



UNLOCKING THE MYSTERY OF SKIN COLOR

The *Strictly Natural* Way to dramatically lighten
your skin color through diet and lifestyle.

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Unlocking the Mystery of Skin Color: The *Strictly Natural* Way to Dramatically Lighten Your Skin Color through Diet and Lifestyle. Copyright © 2007 by Thienna Ho, Ph.D., and THIËNNA, Inc. All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the author.

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CHAPTER 1



The Mysterious Variety of Human Skin Color



*E*nchantingly beautiful in every one of its shades from palest albino to deepest ebony, human skin color is mysterious in its variety. It varies from region to region, and it also varies within every region. Whether people swelter under the harsh equatorial sun, shiver in the thin atmosphere of a high desert, or shelter in the eternal shade of a tropical rainforest, they live next to neighbors whose colors are startlingly different from their own. Everyone native to the equator is not black, just as everyone native to the Arctic Circle is not white. No place on Earth is without variation in human skin color.



On von Luschan's Chromatic Scale, tiles 1 through 12 match skin colors in the albino-to-light white range. Tiles 13 and 14 match average white skin. Tiles 15 to 23 match olive skin tones, with light olive shown on 15 to 17, medium olive on 18 through 20, and dark olive on 21 to 23. Tiles 24 to 26 match light brown skin, 27 to 29 match medium brown skin, and 30 to 36 match dark brown to black skin.

Our African Ancestors

Recent research in anthropology and genetics indicates that all humanity originated in Africa. Whatever your color, you are descended from ancestors who originated in Africa about 200,000 years ago, developed into modern humans about 100,000 years ago, left Africa about 60,000 years ago, and then gradually migrated around the globe.

Genetic researchers have concluded that every human being on Earth is descended from a single man and woman whose genetic material we all still carry. The genetic material that places each one of us on the same family tree consists of the male's Y-chromosome and the female's mitochondrial DNA. The *Y-chromosome* is what makes male babies male. Every male inherits his Y-chromosome exclusively from his father, who received it exclusively from his father, and so on back to the beginning of the human race. Similarly, every female received her *mitochondrial DNA (mtDNA)* exclusively from her mother, who received it from her mother, and so on back to the beginning of the human race. (Mothers also pass their mitochondrial DNA to their sons.)

Y-chromosome Adam and mitochondrial Eve lived in Africa about 200,000 years ago during an ice age that froze most parts of Europe and caused drought on the African continent. When the ice-age glaciers began to melt about 60,000 years ago, torrential rains followed. Falling rain



scientists think that they at least know what substances form human melanin. Human skin color, researchers agree, is composed of two different types of melanin: brownish-black *eumelanin* and reddish-yellow *pheomelanin*.³⁴⁻³⁷

These two forms of melanin often are present together in varying proportions, and differences in this ratio translate into different skin colors,³⁸ *with darker, browner skin containing more of the brownish-black pigment and lighter, whiter skin containing more of the reddish-yellow pigment*.³⁹

How Your Skin Manufactures Pigment

Both the brownish-black pigment, *eumelanin*, and the reddish-yellow pigment, *pheomelanin*, begin when an enzyme called *tyrosinase* goes to work to induce production of a substance called *dopaquinone*. If, inside your skin, the *dopaquinone* undergoes a conversion in which it picks up oxygen, brownish-black *eumelanin* results. If, however, the *dopaquinone* combines with the sulfur-containing amino acid, *cysteine*, reddish-yellow *pheomelanin* results.

Watch Eumelanin Being Produced

Because plants also contain the enzyme *tyrosinase*, you can watch the oxidation process that produces brownish-black pigment when you slice a potato and it blackens as it is exposed to the air.

For anyone interested in having lighter skin, the connection between reddish-yellow *pheomelanin* and the sulfur-containing amino acid, *cysteine*, is a very important one. Reddish-yellow *pheomelanin*, you will remember, is the skin pigment of lighter, whiter skin tones.

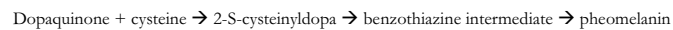
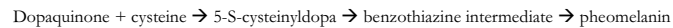


Melanogenesis Pathways

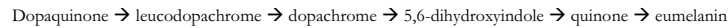
The first step of the pathway by which both reddish-yellow pheomelanins and brownish-black eumelanins are mediated by the enzyme tyrosinase is the following:



Next, dopaquinone can combine with cysteine by two pathways to become benzothiazines and then pheomelanins:



Alternatively, dopaquinone can be converted to leucodopachrome and follow two more pathways to become eumelanins.



Source: Ito and Levine 1993.³⁸

For a long time, researchers believed that it was the activity of the enzyme tyrosinase that indirectly determined the ratio between the dark and light pigments in the skin.^{33,40-45} However, as it turns out, the element that actually controls this ratio is the sulfur in the amino-acid cysteine. *Sulfur* is a crucial component of the reddish-yellow pigment, pheomelanin.³⁷

The sulfur in cysteine drives your skin's production of this reddish-yellow pigment.⁴⁶⁻⁴⁷ When the melanin-producing cells in your skin get *less* cysteine, they get *less* sulfur. Result: they make *less* reddish-yellow pigment and *more* brownish-black pigment.⁴⁶ This means that the presence or absence of sulfur molecules in your skin determines whether your skin cells produce reddish-yellow pigment or brownish-black pigment.^{33,40,48-51} In other words, *if you can get more sulfur into your skin, you can lighten your complexion!*

Is Melanin's Main Job Really to Protect Your Body from Solar Radiation?

People have long believed that skin pigment evolved mainly to protect the skin from damage by the sun's rays. This belief seems reasonable, but it is not without flaws.

**WARNING**

If you are taking an anti-coagulant drug, don't eat onions or garlic. Their anti-clotting properties can increase the drug's effect and lead to bleeding. These strong anti-clotting properties make onions and garlic poisonous to small animals like squirrels and cats.

Regularly including onions and garlic in your diet might help prevent cardiovascular disease, particularly since doing so diminishes the risk of blood clots. These foods are natural anticlotting agents, and eating them is thought to contribute to healthier levels of blood cholesterol and triglycerides.²⁴⁶ The more pungent, stronger-tasting onions and garlic contain the highest levels of sulfur compounds, and thus have the highest antioxidant and anti-clotting properties.

Thienna's Natural Fairskin™ Tips:

- For good health and good taste, add plenty of onions and garlic to the foods that you cook.
- Eating onions and garlic raw is best!

The Cabbage Family

People around the world love cabbage in its many guises, including bok choy (Chinese cabbage), broccoli, Brussels sprouts, cauliflower, daikon, horseradish, kohlrabi, mustard, napa cabbage, radishes, rutabagas, turnips, and wasabi. Botanists call these plants *cruciferous* because their flowers have four petals in the shape of a cross.²⁴⁷

The spicy tastes and pungent aromas of these vegetables come from *glucosinolates*, organic compounds that contain sulfur, nitrogen, and a group derived from glucose, a simple sugar that cells use for energy.²⁴⁷



Appendix 2

Skin Colors Compared by Country

On the scale represented below, the lightest skin color is represented by the lowest number and the darkest skin color by the highest number. Of the countries shown on this table, the lightest skin colors occur in Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Latvia, Luxembourg, the Netherlands, Norway, Poland, Slovenia, Sweden, Switzerland, and the United Kingdom. The darkest colors occur in Burkina Faso, the Central African Republic, Gambia, Guinea-Bissau, Senegal, Uganda, and Zambia.

Country	Skin Color	Country	Skin Color	Country	Skin Color
Afghanistan	3.00	Ghana	7.00	Norway	1.00
Albania	1.67	Greece	2.00	Oman	5.00
Algeria	4.33	Guinea	7.67	Pakistan	3.67
Angola	7.00	Guinea-Bissau	7.33	Philippines	4.00
Armenia	1.67	Hong Kong	2.00	Poland	1.00
Austria	1.00	Hungary	1.00	Portugal	2.00
Azerbaijan	2.00	Iceland	1.00	Qatar	4.00
Bahrain	4.00	India	6.33	Romania	2.00
Bangladesh	4.33	Indonesia	4.67	Russia	2.00
Belarus	2.33	Iran	3.00	Rwanda	7.00
Belgium	1.00	Iraq	3.33	Saudi Arabia	4.00
Benin	7.00	Ireland	1.00	Senegal	7.67
Bhutan	3.00	Italy	1.67	Sierra Leone	7.00
Botswana	7.00	Japan	2.00	Slovakia	1.33
Brunei	4.00	Jordan	3.00	Slovenia	1.00
Bulgaria	1.67	Kazakhstan	2.00	Somalia	7.00
Burkina Faso	7.67	Kenya	6.67	South Africa	6.67
Burma	3.00	Korea, North	2.00	Spain	2.00
Burundi	7.00	Korea, South	2.00	Sri Lanka	6.00
Cambodia	5.00	Kuwait	4.00	Sudan	6.67
Cameroon	7.00	Kyrgyzstan	2.00	Swaziland	7.00
Central African Republic	7.33	Laos	4.33	Sweden	1.00
Chad	7.00	Latvia	1.00	Switzerland	1.00
China	2.00	Lebanon	3.67	Syria	3.33
Congo (Brazzaville)	6.67	Lesotho	7.00	Taiwan	3.00

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Country	Skin Color	Country	Skin Color	Country	Skin Color
Congo (Zaire)	7.00	Liberia	7.00	Tajikistan	2.67
Cote d'Ivoire	6.33	Libya	4.33	Tanzania	7.00
Croatia	2.00	Lithuania	1.33	Thailand	3.67
Cyprus	2.00	Luxembourg	1.00	Togo	7.00
Czech Republic	1.33	Macedonia	1.67	Tonga	5.00
Denmark	1.00	Malawi	7.00	Tunisia	3.00
Djibouti	6.00	Malaysia	4.67	Turkey	2.00
Egypt	4.00	Mali	6.00	Turkmenistan	2.33
Equatorial Guinea	6.00	Mauritania	5.00	Uganda	7.67
Eritrea	6.33	Moldova	2.00	Ukraine	1.67
Estonia	1.00	Mongolia	2.00	United Arab Emirates	4.00
Ethiopia	6.67	Morocco	2.67	United Kingdom	1.00
Finland	1.00	Mozambique	7.00	Uzbekistan	2.00
France	1.00	Namibia	6.67	Vietnam	4.00
Gabon	7.00	Nepal	4.33	Yemen	6.00
Gambia	8.00	Netherlands	1.00	Yugoslavia	2.00
Georgia	2.00	Niger	7.00	Zambia	7.67
Germany	1.00	Nigeria	7.00	Zimbabwe	7.00

Source: Templer and Arikawa 2006.⁵⁷⁹



Appendix 3

Skin Reflectance measurements for Indigenous Population Groups, by Country.¹⁰ The skin reflectance measurements in the following table record the percentage of light reflected by human skin at 685 nanometers. A *nanometer* is one billionth of a meter. Lower measurements indicate less reflective, darker skin. Higher measurements indicate more reflective, lighter skin. The measurements shown in this table correspond to results of tests of skin located under the arm, where exposure to the sun is minimal.

Population	% Skin Reflectance at 685 nm	Population	% Skin Reflectance at 685 nm	Population	% Skin Reflectance at 685 nm
Australia (Darwin)	19.30	Libya (Fezzan) Northern	44.00	India (Punja) N. Delhi	54.33
Mozambique (Chopi)	19.45	India (Bengal) Northern Low Caste	44.80	Libya (Tripoli) Northern	54.40
Cameroon (Fali)	21.80	India (Southern)	46.70	China (Tibet)	54.70
Namibia Okavango	23.28	South Africa Hottentot	46.80	Iran Nowshahr	54.85
Chad Sara	24.60	Brazil (Guarari) (SH)	47.20	Morocco	54.85
Namibia	25.55	Peru (Nunua)	47.70	Japan (Northern)	54.90
Tanzania (Nyatura)	25.80	India (Bengal) Northern Kayastha	48.60	Japan Central	55.42
Malawi	27.00	India (North) Banija	48.60	Afganistan/Iran	55.70
Nigeria Yoruba	27.40	India (N.) Delhi Saxena Kayastha	49.30	Greenland (Southern) Eskimo Ammassalimuit	55.70
Nigeria Ibo	28.20	India (Northern) Khattris	49.30	India (Northern) Brahman	55.80
Burkina Faso Kurumba	28.60	Brazil (Caingan) (SH)	49.40	Vietnam	55.90
Tanzania (Sandewe)	28.90	India (Bengal) N. Calcutta Rarhi Brahman	49.70	India (Punja) Northern Punjab	56.10
Zaire Konda	29.40	India (Bengal) Northern	49.73	India (Northern) Aroras	56.30
Liberia	29.40	Jordan Azzarqa	49.75	Tunisia	56.30
Papua Lufa	31.20	India (Bengal) Northern Brahman	49.90	Spain (Basques)	56.60
Ethiopia Northern	31.70	Nepal (Eastern)	50.42	Algeria (Aures)	58.05
India (Orrisa) Northern	32.05	India (North) England	50.60	Israel	58.20
Kenya	32.40	South Africa Cape	50.68	Lebanon	58.20
Zaire	33.20	India (Bengal) N. Vaidya	50.70	China (Southern)	58.80
Papua Karker	33.20	Nepal (Eastern)	51.12	Japan (Hidakka)	59.10
Ethiopia (Highland) Northern	33.55	India (North) Delhi Aggarwal	51.25	Turkey	59.15
Mali Dogon	34.10	India (North) Jat Sikhs	51.50	Iraq/Syria (Kurds)	61.12
Papua New Guinea	35.30	India (Rajasthan) N. Rajputs	52.00	UK (London)	62.30
Papua Mt Hagen	35.35	Jordan All-Arabs	52.20	Belgium	63.14

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