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[54] **METHODS OF CONTROLLING DANDRUFF USING 5,7-DICHLORO-8-HYDROXY QUINOLINE**

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[63] Continuation of Ser. No. 100,447, Dec. 21, 1970, abandoned, which is a continuation-in-part of Ser. No. 659,613, Aug. 10, 1967, abandoned.

[30] **Foreign Application Priority Data**

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[58] **Field of Search** ..... 424/70, 245, 258, DIG. 4; 167/87 AD; 252/106, 107

[56] **References Cited**

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246,452	8/1963	Australia

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[57] **ABSTRACT**

A method and composition for controlling dandruff on the human scalp using 5,7-dichlor-8-hydroxy quinoline or a salt thereof.

11 Claims, No Drawings

METHODS OF CONTROLLING DANDRUFF USING 5,7-DICHLORO-8-HYDROXY QUINOLINE

This application is a continuation of application Ser. No. 100,447, filed Dec. 21, 1970, which in turn is a continuation-in-part of application Ser. No. 659,613, filed Aug. 10, 1967, now abandoned.

The present invention relates to a method and composition for controlling dandruff on the human scalp by using 5,7-dichlor-8-hydroxy quinoline, or a salt thereof.

The human skin constantly renews itself, casting off parts of the old skin. These particles of skin, known as dandruff, cannot be seen with the naked eye when the formation is normal. In normal cases, the formation of dandruff on the skin occurs practically invisibly. In many cases, however, especially on the skin of the scalp, the formation of dandruff takes place with formation of large pieces which may be seen with the naked eye and which, from the cosmetic point of view, are regarded as extremely unpleasant. When the hair is combed, the dandruff falls upon the clothing, giving the impression of a lack in hygiene. Thus, one of the aims in caring for the hair is to control the formation of visible dandruff.

Many agents have been suggested for the purpose. For example, mention has been made of the use of substances exhibiting bacteriostatic and fungistatic properties as agents for controlling dandruff. Such substances are, for example, phenols, resorcine, hexachlorophene, or 2,2'-thio-bis-dichlorophenol, carbanilides such as, for example, 3,4,4'-trichlorosalicylic anilide, quaternary ammonium compounds such as cetyl trimethyl ammonium bromide, organic metal compounds such as, for example, phenyl-mercury acetate, hydroxy quinolines such as, for example, 5-iodine-8-hydroxy quinoline, or 5-chlor-7-iodine-8-hydroxy quinoline, pyridine thiones such as 2-pyridone thione-N-oxide, especially the zinc salt thereof, N-trichlormethylmercapto-4-cyclohexene-1,2-carboximide, dialkyl-polythio-ether-dicarbonic acids such as, for example, the disulphide of B-mercaptopropionic acid, and undecylenic acid-monoethanolamide. In Australian Pat. No. 246,452 of August 2, 1963, the use of 5,7-diiodo-8-hydroxy quinoline as a dandruff controlling agent is described.

There was thought to be a connection between the bacterial flora of the scalp skin and the onset of visible dandruff. Recent work, however, causes this finding to appear as very doubtful, since it has been impossible to demonstrate any clear differences between the bacterial flora in a scalp skin with visible dandruff and one with normal invisible dandruff. Thus the action of certain bacteriostatic and fungistatic substances cannot, in the present state of the art, be explained simply by the said properties of these substances. The effective action of sulphur, sulphur compounds, and selenium

compounds against dandruff shows that other assumptions for effective action against visible dandruff may be significant. For example, sodium selenite, which is effective against dandruff, exhibits scarcely any bacteriostatic action. This may be seen in Table 1, which shows the limit of dilution in g/ml at which germ inhibition is to be observed in an aqueous solution.

TABLE 1

	Staph. aureus "Oxford"	Escherichia	Candida albicans
Sodium Selenite	500	500	500
Cetyl Trimethyl-Ammonium Bromide	2	15	8

For purposes of comparison, Table 1 shows the bacteriostatic action of cetyl-trimethyl-ammonium bromide.

Determination of the limiting bacteriostatic action was carried out by the tube-series dilution test.

Control of dandruff by the above-mentioned substances, which have scarcely any bacteriostatic action, is frequently ascribed to their keratolytic action. However, accurate data in this connection has not hitherto been available, and precise information regarding the mechanism of these compounds in combatting dandruff attack cannot be given.

It has now been found, according to the invention, that among the large class of chemical compounds having bacteriostatic and fungistatic action, there are to be found certain compounds which have a specific action against dandruff in addition to the said bacteriostatic and fungistatic action.

These compounds are 5,7-dichlor-8-hydroxy quinoline and the salts thereof. Among the salts, the salts with elements of the first, second and third main groups, and the second and fifth secondary groups of the periodic system are particularly advantageous. The preferred salts are those with calcium, bismuth, aluminium and zinc. The aluminium salt is particularly preferred.

These compounds meet all of the requirements for an additive to agents for the care of the hair, whether they be shampoos or hair treatments.

These requirements are:

Constant action after long storage, especially in the presence of detergent substances such as are used in shampoos and hair treatments.

Substantivity of the additive on the scalp and hair, to ensure lasting effect between shampoos or treatments.

Satisfactory compatibility with the skin and, finally, with all substances used in making up shampoos and hair treatments.

Retention of full bacteriostatic action after long storage and in the presence of detergent substances was demonstrated by the tube-series dilution test. The values in Table II show a very satisfactory action by 5,7-dichlor-8-hydroxy quinoline and its salts in shampoos.

TABLE II

	Staphylococcus aureus	Staphylococcus epidermis	Corynebact. pseudodiphth	Escherichia Coli	Pityrosporon ovale	Candida albicans
Shampoo A diluted 1:10	no inhibition	no inhibition	no inhibition	no inhibition	no inhibition	no inhibition

TABLE II—Continued

	Staphylococcus aureus	Staphylococcus epidermis	Corynebact. pseudodiphth	Escherichia Coli	Pityrosporon ovale	Candida albicans
Shampoo B diluted 1:10	1:2[1]	no inhibition	1:4	no inhibition	no inhibition	1:2
Shampoo A +2% 5,7-Dichlor-8-hydroxyquinoline diluted 1:10	1:256	1:512	1:1024	1:256	1:512	1:512
Shampoo B +2% 5,7-Dichlor-8-hydroxyquinoline diluted 1:10	1:128	1:512	1:512	1:512	1:512	1:512
Shampoo A +2% Bismuth Salt of 5,7-Dichlor-8-hydroxyquinoline diluted 1:10	1:256	1:256	1:1024	1:512	1:256	1:512
Shampoo B +2% Ca-Salt of 5,7-Dichlor-8-hydroxyquinoline diluted 1:10	1:512	1:512	1:1024	1:512	1:256	1:256
Shampoo A +2% Bacterosan [2] diluted 1:10	1:64	1:16	1:16	1:8	1:8	1:16
Shampoo B +2% Bacterosan diluted 1:10	1:16	1:8	1:8	1:16	1:8	1:16

[1]The numbers show the dilution of the 1:10 diluted solutions up to which no growth of the cultures occurs (undiluted shampoo solutions do not show any clear change in the indicator).

[2]2,2'-Thio-bis(4,4'-chlorophenol).

Shampoo A

1.0 % lecithin
0.3 % stearic acid
0.3 % palmitic acid
0.1 % oleic acid
4.0 % oleic acid diethanolamide
8.0 % sodium salt of N-lauroyl-N-methyl-amino-ethyl sulfonate ($C_{12}H_{25}—CO—N(CH_3)—CH_2—CH_2SO_3N_a$)
(45–49% in water)
2.0 % glycerine
1.0 % turkey-red oil
6.0 % sodium salt of stearoyl-N-methyl-amino-ethyl sulfonate ($C_{17}H_{35}—CO—N(CH_3)—CH_2—CH_2—SO_3N_a$)
(50% in water)
70.0 % sodium salt of the condensation product of C_{12} fatty acid and methyl taurine (45 – 49% in water)
0.6 % perfume
6.7 % desalted water

Shampoo B

20.0 % Lamepon S (N-Lauroyl-potassium amino-acetate) ($C_{11}H_{23}—CO[NH—CH_2CO]$ 20 OK((35–36% in water)
40.0 % Texapon N (Lauryl-alcohol biethoxy-sulphate ($C_{12}H_{25}(O—CH_2CH_2)_2OSO_3N_a$) (28% in water)
5.0 % Medialan KP (N-Lauroyl-N-methyl-amino-triethanolamine acetate) ($C_{11}H_{23}CON(CH_3)—CH_2—COON(C_2H_4OH)_3$)
(40% in water)
0.5 % perfume
34.5 % desalted water

According to Table III the action of the compounds according to the invention are also not lost after 6 months storage at 40°C.

TABLE III

	Staphylococcus aureus	Staphylococcus epidermis	Corynebact. pseudodiphth.	Escherichia Coli	Pityrosporan ovale	Candida albicans
Shampoo B +2% 5,7-dichlor-8-hydroxy quinoline; freshly prepared; diluted 1:10 with water.	1:128	1:512	1:512	1:512	1:512	1:512
Shampoo B +2% 5,7-dichlor-8-hydroxy quinoline; stored 6 months at 40°C; diluted 1:10 with water.	1:128	1:512	1:1024	1:512	1:256	1:512
Shampoo A +2% bismuth salt of 5,7-dichlor-8-hydroxy quinoline; freshly prepared; diluted 1:10 with water	1:256	1:256	1:1024	1:512	1:256	1:512
Shampoo A +2% bismuth salt of 5,7-dichlor-8-hydroxy quiline; diluted 1:10 with water.*	1:256	1:128	1:1024	1:256	1:256	1:512

*stored 6 months at 40°C.

The numbers give the limiting dilution for growth inhibition, starting with a shampoo diluted 1:10 with water. Dilution of the shampoo was carried out immediately prior to the test. The compositions of shampoos A and B are given in Table II.

The enduring action of 5,7-dichlor-8-hydroxy quinoline and its salts over a period of time was demonstrated by the identifications of germs on hair. It was found that by taking ten individual hairs from a test subject, the same cultures were demonstrated as by taking 100 hairs from the same test subject. Thus by taking about 10 hairs, it could be assumed with safety that practically all cultures appearing on the hairs were covered.

Ten hairs were used in the tests at all times. The hairs were cut with sterile shears at a maximum of 0.5 cm from the skin of the scalp, were transferred with a sterile pipette to a sterile tube, and were finally added to the nutrient medium. After incubating for 24 hours at 37°C, sowing on blood-agar plates was carried out, these being again incubated at 37°C for 24 hours. A qualitative determination of the cultures was then carried out. Table IV shows the results of these tests.

TABLE IV

	Sample Before Washing	Sample Directly After Washing	Sample 3 Hours After Washing	Sample 24 Hours After Washing
Test Subject 1 Washed with Shampoo A with No Additive	Staph. epidermis Staph. albus haem	Staph. epidermis	Staph. epidermis; phyllomanic Streptococcen	Staph. epidermis; Staph. albus haem; Gramnegative Rods (Dirt

TABLE IV – Continued

	Sample Before Washing	Sample Directly After Washing	Sample 3 Hours After Washing	Sample 24 Hours After Washing
				Germs)
Test Subject 2 Washed with Shampoo A with No additive	Staph. albus haem; Staph. epidermis	Staph. albus haem; Staph. epidermis	Staph. albus haem; Staph. aureus haem; Staph. epidermis	Staph. albus; Staph. aureus haem; Staph. epidermis
Test Subject 3 Washed with Shampoo A with No additive	Staph. albus haem; Gramnegative Rods (Dirt Germs)	Staph. albus haem	Staph. albus haem; Staph. aureus haem; Gramnegative Rods (Dirt Germs)	Staph. albus haem; Staph. aureus haem; Gramnegative Rods (Dirt Germs)
Test Subject 4 Washed with Shampoo A with No additive	Aerobacter aerogenes; Staph. epidermis	Staph. citreus	Aerobacter aerogenes; Staph. epidermis	Aerobacter aerogenes; Staph. epidermis
Test Subject 5 Washed with Shampoo A with No additive	Bacillus cereus; Staph. albus haem	Staph. albus haem	Staph. albus haem; Staph. epidermis; Pseudonomas	Staph. albus haem; Staph. epidermis; Pseudonomas
Test Subject 6 Washed with Shampoo A + Addition of 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Staph. albus haem; Strept. anh.	—	Staph. albus haem	Staph. albus haem
Test Subject 7 Washed with Shampoo A + Addition of 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Staph. albus; Strept. anh.; Aerobacter aerogenes	Staph. albus haem	Staph. albus haem	Staph. albus haem
Test Subject 8 Washed with Shampoo A + Addition of 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Staph. albus haem; Esch. coli	—	Staph. albus haem	Staph. albus haem
Test Subject 9 Washed with Shampoo A + Addition of 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Staph. albus haem; acrobe Actinomyceten	Staph. albus haem	Staph. albus haem	Staph. albus haem
Test Subject 10 Wahsed with Shampoo A + 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Staph. albus haem; Adhesive spec.	Staph. albus haem	Staph. albus haem	Staph. albus haem; Adhesive spec.
Test Subject 11 Washed with Shampoo A + 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Staph. albus haem; Gramnegative bacilli (Air Germ)	—	Staph. albus haem	Staph. albus haem
Test Subject 12 Washed with Shampoo A + 2% Calcium Salt of 5,7-Dichlor-8-hydroxyquinoline	Gramnegative bacilli (Dirt Germs) Phyllomanic Streptococcus Staph. alb. haem; Sarcina lutea	Staph. albus haem	Staph. albus haem	Staph. albus haem
Test Subject 13 Washed with Shampoo	Staph. albus haem; Bac.	Staph. albus haem	Staph. albus haem	Staph. albus haem

TABLE IV – Continued

Sample Before Washing	Sample Directly After Washing	Sample 3 Hours After Washing	Sample 24 Hours After Washing
A + 2% Calcium Salt of 5,7-Dichlor-8-hydroxy-quinoline	cereus		

The composition of Shampoos A and B are shown in Table II.

Samples of hair were taken prior to washing, immediately after washing and three hours and 24 hours after washing. In the case of heads washed with shampoos containing the addition according to the invention of 5,7-dichlor-8-hydroxy quinoline, there occurred throughout a slower resettlement than in the case of the comparison washing without the additive of the invention.

The skin compatibility of the compounds according to the invention is very good. By means of the "repeated-insult-patch-test" it was proved that shampoos and hair treatments containing 2% of the active substance of the invention produced no sensitization.

The compounds of the invention may be applied to the hair and scalp in any non-toxic pharmaceutically acceptable carrier, and in particular in compositions normally used for application to the hair such as shampoos, hair conditioners, hair tonics and hair creams.

It is particularly advantageous to use the compounds in combination with a detergent. The detergent can be anionic, cationic or amphoteric. Anionic detergents include both soap and non-soap detergents. Suitable soap detergents are the sodium, potassium, ammonium and alkanolammonium salts of higher fatty acids. When used in a detergent composition, the detergent acts as a wetting agent to suspend the treatment agent in the aqueous or alcoholic medium and as an agent to facilitate washing and rinsing.

Practical application of shampoos or hairtreatment agents containing the additive of the invention is as usual. In the case of heavy dandruff attack, the hair should be washed at intervals of 2 – 3 days. Washing of the hair may be followed by treatment with an additive containing treatment agent. Proof of the effectiveness of the substances of the invention is best obtained by controlled treatment of test subjects by the hairdresser. Particularly good results have been obtained by tests on one side only; after a few washings, these show the expert a clear distinction between the differently treated halves of the head.

The treatment agent according to the invention can be used as follows: 5,7-dichlor-8-hydroxy quinoline, or a salt of this compound, is incorporated into a shampoo formula. In the case of heavy dandruff attack, the head is washed with this product every third to fourth day. In nearly all cases, the dandruff has disappeared after the fourth or fifth washing. In order to avoid the reoccurrence of dandruff, it is generally sufficient to wash with the dandruff shampoo in one to two weeks. In particularly obstinate cases, it is advisable to treat again, after washing, with a composition containing the treatment agent of the invention.

The amount of the treatment agent incorporated into the shampoo or other hair treating composition used can be any amount effective for anti-dandruff control. Good results are obtained if from 0.01 to 5.0% by weight of the treatment agent are used, preferably 0.05 to 5.0%. Particularly good results are obtained when from 0.5 to 2.0% by weight of the treatment agent are used in the composition.

Preferably these should be used in amounts of from 5 to 20 grams of the treatment agent for each treatment, this amount usually being applied in two separate consecutive treatments. Preferably the complete treatment consists of treating the hair twice a week for the first 2 weeks and once a week for the next 4 weeks.

The following examples are given by way of describing typical usage of the anti-dandruff additive according to the invention.

EXAMPLE 1

With a shampoo consisting of	
lecithin	1.0%
stearic acid	0.3%
palmitic acid	0.3%
oleic acid	0.1%
oleic-acid diethanolamide	4.0%
sodium salt of N-lauroyl-N-methyl-amino-ethyl sulfonate ($C_{12}H_{25}$—CO—N(CH_3)—CH_2—CH_2—SO_3N_a)	
(45–49% in water)	8.0%
glycerine	2.0%
Turkey-red oil	1.0%
5,7-dichlor-8-hydroxy quinoline	1.0%
sodium salt of the condensation product of C_{12} fatty acid and methyl taurine (45–49% in water)	69.0%
sodium salt of stearoyl-N-methyl-amino-ethyl-sulfonate ($C_{17}H_{35}$-CO—N(CH_3)—Ch_2—CH_2—Ch_2—SO_3N_a)	
(50% in water)	6.0%
PERFUME	0.6%
water, desalted	6.7%

the hair of 20 persons suffering from heavy dandruff attack is washed every 3 to 4 days. After washing, the hair is well rinsed. By way of comparison, 20 hair washings are carried out with the same formula without the addition of 5,7-dichlor-8-hydroxy quinoline every third to fourth day.

After the third washing, the heads washed with the shampoo containing the additive show slightly less dandruff than those washed with the shampoo without the additive. After five washings, 16 of the 20 heads washed with the shampoo containing the additive are practically free of dandruff. The remaining four show substantially less dandruff than at the start of the test washing. The blank test made practically no improvement, i.e., several washings with a shampoo without the addition of 5,7-dichlor-8-hydroxy quinoline did not cause the dandruff to disappear, or even reduce it. Of the subjects treated with the additive-containing shampoo, a group of 8 then had their hair washed with the

shampoo without the additive at intervals of 3 to 4 days, while another group of 8 persons had their hair washed again with the additive-containing shampoo at intervals of 3 to 4 days. After 5 to 10 washings, dandruff reoccurred in the 8 persons who had their hair washed with the formula without the additive, while the persons who had their hair washed with the shampoo containing the additive remained free of dandruff.

EXAMPLE 2

The bismuth salt of 5,7-dichlor-8-hydroxy quinoline was used as the additive. The shampoo formula was the same as that in Example 1, but 2% of the additive is used (instead of 1% as in Example 1) and the amount of water added is reduced to 5.7%.

Twenty persons exhibiting heavy dandruff attack had their hair washed on one side with the aforesaid additive-containing shampoo, and on the other side with the same formula without any additive. After four washings at intervals of 3 to 4 days, the side washed with the additive-containing dandruff shampoo showed a distinct improvement, the dandruff attack having receded. After eight washings, practically all of the sides of the heads washed with the additive-containing shampoo were free of dandruff, while the sides of the heads washed with the same formula without additive showed no improvement.

Example 3	
sodium-laurylalcohol-di-ethoxy ether sulfate	40.0%
lauric acid diethanol amide	3.0%
5,7-dichlor-8-hydroxy-aluminum quinolate	1.0%
remainder water	56.0%
Example 4	
triethanolamine-dodecyl benzene sulphonate	10.0%
lauroyl-methyl-amino-triethanolamine acetate	8.0%
5,7-dichlor-8-hydroxy-bismuth quinolate	1.5%
remainder water	80.5%
Example 5	
stearic acid	4.0%
glycol distearate	4.0%
sodium-lauroyl-methyl-amino ethane sulphonate	41.0%
sodium-dodecyl benzene sulphonate	12.5%
5,7-dichlor-8-hydroxy-zinc-quinolate	3.5%
remainder water	35.0%

The compositions of Examples 3, 4 and 5 were used in the treatment of the hair of persons suffering from heavy dandruff attack following the procedures outlined above and similar results with respect to the control of dandruff were obtained.

In all of the examples there was no indication of any toxic effect of the compositions on the scalps of the persons treated.

In order to illustrate the superiority of the treatment agents of this invention over known bacteriostatic agents, tests were made using the 5,7-diiodo-8-hydroxy quinoline compound disclosed in the Australian Pat. No. 246,452 referred to above for purposes of comparison.

Following the disclosure of the Australian patent, the 5,7-dichlor-8-hydroxy quinoline of applicant's invention was used in a shampoo composition similar to Example 1 of the Australian patent, and a hair lotion composition similar to Example 14 of the Australian patent. The four compositions used for testing are set out in Table V below. Composition 1 is a shampoo composition similar to Example 1 of the Australian patent containing 1.0% by weight of the diiodo additive of the Australian patent. Composition 2 is the same shampoo composition containing 1.0% by weight of the dichlor of applicant's invention. Composition 3 is a hair lotion composition similar to Example 14 of the Australian patent containing 1.0% by weight of the diiodo additive of the Australian patent. Composition 4 is the same hair lotion composition containing 1.0% by weight of the dichlor additive of applicant's invention.

TABLE V

Composition 1	
Bentonite	5.0%
Alkyl aryl sulphonate	17.0%
Glyceryl monoricinoleate	1.0%
5,7-Diiodo-8-hydroxyquinoline	1.0%
Deionized water to 100%	
Composition 2	
Bentonite	5.0%
Alkyl aryl sulphonate	17.0%
Glyceryl monoricinoleate	1.0%
5,7-Dichlor-8-hydroxyquinoline	1.0%
Deinoized water to 100%	
Composition 3	
Glycerine	0.5%
Ethyl alcohol	50.0%
5,7-Diiodo-8-hydroxyquinoline	0.5%
Polyoxyethylene sorbitan monolaureate	0.2%
Deionized water to 100%	
Composition 4	
Glycerine	0.5%
Ethyl alcohol	50.0%
5,7-Dichlor-8-hydroxyquinoline	0.5%
Polyoxyethylene sorbitan monolaurate	0.2%
Deionized water to 100%	

The models treated were selected according to the degree of dandruff attack, the emphasis being placed on medium and heavy attacks. In making the selection, care was taken to include in the tests only persons having dandruff uniformly distributed over the whole scalp. The selection was made in the presence of a dermatologist. No persons suffering from diseases of the scalp were included in the tests.

The persons tested had to undertake to refrain from using any hair care agents for a period of 8 weeks. They were not allowed to wash their hair for this period.

Independent appraisals were made by four judges before the hair was washed. A total of five stages of evaluation was possible:

XXX - heavy dandruff attack
XX - medium dandruff attack
X - mild dandruff attack
(X) - dandruff no longer detected by person under test; isolated flakes still found by examiner
0 - complete freedom from dandruff

In the valuation:

XXX - was assigned 3 points
XX - was assigned 2 points
X - was assigned 1 point
(X) - was assigned 0.2 points
0 - was assigned 0 points

After the persons to be tested had been selected and appraised, one of the test hairdressers made a center

parting, after which the halves of the heads were washed with shampoo compositions 1 or 2.

The hair on each side was uniformly wetted and the so-called preliminary washing was carried out on each side. After the shampoo had been uniformly rinsed away, the main washing was carried out. Great care was taken to ensure that both sides received the same treatment as regards time of action, volume of rinse, and water temperature. After drying, each side was dressed without any after-treatment agent.

This washing of the hair on each side was carried out twice in the first 2 weeks and once in the next 4 weeks.

Fourteen days after the last treatment, all the hair on the head was washed with a shampoo free of the active substance. Final appraisal was carried out 2 weeks later.

Comparison of hair lotions was carried out as follows: prior to the treatment, all the hair was washed with a shampoo free of the active substance. After rinsing and drying, the hair was parted in the middle and each side was treated with the same amount of hair lotion compositions 3 or 4. The treatment with the hair lotion was repeated once more in the same week without prior washing.

This method of treatment was carried out for a total of 4 weeks. Fourteen days later the judges made their appraisal. It is easy to see from the following table that shampoo composition 2 and hair lotion composition 4, both of which contained the additive of applicant's invention, were substantially more effective for all 24 persons treated (see Table VI).

TABLE VI

	Dandruff Eliminated	Partly Eliminated	No Change
1	9	9	6
2	17	6	1
3	10	12	2
4	19	5	—

In order to give additional emphasis to the results of this practical test, it should also be mentioned that the bactericidal and fungacidal action of the dichlor compound II is considerably greater than that of the diiodo compound I. The following figures show the concentration, in mg/ml, required to inhibit the growth of the micro-organisms indicated.

TABLE VII

	I	II
Strept. pyrogenes	6.2	2.1
Strept. faecalis	99.2	8.6
Staph. aureaus	39.7	5.4
Escherichia coli	99.2	21.4
Asperg. niger	4.0	1.3

The above tests illustrate that the treatment agent of the invention exhibits unexpectedly superior effectiveness as a dandruff controlling agent over the additive of the Australian patent.

What we claim as our invention is:

1. A method of controlling the formation of visible dandruff comprising applying to the hair and scalp of humans affected therewith a composition comprising a non-toxic pharmaceutically acceptable carrier and 5,7-dichlor-8-hydroxy quinoline in an amount sufficient to provide effective anti-dandruff control.

2. The method of claim **1**, in which the composition contains from 0.05 to 5.0% by weight of the 5,7-dichlor-8-hydroxy quinoline.

3. The method of claim **1** in which the composition contains from 0.01 to 5.0% by weight of the 5,7-dichlor-8-hydroxy quinoline.

4. The method of claim **1** in which the composition contains from 0.5 to 2.0% by weight of the 5,7-dichlor-8-hydroxy quinoline.

5. A method of controlling the formation of visible dandruff comprising shampooing the hair and scalp of humans affected therewith with an anionic, cationic or amphoteric detergent composition containing 5,7-dichlor-8-hydroxy quinoline in an amount sufficient to provide effective anti-dandruff control.

6. The method of claim **5**, in which the composition contains from 0.05 to 5.0% by weight of the 5,7-dichlor-8-hydroxy quinoline.

7. The method of claim **5** in which the composition contains from 0.1 to 5.0% by weight of the 5,7-dichlor-8-hydroxy quinoline.

8. The method of claim **5** in which the composition contains from 0.5 to 2.0% by weight of the 5,7-dichlor-8-hydroxy quinoline.

9. The method of claim **5** in which the hair and scalp of humans is shampooed with from 5 to 20 grams of the 5,7-dichlor-8-hydroxy quinoline.

10. The method of claim **9** in which the 5 to 20 grams is applied in two separate consecutive treatments.

11. The method of claim **9** in which shampooing is conducted twice each week for 2 weeks, and once each week for the next 4 weeks.

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