+	+	+
4	T.Y.	17	RV Water	-	L ± R -	±	-	±	±	+	+
5	M.A.	16	RV Water	-	L ± R ±	-	-	±	±	-	±
6	K.I.	16	Water RV	-	L - R +	+	±	+	+	-	+
7	I.H.	16	RV Water	-	L + R ±	+	±	±	±	+	±
8	N.K.	17	RV Water	-	L + R -	+	±	±	±	+	±
9	M.K.	17	Water RV	-	-	L - R ±	-	±	-	-	+
10	M.K.	16	RV Water	-	-	L + R +	+	+	+	+	+
11	T.O.	17	Water RV	-	L - R ±	-	+	+	+	+	+
12	T.O.	16	RV Water	-	-	L + R -	+	±	±	-	±
13	O.F.	17	Water RV	-	L - R +	+	+	+	+	+	+
14	M.H.	18	Water RV	-	L + R +	+	+	+	+	+	+
15	F.K.	17	Water RV	-	L - R +	-	+	-	-	-	±

R.V.=Rhus Venicitera

Main Experiment: The extract of R.V. was applied to fifteen subjects from the group who reported a moderate reaction to R.V. or R.S.. The results are shown in Tables 6 and 7.

Table 7. Summary of Table 6 (Experiment B)

	Reaction						Response to Suggestion
	RV ++ W. +	RV + W. +	RV ++ W. -	RV + W. -	RV ± W. -	RV - W. -	
Subjects							
Number	2	5	1	2	5	0	8
Fraction	2/15	5/15	1/15	2/15	5/15	0	8/15
Percent	13.3	33.3	6.7	13.4	33.3	0	53.3

R.V.=Rhus Venicitera Extract W.= Water

As shown in Table 7, the effect of suggestion was recognized in as high as 53.3 %, even in the group of moderate reactors.

*Experiment C: Leaf Contact in Dark and Bright Room.*

Part 1: Subjects with no previous experience with R.V. or R.S. As shown in Table 8, three out of five subjects who had had no previous experience of contact with these trees were found to be sensitive to the lacquer tree. In two of them, the effect of suggestion was recognized. The authors assume that the symptoms of contagious dermatitis even in these two subjects became manifest because of the interaction of constitutional factors and the effect of suggestion.

Table 8. Results of Experiment C Part 1. Subjects with no previous experience with R.V or R.S. Touched on arm with R.V. in dark and bright room

Exp No.	Subject	Age in Years	Day #1		# 2		# 3	# 4		# 5	Results	
			8a.m.	10p.m.	8a.m.	10p.m.	8a.m.	8a.m.	10p.m.	8a.m.	Dark Room	Bright Room
1	I.K.	16	-	-	±	L ± R -	+	+	+	+	+	+
2	P.K.	16	-	-	-	L - R -	-	-	±	+	-	+
3	N.F.	17	-	-	±	L + R ±	+	+	+	+	+	+
4	T.Y.	18	-	-	-	L - R ±	-	±	±	-	-	+
5	K.S.	16	-	-	-	L + R +	+	+	+	+	+	+

R.V.= Rhus Venicifera R.S.=Rhus Succedanea

R.V. leaves were applied to the subjects' left arm at 8a.m. on the first day, in a dark room.  
R.V. leaves were applied to the subjects' right arm at 8a.m. on the second day, in a lighted room.

Part 2: Subjects with no previous reaction to R.V. or R.S. As shown in Table 9, even in this group, we found five out of sixteen subjects sensitive to R.V.. It is felt that this sensitivity can be explained by the greater contact with the leaves than would normally occur. In five subjects, the reaction was doubtfully positive and the reaction on the left arm appeared after the subjects saw the appearance of contagious dermatitis on the right

arm which was produced by contact in the bright room. We considered that in these cases further experiments were necessary to clarify the doubtful results.

Table 9. Results of Experiment C Part 2. Subjects with no previous reaction to R.V. or R.S. touched on arm with R.V. leaves in dark and bright room

Exp No.	Subject	Age in Years	Day #1		# 2		#3	# 4		#5	Results	
			8a.m.	10p.m.	8a.m.	10p.m.		8a.m.	8a.m.		10p.m.	8a.m.
1	Y.S.	16	-	-	-		L - R -	-	-	-	-	-
2	M.I.	15	-	-	-	L - R -	-	-	-	-	-	-
3	M.Y.	16	-	+	+	L + R +		+	+	+	+	+
4	T.M.	16	-	±	+	L + R ±		+	±	±	+	+
5	H.M.	15	-	-	-	L - R -		-	-	-	-	-
6	K.S.	17	-	-	-	L - R -	+ ±	+	±	±	+	? ?
7	S.S.	16	-	-	-	L - R -		-	±	+	+	? ?
8	H.M.	16	-	-	-	L + R ±	+ +	+	+	+	+	+
9	Y.F.	17	-	±	±	L ± R ±	± ±	±	±	±	+	+
10	T.H.	17	-	-	-	L ± R ±	± ±	±	±	±	+	? ?
11	Y.T.	18	-	-	-	L - R -		±	+	+	+	? ?
12	T.N.	17	-	-	-	L - R -	-	-	+	+	+	- +
13	N.T.	18	-	-	-	L - R -	-	-	-	-	-	- -
14	S.K.	18	-	-	-	L - R -	-	-	-	-	-	- -
15	M.O.	18	-	+	+	L + R ±	+ +	+	+	+	+	+
16	H.Y.	18	-	-	-		L + R +	+	+	+	+	? ?

R.V.=Rhus Venicifera R.S.=Rhus Sucedanea

R.V. leaves were applied to the subjects' left arm at 8 a.m. on the first day, in a dark room.  
R.V. leaves were applied to the subjects' right arm at 8 a.m. on the second day, in a lighted room.

As shown in Table 10, the R.V. extract was applied to the left lower arm of these five subjects with the suggestion of water. In this experiment, the reaction was positive with only one subject (K.S.). This experiment was followed by the experiment shown in Table 11 where the remaining four subjects who showed a previous negative reaction had R.V. extract applied to the right lower arm. This time they were told it was R.V. extract. Three of them showed a positive reaction. These results reveal the fact that one of the five doubtful subjects was a true positive reactor, one was a true negative reactor, and the other three showed a positive reaction only when constitutional factors interacted with the

anxiety caused by an awareness of the poison.

**Table 10.** Results of Experiment C. Subjects with doubtful results in Part 2 R.V. extract was rubbed on left lower arm. Subjects were given suggestion it was water

Case No.	Subject	Age in Years	Day Number									Result
			1	2	3	4	5	6	7	8	9	
6	K.S.	17	—	—	+	+	+	±	±	±	—	+
7	S.S.	16	—	—	—	—	—	—	—	—	—	—
10	T.H.	17	—	—	—	—	—	—	—	—	—	—
11	Y.T.	18	—	—	—	—	—	—	—	—	—	—
16	H.Y.	18	—	—	—	—	—	—	—	—	—	—

R.V.=Rhus Vencifera

**Table 11.** Results of Experiment C. Subjects with negative results in table 10 R.V. extract was rubbed on right lower arm. Subjects were told it was R.V.

Case No.	Subject	Age in Years	Day Number									Result
			1	2	3	4	5	6	7	8	9	
7	S.S.	16	—	—	—	—	—	—	—	—	—	—
10	T.H.	17	—	—	±	±	±	+	±	±	—	+
11	Y.T.	18	—	—	+	+	+	±	±	±	±	+
16	H.Y.	18	—	—	±	+	+	±	±	—	—	+

R.V.=Rhus Vencifera

Table 12 shows a summary of Experiment C, Part 2. Out of sixteen subjects, five showed a positive reaction in both the dark and bright rooms. One doubtful case (K.S.) finally proved to be a true positive reactor. One of the sixteen (T.N.) showed a negative reaction in the dark room and a positive reaction in the bright room. Three doubtful cases (T.H., Y.T., H.Y.) proved to be in the same category. That is, in these four cases, the definite effect of suggestion was observed. Five out of sixteen showed a negative reaction in both the bright and dark room and one doubtful case (S.S.) was also in the same category.

**Table 12.** Summary of Experiment C Part 2

	Reaction				Effect of Suggestion
	Dark Bright or Water Suggest	+	Dark Bright or Water Suggest R.V.	— + — +	
Number	6		4		4/16
Percent	37.5		25.0		37.5 25.0

R.V.=Rhus Vencifera

The results of this experiment indicate that a positive reaction is partially dependent upon the amount of poison. Even in the questionnaire category of "no reaction" we could find four subjects who showed definite effects of suggestion. Thus we found 51 positive reactors out of 57 subjects, 89.5%, based on the subjects' statements and the results of our

experiments. There is the possibility that almost everyone can be a positive reactor depending upon the method of application, the amount of the poison used, and the condition of the subject.

In regard to subject S.S. (#7 in Table 9) who showed a negative reaction in Tables 10 and 11 in spite of a positive reaction in Table 9, it is considered probable that his initial positive reaction was due to a particular constellation of emotional and constitutional factors at the time of the experiment. He had neither previous family nor personal history of allergic conditions.

#### A Comprehensive Summary of the Above Experiments

Table 13 shows the comprehensive results of the experiments on the effect of suggestion on the development of contagious dermatitis. As shown in the table, the effect of suggestion was seen in 84.6% of the questionnaire category "marked reaction", 56.2% of the "moderate reaction" category, 40.0% of the "no previous experience" category, and 23.5% in the "no previous reaction" category, showing the expected decline from the most sensitive group to the least sensitive.

Table 13. Summary of Experiments A B and C. Effect of suggestion upon contagious dermatitis

Questionnaire and Experiment Category	Allergic Reaction	Reaction				Effect of Suggestion
		RV, RS Suggest	- +	RV, RS Suggest	-	
Marked Reaction Leaf Contact	2	++3 +6 11 ±2		0		11/13 84.6%
Moderate Reaction Extract Contact	7	++1 +2 8+1 ±5		0		9/16 56.2%
No Previous Experience Dark room	3	+2 2		0		2/5 40%
No Previous Reaction Dark Room Extract Contact	6	+2 4 ±2		6+1		4/17 23.5%
Totals		++4 +12 26 ±9		7		51
Number	18					
Percent	35.3	51.0		13.7		100.0

R.V.=Rhus Venicitera R.S.=Rhus Sucedanea

The ++'s are the two subjects used in the pilot study of Experiment B.

In the 2 subjects at the top of the extreme left group in Table 13, we could see both constitutional and suggestive factors playing important roles. In the other three groups in this column, the reaction was considered to be allergic mostly due to constitutional factors. We chose, therefore, the group with a negative reaction to the poison but a positive reac-

tion to suggestion to see the definite effect of suggestion in contrast to the group with no reaction to either poison or suggestion as shown in Table 14. We performed a chi square test on these figures and obtained a value 16.3 which is statistically significant at the 0.1 % level.

Table 14. Chi square test of definite effect of suggestion

Questionnaire Category	Reaction			Total
	RV, RS Suggest	- +	RV, RS Suggest -	
Marked and Moderate Reaction	20		0	20
No Previous Reaction	4		7	11
Total	24		7	31

Corrected Chi Square=16.3

This value is statistically significant at the 0.1% level.

*Experiment D: Contagious Dermatitis by Conditioning.*

The blue colored raw extract of the leaves of the Japanese lacquer tree was applied to different spots on the forearm of the subjects once daily without explanation as to the nature of the fluid. The poisonous effect of this extract was strong enough to induce an eruption within twenty-four hours of its application. The blue color being the conditioning stimulus, the conditioning was strengthened by this procedure. When such a conditioning was thought to have been built up, the blue colored control solution was applied. This experiment was performed on four subjects. In all of them, more or less noticeable changes were recognized. One case, where the period of conditioning was longest and the pathological changes were most marked will be discussed in detail.

Case No. 5: T.O., an 18 year old male, belongs to the group of "moderate reaction" and has neither a personal nor past family allergic history. The extract of the lacquer tree was applied daily to the flexor surface of the left and right forearms in spots descending toward the wrist.

Figure 13: Left forearm showing the four spots made by the application of extract and the fifth spot made by the application of the control fluid.

Figure 14: Symptoms on these four spots have flourished and a granulous change is occurring on the fifth spot (control). At this time the control solution was applied to the sixth spot.

Figure 15: Right forearm showing the symptoms of acute eczema on the first through third spots. The granular formation on the fourth spot made by the control solution also can be seen. At this time the control solution was applied to the fifth spot.

Figure 16: The right forearm one day later. In this picture, red macules and papules can be seen right under the blue color of the fifth spot (control) and they daily became larger.

Figure 17; The right forearm on the following day. Erythema and papules about the size of 3x5 mm. can be seen on the fifth spot.

Figure 18: Two days after figure 17, the size of the pathological area increased to  $8 \times 12 \times 2.5$  mm. with small vesicles.

Figure 19: The following day, a crust was formed and a biopsy specimen was taken from this pathological tissue. As a control, a biopsy specimen was taken from the second spot of the left forearm where dermatitis of almost identical severity was induced by the application of the extract.

Table 15 shows a comparison between the pathological changes induced by the extract and those induced by the control fluid.

Table 15. Histological Findings

Changes in Epidermis	Induced by Lacquer Extract	Induced by Conditioning
Hyperkeratosis	+	±
Parakeratosis	++	—
Acanthosis	++	+
Spongiosis	++	++
Edema	+++	+
Inflammation	++	+
Teleangiectasis	+	+
Eosinophile cells	+	+

As shown in the histological pictures one through four, spongiosis and acanthosis were markedly seen in both specimens. However, hyperkeratosis, parakeratosis and edema were more marked in the dermatitis induced by the extract than in that induced by the control fluid, eosinophile cells were seen in both specimens. That is, inflammatory findings are a little stronger in the former than in the latter. There is no doubt, however, that histological changes seen in both specimens are due to contagious dermatitis (acute eczema) (Figs. 20-23)

*Experiment E: Induction of Dermatitis by Passing Under a Poisonous Tree.*

This experiment was done with the following two subjects.

Case No. 6: M.S., a thirty-two year old male newspaper dealer. He suffered from severe contagious dermatitis by touching a lacquer tree in the mountains twenty years ago. This was his first experience. Since that time, he has become very afraid of this tree. Fifteen years ago he had the same experience. Since then, he has come to avoid passing under a lacquer tree. He has a family history of allergic conditions. His two younger brothers are also sensitive to the lacquer tree.

Experiment 1: The authors made him pass under a lacquer tree which the subject knew to be a lacquer tree. Forty-eight hours later, there appeared flushing and edema on his face, particularly the cheeks, orbital area and forehead, accompanied by a burning sensation and severe itching (Figs. 24-26). These changes reached the maximum on the third day and then declined.

Experiment 2: The authors mixed a bunch of lacquer tree leaves with oak tree leaves on a hill, and then took the subject under these leaves without explanation. This subject was observed for from forty-eight to seventy-two hours after this without showing any skin reaction on his face, arms, or trunk (Figs. 27-29). Figure 28 is a close-up of a branch of lacquer tree inserted into oak tree leaves.

If minute particles of Urshiol dropped from the lacquer tree and were spread by the

wind and if this was the cause of contagious dermatitis, this subject should have developed skin eruptions in experiment 2.

Case No. 7: T.K., a fifteen year old male high school student. He suffered from severe contagious dermatitis by touching for several hours a lacquer tree in the mountains five years ago. Since that time he came to be much afraid of this tree. He has an allergic family and personal history.

Experiment 1: The authors made him pass under a lacquer tree with the subject's knowledge. This frightened him a great deal. Twenty-four hours later, flushing and edema appeared on his face, particularly the left cheek and forehead.

Experiment 2: This time the subject was blindfolded, made to pass under a willow or chestnut tree, and told it was a lacquer tree, on a windy day. Twenty-four hours later, flushing and edema were recognized on both cheeks, forehead, and neck (Figs. 30, 31).

*The Relationship Between Previous Family History and The Degree and Pattern of Response*

As shown in Table 16, the higher the percentage of the family allergic history is, the higher is the degree of sensitivity of the subjects. The same is true of the personal allergic histories.

Table 16. Past allergy history of subjects and subjects' families

History Category	Reaction				Total
	Marked	Moderate	Slight	None	
Positive Family History	7 100.0%	14 58.0%	7 37.0%	2 28.0%	30 52.7%
Positive Personal History	6 86.0%	10 42.0%	5 26.0%	0	21 36.9%
Total Number of Subjects	7	24	19	7	57

Table 17 shows that the percentage of positive family history is highest in the group with a positive reaction to both actual contact with the poisonous substance and suggestion, in which the role of constitutional factors is important, lower in the group showing a positive reaction only in response to suggestion, and lowest in the group of negative reactors. On the other hand, the percentage of positive past histories was higher in the group having high suggestibility than in the group where constitutional factors play a more important role. This fact suggests the significance of hereditary factors in the latter group and that of anxiety due to past experience in the former group.

### Discussion

In contagious dermatitis caused by the wax tree, lacquer tree, or something containing a substance from these trees, erythema, papules, and vesicles accompanied by edema and a burning sensation and itching appear on exposed parts of the body in anywhere from within several hours to a week. In severe cases, pathological tissue changes into pustules and erosion of the skin occur and then the inflammation subsides. The cause of this condition

Table 17. Past allergy history of subjects and subjects' families

History Category	Reaction				Total
	Allergic Reaction	RV, RS Suggest +	RV, RS Suggest -	RV, RS Suggest -	
Positive Family History	11 61.0%	12 46.0%	2 28.0%		25 49.0%
Positive Personal History	4 22.0%	12 46.0%	0		16 32.0%
Total Number of Subjects	18	26	7		51

R.V.=Rhus Venicifera    R.S.=Rhus Succedanea

has been said to be the adhering of poisonous substances such as Urshiol, Laccol, etc. to the skin.

The fact that persons having a hypersensitivity to these trees or their poisonous substances may develop dermatitis without actual contact with them was considered to be due to the spread of minute particles of the poisonous substance. However, the authors considered such an explanation very unsatisfactory.

In the outbreak of contagious dermatitis, the allergic reaction in the epidermis, two factors are interacting. They are constitutional factors including the susceptibility of the skin and the contact with the allergen. The consideration of the amount and concentration of the allergen which contacts the skin is felt to be very important as the authors have shown in these experiments. More attention should be paid, however, to the marked individual differences in sensitivity, the disposition to this type of allergic reaction at the time of contact with the allergen, in order to clarify the above-mentioned fact.

Most of the subjects sensitive to these trees expressed a strong fear of them. By this experiment it was proved that the percentage of the effectiveness of suggestion was definitely high in the group of subjects of strong and moderate reactions who believe in their susceptibility to these trees. The effect of suggestion was shown to be statistically significant at the 0.1% level.

The phenomenon of this dermatitis developing purely by suggestion of contact with the poisonous tree in the leaf-contact experiment clearly indicates the importance of the psychophysiological mechanism in the outbreak of this kind of dermatitis. The development of the dermatitis only by passing under a poisonous tree can be explained by the same psychophysiological mechanisms induced by auto-suggestion. Such an effect of suggestion was proven even in the subjects who reported no sensitivity on the questionnaire though it was low in percentage (23.5%). Thus the definite effect of suggestion was seen in more than half of the subjects.

On the other hand, a certain percentage of subjects did not react either to the actual contact with poisonous trees or to the suggestion of contact. That is, such a suggestion was not effective to the subjects having an insufficient constitutional sensitivity at the time of contact with the poisonous agents. This fact indicates the importance of constitutional factors in the development of this dermatitis which interact with psychological and other fac-

tors.

One of the most important findings in this experiment is that the dermatitis was produced by the conditioning procedure and that thus induced skin pathology was very similar to that induced by the actual contact with the poisonous agent. Further investigations into the pathological findings of the skin pathology induced by suggestion are necessary.

In our previous works, we have experimentally proven that food allergy-like symptoms can be induced by suggestion without giving certain kinds of foods which are believed by the subjects to be allergens. The percentage of occurrence of such a so-called pseudo-allergic phenomena is rather low in the area of food allergy, however, the percentage of occurrence of the skin reaction to the poisonous trees is very high. Therefore, this phenomenon can be a good subject for psychosomatic study on the interaction of psychological and constitutional factors in allergic reactions. In addition, the pathology of such a skin reaction can easily be seen externally and a histological examination can easily be accomplished.

We are now extending our study into the desensitization of the subjects sensitive to these poisonous agents because this experiment suggests the possibility that by diminishing the effect of auto-suggestive factors, the outbreak of dermatitis seems to be considerably controlled even when constitutional factors are active. Such constitutional factors are more difficult to modify.

#### Summary

An experimental study on the effect of suggestion on the outbreak of contagious dermatitis induced by wax trees and lacquer trees has been performed with fifty-seven male subjects, aged fifteen to eighteen years.

I: In the leaf-contact experiment, in 13 subjects with "strong reaction" reported on the questionnaire, the definite effect of suggestion was seen in 84.6% of the subjects.

II: In the experimental application of the extract of the poisonous trees in 15 subjects with a "moderate reaction" reported on the questionnaire, the effect of suggestion was seen in 56.2% of the subjects.

III: In the leaf-contact experiment, in the dark room in 5 subjects with "no previous experience" reported on the questionnaire, the effect of suggestion was seen in 40.0% of the subjects.

IV: In the leaf-contact experiment in the dark room and experimental application of the extract with 16 subjects with "no previous reaction" reported on the questionnaire the effect of suggestion was seen in 23.5% of the subjects.

V: In the summary of the results of the above experiments, the reactivity was actually seen in as high as 89.5% of the subjects. In 35.3%, constitutional factors seem to play the dominant role with the exception of 2 cases where the effect of suggestion also was distinctly seen. In 51.0%, suggestion clearly predominates over the constitutional factors. The percentage of subjects who showed no reaction to either suggestion or poison was 13.7% (Table 13).

VI: The effect of suggestion upon the development of contagious dermatitis was proven to be statistically significant at the 0.1% level.

VII: The percentage of allergic family history was higher in the group of allergic reaction than in the auto-suggestive group.

VIII: Skin pathology of acute eczema was produced by the conditioning procedure and the histological findings of thus induced skin reaction were proven to be similar to the skin pathology produced by actual contact with the lacquer extract.